



ABSTRACTS

of the **PSYCHONOMIC SOCIETY**

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62ND ANNUAL MEETING

A Virtual Conference

Thursday, November 4–Sunday, November 7, 2021

All times are listed in US Central Time.

Note: Daylight Saving Time in the United States ends at 2 AM on Sunday, November 7, the final day of the Psychonomic Society 2021 Annual Meeting. If you will be joining virtually from a location that does not observe US Daylight Saving Time, please adjust your schedule accordingly for events you wish to attend on Sunday, November 7.



A PSYCHONOMIC SOCIETY PUBLICATION
www.psychonomic.org

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PSYCHONOMIC SOCIETY STATEMENT ON HARASSMENT

The Psychonomic Society is an inclusive and welcoming organization. Our annual and affiliate meetings, and our professional communications, should reflect those values. Society members, conference attendees, and virtual meeting participants should enjoy freedom of speech, freedom of thought, and freedom from harassment and discrimination of any kind.

We encourage members to be mindful of others' perspectives and to consider how a question, comment, or invitation might be received, particularly when there is a power differential between parties. Constructive criticism is an essential part of science. No participant should feel vulnerable to harassment or discrimination, nor should they endure a climate of fear or hostility, at our meetings or in our digital events.

Let's all work together to ensure that our values of inclusion, respect, and professionalism are ones that are enjoyed by all of our members and event participants.



The Adaptable Speaker: Speech Errors Reveal Implicit Learning in the Language Production System

Gary Dell

University of Illinois at Urbana-Champaign, USA

Thursday, November 4, 7:30–8:30 PM US CDT

Captioning and an American Sign Language (ASL) interpreter will be available for this address.

Joe Biden and Sigmund Freud are famous for slips of the tongue, Biden because people believe he often makes them, and Freud because he thought people like Biden are revealing their unconscious state when they slip. In thinking this, Freud was right in at least one respect: speech errors do reveal something about the speaker's unconscious—their implicit knowledge of the sound patterns of their language. For example, Biden and all English speakers implicitly know that you cannot begin a syllable with the “ng” sound. And one’s slips “know” this fact, too. An English speaker might say “hangmang” instead of “hangman” but would never say “ngangman.” Because other languages do allow “ng” syllable onsets, we can conclude that the English speaker’s belief that “ng” cannot be an onset is the result of learning.

This talk shows that this kind of learning can be altered in the laboratory and that slip behavior will change accordingly. If speakers produce syllables in the lab in which /f/ only occurs in syllable onsets, their slips will follow this new rule. The speakers have implicitly learned a new sound pattern. I will review a number of phenomena related to this finding and suggest a new theory of implicit learning in language production. In this respect, the talk will introduce the audience to the many upcoming sessions of the Psychonomic Society meeting that focus on psycholinguistics and the nearly as large number of sessions that address implicit learning. The theory will also touch on issues discussed in sessions on animal learning, motor behavior, developmental psychology, and memory consolidation.

Past Keynote Speakers

- | | | | |
|------|---|------|--|
| 2001 | William K. Estes, Indiana University, USA | 2012 | John Anderson, Carnegie Mellon University, USA |
| 2002 | Roger Shepard, Stanford University, USA | 2013 | Elizabeth F. Loftus, University of California, Irvine, USA |
| 2003 | Gordon Bower, Stanford University, USA | 2014 | Larry Jacoby, Washington University in St. Louis, USA |
| 2004 | Anne Treisman, Princeton University, USA | 2015 | Asher Koriat, University of Haifa, Israel |
| 2005 | Michael Posner, University of Oregon, USA | 2016 | Roberta L. Klatzky, Carnegie Mellon University, USA |
| 2006 | Mary C. Potter, Massachusetts Institute of Technology, USA | 2017 | Randall W. Engle, Georgia Institute of Technology, USA |
| 2007 | Marcia K. Johnson, Yale University, USA | 2018 | Hal Pashler, University of California, San Diego, USA |
| 2008 | Daniel Kahneman, Princeton University, USA | 2019 | Judith F. Kroll 🌟, University of California, Irvine, USA |
| 2009 | Henry L. Roediger, III, Washington University in St. Louis, USA | 2020 | Lynn Hasher, University of Toronto, Canada |
| 2010 | Robert A. Bjork, University of California, Los Angeles, USA | | |
| 2011 | Nora Newcombe, Temple University, USA | | |

SCHEDULE AT A GLANCE



THURSDAY

7 AM						
8 AM	8 am-4 pm US CDT Affiliate Posters Society for Computation in Psychology (SCiP) Society for Mathematical Psychology (SMP) Tactile Research Group (TRG)	8 am-5 pm US CDT Society for Computation in Psychology (SCiP)	9 am-1 pm US CDT Culture & Cognition Meeting	9 am-3 pm US CDT Society for Mathematical Psychology (SMP) Symposium on Current Trends in Mathematical Psychology	9 am-3:45 pm US CDT Tactile Research Group (TRG)	
9 AM						
10 AM						
11 AM						
12 PM						12-2 pm US CDT BMW: Bilingualism Matters across the World
1 PM						
2 PM						2-4 pm US CDT SPARK Society
3 PM						
4 PM						4-6 pm US CDT Women in Cognitive Sciences (WICS)
5 PM						
6 PM						
7 PM	7:30-8:30 US CDT Keynote Address					
8 PM						
9 PM	8:30-9:30 US CDT Opening Reception					

SCHEDULE AT A GLANCE



FRIDAY

7 AM	7-8 am US CDT Virtual Coffee Chat							
8 AM	8-9:40 am US CDT Individual Differences in Attention	8-9:40 am US CDT Cognitive Aging I	8-9:40 am US CDT Motivation, Reward, and Cognitive Processes	8-10 am US CDT Decision Making I	8-10 am US CDT Language Production and Writing	8-10 am US CDT Speech Perception I	8-10 am US CDT Test Effects on Memory and Learning	
9 AM								
10 AM	10 am-11: 40 am US CDT Symposium I: The Information Exchange Between Working Memory and Long-Term Memory	10 am-12 pm US CDT Neural Mechanisms of Memory and Cognition	10 am-12 pm US CDT Eyewitness Memory	10:20 am-12 pm US CDT Attention Capture	10:20 am-12 pm US CDT Associative Learning	10 am-12 pm US CDT Bilingualism I	10:20 am-12 pm US CDT Reasoning	
11 AM								
12 PM	12-1 pm US CDT Virtual Poster Session I with Authors Present	12-1:30 pm US CDT Lunchtime Workshop Information Session: Funding at the National Science Foundation						
1 PM	1:30-3:30 pm US CDT Symposium II: Beyond the Button Press: Studying the Mind Through Drawings	1:30-3:30 pm US CDT Attention Control	1:30-3:30 pm US CDT Bilingualism II	1:30-3:30 pm US CDT Judgment and Decision Making	1:30-3:30 pm US CDT Psycholinguistics	1:30-3:30 pm US CDT Recall I	1:30-3:30 pm US CDT Multisensory Perception	
2 PM								
3 PM	3:45-5:45 pm US CDT							
4 PM	Symposium III: Moving Beyond Cognitive Universals (Special Symposium)							
5 PM	5:45-6:45 pm US CDT							
6 PM	Diversity and Inclusion Discussion: Challenges and Opportunities							

SCHEDULE AT A GLANCE



SATURDAY

7 AM	7-8 am US CDT Virtual Coffee Chat						
8 AM	8-9:40 am US CDT Cognitive Aging II	8-9:40 am US CDT Decision Making II	8:20-9:40 am US CDT Speech Perception II	8-9:40 am US CDT Recall II	8-10 am US CDT Emotion and Cognition	8-10 am US CDT Letter/Word Processing	8-10 am US CDT Visual Working Memory
9 AM							
10 AM	10 am-12 pm US CDT Symposium IV: Advancing Cognition Through Adversarial Collaboration: The Case of Working and Long-Term Memory (Leading Edge Workshop)	10:20 am-12 pm US CDT Cognition in Non-Human Animals	10:20 am-12 pm US CDT Social/Cultural Influences on Cognition I	10:20 am-12 pm US CDT Autobiographical Memory	10 am-12 pm US CDT Reading	10 am-12 pm US CDT Metacognition	10 am-12 pm US CDT Spatial Cognition and Memory
11 AM							
12 PM	12-1 pm US CDT Virtual Poster Session II with Authors Present	12-1:30 pm US CDT Lunchtime Workshop Basic Experimental Studies Involving Humans (BESH) session					
1 PM	1:30-3:30 pm US CDT Symposium V: The Reliability Paradox: Current Issues, Partial Solutions, and Future Directions	1:30-3:10 pm US CDT Concepts and Categories	1:30-3:10 pm US CDT Statistics and Methodology	1:30-3:10 pm US CDT Human Learning and Instruction I	1:30-3:10 pm US CDT Recognition Memory I	1:30-3:30 pm US CDT Attention and Visual Search I	
2 PM							
3 PM							
4 PM		3:30-5:30 pm US CDT Cognition and Technology	3:50-5:30 pm US CDT Working Memory I	3:30-5:30 pm US CDT Judgment and Decision Making I	4:10-5:30 pm US CDT Recognition Memory II	3:50-5:30 pm US CDT Cognitive and Motor Control of Performance I	3:30-5:30 pm US CDT Visual Perception I
5 PM	5:10-6 pm US CDT Awards and Business Meeting						
6 PM		5:30-6:30 pm US CDT Reception					

SCHEDULE AT A GLANCE



SUNDAY

7 AM	7-8 am US CST Virtual Coffee Chat						
8 AM	8:20-10 am US CST Attention and Visual Search II	8-10 am US CST Judgment and Decision Making II	8-10 am US CST Human Learning and Instruction II	8-9:40 am US CST Cognitive and Motor Control of Performance II	8-9:40 am US CST Perception and Action	8-9:40 am US CST Language and Semantics	
9 AM							
10 AM	10 am-12 pm US CST Discourse Processes	10:20 am-12 pm US CST Working Memory II	10:20 am-12 pm US CST False Memory	10-11:40 am US CST Visual Perception II	10-11:40 am US CST Mental Structures and Processes	10:20 am-12 pm US CST Reasoning and Problem Solving	
11 AM							
12 PM							



Registration

Register online at www.psychonomic.org/2021registration. The early registration deadline is **October 15, 2021**. Although registration will be accepted up until the time of the meeting, meeting attendees who register at the last minute may experience a delay from the time they complete their registration to the time they have access to the virtual meeting platform. Registration is required to attend the meeting.

Members

Registration is FREE for members and undergraduate students and includes virtual access to the Keynote Address, symposia, talks, poster sessions, and receptions. All session recordings will remain available for on-demand viewing for 3 months following the conference.

Nonmembers

Registration fees for the 2021 virtual meeting have been waived for nonmembers. Membership in the Society is inexpensive and strongly encouraged, and it comes with many benefits, in addition to a complimentary registration for future annual meetings. To become a Society member, visit www.psychonomic.org/member.

Registration Refunds

Requests to refund registrations for nonmembers will be considered if received via email at info@psychonomic.org by **November 4, 2021**. Refund requests will be processed after the meeting. “No shows” are not eligible to receive a refund.

Photographic Release

As part of your registration for the 2021 Annual Meeting, the Psychonomic Society reserves the right to use photographs, video, and any other images taken during the onsite and virtual meetings for future marketing purposes. If you do not wish to have your photograph or video used for such purposes, please contact us at info@psychonomic.org.

Become a Member!

Join the Psychonomic Society to connect with more than 5,600 cognitive and experimental psychologists from around the world! Our members include some of the most distinguished researchers in the field. Many of us are concerned with the application of psychology to health, technology, and education, and many of us use converging methods such as neuroscience and computational science to achieve our research goals.

Join online at <https://www.psychonomic.org/member>.

Membership Categories

MEMBER

Qualifications: Must have a PhD or equivalent in psychology or an allied field.

2021 Dues: U.S.: \$35 USD; Outside U.S.: \$20 USD

FELLOW (by application only)

Qualifications: (1) Must hold a PhD or equivalent and be at least 3 years post PhD; (2) Published significant, peer-reviewed research beyond the doctoral dissertation, as evidenced by having at least six recent research publications in high-quality refereed journals, in addition to the publications resulting from the PhD; (3) Be actively involved in independent scientific research in psychology or allied sciences. Members wishing to apply to become Fellows can do so on a rolling basis, with applications reviewed twice a year.

2021 Dues: U.S.: \$75 USD; Outside U.S.: \$60 USD

GRADUATE STUDENT

Qualifications: Actively enrolled in a graduate program in psychology or an allied field.

2021 Dues: U.S.: \$15 USD; Outside U.S.: \$15 USD

EMERITUS

Qualifications: Fellows and Members in good standing who have retired may request Emeritus status.

2021 Dues: No Fee

Undergraduate students do not qualify for Society membership but are welcomed and encouraged to attend and participate in the Annual Meeting. To make our conference as accessible as possible to undergraduate students and to encourage them to consider careers in the psychological sciences, we waive the registration fee and allow undergraduate students to attend the conference for FREE.



Scientific Program

2021 Program

There were 1,297 submissions, of which 1,297 were valid. Of the 1,281 placed on the program, 302 are spoken and 983 are posters. In addition, there are five accepted symposia.

Program History

Year–Site	Valid Submissions
2021–Virtual	1,285
2020–Virtual	1,294
2019–Montréal	1,507
2018–New Orleans	1,523
2017–Vancouver	1,438
2016–Boston	1,514

Poster Sessions

All poster presentations are prerecorded and will be presented during one of our Virtual Poster Sessions, with poster presenters available online at specific times for a live Q&A. All posters will remain available for on-demand viewing for 3 months following the conference.

Designation of Award Recipients

Throughout the abstract book, our award recipients are identified as follows:

 Clifford T. Morgan Distinguished Leadership Award recipient

 Mid-Career Award recipient

 Early Career Award recipient

 J. Frank Yates Student Conference Award recipient

 Graduate Conference Award recipient

 Best Article Award recipient

Solutions Center (Exhibitors)

Attendees are encouraged to visit our virtual Solutions Center to see the latest information and get contact information. Exhibitors will also be posting the times they will be available in their virtual booths for active conversation during the regular conference hours. Be sure to visit our Solutions Center for the opportunity to chat and engage with the leaders in our industry.

Virtual Receptions and Coffee Chats

Opening Reception

Thursday, November 4, 8:30–9:30 PM US CDT (immediately following the Keynote Address)

Saturday Reception

Saturday, November 6, 5:30–6:30 PM US CDT

Virtual Coffee Chats

Virtual coffee chats will take place Friday, Saturday, and Sunday from 7 to 8 AM US Central Time. Join your peers to start your day in the Remo Virtual Networking platform.

Program & Conference Organization

The Secretary, Reed Hunt, has the responsibility for organizing the program, and the [Program Committee](#) reviews all submissions. They do so with the indispensable help of Lou Shomette, Executive Director; Stephanie Dylkiewicz, Director of Meetings; Tiffany Aurora, Director of Membership, Marketing, & Communications; Sarah Bilissis, Director of Operations; Joe Dobbs, Member Services Specialist; Laura Harris, Meetings Administrator; Brianna Johnson, Education Manager; Josh Karney, Senior Manager, Professional Relations; Jerrod Liveoak, Senior Manager, Editorial & Content; Juliana Loiola, Registration Coordinator; Phyllis Milz, Finance Manager; Julie Rogers, Senior Managing Editor; and Timothy Utesch, Graphic Designer.

Future Meetings

2022 Boston, MA, November 17–20

2023 San Francisco, CA, November 16–19

2024 New York, NY, November 21–24

2025 Denver, CO, November 20–23

2026 San Diego, CA, November 19–22



Symposium I: The Information Exchange Between Working Memory and Long-Term Memory

Friday, November 5, 10 AM-Noon CDT

Chairs: Lea Bartsch (University of Zurich), Vanessa Loaiza (University of Essex), and Eda Mizrak (University of Zurich)

A fundamental and enduring question since the beginning of memory research concerns the overlap and reciprocal impacts of briefly keeping information active in mind (working memory) and the durable retention of that information (long-term memory). Much research has addressed this question by considering how working memory processes constrain and shape subsequent long-term memory, and, concomitantly, how stored information in long-term memory may enhance or interfere with working memory. This work has significant theoretical implications for many models of memory regarding whether working memory and long-term memory are dissociable systems and to what extent. In this symposium, we consider the latest findings that speak to the bidirectional relationship between working memory and long-term memory in an effort to bring consensus to a field that has been wrought with debate for over 100 years. ([Full Description](#))

Symposium II: Beyond the Button Press: Studying the Mind Through Drawings

Friday, November 5, 1:30-3:30 PM CDT

Chairs: J. Brendan Ritchie (National Institutes of Health) and Benjamin van Buren (The New School)

Researchers often study visual cognition by asking participants to view stimuli and press keys on a computer keyboard. By contrast, in this symposium, we highlight recent discoveries which have been made possible by considering a higher-dimensional measure – namely, drawings. By collecting drawings from study participants, our speakers have found new answers to questions such as, “What do we remember about a visual scene?”, “How is visual input segmented into discrete objects and events?”, “How do different communicative purposes determine the amount of abstraction used in a drawing?”, and “What are the perceptual and cognitive differences that distinguish a drawing expert from a non-expert?” This symposium is a celebration of methodological innovation in behavioral research. Thus, in addition to discussing our findings, we will provide practical advice for those interested in using drawings to study the mind. We will also discuss the theoretical challenges and opportunities that arise from incorporating cultural artifacts into basic research on human perception and cognition. ([Full Description](#))

Symposium III: Moving Beyond Cognitive Universals (Special Symposium)

Co-Sponsored by the SPARK Society

Friday, November 5, 3:40-5:40 PM CDT

Chair: Belem G. López (The University of Texas at Austin)

Co-Organizers: Angela Gutches (Brandeis University) and Ayanna Thomas (Tufts University)

Though it is well documented that race plays a role in how we perceive, remember, think, and navigate the world, much of research in Cognitive Psychology has ignored race. One reason may be that we have approached the study of human cognition from the perspective of cognition as universal, as being explained using species-typical mechanisms. Such a perspective has influenced how the field values specific research questions focused on diversity within cognition. Structural factors also play an important role as to why race is ignored in our field. The lack of racial diversity in the publication process and the field may leave us unprepared to engage in impactful science relevant to an increasingly diverse society. The panel of experts will present research that highlights why race should be considered in understanding human cognition, and how we as field may eliminate structural barriers that have prevented this important consideration. ([Full Description](#))

Symposium IV: Advancing Cognition Through Adversarial Collaboration: The Case of Working and Long-Term Memory (Leading Edge Workshop)

Saturday, November 6, 10 AM-Noon CDT

Chair: Robert H. Logie (University of Edinburgh)

One of the long-standing debates in cognition concerns how temporary representations and ongoing mental activity are related to the formation and retrieval of more lasting records of events and the accumulation of knowledge. This debate continues and was highlighted in the 2021 Psychonomic Society Leading Edge Workshop on how adversarial collaboration in research between opponents in debate might lead to resolution of those debates rather than perpetuating debate indefinitely. This symposium highlights key areas of research that offer pathways to progress in understanding the relationship between temporary and longer-lasting representations, both as the psychological constructs, working memory and long-term memory, and in terms of neurobiology. ([Full Description](#))



Symposium V: The Reliability Paradox: Current Issues, Partial Solutions, and Future Directions

Saturday, November 6, 1:30 - 3:30 PM CT

*Chairs: Brandon Turner (The Ohio State University)
and Mark Pitt (The Ohio State University)*

Recent evidence suggests that many robust group-level behavioral effects derived from attention, self-regulation/impulsivity, learning, and implicit bias paradigms are poorly suited for making reliable person-level inference (termed the “reliability paradox”). The same basic pattern is also observed in neuroimaging contexts, wherein contrasts derived from task-based functional MRI show poor test-retest reliability despite many participants showing an effect. Often attributed to the measurement properties of the task or measurement instrument, such findings have led researchers to conclude that behavioral and neural measures should not be used to study trait-like individual differences. However, (mis)measurement is a property determined by multiple factors beyond the task itself, including data pre-processing and other statistical methods used to draw inference from data. In this symposium, we will discuss issues with traditional approaches to statistical inference in the social, behavioral, and brain sciences, highlighting how generative models can mitigate such issues. ([Full Description](#))



2021 Clifford T. Morgan Distinguished Leadership Award Recipients

The Psychonomic Society is pleased to announce the 2021 recipients of our Clifford T. Morgan Distinguished Leadership Award: **Morton Ann Gernsbacher, University of Wisconsin–Madison**, and **Judith F. Kroll, University of California, Irvine**.



Morton Ann Gernsbacher
University of Wisconsin–Madison

Morton Ann Gernsbacher is a Vilas Research Professor and the Sir Frederic C. Bartlett Professor of Psychology at the University of Wisconsin–Madison. She is an award-winning teacher, whose open-access, active-learning undergraduate courses were deemed APA’s 2018 Outstanding

Educational Resource. In 1998, Gernsbacher received the Hilldale Award for Distinguished Professional Accomplishment, the highest award bestowed by the University of Wisconsin–Madison faculty. For nearly 40 years, Gernsbacher’s research has investigated the cognitive and neural mechanisms that underlie human communication. Her research bears both basic science implications and national policy applications. She has published nearly 200 journal articles and invited chapters. She has authored or edited 10 books, including **Language Comprehension as Structure Building** (Erlbaum, 1990); the **Handbook of Psycholinguistics** (Academic Press, 1994; Elsevier, 2006); **Coherence in Spontaneous Text** (Benjamins, 1995), the **Handbook of Discourse Processes** (Erlbaum, 2002), and two editions of **Psychology and the Real World: Essays Illustrating Fundamental Contributions to Society** (Worth, 2010; 2014). Her research has been funded by the National Institutes of Health, the National Science Foundation, the Department of Defense, the Centers for Disease Control and Prevention, and several foundations.



Judith F. Kroll
University of California, Irvine

Judith F. Kroll is Distinguished Professor in the School of Education at University of California, Irvine, and holds affiliate appointments in the Departments of Language Science and Psychological Science. She has held faculty positions at Swarthmore College, Rutgers University, Mount

Holyoke College, Penn State University, and University of California, Riverside, and is the former director of Pennsylvania State University’s Center for Language Science. Her research uses the tools of cognitive neuroscience to examine the way that bilinguals and language learners juggle the presence of two languages in one mind and brain. Her work, supported by grants from NSF and NIH, shows that bilingualism provides a tool for revealing the interplay between language and cognition that is otherwise obscure in speakers of one language alone. She was one of the founding editors of *Bilingualism: Language and Cognition*, and a founding organizer of Women in Cognitive Science. With Penn State colleagues, she is a PI on an NSF PIRE grant (Partnerships for International Research and Education) to develop an international research network and program of training to translate the science of bilingualism to learning environments in the United States and abroad.

The 2021 Clifford T. Morgan Distinguished Leadership Award and Mid-Career Award Subcommittee members are Priti Shah, University of Michigan (chair); Jan De Houwer, Ghent University; Angela Gutchess, Brandeis University; Klaus Oberauer, University of Zurich; Brian Ross, Minerva Schools at KGI; and Jyotsna Vaid, Texas A&M University. The recipients will be recognized at the Awards and Business Meeting on Saturday, November 6, from 5:10–6 PM CDT. Read more about the award at www.psychonomic.org/page/leadershipaward.



About Clifford T. Morgan

Born in 1915 in Minolta, New Jersey, Clifford Thomas Morgan received his undergraduate education at Maryville College and his PhD from Rochester University in 1939. Morgan held academic positions at Harvard University; Johns Hopkins University; University of Wisconsin; the University of California, Santa Barbara; and, finally, at the University of Texas. He was a founding member of the Psychonomic Society and the first Governing Board Chair, and he led the Society’s journal program for many years. He passed away in 1976 in Austin, Texas.



2021 Mid-Career Award Recipients

The Psychonomic Society is pleased to announce the recipients of the 2021 Mid-Career Award: **Isabel Gauthier, Vanderbilt University; Jay Pratt, University of Toronto; and Ayanna Thomas, Tufts University.**



Isabel Gauthier
Vanderbilt University

Dr. Gauthier is Professor of Radiology and Radiological Sciences and David K. Wilson Chair of Psychology at Vanderbilt University. Gauthier uses behavioral and neural methods to study many aspects of object and face recognition, with a focus on the role of perceptual expertise in category-specific effects in domains such as faces, letters or musical notation, with implications for disorders like autism and congenital face blindness. Her recent work addresses domain-general visual abilities for object recognition and ensemble perception. Gauthier received the NAS Troland research award in 2008 “For seminal experiments on the role of visual expertise in the recognition of complex objects including faces and for exploration of brain areas activated by this recognition.” In 2000, she founded the Perceptual Expertise Network, linking 10+ laboratories across North America. Gauthier was an Associate Editor at JEP:HPP (2005-2011), Editor of JEP:General (2011-2017), and Editor of JEP:HPP since 2017. She has published 150+ peer-reviewed articles.



Jay Pratt
University of Toronto

Jay Pratt is a Professor in the Department of Psychology at the University of Toronto. With his research on visual cognition, attention, visual working memory, motor control, eye movements, and aging, he has published more than 250 papers. This research has been funded by the Natural Sciences and Engineering Research Council of Canada, the Canadian Institutes for Health Research, and the Social Sciences and Humanities Research Council of Canada. He has been an Associate Editor for Psychonomic Bulletin & Review, Quarterly Journal of Experimental Psychology, and Visual Cognition. One of his papers in Attention, Performance, & Psychophysics also received the Clifford T. Morgan Best Article Award from the Psychonomic Society. In addition to his research, he has served, in order, as the Chair of the Department of Psychology, Acting Vice Provost for Faculty & Academic Life, Vice-Dean for Research & Infrastructure, and Acting Vice Dean for Graduate Education.



Ayanna Thomas
Tufts University

Ayanna Thomas is a Professor at Tufts University, who takes a translational approach to the study of memory and age-related changes in cognition. Her primary agenda is to translate basic science findings to applications in eyewitness memory, education, and cognitive aging. Professor Thomas’s research group uses a variety of methodological techniques (e.g., behavioral, physiological, neurocognitive) to better understand the cognitive and biological mechanisms that result in successful memory and cognition. She is a Fellow of the Psychonomic Society, a Fellow of the Association for Psychological Science, an APA MFP Fellow, a founding member of the SPARK Society designed to increase Diversity in Cognitive Psychology, and the recipient of the 2018 Dalmas A. Taylor Award for Distinguished Contributions.

The 2021 Clifford T. Morgan Distinguished Leadership Award and Mid-Career Award Subcommittee members are Priti Shah, University of Michigan (chair); Jan De Houwer, Ghent University; Angela Gutchess, Brandeis University; Klaus Oberauer, University of Zurich; Brian Ross, Minerva Schools at KGI; and Jyotsna Vaid, Texas A&M University. The recipients will be recognized at the Awards and Business Meeting on Saturday, November 6, from 5:10–6 PM CDT. Visit www.psychonomic.org/page/midcareeraward to learn more about this award.



2021 Early Career Award Recipients

The Psychonomic Society is pleased to announce the recipients of the 2021 Early Career Award: **Hui Chen, Zhejiang University (Steven Yantis Early Career Award); Christopher Madan, University of Nottingham; Erin Maloney, University of Ottawa;** and **Gordon Pennycook, University of Regina.**



Hui Chen

Zhejiang University

(Steven Yantis Early Career Award)

Hui Chen (陈辉) is a Professor in the Department of Psychology and Behavioral Sciences at Zhejiang University in Hangzhou, China. His research focuses on visual attention, working memory, awareness, and their interactions, using elegant behavioral experiments, eye-tracking, and neuroscientific (EEG) methodologies. He has served as an Associate Editor for *Frontiers in Psychology* and as a Consulting Editor for *Memory & Cognition*; *Attention, Perception, & Psychophysics*; *Visual Cognition*; and *International Journal of Mental Health Promotion*. He has published 27 journal articles.



Christopher Madan

University of Nottingham

Christopher Madan is an Assistant Professor in the School of Psychology at the University of Nottingham. His research combines cognitive psychology approaches with neuroimaging techniques (fMRI, EEG) and computational modelling. He is particularly interested in investigating factors that make some experiences more memorable than others—including emotion, motivation, and pre-existing semantic knowledge—and how these influences can manifest in future decisions. He also specializes in characterizing inter-individual differences in brain morphology, particularly with respect to healthy aging and mental health conditions. He has published over 100 journal articles and three books.



Erin Maloney

University of Ottawa

Erin Maloney is an Assistant Professor in the School of Psychology at the University of Ottawa. The overarching goal of her research, which sits at the intersection of Cognitive Psychology, Developmental Psychology, and Education, is to understand the cognitive and emotional factors that underlie success in mathematics and science. By conducting studies in the laboratory, in school settings, and online, with adults and children, Dr. Maloney's research provides a greater understanding of how the mind processes numerical and spatial information and how this processing can be disrupted or enhanced by various emotional states.



Gordon Pennycook

University of Regina

Gordon Pennycook is an Assistant Professor at University of Regina's Hill/Levene Schools of Business and an Associate Member of the Department of Psychology. His expertise is on human reasoning and decision-making, with a particular focus on the distinction between intuitive processes and more deliberative reasoning processes. His research, which sits at the intersection between cognitive and social psychology, has spanned numerous topics, including metacognition, religious belief, morality, science communication, pseudo-profound bullshit, fake news/misinformation, and political ideology.

The 2021 Early Career Award Subcommittee members are Priti Shah, University of Michigan (chair); Ian Dobbins, Washington University in St. Louis; Christopher Donkin, University of New South Wales; and Candice Morey, Cardiff University. The recipients will be recognized at the Awards and Business Meeting on Saturday, November 6, from 5:10–6 PM CDT. Read more about the Early Career Award at www.psychonomic.org/page/early_career_award.



2021 J. Frank Yates Student Conference Award Recipients

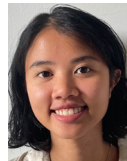
Supporting Diversity and Inclusion in Cognitive Psychology

The Psychonomic Society Diversity & Inclusion Committee selected 12 recipients of the J. Frank Yates Student Conference Award for the 2021 Annual Meeting.



Hiu Wah Cheung
University of Essex

Abstract 1149: Do Cultural Differences and Prior Knowledge Influence Feature Binding in Working Memory?



Fraulein Retanal
University of Ottawa

Abstract 1302: Verbal and Spatial Working Memory Loads Decreases the Symbolic Numerical-Distance Effect on Simultaneous Comparison Task



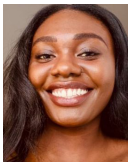
Shuangke Jiang
University of Sheffield

Abstract 1157: Visual Working Memory Training Effects on the Quantity and Quality of Representations



Andres Sanchez
Georgia State University

Abstract 1195: The Generalizability of Symbol Learning by Rhesus Macaques



Jahla Osborne
University of Michigan Ann Arbor

Abstract 1023: The Relative Influence of Different Sources of Distraction in Attention Deficit/Hyperactivity Disorder



Nidhi Sinha
Indian Institute of Technology Hyderabad

Abstract 2381: How Long Can You Remember? Temporal Trends of Delayed Recall in Low-and High-Performing Children



Tori Peña
Stony Brook University

Abstract 2380: How Social is Social Memory? Isolating the Disruptive Influences of Social versus Nonsocial Cues on Recall



Alexis Torres
Arizona State University

Abstract 1028: Individual Differences in Sustained Attention



Ali Pournaghдали
Florida International University

Abstract 2443: Investigating Metacognitive Sensitivity of Tip-of-the-tongue States and Feeling-of-knowing Judgments with General Recognition Theory



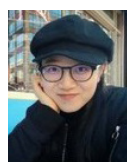
Summer Whillock
Montana State University

Abstract 1442: Hypervigilance Effects on Memory Depend on Retrieval Context



Jinglei C. Ren
University of Maryland College Park

Abstract 1273: Development of Statistical Learning Across Modalities, Domains and Languages



Qian Zhang
University of Georgia

Abstract 2053: Why Did I Get that Wrong? Self-Explaining Errors in Physics Problem Solving

Diversity & Inclusion Committee members include Jeanette Altarriba, University at Albany, SUNY (Chair); Matthew Dye, Rochester Institute of Technology; Stephan Lewandowsky, University of Bristol; Kathy Rastle, Royal Holloway University of London; Jill Shelton, University of Tennessee at Chattanooga; Sharda Umanath, Claremont McKenna College; and Maria Zaragoza, Kent State University. Please join the committee in congratulating the recipients of the 2021 J. Frank Yates Student Conference Award. Each recipient receives an award of \$1,000 USD and will be recognized during the Awards and Business Meeting on Saturday, November 6, from 5:10–6 PM CDT. Visit www.psychonomic.org/page/yatestravelaward for more information.



2021 Graduate Conference Award Recipients

The Psychonomic Society Program Committee selected 20 recipients for the Graduate Conference Award for the 2021 Annual Meeting based on the quality of the abstracts submitted by student members of the Society.



Emily Burgess

Oregon State University

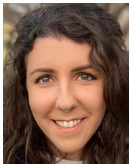
Abstract 2290: Navigating Zoom: The Effect of Individual Working Memory Capacity and Cognitive Load



María Fernández-López

University of València

Abstract 1278: Unveiling the Boost in the Sandwich Priming Technique



Olivia R. Burton

Flinders University

Abstract 2044: Training Improves Discrimination of Judgements of Solvability, but Not How Well They Predict Later Problem-Solving Success



Yingtao Fu

Zhejiang University

Abstract 1146: Visual Working Memory Drives Unconscious Processing in a Coarse (BUT Not Fine) Manner



Ewa Butowska

SWPS University

Abstract 1304: You Won't Guess That. On the Limited Benefits of Guessing when Learning a Foreign Language



Jessica Gettleman

University of Virginia

Abstract 2122: Verbal Justifications Improve the Predictive Value of Numeric Judgments of Learning for Eyewitness Identifications



Minyu Chang

Cornell University

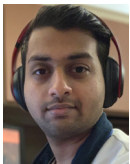
Abstract 2413: A Meta-Analysis for The Font Size Effect: Judgments of Learning and Memory Are Not Always Dissociated



Aleksandra Krogulska

Warwick University

Abstract 2396: How Much Should You Learn in Order to Recall as Much as Possible Later? The Role of Test Delay in Metamemory Decisions to Stop Learning



Abhijit M. Chinchani

The University of British Columbia

Abstract 1325: Item-Specific Overlap Between Hallucinatory Experiences and Cognition in the General Population: A Three-step Multivariate Analysis of International Multisite Data



Abhilasha Kumar

Washington University in St Louis

Abstract 2368: Modeling Distributional Structure and Retrieval Processes in Semantic Retrieval Tasks



Jackson S. Colvett

Washington University in St Louis

Abstract 1227: Revealing Object-Based Attentional Control in a Moving Object Paradigm



Kanthika Latthirun

National Cheng Kung University

Abstract 2167: Individual Differences in Mindfulness and Multisignal Processing Efficiency



Nafiseh Faghihi

Texas A&M University

Abstract 2462: Causal Attributions Are Influenced by Perceived Ethnicity



Li Xin Lim

Purdue University

Abstract 1058: Cognitive and Physical Effort-Based Decision-Making: Comparing Effort Discounting in Choice Selection





2021 Graduate Conference Award Recipients



Gia M. Macias

Purdue University

Abstract 1231: Interrupted Reading with Similar and Dissimilar Tasks



Michelle Ramey

University of California, Davis

Abstract 1454: Schema Knowledge and Episodic Memory Trade Off to Influence Spatial Memory



Mirrah Maziyah Mohamed

University of Western Ontario

Abstract 1290: Malay Lexicon Project 2: Morphology in Malay Word Recognition



Nikita Salovich

Northwestern University

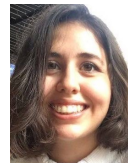
Abstract 2054: You're Not as Good as You Think: Using Metacognitive Feedback to Reduce the Influence of Inaccurate Information



Phivos Phylactou

Cyprus University of Technology

Abstract 1156: Sensory Recruitment in Visual Short-Term Memory: A Systematic Review and Meta-Analysis of Sensory Visual Cortex Interference Using Transcranial Magnetic Stimulation



Zeynep Sisman

University of Chicago

Abstract 1359: Bilinguals' Representation of Emotion Concepts: Reduced Emphasis on the Arousal Dimension

2021 Program Committee members are Angela Gutchess, Brandeis University (Chair); Jeanette Altarriba, University at Albany, SUNY; Aysecan Boduroglu, Boğaziçi University; Kimberly Fenn, Michigan State University; John Henderson, University of California, Davis; Stephan Lewandowsky, University of Bristol; Priti Shah, University of Michigan; and Reed Hunt, University of Mississippi, ex officio. Each recipient receives an award of \$1,000 USD and will be recognized at the Awards and Business Meeting on Saturday, November 6, from 5:10–6 PM CDT. Learn more about the Graduate Conference Award at www.psychonomic.org/page/graduatetravel.





2021 Best Article Award Recipients

The Psychonomic is pleased to announce the recipients of the 2021 Best Article Awards.



ATTENTION, PERCEPTION, & PSYCHOPHYSICS

Editor-in-Chief: Sarah Shomstein

Brett A. Cochrane, Ben Townsend, Ryan C. Lee, Joey K. Legere, Bruce Milliken, & Judith M. Shedden

“Visual imagery influences attentional guidance during visual search: Behavioral and electrophysiological evidence”

DOI: 10.3758/s13414-020-02208-7



LEARNING & BEHAVIOR

Editor-in-Chief: Jonathon D. Crystal

Emily Kathryn Brown & Robert R. Hampton

“Cognitive control of working memory but not familiarity in rhesus monkeys (*Macaca mulatta*)”

DOI: 10.3758/s13420-020-00432-7



BEHAVIOR RESEARCH METHODS

Editor-in-Chief: Marc Brysbaert

Roger E. Beaty & Dan R. Johnson

“Automating creativity assessment with SemDis: An open platform for computing semantic distance.”

DOI: 10.3758/s13428-020-01453-w



MEMORY & COGNITION

Editor-in-Chief: Ayanna Thomas

Mateja F. Zenner, Ute J. Bayen, & Reinhard Pietrowsky

“Nighttime sleep benefits the prospective component of prospective memory”

DOI: 10.3758/s13421-021-01187-w



COGNITIVE, AFFECTIVE, & BEHAVIORAL NEUROSCIENCE

Editor-in-Chief: Diego Pizzagalli

Alessandra Borsini, Amelia St. John Wallis, Patricia Zunszain, Carmine Maria Pariante, & Matthew J. Kempton

“Characterizing anhedonia: A systematic review of neuroimaging across the subtypes of reward processing deficits in depression”

DOI: 10.3758/s13415-020-00804-6



PSYCHONOMIC BULLETIN & REVIEW

Editor-in-Chief: James R. Brockmole

Roy S. Hessels

“How does gaze to faces support face-to-face interaction? A review and perspective”

DOI: 10.3758/s13423-020-01715-w



COGNITIVE RESEARCH: PRINCIPLES & IMPLICATIONS

Editor-in-Chief: Jeremy M. Wolfe

Vebjørn Ekroll, Mats Svalebjørg, Angelo Pirrone, Gisela Böhm, Sebastian Jentschke, Rob van Lier, Johan Wagemans, & Alena Høye

“The illusion of absence: How a common feature of magic shows can explain a class of road accidents”

DOI: 10.1186/s41235-021-00287-0

The Psychonomic Society Best Article Award recognizes the best article published in each of the Psychonomic Society’s journals during the last year. Selections are made by the editorial team of each journal. Award recipients (the lead author) receive a certificate and honorarium of \$1,000 USD and will be recognized at the Awards and Business Meeting on Saturday, November 6, from 5:10–6 PM CDT. Visit www.psychonomic.org/page/BestArticleAward for more information and to view previous recipients.

SPECIAL EVENTS



Information Session: Funding at the National Science Foundation

Organized by Betty Tuller and Mike Hout, National Science Foundation

FRIDAY, NOVEMBER 5
NOON-1:30 PM CDT

Held virtually

NSF opportunities change all the time! Come hear the latest and get your questions answered. This presentation and Q&A session will provide information on current funding opportunities relevant to the Psychonomics community, NSF merit criteria, and the review process. Program officers will discuss. We will also cover 1) how to find the appropriate program for your work, 2) how to apply for National Science Foundation (NSF) funding, 3) the grant-writing process, and 4) tips for writing successful proposals. Program Directors will also be available to schedule one-on-one virtual meetings, to discuss specifics of your research and how to get it funded.

Diversity and Inclusion Discussion: Challenges and Opportunities

Organizers: Jeanette Altarriba, University at Albany, SUNY, and Mary Peterson, University of Arizona

FRIDAY, NOVEMBER 5
APPROXIMATELY 5:45-6:45 PM CDT

Please join us for an informal discussion regarding issues of diversity, equity, and inclusion with an aim towards understanding the issues, concerns, challenges, and opportunities that members face in this arena, as directly related to their roles within their institutions, the profession, and within the organization, overall. An exchange and dialogue seeking to uncover areas of most concern and how they can be addressed by the Society would be important to gauge the ways in which initiatives, programming, and plans can unfold over the next year, to further these discussions within our group. Aspects of the data generated by the membership regarding diversity from this year's conference submissions also will be shared as part of this conversation.

Basic Experimental Studies Involving Humans (BESH) session

Organized by Todd Horowitz, NIH/NCI and Jeremy Wolfe, Brigham & Women's Hospital/Harvard Medical School

SATURDAY, NOVEMBER 6
NOON-1:30 PM CDT

Held virtually

A few years back, the NIH definition of "clinical trial" was changed in a manner that reclassified much of our basic cognitive research into the clinical trial category. This could have had some quite dramatic consequences for our work. After considerable pushback, implementation of the new policy was delayed and a new category of clinical trial was created: "Basic Experimental Studies Involving Humans" (BESH). The BESH classification also has consequences, less dire, but very real. BESH implementation has also been delayed, but it is coming, and cognitive researchers need to understand the implications for their NIH funding. We will bring you up-to-date with the state of play at the time of the Psychonomics meeting.

Awards and Business Meeting

SATURDAY, NOVEMBER 6
5:10-6 PM CDT

Join the Psychonomic Society's leadership as they provide updates on Society business and honor the 2021 award recipients.

Individuals to be recognized include recipients of the following awards:

- Clifford T. Morgan Distinguished Leadership Award
- Mid-Career Award
- Early Career Award
- J. Frank Yates Student Conference Award
- Graduate Conference Award
- Best Article Award
- Governing Board Service Recognition

AFFILIATE MEETINGS



2021 Affiliate Meetings at the Psychonomic Society Virtual Annual Meeting

BMW: Bilingualism Matters across the World

Thursday, November 4, 2021

Noon–2 PM US CDT

<https://sites.google.com/view/bilingualism-matters-world/home>

Culture and Cognition Meeting

Thursday, November 4, 2021

9 AM–1 PM US CDT

www.brandeis.edu/gutchess/culture-cog-preconference.html

Society for Computation in Psychology (SCiP)

Thursday, November 4, 2021

8 AM–5 PM US CDT

<https://computationinpsych.com>

Society for Mathematical Psychology Symposium on Current Trends in Mathematical Psychology

Thursday, November 4, 2021

9 AM–3 PM US CDT

www.mathpsych.org

SPARK Society

Thursday, November 4, 2021

2–4 PM US CDT

<https://www.sparkociety.org>

Tactile Research Group (TRG)

Thursday, November 4, 2021

9 AM–3:45 PM US CDT

<http://trg.objectis.net>

Women in Cognitive Science (WiCS)

Thursday, November 4, 2021

4–6 PM US CDT

<http://womenincogsci.org/meetings>

2021 Affiliate Meetings Occurring Independent of the Psychonomic Society Virtual Annual Meeting

Society for Judgement and Decision Making (SJDm)

42nd Annual Conference

November 19–21, 2021

University of California, San Diego

www.sjdm.org

Object Perception, Attention and Memory (OPAM)

November 3–4, 2021

www.opam.net

Auditory Perception, Cognition, and Action (APCAM)

Thursday, November 4, 2021

8 AM–5 PM CDT

<https://apcsociety.org/>

No Program in 2021

The Brunswik Society

<http://brunswik.org/>

Configural Processing Consortium (CPC)

www.configural.org

Comparative Cognition Society

<http://comparativecognition.org/>

International Meeting for Metacognition

<http://iametacognition.wix.com/metacognition>



2021 GOVERNING BOARD



Duane Watson, Chair
Vanderbilt University



James Pomerantz, Past Chair
Rice University



Penny M. Pexman, Chair-Elect
University of Calgary



Jeanette Altarriba
University at Albany, SUNY



Edward Awh
University of Chicago



Laura Carlson
University of Notre Dame



Angela Gutches
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Brandeis University



Jeanette Altarriba
University at Albany, SUNY



Aysecan Boduroglu
Boğaziçi University



Kimberly Fenn
Michigan State University



John Henderson
University of California, Davis



Stephan Lewandowsky
University of Bristol



Priti Shah
University of Michigan




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EDITORS-IN-CHIEF

PSYCHONOMIC SOCIETY JOURNALS

The Psychonomic Society publishes seven highly respected, peer-reviewed journals covering all aspects of cognitive and experimental psychology. Select a Psychonomic Society journal to showcase your science and to ensure that your research delivers the maximum impact to the global scientific community. Members receive free online access to all seven Psychonomic Society journals. Visit www.psychonomic.org/page/journals to learn more about each title.



ATTENTION, PERCEPTION, & PSYCHOPHYSICS
Sarah Shomstein, Editor-in-Chief
 The George Washington University



BEHAVIOR RESEARCH METHODS
Marc Brysbaert, Editor-in-Chief
 Ghent University




COGNITIVE, AFFECTIVE, & BEHAVIORAL NEUROSCIENCE
Diego Pizzagalli, Editor-in-Chief
 Harvard Medical School




COGNITIVE RESEARCH: PRINCIPLES & IMPLICATIONS
Jeremy M. Wolfe, Editor-in-Chief
 Harvard Medical School/Brigham and Women's Hospital



LEARNING & BEHAVIOR
Jonathon D. Crystal, Editor-in-Chief
 Indiana University Bloomington



MEMORY & COGNITION
Ayanna Thomas, Editor-in-Chief
 Tufts University



PSYCHONOMIC BULLETIN & REVIEW
James R. Brockmole, Editor-in-Chief
 University of Notre Dame



PSYCHONOMIC SOCIETY PODCAST & BLOG
Laura Mickes, Editor-in-Chief
 University of Bristol



Psychonomic Society Members | July 1, 2020–June 30, 2021

The Psychonomic Society honors deceased members by publishing obituaries [on our website](#). If you know a member of our community who has recently passed away, please contact Colin MacLeod. Particularly valuable would be suggestions for who might write the obituary. For consistency, the text is to be no more than 150 words, adding one or two links to longer tributes published elsewhere.



J. Frank Yates (1945–2020)

J. Frank Yates passed away November 19, 2020, in Ann Arbor, Michigan. Frank earned his PhD and joined the professorial rank at the University of Michigan in 1971, where he spent his entire career, retiring in 2020 as the Arthur F. Thurnau Professor Emeritus of Psychology and Professor Emeritus of Business Administration at the Stephen M. Ross School of Business. Frank's groundbreaking scholarship defined the field in his book, **Judgment and Decision Making** (1990). He co-founded the **Journal of Behavioral Decision Making** (1987) and served as associate editor for ~30 years. He was the James McKeen Cattell Fellow (APS 2011) and was elected to the American Academy of Arts and Sciences (2017). An outstanding teacher, mentor, and visionary leader, Frank's programmatic efforts advanced diversity in higher education, serving thousands of students from underrepresented groups. In 2016, the Psychonomic Society established the [J. Frank](#)

[Yates Student Travel Awards](#) (recently renamed the J. Frank Yates Student Conference Award) to support diversity and inclusion in the psychological sciences.

More information about Frank can be found [here](#) and [here](#).

—Patricia Reuter-Lorenz



Arthur Shimamura (1954–2020)

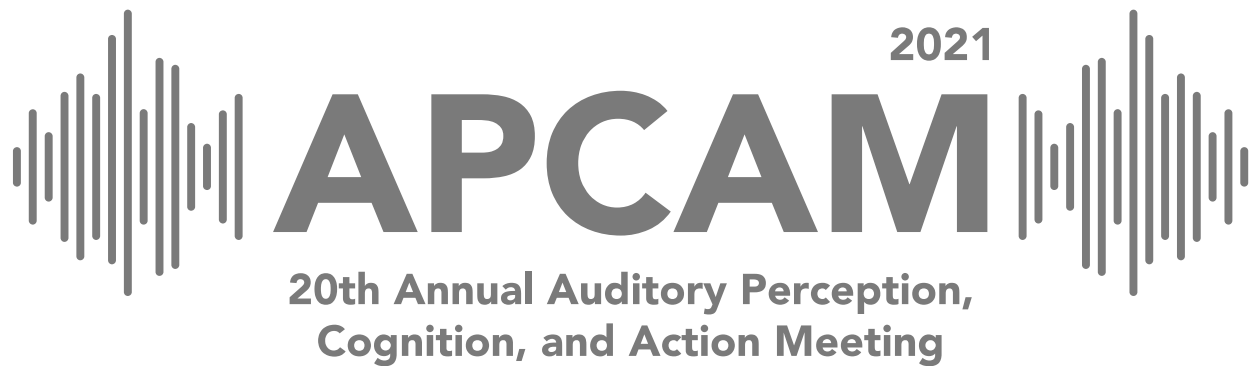
Art Shimamura was an inspirational and creative scientist who expanded our understanding of memory and the frontal lobes. His early work in cognitive neuroscience included influential studies of memory disorders. As a Berkeley professor, he explored many research topics, published many highly cited studies, and fascinated generations of students in his classes. With a Guggenheim Fellowship, he explored relationships between art and cognitive neuroscience, culminating in a popular book, **Experiencing Art: In the Brain of the Beholder**. In an historical excavation, he linked the innovations of photographer Edward Muybridge with personality changes due to frontal-lobe injury. Art's interests in aesthetics were reflected both in his research and in his talent as a photographer. He also took up writing for the general public on topics such as effective learning, healthy aging, psychocinematics, walkabouts around O'ahu, and cancer. He is

deeply missed by friends, family, students, and his many scientific colleagues.

For books, blogs, and photography, [click here](#).

—Ken Paller and Rich Ivry





Thursday, November 4, 2021
A Virtual Meeting for Auditory Science
8:00 am - 5:00pm CDT

**Featuring Keynote address by Dr. Diana Deutsch,
University of California, San Diego**

The goal of APCAM is to bring together researchers from various theoretical perspectives to present focused research on auditory cognition, perception, and aurally guided action. APCAM is a unique meeting in its broad inclusion of basic and applied research that targets multiple levels of processing, theoretical perspectives, and methodologies.

Organizing Committee

Timothy Hubbard (Chair)
Laura Getz (Co-chair)
Devin McAuley
Kristopher Patten
Peter Pfordresher
Hannah Shatzer

APCAM is supported in part by the Auditory Perception and Cognition Society. Work from accepted abstracts may be submitted as a brief report for consideration in a special issue of *Auditory Perception & Cognition* highlighting work from APCAM.

Visit www.apcsociety.org for more details

**SECOND MEETING OF
BILINGUALISM MATTERS ACROSS THE WORLD
AT THE 2021 ANNUAL VIRTUAL MEETING OF THE
PSYCHONOMIC SOCIETY**



**THURSDAY NOVEMBER 4, 2021 NOON-2PM CDT
FULLY ONLINE**



AGENDA

12:00-12:15 Eleonora Rossi (University of Florida)
Bilingualism across the world: A lens to understand diversity through cognition, linguistics and education

12:15-12:30 Richard Brecht (American Councils Research Center)
Equal Access for America's Underserved Bilingual Communities

12:30-12:45 Jason Rothman (UiT-The Arctic University of Norway)
Heritage Speaker Bilingualism: A Natural Laboratory and an Opportunity

12:45-1:00PM Antonella Sorace (University of Edinburgh)
Joining the dots: social attitudes, change, and cognition in bilingual speakers of minority languages

YOUNG SCHOLARS

1:00-1:15PM Jason Gullifer (McGill University)
Bilingualism: A socio-cognitive exercise in managing uncertainty

1:15-1:30PM Sibylla Leon Guerrero (UC Irvine)
Bilingualism in adolescence: Opportunities and challenges

1:30-2:00PM Open discussion and Q&A

For details on how to join the meeting and to join our activities go to:
<https://sites.google.com/view/bilingualism-matters-world/home>

Bilingualism Matters Across The World Founder and Organizers

Eleonora Rossi

Antonella Sorace

Judith Kroll

Third Annual Culture and Cognition Preconference of the Psychonomic Society



Thursday November 4th, 2021

Fully Virtual

Schedule

Invited Talks: 9:00 am - 10:55am (CDT)
Panel Discussion: 11:10 am - 12:15 pm (CDT)

Invited Talks

Shinobu Kitayama, University of Michigan

Culture, self, and the brain: The gray matter volume of scene processing regions varies by culture and self-construal

Tanya Broesch, Simon Fraser University

TBA

William W. Dressler, The University of Alabama

Culture and the Individual: A Model

Thomas Talhelm, University of Chicago Booth School of Business

When China randomly assigned people to farm rice or wheat, it changed their thought style

Audrey Duarte, University of Texas at Austin

Interactions between psychosocial and sociodemographic factors in sleep-memory associations

Panel Discussion

How we define culture in scientific inquiry

Featuring Tanya Broesch, William W. Dressler, Audrey Duarte, Shinobu Kitayama, Thomas Talhelm, and Qi Wang.

Founded and Organized by

Suparna Rajaram, Stony Brook University & Angela Gutchess, Brandeis University

Student Organizers

Tori Peña, Stony Brook University & Krystal Leger, Brandeis University

This meeting is made possible through support from the Psychonomic Society.

virtual opam21

November 3-4, 2021

Join us online to witness outstanding research by graduate and postdoctoral scientists at the annual Object Perception, Attention, and Memory conference.

Conference Dates

Wednesday, November 3, 2021
3:15 PM-7:15 PM CDT

Thursday, November 4, 2021
8:00 AM-4:00 PM CDT

Keynote Address

Dr. Diane Beck

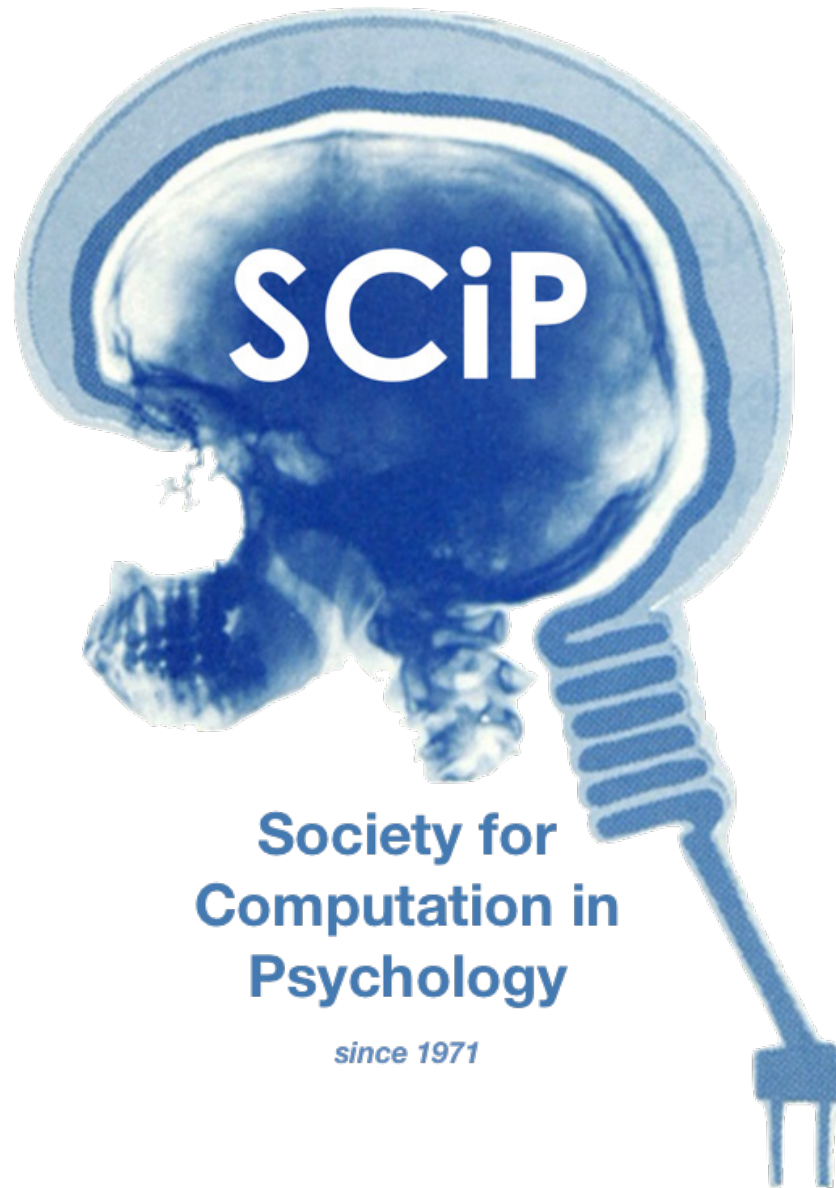
Wednesday, November 3, 2021
5:00 PM-6:00 PM CDT

All events available online
at www.opam.net

2021 Organizers

Blaire Dube
Andrew Clement
Xiaoli Zhang
Doug Addleman

Visit www.opam.net for more details



The 51st Annual Meeting of the Society for Computation in Psychology

50 Years of Computation

November 4th, 2021

<https://ComputationInPsych.com>



mathpsych.org

The Society for Mathematical Psychology

Invites you to a symposium on

**CURRENT TRENDS IN
MATHEMATICAL PSYCHOLOGY**



Nov 4, 2021



A **virtual** event

Online only, only via

→ **psychonomic.org**

Get updates on our social media

and via mathpsych.org



@socmathpsych
fb/MathPsych

PLEASE JOIN US
for the
4th Annual Meeting of the



SPARK
Society

Our goal is to create networks and promote professional development of marginalized scholars in Cognitive Psychology and Cognitive Science.

Thursday, November 4th, 2021

Panel and Q&A: 2:00-3:15pm CDT

Speed Mentoring: 3:15-4:00 pm CDT

This will be a virtual event

All are welcome!

Panel Topic: *Mentoring Diverse Students and Instilling Belongingness*



Loretta Neal McGregor
Arkansas State University



Kevin Binning
University of Pittsburgh



Join us for our annual meeting

to be held on

Thursday November 4th, 2021

9 a.m. to 5 p.m. CST

The meeting will be held online!

From its humble beginning as a handful of colleagues sitting on beds in a hotel room discussing research on the perception of touch, the TRG has become an international collection of over 100 people conducting research on a wide variety of topics related to tactile perception. Our members come from both academia and industry and span a wide range of exciting topics including tactile acuity in the blind, haptic interfaces for driving and aviation, simulation of object texture in VR, sensory integration, synesthesia, and haptic space perception (and more!).

The purpose of the TRG is to facilitate interaction between tactile researchers and to provide a venue to share new research findings. This is primarily achieved through the TRG annual meeting held in conjunction with the meeting of the Psychonomic Society.

For more information or to be added to our mailing list,
please contact:

tactileresearchgroup@gmail.com

[facebook.com/tactileresearchgroup](https://www.facebook.com/tactileresearchgroup)



The 21st Annual Meeting of Women in Cognitive Science

Thursday, November 4, 2021

Panel and Q&A: 4-6 CDT

Social Hour & Speed Mentoring: 6-7 CDT

An all virtual event.

Mentoring Matters

Mentoring provides guidance and support across the course of a career with different types of mentoring relationships needed at different career stages. Yet, training in how to mentor is rarely part of preparation for a career, leaving many researchers wondering how to develop the skills needed to be a good mentor. Our panel of speakers brings a wealth of experience in mentoring in different institutional settings and across different career stages from students to mid-career faculty. Join the workshop to hear them share stories of why mentoring matters.

Panelists:

Matthew Botvinick, DeepMind and University College London

Nadia Brashier, Purdue University

Marisa Carrasco, New York University

Barbara Shinn-Cunningham, Carnegie Mellon University

WiCS Leadership Team:

Kate Arrington, Chair, Lehigh University

Karin Butler, Sandia National Laboratory

Kristi Multhaup, Davidson College

Bonnie Nozari, Carnegie Mellon University

Joo-Hyun Song, Brown University

Find WiCS online:

Website: <http://www.womenincogsci.org/>

Twitter: @WomenInCogSci

Facebook: WomenInCognitiveScience

Email: womenincognitivescience@gmail.com

Connect with WiCS Chapters in Canada and Europe

Twitter: @WiCSCanada

Facebook: WiCSC

Twitter: @WiCSEurope

Facebook: WiCSEurope

Email: wics.europe@gmail.com

Women in Cognitive Science is affiliated with the Psychonomic Society and its activities are funded by the Perception, Action & Cognition program at the National Science Foundation.

CONDENSED SCHEDULE A



Friday, November 5, 2021

Spoken Sessions and Symposia

Individual Differences in Attention (1-5).....	8:00–9:40 AM US CDT
Cognitive Aging I (6-10).....	8:00–9:40 AM US CDT
Motivation, Reward, and Cognitive Processes (11-15).....	8:00–9:40 AM US CDT
Decision Making I (16-21).....	8:00–10:00 AM US CDT
Language Production and Writing (22-27).....	8:00–10:00 AM US CDT
Speech Perception I (28-33).....	8:00–10:00 AM US CDT
Test Effects on Memory and Learning (34-39).....	8:00–10:00 AM US CDT

Symposium I: The Information Exchange Between Working Memory and Long-Term Memory (SYM1-SYM5).....	10:00–11:40 AM US CDT
Neural Mechanisms of Memory and Cognition (45-50).....	10:00 AM–12:00 PM US CDT
Eyewitness Memory (51-56).....	10:00 AM–12:00 PM US CDT
Attention Capture (57-61).....	10:20 AM–12:00 PM US CDT
Associative Learning (62-66).....	10:20 AM–12:00 PM US CDT
Bilingualism I (67-71).....	10:00 AM–12:00 PM US CDT
Reasoning (73-77).....	10:20 AM–12:00 PM US CDT

Virtual Poster Session I with Authors Present 12:00–1:00 PM US CDT

Attention Capture (1001-1020, 1467)	Concepts and Categories (1239-1254)
Individual Differences in Attention (1021-1036)	Emotion and Cognition I (1255-1269)
Cognitive Skill Acquisition (1037-1040)	Letter/Word Processing (1270-1295)
Decision Making I (1041-1056, 1466, 2495)	Numerical Cognition (1296-1303)
Motivation and Reward in Decision Making (1057-1074)	Test Effects on Learning and Memory (1304-1322)
Discourse Processes (1075-1089)	Statistics and Methodology (1323-1330)
Language Production and Writing (1090-1102)	Consciousness and Attentional Control (1331-1351)
Associative Learning (1103-1114)	Development and Individual Differences in Bilingualism (1352-1362, 1469)
Autobiographical Memory (1115-1125)	Embodied Cognition (1363-1371)
Human Learning and Instruction I (1126-1145)	Music Cognition (1372-1380)
Visual Working Memory (1146-1170)	Perception and Action (1381-1399)
Cognitive and Motor Control of Performance (1171-1193)	Psycholinguistics I (1400-1418)
Animal Learning & Cognition (1194-1200, 1470, 1471)	Reasoning/Problem Solving I (1419-1433)
Motivation and Reward in Learning and Memory (1201-1210, 1468)	Recall I (1434-1450)
Automatic Processing and Cognitive Control (1211-1238)	Recognition I (1451-1465)

Spoken Sessions and Symposia

Symposium II: Beyond the Button Press: Studying the Mind Through Drawings (SYM6-SYM11).....	1:30–3:30 PM US CDT
Attention Control (86-91).....	1:30–3:30 PM US CDT
Bilingualism II (92-97).....	1:30–3:30 PM US CDT
Judgment and Decision Making I (98-103).....	1:30–3:30 PM US CDT
Psycholinguistics (104-109).....	1:30–3:30 PM US CDT
Recall I (110-115).....	1:30–3:30 PM US CDT
Multisensory Perception (116-121).....	1:30–3:30 PM US CDT

Symposium III: Moving Beyond Cognitive Universals (Special Symposium) (SYM12-SYM16).....	3:45–5:45 PM US CDT
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CONDENSED SCHEDULE A



Saturday November 6, 2021

Spoken Sessions and Symposia

Cognitive Aging II (127-131)	8:00-9:40 AM US CDT
Decision Making II (132-136)	8:00-9:40 AM US CDT
Speech Perception II (137-141)	8:20-9:40 AM US CDT
Recall II (142-146)	8:00-9:40 AM US CDT
Emotion and Cognition (147-152)	8:00-10:00 AM US CDT
Letter/Word Processing (153-158)	8:00-10:00 AM US CDT
Visual Working Memory (159-164)	8:00-10:00 AM US CDT

Symposium IV: Advancing Cognition Through Adversarial Collaboration: The Case of Working and Long-Term Memory

(Leading Edge Workshop) (SYM17-SYM21)	10:00 AM-12:00 PM US CDT
Cognition in Non-Human Animals (170-174)	10:20 AM-12:00 PM US CDT
Social/Cultural Influences on Cognition I (175-179)	10:20 AM-12:00 PM US CDT
Autobiographical Memory (180-184)	10:20 AM-12:00 PM US CDT
Reading (185-190)	10:00 AM-12:00 PM US CDT
Metacognition (191-196)	10:00 AM-12:00 PM US CDT
Spatial Cognition and Memory (197-202)	10:00 AM-12:00 PM US CDT

Virtual Poster Session II with Authors Present 12:00-1:00 PM US CDT

Bilingual Comprehension and Production (2001-2022)	Cognitive Aging (2258-2281, 2497)
Decision Making II (2023-2045)	Working Memory (2282-2303)
Human Learning and Instruction II (2046-2060)	Spatial Memory and Cognition (2304-2314, 2494)
Emotion and Cognition II (2061-2080)	Event Cognition (2315-2324)
Reading (2081-2102, 2502)	Reasoning/Problem Solving II (2325-2340)
Eyewitness Identification (2103-2123)	Psycholinguistics II (2341-2358, 1245)
False Memory (2124-2136)	Language and Meaning (2359-2372)
Prospective Memory (2137-2147)	Recall II (2373-2396)
Sensation and Perception (2148-2161)	Recognition II (2397-2410)
Attention to Scenes and Objects (2162-2172)	Metamemory (2411-2425)
Visual Search and Attention (2173-2193)	Metacognition (2426-2447, 2499, 1347)
Judgment (2194-2212)	Cultural/Social Influences on Cognition (2448-2463)
Speech Perception (2213-2240)	Spatial Cognition (2464-2478)
Cognition and Technology (2241-2257)	Visual Perception (2479-2493)

Spoken Sessions and Symposia

Symposium V: The Reliability Paradox: Current Issues, Partial Solutions, and Future Directions (SYM22-SYM25)	1:30-3:30 PM US CDT
Concepts and Categories (208-212)	1:30-3:10 PM US CDT
Statistics and Methodology (213-217)	1:30-3:10 PM US CDT
Human Learning and Instruction I (218-222)	1:30-3:10 PM US CDT
Recognition Memory I (223-227)	1:30-3:10 PM US CDT
Attention and Visual Search I (228-233)	1:30-3:30 PM US CDT
Cognition and Technology (234-239)	3:30-5:30 PM US CDT
Working Memory I (240-244)	3:50-5:30 PM US CDT
Judgment and Decision Making II (245-250)	3:30-5:30 PM US CDT
Recognition Memory II (251-255)	4:10-5:30 PM US CDT
Cognitive and Motor Control of Performance I (256-260)	3:50-5:30 PM US CDT
Visual Perception I (261-266)	3:30-5:30 PM US CDT

CONDENSED SCHEDULE A



Sunday, November 7, 2021

Spoken Sessions and Symposia

Attention and Visual Search II (268-273)	8:20-10:00 AM US CDT
Judgment and Decision Making III (274-279)	8:00-10:00 AM US CDT
Human Learning and Instruction II (280-285)	8:00-10:00 AM US CDT
Cognitive and Motor Control of Performance II (286-290)	8:00-9:40 AM US CDT
Perception and Action (291-295)	8:00-9:40 AM US CDT
Language and Semantics (296-300)	8:00-9:40 AM US CDT
Discourse Processes (301-306)	10:00 AM-12:00 PM US CDT
Working Memory II (307-311)	10:20 AM-12:00 PM US CDT
False Memory (312-316)	10:20 AM-12:00 PM US CDT
Visual Perception II (317-321)	10:00-11:40 AM US CDT
Mental Structures and Processes (322-326)	10:00-11:40 AM US CDT
Reasoning and Problem Solving (327-331)	10:20 AM-12:00 PM US CDT



Friday, November 5, 2021
8:00-10:00 AM US CDT (unless otherwise noted)
Spoken Sessions (1-39)

Individual Differences in Attention (1-5)

8:00-8:20 AM Shipstead
8:20-8:40 AM Zhang, Miyake, Osborne, Shah, Jonides
8:40-9:00 AM Namuth, Kerr-German, Tuman, Gordan, White
9:00-9:20 AM Rey-Mermet, Rothen
9:20-9:40 AM Goodhew, Thomson

Cognitive Aging I (6-10)

8:00-8:20 AM Richmond, Brackins, Rajaram
8:20-8:40 AM Bowen, Hargis, Gallant
8:40-9:00 AM DeCaro, Marin, Schiloski, Hajos, Lahdo, Donnelly, Vives
Rodriguez, Stein, Budson
9:00-9:20 AM Ratcliff, Scharre, McKoon
9:20-9:40 AM Horn, Freund

Motivation, Reward, and Cognitive Processes (11-15)

8:00-8:20 AM Reyna, Edelson, Stallone, Hayes, Surtani
8:20-8:40 AM Withdrawn
8:40-9:00 AM Pennycook 
9:00-9:20 AM Baribault, Ironside, Johnson, Collins
9:20-9:40 AM West, Gost

Decision Making I (16-21)

8:00-8:20 AM Knowlton, Schorn
8:20-8:40 AM Kumar, Steyvers, Patel, Benjamin
8:40-9:00 AM Kvam, Alaukik, Baldwin, Mims, Martemyanova
9:00-9:20 AM McMullin, McCarthy, Davis-Stober

9:20-9:40 AM Zilker, Pachur
9:40-10:00 AM Hawkins, Cavallaro, Brown

Language Production and Writing (22-27)

8:00-8:20 AM Nozari, Pinet, Haney, Kanagala
8:20-8:40 AM Withdrawn
8:40-9:00 AM Hronský, Keuleers
9:00-9:20 AM Pinet, Martin
9:20-9:40 AM Gallant, Libben, Feldman
9:40-10:00 AM Pham, Karuza

Speech Perception I (28-33)

8:00-8:20 AM Carlson, Atiyeh, Giovagnoli, McQueen
8:20-8:40 AM McAuley, Shen, Smith, Kidd
8:40-9:00 AM Samuel, Zheng, Dumay
9:00-9:20 AM Deutsch, Lador-Weizman
9:20-9:40 AM Banai, Karawani, Lavie
9:40-10:00 AM Withdrawn

Test Effects on Memory and Learning (34-39)

8:00-8:20 AM Lyle, Bego, Ralston, Immekus
8:20-8:40 AM Walsh, Rissman
8:40-9:00 AM Carvalho, Koedinger
9:00-9:20 AM Shaffer, McDermott
9:20-9:40 AM Higham, Alamri
9:40-10:00 AM Pickering, Higham, Hadwin, Potts, Murayama

10:00 AM-12:00 PM US CDT (unless otherwise noted)
Symposium I (SYM1-SYM5) and Spoken Sessions (45-77)

Symposium I: The Information Exchange Between Working

Memory and Long-Term Memory (SYM1-SYM5)

10:00-10:20 AM Loaiza, Souza
10:20-10:40 AM Forsberg, Adams, Greene, Pattanakul, Naveh-Benjamin,
Cowan
10:40-11:00 AM Bartsch
11:00-11:20 AM Brady, Allen, DeStefano
11:20-11:40 AM Mizrak, Popov, Oberauer

Neural Mechanisms of Memory and Cognition (45-50)

10:00-10:20 AM Diamond, Kahana
10:20-10:40 AM Withdrawn
10:40-11:00 AM Herz, Bukala, Kahana
11:00-11:20 AM Heffernan, Mack, Schlichting
11:20-11:40 AM Thoma
11:40-12:00 PM Espinal, Bickel, Mehta, Chryssikou

Eyewitness Memory (51-56)

10:00-10:20 AM Hyman, Cordero, Armstrong, Collie, Reyna
10:20-10:40 AM Wixted, Colloff, Vul, Wilson
10:40-11:00 AM Yang, Moody, Burke
11:00-11:20 AM Starns, Cohen, Rotello
11:20-11:40 AM Cohen, Starns, Rotello
11:40-12:00 PM Tamminen

Attention Capture (57-61)

10:20-10:40 AM Gaspelin, Stilwell, Egeth
10:40-11:00 AM Kim, Ogden, Cabrera, Bibb, Anderson
11:00-11:20 AM Dube, Golomb
11:20-11:40 AM Lien, Ruthruff, Hauck
11:40-12:00 PM Parmentier, Gallego



Friday, November 5, 2021
10:00 AM-12:00 PM US CDT (unless otherwise noted)
Spoken Sessions (45-77) (continued)

Associative Learning (62-66)

10:20-10:40 AM Moss, Newlin
10:40-11:00 AM Antony, Bennion
11:00-11:20 AM Maxcey, Shiffrin, Cousineau, Atkinson
11:20-11:40 AM Jamieson, Crump
11:40-12:00 PM Arnal, Plaza, Gerhardstein, Estévez, Fuentes

11:20-11:40 AM Matzen, Ting, Stites, Wisniewski
11:40-12:00 PM Withdrawn

Reasoning (73-77)

10:20-10:40 AM Ackerman, Shuster, Levontin
10:40-11:00 AM Smith, Mansharamani
11:00-11:20 AM Brockbank, Vul
11:20-11:40 AM Wolfe, Weil
11:40-12:00 PM Sharps, Nagra, Paulsen, Moreno, Mortensen, Folmer, Jones, Price-Sharp

Bilingualism I (67-71)

10:00-10:20 AM Navarro, Rossi
10:20-10:40 AM Schwartz
10:40-11:00 AM Palma, Titone, Lee
11:00-11:20 AM Kałamała, Chuderski, Szewczyk, Senderecka, Wodniecka, Wodniecka

12:00-1:00 PM US CDT (unless otherwise noted)
Poster Session I (1001-1469)

Attention Capture (1001-1020, 1467)


(1001) Stolte, Ansoorge
(1002) Prasad, Mishra
(1003) Daly, Pitt
(1004) Heaton, Buetti, Lleras, Hummel
(1005) Ma, Abrams
(1006) Adams, Ruthruff, Gaspelin
(1007) Manini, Botta, Martín-Arévalo, Lupiáñez Castillo
(1008) Hanne, Tünnermann, Schubö
(1009) Bogaerts, van Moorselaar, Theeuwes
(1010) Moher, Leber, Nardone
(1011) Oyama, Ishikawa, Okubo
(1012) Santacroce, Swami, Tamber-Rosenau
(1013) Clement, Grégoire, Anderson
(1014) Hauck, Lien
(1015) Chen, Chen , Shen
(1016) Hannula, Hoelter
(1017) Kim, Gregoire, Anderson
(1018) van der Wel, Pittig, Welsh, Boeckler-Raettig
(1019) Rigsby, Stilwell, Ruthruff, Gaspelin
(1020) Drisdelle, Eimer
(1467) Ju, Cho

(1027) Welhaf, Kane
(1028) Torres , Robison, Brewer
(1029) Couperus, Clarke, Roy, Joh, Sadeh, Sikder, Bukach, Reed
(1030) Hood, Scott, Hutchison
(1031) Lawrence, Clement, Chasteen, Pratt 
(1032) Draheim, Engle
(1033) Miller, Unsworth
(1034) Litovsky, Hinault, Courtney, Rapp
(1035) Hopkins, Reppa
(1036) Gerlofs, Anderson, Kingstone


Cognitive Skill Acquisition (1037-1040)

(1037) De Wever, Hainselin, Gignon
(1038) Osman, Ng, Kerlan, Jaffe, Schafer
(1039) Wells, Mayer, Olsen, Plass, Homer
(1040) Li, Tullis

Decision Making I (1041-1056, 1466, 2495)

(1041) Gokce, Doğan, Kalpakyan, Taskiran
(1042) Meacham, Sosnowski, Brosnan, Kleider-Offutt
(1043) Braun
(1044) Lopez, Orr
(1045) Poon, Luckman, Isoni, Mullett
(1046) Mongrain, Donatien, Pratt , Weidler, Hilchey
(1047) He, Bhatia
(1048) Jiang, Hou, Peng, Macnamara
(1049) Conway, Cohen
(1050) Griesbach, Raßbach, Herbort, Cañal-Bruland
(1051) Martin, Cumberbatch, Schneider

Individual Differences in Attention (1021-1036)

(1021) Frischkorn, Oberauer
(1022) Bruening, Manzey
(1023) Osborne , Zhang, Shah, Jonides
(1024) Hood, Hart, Marchak, Hutchison
(1025) Tsukahara, Engle
(1026) Lee, Pitt





Friday, November 5, 2021
12:00-1:00 PM US CDT (unless otherwise noted)
Poster Session I (1001-1469) (continued)

(1052) LaFollette, Kotynski, Frank, Merner, Jiang, Macnamara, Burns, Demaree

(1053) Karjack, Barnes, Brudzinski, Shipley

(1054) Lowry, Trivedi, Treviño, Boyd, Julian, Perna

(1055) Hasan, Eichbaum, Seegmiller, Stratton, Trueblood

(1056) Gheza, Kool

(1466) Burns, Berman, Toglia

(2495) Marciano, Wertheimer, Bourgeois Gironde, Deouell

Motivation and Reward in Decision Making (1057-1074)

(1057) Kracinovich, Cuellar, Walker, Markwald

(1058) Lim , Helie, Fansher

(1059) Liao, Cornwall, Anderson, Worthy

(1060) Chantland, Ravizza

(1061) Weldon, Letsou, An, Dunwoody

(1062) Meek, Conrady, Phillips-Meek

(1063) Withdrawn

(1064) Dolgin, Kool, Wilson

(1065) Wernette, Altmann, Fenn

(1066) Ishikawa, Itakura

(1067) Withdrawn

(1068) Hayes, Wedell

(1069) Cohen, Halewicz, Hogeboom, Kable

(1070) Tzavella, Chambers

(1071) Su, Huang

(1072) Adkins, Lee

(1073) Karagoz, Reagh, Kool

(1074) Schmitt, Schade, Pfeuffer

Discourse Processes (1075-1089)

(1075) Magliano, Feller, Loschky, Cohn, Hutson

(1076) Butterfuss, Johnson, Kendeou

(1077) Van Der Wege, Block, Carothers-Liske, Fox, Freedman, Rao, Navarro

(1078) Mertens, Forman, de Ruiter

(1079) Flynn, Allen

(1080) Duffau, Fox Tree

(1081) Oviedo, Fox Tree

(1082) Long, Kaschak

(1083) Withdrawn

(1084) Thorpe, Subramanian, Yoon

(1085) Olkonien, Kaakinen

(1086) Johnson, Butterfuss, Kendeou

(1087) Feller, Hutson, Newell, Wing-Paul, Troemel, Tighe, McCarthy, Magliano

(1088) Nault, Voleti, Nicastro, Munhall

(1089) Withdrawn

Language Production and Writing (1090-1102)

(1090) Habib, Beauvais, Gosling, Gueraud

(1091) Terai, Chikazoe, Yoshimoto, Sadato, Jimura

(1092) Hardy, Ushioda, Messenger

(1093) Withdrawn

(1094) Hambric, O'Seaghdha

(1095) Baynard-Montague, James, Panique

(1096) Alderete, Baese-Berk

(1097) Chen, Lu, O'Seaghdha

(1098) Kelley, Dell

(1099) Breen, Garcia, Antonio Lopez, Fitzroy, Franck

(1100) Perdomo, Watson

(1101) Lebkuecher, Weiss

(1102) Withdrawn

Associative Learning (1103-1114)

(1103) Saad, Musolino, Hemmer

(1104) Fischer, Moscovitch, Alain

(1105) Thomas, Caplan

(1106) Rosca, Kiesel, Pfeuffer

(1107) Bangert, Tsuboi

(1108) James, Venuto, Headen, Panique

(1109) Beal, Bowersox, Rollins

(1110) Ricks, Zhou, Gora, Zempel

(1111) Tan, Hockley

(1112) Withdrawn

(1113) Dessenberger, Sommers

(1114) Mundorf, Uitvulgt, Healey

Autobiographical Memory (1115-1125)

(1115) Frazier, Karjack, Johnson, Newcombe, Olson

(1116) Gander

(1117) Tanguay, Palombo, Love, Davidson, Renoult

(1118) Pelagatti, Chiorri, Casale, Favilli, Vannucci

(1119) Wojcik, Díez-Álamo, Villoria, Flores García, Eugenio, Fernandez

(1120) Sklenar, Kadwe, Frankenstein, Urban Levy, Leshikar

(1121) Davis, Frechette, Campbell

(1122) Yeung, Startna, Fernandes

(1123) Morris, Miller

(1124) Ekinci, Brown

(1125) Putnam, Deng, Talhelm

Human Learning and Instruction (1126-1145)

(1126) Kalsi, Forrin, Sana, Kim, MacLeod

(1127) Lawson, Mayer

(1128) Velic, Kaiser, DeCaro

(1129) Fansher, Lalwani, Adkins, Carlson, Quirk, Boduroglu, Lewis, Jonides, Shah





Friday, November 5, 2021
12:00-1:00 PM US CDT (unless otherwise noted)
Poster Session I (1001-1469) (continued)

(1130) Liu, Gomatam, Goldschmidt, Pilegard
(1131) Ramirez-Perez, Soares, Ditta
(1132) Van, Trott, Walker
(1133) Guerrero, Wiley
(1134) Huff, Namias
(1135) Silaj, Castel
(1136) Gorin, Skieresz, Marca, Reber, Rothen
(1137) Graham, Greve, Byrnes, Was
(1138) Withdrawn
(1139) Kuepper-Tetzl, Gardner
(1140) Blalock, Kelley
(1141) Arunkumar, Giesen
(1142) Wagner, Robey
(1143) Eakin, McDonald
(1144) Guo, Forrin, Sana, Kim
(1145) Jaeger, Fiorella

Visual Working Memory (1146-1170)

(1146) Fu 🦋, Yan, Shen, Chen
(1147) Goldenhaus-Manning, Cooper, Loaiza
(1148) Yörük, Tamber-Rosenau
(1149) Cheung 🦋, Geeraert, Loaiza
(1150) Zhao, Vogel
(1151) O'Donnell, Wyble, Clement
(1152) Tam, Wyble
(1153) Sobrinho, Souza
(1154) Jeanneret, Bartsch, Vergauwe
(1155) Musfeld, Souza, Oberauer
(1156) Phylactou 🦋, Traikapi, Papadatou-Pastou, Konstantinou
(1157) Jiang 🦋, Jones, von Bastian
(1158) Ricker, Vergauwe
(1159) Williams, Pratt 🦋, Ferber
(1160) Allen, Brady, DeStefano
(1161) Maturi, Sheridan
(1162) Withdrawn
(1163) Hale, Conway
(1164) Hedayati, Wyble
(1165) Zhou, Gora, Ricks, Perrault, Mimmack
(1166) Metzger, Mallik, Loucks, Clinger, Rasmus
(1167) McCray, Cotton, Ricker
(1168) Vergauwe, Hautekiet, Langerock
(1169) Langerock, Vergauwe
(1170) Fordyce, Redick, Karpicke

Cognitive and Motor Control of Performance (1171-1193)

(1171) Zanesco, Ekaterina, Jha
(1172) Koob, Ulrich, Janczyk
(1173) Sawyer, Weiss, Franco, Altmann, Fenn
(1174) Rosa, Thelen, Tsai, Sirgy, Jackson

(1175) Gupta, Rickard
(1176) Mattingly, Pahor, Carrillo, Amin, Rivera, Ghil, Tsai, Reimer, Jaeggi, Seitz
(1177) Zhong, Chen, Proctor
(1178) Prosser, Yamaguchi, Swainson
(1179) Khoo, Danielmeier, Derrfuss
(1180) Gouret, Krummenacher, Kiesel, Pfeuffer
(1181) Janczyk, Mackenzie, Ulrich, Leuthold, Koob
(1182) Huestegge, Strobach
(1183) Verhaegen, Reynvoet, Van den Bussche
(1184) Friedgen, Koch, Stephan
(1185) Raettig, Huestegge
(1186) Kalfaoglu
(1187) Pfister, Steinhauser, Schwarz, Kunde, Foerster
(1188) Brunyé, Yau, Okano, Elliott, Olenich, Miller
(1189) Smith, Ulrich
(1190) Savalia, Huber, Cowell
(1191) Kuerten, Gutzeit, Huestegge
(1192) Ray, Karlinsky, Welsh
(1193) Garcia Mora, Bukowski, Van Gemmert, Marcinowski

Animal Learning & Cognition (1194-1200, 1470, 1471)

(1194) Flaim, Blaisdell
(1195) Sanchez 🦋, Jackson, Adamczyk, Bowden, Church, Smith
(1196) Taniuchi, Kurachi
(1197) Neiworth, Knighten, Leppink-Shands
(1198) De Guzman, Enriquez, Knowlton, Blaisdell
(1199) Schally, Couvillon
(1200) Withdrawn
(1470) Yeaton, Tosatto, Fagot, Grainger, Rey
(1471) Chartier, Fagot

Motivation and Reward in Learning and Memory (1201-1210, 1468)

(1201) Bond, Melo, Nerz, Raab, Leising
(1202) Schwartz, Siegel, Castel
(1203) Parmar, Rothermun
(1204) Chao, Gallant, Bowen
(1205) Whatley, Castel
(1206) Cariño, Pan, Bjork
(1207) Chakravarty, Caplan
(1208) Pereira, Teixeira-Santos, Sampaio, Pinheiro
(1209) Simonsen, Madan 🦋
(1210) Katerman, Howath, Murty
(1468) Zeng, Killingsworth, Tomparry, Thompson-Schill

Automatic Processing and Cognitive Control (1211-1238)

(1211) Arreola, Schneider
(1212) Charras, Capizzi





Friday, November 5, 2021
12:00-1:00 PM US CDT (unless otherwise noted)
Poster Session I (1001-1469) (continued)

- (1213) Chacón Candia, Román-Caballero, Lupiáñez Castillo,
Casagrande, Marotta
(1214) Lyphout-Spitz, Maquestiaux, Ruthruff
(1215) Withdrawn
(1216) Skarratt, Peney, Smith
(1217) Cochrane 🦋, Galarraga, Pratt 🦋
(1218) Philipp, Benini, Koch, Mayr, Frings
(1219) Hershman, Levi, Tzelgov, Henik
(1220) Mashburn, Engle
(1221) Kool, Gruber, Dolgin
(1222) Spinelli, Lupker
(1223) Chen, Cave, Chen
(1224) Chao, Huang, Hsiao
(1225) Medina, Lutfi-Proctor, Elliott
(1226) Seibold
(1227) Colvett 🦋, Widler, Bugg
(1228) Tanaka, Okubo
(1229) Pardy, Clancy, Fenske
(1230) Hunter, Shields
(1231) Macias 🦋, Schneider
(1232) Kang, Chiu
(1233) Fu, Kao, Wang, Yang
(1234) Withdrawn
(1235) Moretti, Koch, Steinhauser, Schuch
(1236) Gustavson, Reynolds, Corley, Wadsworth, Hewitt, Friedman
(1237) Escalera, Bediou, Chanal, Bavelier
(1238) Stephan, Koch

Concepts and Categories (1239-1254)

- (1239) Jackson, Sanchez, Adamczyk, Smith, Church
(1240) Zou, Bhatia
(1241) Dethoor, Hainselin, Duclos
(1242) Karadima, Ralli, Vatakis
(1243) Corral, Burte
(1244) Ruiz Pardo, Khemani, Ghai, Ghulamhussain, McKenzie, Minda
(1246) Clements, Thompson-Schill
(1247) Whitehead, Zamary, Marsh
(1248) Nepangue, Little, Abraham, Karlin
(1249) Withdrawn
(1250) Bennett, Lund, Cohen-Shikora, Weidler
(1251) Yang
(1252) Babineau, Tauber
(1253) Shumaker, Houston, Middlebrooks, Arnold
(1254) de Almeida, Antal

Emotion and Cognition I (1255-1269)

- (1255) Almasi, Tae, Sohn
(1256) Holtzman, Griffith, Boals, Banks
(1257) Ishikawa, Oyama, Okubo
(1258) Rickert, Rosca, Geppert, Gouret, Kirschner, Pfeuffer
(1259) Tae, Weldon, Almasi, An, Lee, Sohn
(1260) Purcell, Stewart
(1261) Bolshin, Khatri, Ryan
(1262) Prischak, Eaton, Kazmerski, Ashour
(1263) Withdrawn
(1264) Sugiyama, Hiroyasu, Yotsumoto
(1265) Manno, Zhao, Zhou, Rossit, Bayliss, Zhao
(1266) Durham, Gronlund
(1267) Stone, Stanley, Marsh
(1268) Withdrawn
(1269) Suzuki, Ueno, Ishikawa, Kobayashi, Okubo, Nakai

Letter/Word Processing (1270-1295)

- (1270) Smith
(1271) Withdrawn
(1272) Suarez, Beato
(1273) Ren 🦋, Wang
(1274) Hughes Berheim, Morett, Nelson, Scofield
(1275) Grossi, Olmstead, Judson, Lisiecki, Lukaszewski
(1276) Saneyoshi, Inada, Fujita, Kuraya, Hara, Hiramatsu
(1277) Lau
(1278) Fernández-López 🦋, Gomez, Davis, Marcet, Perea
(1279) Tkacikova, Rice, Armstrong, Tokowicz
(1280) Häikiö, Kanerva
(1281) Chi, Lupker
(1282) Cauchi, Grainger, Lété, Beyersmann
(1283) Brossette, Lété, Grainger, Dufau
(1284) Baciero, Perea, Dunabeitia, Gomez
(1285) Taikh, Gagné, Spalding
(1286) Chee, Yap
(1287) Tse, Chan, Yap, Chow
(1288) De Rosa, Crepaldi
(1289) Curtis, Gaskell, Mak, Chen, Rodd
(1290) Maziyah Mohamed 🦋, Yap, Chee, Jared
(1291) Massol, Mirault, Grainger
(1292) Mason, Nickels, Hameau
(1293) Wong, Goh, Yap
(1294) Harmon, Barak, Shafto, Edwards, Feldman
(1295) Lelonkiewicz, Ktori, Crepaldi





Friday, November 5, 2021
12:00-1:00 PM US CDT (*unless otherwise noted*)
Poster Session I (1001-1469) (*continued*)

Numerical Cognition (1296-1303)

- (1296) Boggan, Clark, Sample
- (1297) Lopiccolo, Chang
- (1298) Oberholzer, Lindskog, Scheibehne
- (1299) Vaidya, Kayton, Barth, Patalano
- (1300) Gwiazda, Bondhus, Williams, Kayton, Barth, Patalano
- (1301) Barth, Vaidya, Barragan, Delgado, Hammond, Litts, Montano, Newman, Ohiomah, Wolk, Patalano, Eisen
- (1302) Retanal , Maloney 
- (1303) Scheibe, Fitzsimmons, Thompson

Test Effects on Learning and Memory (1304-1322)

- (1304) Butowska , Hanczakowski, Zawadzka
- (1305) Arcos, Hausman, Storm
- (1306) Zung, Imundo, Pan
- (1307) Badali, Rawson, Dunlosky
- (1308) Johnson, Marraffino, Whitmer, Flores-Cruz, Sobel, Garibaldi
- (1309) Daley, Rivers, Rawson
- (1310) Kaku, Pan, Sana
- (1311) Gorospe, Little, Wapp-Prasad
- (1312) Hildenbrand, Griffin, Wiley
- (1313) Crowley, Newbury, Tamminen, Rastle
- (1314) Karaca, Geraci, Lithander
- (1315) Buchin, Mulligan
- (1316) Ahn, Chan
- (1317) Imundo, Clark, Paquette-Smith
- (1318) Wissman
- (1319) DiMarco, Marmurek
- (1320) Xie, Reuter-Lorenz
- (1321) Hausman, Rhodes, Hahne, Kubik
- (1322) Vaughn, Fitzgerald, Hood, Migneault, Krummen

Statistics and Methodology (1323-1330)

- (1323) Hout, Cazares Rodriguez, Sandin, Papesh, Post, Madrid, White, Guevara Pinto, Welsh, Goode, Skuslky
- (1324) Stefan, Evans, Wagenmakers
- (1325) Chinchani , Menon, Roes, Hwang, Allen, Bell, Bless, Bortolon, Cella, Fernyhough, Garrison, Kozáková, Laroi, Moffatt, Say, Suzuki, Toh, Zaytseva, Rossell, Moseley, Woodward
- (1326) Plant
- (1327) Smith, Spear, Jamieson
- (1328) Rabe, Paape, Vasisht, Engbert
- (1329) Jaffe, Bissett, Poldrack, Schafer
- (1330) Akrenius

Consciousness and Attentional Control (1331-1351)

- (1331) Tseng, Damian
- (1332) Strivens, Koch, Lavric
- (1333) Balcazar, Orr
- (1334) Siqi-Liu, Egner
- (1335) Withdrawn
- (1336) Hood, Charbonneau, Hutchison
- (1337) Geddert, Egner
- (1338) Lee, Cho
- (1339) Lee, Cho
- (1340) Möller, Mayr
- (1341) Hirsch, Koch
- (1342) Mowad, Arrington
- (1343) Kahan, Bogue
- (1344) Snijder, Bugg, Tang, Conway, Braver
- (1345) Martis, Davis
- (1346) Nicosia, Balota
- (1348) Bryce, Bratzke
- (1349) Nikiforova, Huber, Cowell
- (1350) Barnhart, Lundell, Ludwiczak, Shebesta
- (1351) Cunningham, Beck, Sadaghiani, Wang

Development and Individual Differences in Bilingualism (1352-1362, 1469)

- (1352) Bobb, Hoshino, Sunderman, Bascom, Hutchinson, Palleschi, Cox
- (1353) Garcia, Gollan
- (1354) Tosun, Batman, Filipovic
- (1355) Song, Kröll , Scontras
- (1356) Prior, Schreiber, Degani
- (1357) Botezatu, Peterson, Kröll , Garcia
- (1358) Hummel
- (1359) Aslan Sisman , Keysar
- (1360) Wiley, Washington
- (1361) Withdrawn
- (1362) Link, Weiss, Carlson
- (1469) Rivera, Paolieri, Pérez, Bajoi

Embodied Cognition (1363-1371)

- (1363) Bottini, Steinlein, Kundu
- (1364) Withdrawn
- (1365) Raßbach, Griefsbach, Cañal-Bruland, Herbort
- (1366) Marshall, Graham, Briones
- (1367) Vladimirov, Kuritsyn, Chistopolskaya
- (1368) Feiler, Scofield
- (1369) Escámez Moreno, Callizo-Romero, Solana, Santiago
- (1370) Kelly, Chrysikou
- (1371) Chekhonin, Spiridonov





Friday, November 5, 2021
12:00-1:00 PM US CDT (unless otherwise noted)
Poster Session I (1001-1469) (continued)

Music Cognition (1372-1380)

- (1372) Halpern, Armitage, Eerola
- (1373) Withdrawn
- (1374) Thompson, Slevc
- (1375) Schmidt Avendaño, Eskenazi
- (1376) Van Hedger, Khudhair
- (1377) Aryanto, Aisyah, Blakey, Timmers, von Bastian
- (1378) Burnham
- (1379) Hansen, Whitaker, Stefanucci
- (1380) Ren, Brown

Perception and Action (1381-1399)

- (1381) O'Rear, Radvansky
- (1382) Proctor, Han, Rao
- (1383) Rodriguez-Velasquez, Ewolds, Kuenzell, Broeker, Raab, Feldmann, Kiesel, Thomaschke
- (1384) Kyrkos, Strawn, Eder, Slifkin
- (1385) Harris, Strang, Reed
- (1386) Macuga, Durand, Boone, Lemasson
- (1387) Dowell, Korkmaz, Hajnal
- (1388) Mayr, Qiu, Möller, Koch, Frings
- (1389) Choi, Proctor
- (1390) Withdrawn
- (1391) Miles, Winter
- (1392) Terry, Trick
- (1393) Schröger, Raab, Cañal-Bruland
- (1394) Liesner, Schwinum, Kunde
- (1395) Gutzeit, Donath, Huestegge, Weller, Kürten
- (1396) MacNeil, Whitwell, Enns
- (1397) Whitaker, Gill, Azbill, Stefanucci
- (1398) Withdrawn
- (1399) Huette

Psycholinguistics I (1400-1418)

- (1400) Oncel, Creer, Mills, Allen
- (1401) Marcet, Perea
- (1402) Lei, Liu, Hell
- (1403) Lopez, McDonald
- (1404) Langley, Almor
- (1405) Cheimariou
- (1406) Withdrawn
- (1407) Potter, Watson
- (1408) Coskun, Kuperman
- (1409) de Long, Folk
- (1410) AlJassmi, McGowan, Xie, Paterson
- (1411) Patra, Kirkwood, Middleton, Thothathiri
- (1412) Båk

- (1413) Severijnen, Di Donna, Bosker, McQueen
- (1414) Neergaard, Waegemaekers
- (1415) Kim, Nam, Kang, Lee, Sun
- (1416) Papoutsi, Frost, Bosker
- (1417) Withdrawn
- (1418) Siew, Castro

Reasoning/Problem Solving I (1419-1433)

- (1419) Czarnowski, Marsh
- (1420) Mason, Kurtz
- (1421) Strickland, Ohlsson, Wiley
- (1422) Liu, Novick
- (1423) Yu, Beeman, Salvi
- (1424) Mayers, Calvillo
- (1425) Ricco, Von Monteza, Bonsel, Koshino
- (1426) Raoelison, Policarpio
- (1427) Voudouri, Bago, Borst, De Neys
- (1428) Loginov, Spiridonov, Kurbanov, Ardislamov, Ammalainen, Vyazovkina
- (1429) Markina, Korovkin
- (1430) Ammalainen, Moroshkina
- (1431) O'Neill, Henne, Bello, Pearson, De Brigard
- (1432) Withdrawn
- (1433) Taylor, von Hippel

Recall I (1434-1450)

- (1434) Shoval, Gronau, Makovski
- (1435) Clark, Todorovic, Levy, Eschmann, Anderson, Fawcett
- (1436) Withdrawn
- (1437) Broitman, Swallow
- (1438) Redifer, Bragg
- (1439) Hernandez, Lindsey
- (1440) Gopi, Madan 🇮🇳
- (1441) DeYoung, Serra
- (1442) Whillock 🇺🇸, Scott, Meade
- (1443) Adler, Kron, Pansky
- (1444) Kazanas, Johnson
- (1445) Nadarevic
- (1446) Delarazan, Morse, Bosak, Lee, Cohn-Sheehy, Zacks, Reagh
- (1447) Skinner, Smith, Hunt
- (1448) Withdrawn
- (1449) Kelly, Risko
- (1450) Jin, Choi, Pepe, Greeley, Kensing, Mohanty, Rajaram

Recognition I (1451-1465)

- (1451) Yuquimpo, Benjamin
- (1452) Dollois, Anees, Fenske, Fiacconi





Friday, November 5, 2021
12:00-1:00 PM US CDT (unless otherwise noted)
Poster Session I (1001-1469) (continued)

(1453) Werner, McMillin, Snyder, Parks

(1454) Ramey , Henderson, Yonelinas

(1455) Lim, Pratt , Fukuda

(1456) Zaborowska, Wulff, Kuhlmann, Zawadzka, Hanczakowski

(1457) Layher, Agrawal, Bhatia, Miller

(1458) Fallow, Barden, Lindsay

(1459) de la Rosa-Rivera, Cowell

(1460) Whitlock, Sahakyan, Hubbard

(1461) Owusu, Service

(1462) Kiyokawwa, Yoshino

(1463) Lloyd, Colombo, Morgan, Fels, Capriglione, Hunter

(1464) Lo, Sahakyan

(1465) Li, Layher, Miller

1:30-3:30 PM US CDT (unless otherwise noted)
Symposium II (SYM6-SYM11) and Spoken Session (86-121)

**Symposium II: Beyond the Button Press: Studying the Mind
Through Drawings (SYM6-SYM11)**

1:30-1:50 PM Bainbridge

1:50-2:10 PM Fan

2:10-2:30 PM Chamberlain

2:30-2:50 PM Ritchie, Van Buren

2:50-3:10 PM Van Buren, Ritche, Lefèvre, Wagemans

3:10-3:30 PM Van Geert, Frérart, Wagemans

Attention Control (86-91)

1:30-1:50 PM Woodman, Wang, Sutterer, Reinhart, Fukuda

1:50-2:10 PM Teubner-Rhodes, Luu, Vaden

2:10-2:30 PM Sperling, Sun, Gan

2:30-2:50 PM Koch, Hazeltine, Petersen, Weissman

2:50-3:10 PM Carlisle

3:10-3:30 PM Morrison, Jagacinski, Petrov

Bilingualism II (92-97)

1:30-1:50 PM Withdrawn

1:50-2:10 PM Degani, Kreiner, Declerck

2:10-2:30 PM Chan, Iwasaki, Kroll 

2:30-2:50 PM Buffington, Demos, Morgan-Short

2:50-3:10 PM Paap, Machuca, Zimiga

3:10-3:30 PM Privitera, Momenian, Bakhtiar, Weekes

Judgment and Decision Making I (98-103)

1:30-1:50 PM Kareev, Avrahami, Budescu, Kugler, Tzameret, Shmuel

1:50-2:10 PM Russo, Boyle, Kim

2:10-2:30 PM Budescu, Himmelstein

2:30-2:50 PM Bruine de Bruin, Slovic

2:50-3:10 PM Pachur, Clarmann von Clarenau, Spitzer

3:10-3:30 PM Caddick, Rottman

Psycholinguistics (104-109)

1:30-1:50 PM Broniatowski, Reyna

1:50-2:10 PM Lowder, Zhou, Gordon

2:10-2:30 PM Gardner, Brown-Schmidt

2:30-2:50 PM Kaiser

2:50-3:10 PM Gutiérrez, Taylor, Blott, Rodd

Recall I (110-115)

1:30-1:50 PM Mulligan, Buchin

1:50-2:10 PM Plancher, Tillmann, Ferreri

2:10-2:30 PM Sahakyan

2:30-2:50 PM Bhatia, Richie

2:50-3:10 PM Nieuwenstein, Ainsworth, Hansen-Manguikian, Yildirim

3:10-3:30 PM Quevedo Pütter, Erdfelder

Multisensory Perception (116-121)

1:30-1:50 PM Morett, Feiler, Getz

1:50-2:10 PM Wilbiks, Brown, Strand

2:10-2:30 PM Withdrawn

2:30-2:50 PM Smeets

2:50-3:10 PM Spape, Harjunen, Ravaja

3:10-3:30 PM O'Donohue, Yamamoto, Lacherez

3:45-5:45 PM US CDT (unless otherwise noted)
Symposium III (SYM12-SYM16)

**Symposium III: Moving Beyond Cognitive Universals
(Special Symposium)**

3:45-4:05 PM Prather

4:05-4:25 PM López

4:25-4:45 PM Camacho

4:45-5:05 PM Duarte

5:05-5:25 PM Manly





Saturday, November 6, 2021

**8:00-10:00 AM US CDT (unless otherwise noted)
Spoken Sessions (127-164)**

Cognitive Aging II (127-131)

8:00-8:20 AM Crawford, Singh, Fenske
8:20-8:40 AM Withdrawn
8:40-9:00 AM Curtis, Schmiedeler, Eberhardt, Wilhelm, Cowan,
McCrae
9:00-9:20 AM Withdrawn
9:20-9:40 AM Johnen, Tanguay, Markostamou, Lambert, Rudrum,
Davidson, Renoult

Decision Making II (132-136)

8:00-8:20 AM Metcalfe, Kim, Malter
8:20-8:40 AM Liu, Townsend
8:40-9:00 AM Trueblood, Sussman
9:00-9:20 AM Wang, Wang, Lu, Zhou, Li, Garelik
9:20-9:40 AM Darby, Gettleman, Dodson, Sederberg

Speech Perception II (137-141)

8:00-8:20 AM Withdrawn
8:20-8:40 AM McLaughlin, Brown, Carraturo, Van Engen
8:40-9:00 AM Crinnion, Luthra, Gaston, Magnuson
9:00-9:20 AM Withdrawn
9:20-9:40 AM Bosker, Heffner

Recall II (142-146)

8:00-8:20 AM Fisher, Radvansky
8:20-8:40 AM Sasmita, Swallow
8:40-9:00 AM Persaud, Bonawitz

9:00-9:20 AM Roberts, MacLeod, Fernandes
9:20-9:40 AM del Missier, Stragà, Munaretto, Ferrante, Mäntylä

Emotion and Cognition (147-152)

8:00-8:20 AM Hudson, Schober
8:20-8:40 AM Kersten, Earles, Vernon, McRostie, Riso
8:40-9:00 AM Wilck, Altarriba
9:00-9:20 AM Brashier, Lang, Schacter
9:20-9:40 AM Kapucu, Söylemez
9:40-10:00 AM Blazhenkova, Booth

Letter/Word Processing (153-158)

8:00-8:20 AM Mak, Hsiao, Nation
8:20-8:40 AM Angele, Baciero, Gomez, Perea
8:40-9:00 AM Snell, Yeaton, Mirault, Theeuwes, Grainger
9:00-9:20 AM Kinoshita
9:20-9:40 AM Colombo, Spinelli, Lupker
9:40-10:00 AM Crepaldi, Lelonkiewicz, Torrisi, Tadić, Zoccolan

Visual Working Memory (159-164)

8:00-8:20 AM Awh, Thyer, Adam, Diaz, Vogel
8:20-8:40 AM Withdrawn
8:40-9:00 AM Withdrawn
9:00-9:20 AM Brissenden, Lee
9:20-9:40 AM Popov, Ji, Oberauer
9:40-10:00 AM Chen 星, Fu, Shen

**10:00 AM-12:00 PM US CDT (unless otherwise noted)
Symposium IV (SYM17-SYM21) and Spoken Sessions (170-202)**

Symposium IV: Advancing Cognition Through Adversarial Collaboration: The Case of Working and Long-Term Memory (Leading Edge Workshop)

10:00-10:20 AM Logie
10:20-10:40 AM Cowan
10:40-11:00 AM Zacks, Bezdek, Nguyen
11:00-11:20 AM Barens
11:20-11:40 AM O'Reilly

Cognition in Non-Human Animals (170-174)

10:20-10:40 AM Withdrawn
10:40-11:00 AM Pepperberg
11:00-11:20 AM Tosatto, Fagot, Nemeth, Rey
11:20-11:40 AM Flaim, Blaisdell
11:40-12:00 PM Leising, Nerz, Elliott, Stahlman

Social/Cultural Influences on Cognition I (175-179)

10:20-10:40 AM Galati, Plastira, Friedman, Avraamides
10:40-11:00 AM McCrackin, Mayrand, Ristic
11:00-11:20 AM Kuhlen, Abdel Rahman
11:20-11:40 AM Wiseheart
11:40 AM-12:00 PM Gobel

Autobiographical Memory (180-184)

10:20-10:40 AM Kuperman, Kyröläinen
10:40-11:00 AM Kyröläinen, Kuperman
11:00-11:20 AM Morales-Valiente, McRae
11:20-11:40 AM Jatau, Kaya Kizilöz
11:40-12:00 PM Janssen, Foo, Johnson, Lim, Satel

Reading (185-190)

10:00-10:20 AM Armstrong, Alhama, Siegelman, Frost
10:20-10:40 AM Jarosz, Creer, Allen





Saturday, November 6, 2021

10:00 AM-12:00 PM US CDT (unless otherwise noted)

Symposium IV (SYM17-SYM21) and Spoken Sessions (170-202) (continued)

10:40-11:00 AM Ulicheva, Rastle
11:00-11:20 AM Rastle, Cevoli, Watkins
11:20-11:40 AM Withdrawn
11:40-12:00 PM Drieghe, Fitzsimmons, Weal, Kaakinen, Jayes

Metacognition (191-196)

10:00-10:20 AM Ariel
10:20-10:40 AM Gilbert
10:40-11:00 AM Thompson, Bueckert, Groot, Moellenbeck, Newman, Quartararo
11:00-11:20 AM Wolfe, Williams, Dewey, Wolfe

11:20-11:40 AM McDonough, Enam, Kraemer, Eakin, Kim
11:40-12:00 PM Baron

Spatial Cognition and Memory (197-202)

10:00-10:20 AM Brunec, Nantais, Sutton, Epstein, Newcombe
10:20-10:40 AM Cherep, Kelly
10:40-11:00 AM Gagnon, Stefanucci, Creem-Regehr
11:00-11:20 AM Singer, Nardi
11:20-11:40 AM Yamamoto, James, Van Pelt, Lowe
11:40-12:00 PM Intraub, Blauvelt

12:00-1:00 PM US CDT (unless otherwise noted)

Poster Session II (2001-2499)

Bilingual Comprehension and Production (2001-2022)

(2001) Bodet, Hernandez
(2002) Declerck, Sánchez, Struys, Philipp
(2003) Titus, Peeters
(2004) Foster, Cherry, Byers, Sosa-Rosales, Sanchez
(2005) Otero, Brouwer, Planelles Almeida, Foucart
(2006) Neveu, Kaushanskaya
(2007) Withdrawn
(2008) Chen, Goldrick
(2009) Vernooij, Boland
(2010) Salig, Valdés Kroff, Slevc, Novick
(2011) Withdrawn
(2012) von Grebmer zu Wolfsturn, Pablos, Schiller
(2013) Wong, Higby
(2014) Cai, Zhao, Chen
(2015) Li, Ferreira, Gollan
(2016) Senaldi, Titone
(2017) Pan, Kim, Shih, Sherwin, Jared
(2018) Hameau, Kim, Kinoshita, Wang, Nickels
(2019) Carraturo, Van Engen
(2020) Iqbal, Shahin, Spivey, Backer
(2021) Patterson, Karuza
(2022) Libersky, Neveu, Kaushanskaya

Decision Making II (2023-2045)

(2023) Illingworth, Thomas
(2024) Barideaux, Gray, Kaltwang, Biganzoli
(2025) Didierjean, Thomas, Navarre
(2026) Nakamura
(2027) Casteel
(2028) Stanley, Wedell
(2029) Teal, Kusev
(2030) Daigle, Sovijarvi-Spape, Harding
(2031) Claus

(2032) Castillo, León-Villagrà, Chater, Sanborn
(2033) Quirk, Jonides, Fansher, Lalwani, Adkins, Shah, Lewis, Boduroglu, Carlson
(2034) Yesilada, Lewandowsky
(2035) Avci, Boduroglu
(2036) Fastrich, Ballard, Newal, Palada, Farrell
(2037) Johnson, Thomas, Davidson, Collins, Pettit
(2038) McOwen, Don, Worthy
(2039) Stornelli, Krause, Berman
(2040) Noh, Kerr, Bornstein
(2041) Wang, Aka, Bhatia
(2042) Sanchez, Bauer
(2043) Bell, Applegate, Bailey
(2044) Burton 🦋, Bodner, Williamson
(2045) White

Human Learning and Instruction II (2046-2060)

(2046) Kluger, Oladimeji, Tan, Brown, Caplan
(2047) Tsapali, Ellefson
(2048) Kurpad, Wilford, Kornell
(2049) Taylor, Shumaker, Arnold
(2050) Withdrawn
(2051) Richardson, Lacroix, Aswad, Robinson, Whittaker
(2052) Frankenstein, Udeogu, Sklenar, Urban Levy, Leshikar
(2053) Withdrawn
(2054) Salovich 🦋, Rapp
(2055) Broeren, Verkoeijen, Heijltjes, Smeets, Arends
(2056) Kim, Butler
(2057) Ciesielski, Hargis, Oppenheimer
(2058) Gereau, Myers, Rhodes
(2059) Witherby, Carpenter
(2060) Laursen, Wammes, Fiacconi





Saturday, November 6, 2021
12:00-1:00 PM US CDT (unless otherwise noted)
Poster Session II (2001-2499) (continued)

Emotion and Cognition II (2061-2080)

- (2061) Holloway, Moore, Nández, Sr.
- (2062) Bognar, Aczel
- (2063) Banissy, Edgar, Bird
- (2064) Oh, Shinkareva
- (2065) Miller, Dougherty
- (2066) Chesebrough, Chryssikou, Kounios
- (2067) Doyle, Ferber
- (2068) Avery, Spencer, Altarriba
- (2069) Febre, Faghihi, Vaid
- (2070) Symeonidou, Burtin, Plohmann, Schnieders, Schott, Schweizer
- (2071) Withdrawn
- (2072) Flynn, Caulfield, Jeung, Polk, Kan
- (2073) Kazanas, Jones
- (2074) Alaifan, Chin Sin-Shuen, Kim, Miao, Graf
- (2075) Cox, Lioret, Chainay, Davidson
- (2076) Yüvrük, Kapucu
- (2077) Chapman, Kole
- (2078) Holmer, Rönnerberg, Ekberg
- (2079) Chamberland, Collin
- (2080) Qureshi, Monk

Reading (2081-2102, 2502)

- (2081) Jensen, Luke
- (2082) Ward, Jared, Friesen
- (2083) Saghiran, Valdois, Diard
- (2084) Steinhilber, Diard, Ginestet, Valdois
- (2085) Hevia-Tuero, Incera, Suárez-Coalla
- (2086) Withdrawn
- (2087) Withdrawn
- (2088) Laks, Sheridan
- (2089) Milligan, Antúnez, Barber, Schotter
- (2090) Eskenazi, Lipkin, Surrency, Tidd
- (2091) Withdrawn
- (2092) Whitford, Byers, Hoe Sue Yeen, MacIsaac
- (2093) Alexeeva, Zubov
- (2094) Deshaies, Christianson
- (2095) Wong, Veldre, Andrews
- (2096) Luke, Dodds
- (2097) Siegelman, Rueckl, Brown, Steacy, Compton
- (2098) Lombard, Dias de Silva, Mills, Collin, Postma, Faber
- (2099) Smith, Hughes, Gordon
- (2100) Houts, Levine
- (2101) Deibel, Knapp, Folk
- (2102) Miller, Dumay, Pitt, Armstrong, Miller
- (2502) Brunstein, Brunstein, Rosenstock

Eyewitness Identification (2103-2123)

- (2103) Hoover, Cohen, Rotello
- (2104) Kleider-Offutt, Stevens
- (2105) Paramo, Maass
- (2106) DiDomenica, Gronlund
- (2107) Sifre, Pérez-Mata, Diges
- (2108) Pezdek, Shapland
- (2109) Mah, King-Nyberg, Grannon, Friesen, Rasor, Wade, Lindsay
- (2110) O'Donnell, Chan, Wells
- (2111) Kim, Kwon, Sanchez, Sitanggang
- (2112) Wooten, Munir, Olof, Carlson
- (2113) Mcadoo, Kellen
- (2114) Capodanno, Offutt
- (2115) Tuttle, Starns, Cohen, Rotello
- (2116) Garcia, Davis, Dianiska, Manley
- (2117) Jones, Carlson, Lockamyeir, Hemby
- (2118) Lockamyeir, Carlson, Jones, Wooten, Carlson, Hemby
- (2119) Ayala, Smith, Wells
- (2120) Shen, Wixted, Lam
- (2121) Smith, Smalarz
- (2122) Gettleman 🌟, Dodson
- (2123) Grabman, Dodson

False Memory (2124-2136)

- (2124) Gurrola, Uribe, Francis
- (2125) Wright, Brown-Schmidt
- (2126) Chang, Coane, Fernández, Díez, Alonso, Sanchez-Gutierrez, McBride
- (2127) Withdrawn
- (2128) Kemp, Garlitch, Loaiza, Wahlheim
- (2129) Botsas, Poirier
- (2130) McCoy, Weidler
- (2131) Marsh, Chang, McBride, Coane
- (2132) Kawasaki, Craik
- (2133) Withdrawn
- (2134) Loprinzi, Smith, Hunt
- (2135) Romero, Bennion
- (2136) Torrance, Karanian, Race, Thomas 🌟

Prospective Memory (2137-2147)

- (2137) López-Rojas, Marful, Pérez, Bajo
- (2138) Wells, Kruck, George, Catlett, Jackson, Culver, Wiley, Shelton
- (2139) Letellier, Blondelle, Hainselin
- (2140) Gier, Kreiner
- (2141) Hughes, Clawson
- (2142) Peper, Ball
- (2143) Wiemers, Ball
- (2144) Félix, Pandeirada





Saturday, November 6, 2021
12:00-1:00 PM US CDT (unless otherwise noted)
Poster Session II (2001-2499) (continued)

(2145) Kuka, Smith

(2146) Harrington, Turner, Melancon

(2147) Tsai, Gilbert

Sensation and Perception (2148-2161)

(2148) Hsu, Tseng, Chen

(2149) Church, Jackson, Wisniewski, Rodgers, Lopata, Mercado

(2150) Kerr-German, Tuman, John, AuBuchon

(2151) Sun, Hines

(2152) Wegner-Clemens, Malcolm, Shomstein

(2153) Dickerson, Gerhardstein, Duff, Moser, Olsen

(2154) Zadoorian, Rosenblum

(2155) Getz, Dejbakhsh

(2156) Yokosawa, Monjo, Konishi

(2157) Kim, Kingstone, Sinnett

(2158) Suzuki, Nagai

(2159) Jang, Ko, Jo, Kim

(2160) Salgues, Plancher, Michael

(2161) McFeaters, Voyer

Attention to Scenes and Objects (2162-2172)

(2162) Bokhari, Sali

(2163) Fu, Dodd

(2164) Robbins, Nah, Dubbelde, Shomstein

(2165) Zhou, Zhou

(2166) Addleman, Stoermer

(2167) Latthirun 🦿, Yang

(2168) Bonnin, Mercier, Leclercq

(2169) Cronin, Henderson

(2170) Charbonneau, Hood, Towner, Marois, Hutchison, Watson

(2171) Kosovicheva, Kanda, Wolfe, Wolfe

(2172) Langley, McBeath

Visual Search and Attention (2173-2193)

(2173) Kim, Beck

(2174) Trost, Baker, Gibson

(2175) Mohite, Mishra

(2176) Lamy

(2177) Lee, Kim, Grindell, Anderson

(2178) Withdrawn

(2179) Withdrawn

(2180) Jankovic, Di Lollo, Spalek

(2181) Talcott, Levy, Gaspelin

(2182) Hong, Kim

(2183) Moen, Heun

(2184) Tünnermann, Schubö

(2185) Cui, Lleras, Buetti

(2186) Scarince, Moreno

(2187) Lanagan-Leitzel, Salters-Pedneault

(2188) Alister, McKay, Sewell, Evans

(2189) Alonso, Lavelle, Drew

(2190) Adema, Tang, Alizadeh Saghati, Mack

(2191) Rosenstreich, Cohen, Levi

(2192) Rieger, Radovic, Manzey

(2193) Mu, Tünnermann, Witzel, Albers, Schubö

Judgment (2194-2212)

(2194) Kara-Yakoubian, Spaniol

(2195) Calvillo, Rutchick, Garcia

(2196) Aka, Bhatia

(2197) Noda, Tanabe, Kimura

(2198) Smelter, Calvillo

(2199) Ramsey, Trueblood

(2200) Katz, Hampton, Schneider

(2201) Fana, Chesney

(2202) Udry, Barber

(2203) Newman, Lewandowsky, Mayo

(2204) Schnuerch, Nadarevic, Rouder

(2205) Haasova, Salmen, Florack, Fiedler

(2206) Graninger, Robey

(2207) Salmen, Ermark, Fiedler

(2208) Withdrawn

(2209) Jordan, Bernstein, Nielsen, Garry

(2210) Sullivan

(2211) Braun, Zaragoza, Calvillo, Kiefer, Ithisuphalap

(2212) Herring, LaCour, Serra

Speech Perception (2213-2240)

(2213) Knight, Mattys

(2214) Exton, Gowing, Newman

(2215) Lee, Backer, Mattys, Bortfeld

(2216) Kapnoula, Samuel

(2217) McGarrigle, Knight, Hornsby, Mattys

(2218) Gomes, Castro, Silva

(2219) Cox, McLennan

(2220) Jaggy, Schwan, Meyerhoff

(2221) Wright, Baese-Berk

(2222) Crinnion, Heffner, Myers

(2223) Derawi, Reinisch, Gabay

(2224) Robinson, Bradlow, Cole

(2225) McLaughlin, Colvett, Bugg, Van Engen

(2226) Charoy, Samuel

(2227) Zevin, Zhang

(2228) Brown, Dillman-Hasso, Van Engen, Strand

(2229) Williams, Obrzut, Waller, Brouwer, Dussias, Viswanathan





Saturday, November 6, 2021
12:00-1:00 PM US CDT (unless otherwise noted)
Poster Session II (2001-2499) (continued)

(2230) Tuft, Incera, McLennan
(2231) Cummings, Karboga, Yang, Jaeger
(2232) Pelzl, Carlson, Jackson, van Hell
(2233) Sarrett, McMurray, Toscano
(2234) Wagner
(2235) Khayer, Banai
(2236) Mechtenberg, Luthra, Myers
(2237) Hunter, Abrahamyan
(2238) Withdrawn
(2239) Vroomen, Pour Hashemi, van Laarhoven, Baart
(2240) Gleason, Francis

Cognition and Technology (2241-2257)

(2241) Gardony, Sipolins, Renshaw, Garijo-Garde
(2242) Sarno, Black, Paradise, Stokx, Summers
(2243) Withdrawn
(2244) Olivia, Storm
(2245) Greeley, Peña, Rajaram
(2246) Ditta, Soares, Storm
(2247) Shepherdson, Nguyen, Benediktsdóttir
(2248) Scarampi, Tsai, Sachdeva, Gilbert
(2249) James, Storm
(2250) Goodman, Moore
(2251) Bittner, Storm
(2252) Eliseev, Marsh
(2253) Haqqim, Janssen, Ismail
(2254) Withdrawn
(2255) Rezlescu, Prabhu-Naik
(2256) Jungers, Sedziol
(2257) Guerra, Zipitria

Cognitive Aging (2258-2281, 2497)

(2258) Parimoo, Grady, Olsen
(2259) Poirier, Tolan
(2260) Hughes, Touron
(2261) Shafto, Abrams, James
(2262) De Pue, Gillebert, Dierckx, Van den Bussche
(2263) Latham, Jennings, Adkins, Blankenstein
(2264) Zemla, Chambers, Austerweil, Cimpian
(2265) Harada, Takawaki, Sawada, Okabe, Nakao
(2266) Mallik, Allen, Lien, Jardin, Houston, Houston, Jurosic
(2267) Hanif, Jefferies, de Bruin
(2268) Aeschbach, De Deyne, Mata, Wulff
(2269) Li, Yang
(2270) Mckinley, Kuhns, Touron, Hertzog
(2271) Das, Steyvers
(2272) Garlitch, Wahlheim, Richmond, Ball
(2273) Myftaraj, Anderson

(2274) Kuhns, Touron
(2275) Cyr, Arrieta
(2276) Costa, McCrae, Cowan, Curtis
(2277) Blackburn, Perez
(2278) Schmiedeler, Curtis
(2279) Wolters, Sun
(2280) Kazmerski, Sheik, Dawood, Blasko
(2281) Burnett, Peña, Rajaram, Richmond
(2497) Kuhlmann, Matsuba, Chen, Bernstein

Working Memory (2282-2302)

(2282) Roman, Ortega, Bajo, Gómez-Ariza
(2283) Hautekiet, Verschooren, Langerock, Vergauwe
(2284) Jang, Lustig, Lewis
(2285) DeStefano, Vul, Brady
(2286) Parong, Green, Seitz, Jaeggi
(2287) Rosales, Hao, Snijder, Kovacs, Kane, Conway
(2288) Maezawa, Kawahara
(2289) Bhatia, Spataro, Rossi-Arnaud
(2290) Withdrawn
(2291) Morrison, Brown
(2292) Dames, Oberauer
(2293) Greve, Byrnes, Graham, Was
(2294) Pham, Varagunan, Malik, Archibald
(2295) Labaronne, Plancher
(2296) MacMilan, Neath, Hourihan
(2297) Wilson, Chesney
(2298) Ward
(2299) Valentini, Cowan, Vergauwe
(2300) Cotton, Ricker
(2301) Debraise, Mathy
(2302) Qiu, Möller, Koch, Mayr
(2303) Bushinski, Redick

Spatial Memory and Cognition (2304-2314, 2494)

(2304) Barhorst-Cates, Wong, Buxbaum
(2305) Tansan, Shipley, Newcombe
(2306) Finney, Murdock, Rohovit, Brickler, Creem-Regehr, Stefanucci
(2307) Cheng, He, Spiers, Coutrot, Hornberger, Hegarty, Chrastil
(2308) Szubielska, Szweczyk, Augustynowicz, Kędziora, Möhring
(2309) Dudas-Thomas, Gardony, Brunyé, Taylor
(2310) Wasche, Sargent, Henderson
(2311) Gallup
(2312) He
(2313) Saxon, Klemser, Fernberg, Creem-Regehr, Stefanucci, Chamberlain
(2314) Lei, Mou
(2494) Lee, Cho





Saturday, November 6, 2021
12:00-1:00 PM US CDT (unless otherwise noted)
Poster Session II (2001-2499) (continued)

Event Cognition (2315-2324)

- (2315) Xin, Ge
(2316) Smith, Loschky, Bailey
(2317) Pitts, Smith, Newberry, Brunner, Wildeman, Apel, Hendrick, Schultz, Bailey
(2318) Kurby, Bangert
(2319) Logie, Donaldson
(2320) Newberry, Bailey
(2321) Schreiner, Meiser, Bröder
(2322) Lee, Levin
(2323) Katikhina, Misersky, Flecken, Lai
(2324) Wang, Egner

Reasoning/Problem Solving II (2325-2340)

- (2325) Ballestero-Arnau, Giaiotti, Garcia-Arch
(2326) Langstone, Kittani
(2327) Loginov, Spiridonov, Ammalainen, Vyazovkina, Ardislamov, Anufriev
(2328) Park, Marsh
(2329) Beda, Kim, Orr, Smith
(2330) Makarov, Savinova, Vladimirov, Bushmanova
(2331) Zhao, Roskos
(2332) Xing, Corter, Zahner
(2333) Tidler, Pai, Snoll, Helmy, Catrambone
(2334) Ratiu, Greene-Winek, Simon, Growth, LaCroix
(2335) Gonzalez, Ratanjee, Sadeghi, Blaisdell
(2336) Michal, Seifert, Shah
(2337) George, Chesebrough
(2338) Withdrawn
(2339) Chistopolskaya, Lazareva, Savinova
(2340) Quartararo, Thompson

Psycholinguistics II (2341-2358, 1245)

- (2341) Vargas Fuentes, Kroll 🌟, Torres
(2342) Ryskin, Nicolette-Sanchez
(2343) Brouwer, Foucart
(2344) Lakshmanan
(2345) Pfeifer, Maytorena, Tzuyin
(2346) Swets, Bonanni, Malinowski
(2347) Maher, Edwards, Novick
(2348) Evans, Brown-Schmidt
(2349) Chia, Kaschak
(2350) Calma-Roddin, Gerrig, Brennan
(2351) Barker, Rehrig, Ferreira
(2352) Li, Dijkstra, Zwaan
(2353) Lampe, Hameau, Nickels
(2354) Tovar, Tokowicz
(2355) Puhacheuskaya, Järvikivi
(2356) Getty, Fraundorf

- (2357) Cotter, Ferreira
(2358) Lazartigues, Mathy, Lavigne
(1245) Tsutsuse, Stout, Sinnett

Language and Meaning (2359-2372)

- (2359) Segura, Pompeia
(2360) Park, Al Otaibi, AlRaqbani, Almohammed
(2361) Withdrawn
(2362) Blair, Morini
(2363) Withdrawn
(2364) Hafri, Gleitman, Landau, Trueswell
(2365) Al-Azary, McRae
(2366) Withdrawn
(2367) Eligio, Kaschak
(2368) Ashok Kumar 🌟, Balota
(2369) Hollander, Olney
(2370) Holmes, Star-Lack, Elpers, Flusberg, Thibodeau
(2371) Taylor, Nation, Hsiao
(2372) Reid, Katz

Recall II (2373-2396)

- (2373) Pepe, Rajaram
(2374) Rajaram, Greeley, Peña, Choi
(2375) Lipowski, Tameling, Brook, Pyc, Canda
(2376) Roberts, Homann, Ahmed, Fernandes
(2377) Houser, Tompary, Murty
(2378) Tullis
(2379) Serra, DeYoung
(2380) Peña 🌟, Pepe, Rajaram
(2381) Sinha 🌟, Kumari
(2382) Nishiyama, Saito
(2383) Briggs, Collins, Walker, Eyma, Tompkins, Goonan, Tola
(2384) Seitz, Equita, Kim, Tomiyama, Blaisdell
(2385) Lu, Kelly, Risko
(2386) Prull, Dickey, Jaramillo, Kronemeyer
(2387) Alexander, Porter
(2388) Rawlinson, Kelley
(2389) Shields, McGinnis, Selmecky
(2390) Bialer, Brainerd, Chang
(2391) Piątkowski, von Bastian, Zawadzka, Hanczakowski
(2392) Booth, Welhaf, Kane
(2393) Zhang, Madan 🌟
(2394) Withdrawn
(2395) Finch, Eakin
(2396) Krogulska 🌟, Allen, Bailey, Maylor





Saturday, November 6, 2021
12:00-1:00 PM US CDT (unless otherwise noted)
Poster Session II (2001-2499) (continued)

Recognition II (2397-2410)

- (2397) Kavanagh, Hourihan, Hockley
- (2398) Austin, Fogler
- (2399) Zhang
- (2400) Pandey, Michaud, Ivanoff, Taylor
- (2401) Kim, Navangul, Philipps, Wong
- (2402) Tanyas, Kuhlmann
- (2403) Loo, Cheng
- (2404) Clark, Hourihan, Baldwin, Fawcett
- (2405) Lauzon, Baker, Rosenbaum
- (2406) Jou, Hwang
- (2407) Duarte, Geng
- (2408) Raat, Farr, Evans
- (2409) Leong, Ismail, Estudillo, Wong
- (2410) Feathersen

Metamemory (2411-2425)

- (2411) Wulff, Zaborowska, Hanczakowski, Zawadzka, Kuhlmann
- (2412) Kurdoglu-Ersoy, Kapucu
- (2413) Chang 🦋, Brainerd
- (2414) Cadavid, Luna, Botia
- (2415) Navarro-Baex, Undorf, Bröder
- (2416) Maxwell, Perry, Huff
- (2417) West, Kuhns, Mulligan, Touron
- (2418) Stern, Halamish
- (2419) Leslie, Layher, Miller
- (2420) Mitton, Fiacconi
- (2421) Kraemer, Black, McDonough
- (2422) Smith-Pierce, Lin, Jaeggi
- (2423) Undorf, Navarro-Baez, Bröder
- (2424) Jang
- (2425) Zimdahl, Undorf

Metacognition (2426-2447, 2499, 1347)

- (2426) Arar, Miller, Needell, Gallo
- (2427) Yilmaz, Wixted
- (2428) Mielicki, Fitzsimmons, Scheibe, Thompson
- (2429) Lyons, Thiede, Osguthorpe
- (2430) Withdrawn
- (2431) Madison, Fulton, Gray, Dirickson, Fregoso
- (2432) Umanath, Coane, Cipollini, Song, Beaulieu, Itagaki, Sakoda
- (2433) Lipko-Speed, Akinyemi, Earle, Horan, Mehta, Rivera, Soda
- (2434) Holm, Venell, Olsson, Schrater
- (2435) Said, Brich, Buder, Huff
- (2436) Krasnoff, Souza
- (2437) Withdrawn
- (2438) Fralick, Yan

- (2439) Alakbarova, Peper, Ball
- (2440) Withdrawn
- (2441) Aitken, Jentzsch, O'Connor
- (2442) Léonard, Sylvia, Billet, Geurten
- (2443) Pournaghдали 🦋, Schwartz, Soto
- (2444) Kelemen, Loprinzi, Rigdon, Javadi
- (2445) Martin-Luengo, Altuhov, Leminen, Alekseeva, Shtyrov
- (2446) Siedlecka, Paulewicz
- (2447) Gora, Ricks, Zhou
- (2499) Son, Kim
- (1347) Steindorf, Rummel

Cultural/Social Influences on Cognition (2448-2463)

- (2448) Mayrand, Capozzi, Ristic
- (2449) Paes, Duncan, Purpura, Schmitt
- (2450) Mills, Poulos, Wong, Pascale
- (2451) Withdrawn
- (2452) Gross, Obaid, Altarriba, El-Dakhs
- (2453) Washburn, Donet
- (2454) Skrotzki, Szpunar, Yang
- (2455) Dania, Gleaton, Catrambone
- (2456) Li, Szpunar
- (2457) Ford, Qureshi, Monk, Litchfield
- (2458) Irons, Fischer-Baum
- (2459) Garcia-Arch, Sabio Albert, Fuentemilla Garriga
- (2460) Singh, Su, Jiang, Casasanto
- (2461) Nafcha, Dorfman, Shamay-Tsoory, Gabay
- (2462) Faghihi 🦋, Biehle, Melo, Garcia, Vaid
- (2463) Zhao, Boduroglu, Gutches


Spatial Cognition (2464-2478)

- (2464) Navarro-Cebrian, Forkan, Pearson, Ralston, Fischer
- (2465) Withdrawn
- (2466) Mason, Patron, Thomas 🦋, Wolford II, Taylor
- (2467) Park, Watanabe, Burte
- (2468) Burte, Arismendi, Fackler, Jircik
- (2469) He, Protzko, Kunz, Schooler, Hegarty
- (2470) Kunz, He, Protzko, Schooler, Hegarty
- (2471) Munger, Hu, Yoo, Multhaup
- (2472) Samuel, Eacott, Cole
- (2473) Nguyen, Newcombe, Olson
- (2474) McIntire, Dopkins
- (2475) Withdrawn
- (2476) Böffel, Herbst, Lindemann, Müsseler
- (2477) Hosseinpour, Castro, Padillaa, Quinan
- (2478) Otsuka, Yotsumoto



Saturday, November 6, 2021
12:00-1:00 PM US CDT (unless otherwise noted)
Poster Session II (2001-2499) (continued)

Visual Perception (2479-2493)

(2479) Withdrawn
(2480) Fisk, Haase
(2481) Okubo, Kawabe, Yokosawa
(2482) Knox, Pratt , Cant
(2483) Johansson, Ulrich
(2484) Kyle-Davidson, Skelton, Bors, Evans
(2485) Schoenlein, Soto, Schloss

(2486) Mejia Ramirez, Valdes-Sosa, Bobes-Leon
(2487) Zheng, Moore
(2488) Sahar, Yeshurun, Makovski
(2489) Marma, Bulatov, Bulatova, Diržius
(2490) Rothen, Rey-Mermet, Ovalle-Fresa, Reber
(2491) Cui, Roudaia, Herrmann, Sekuler
(2492) Song, Brown
(2493) Kennedy

1:30-3:30 PM US CDT (unless otherwise noted)
Symposium V (SYM22-SYM25) and Spoken Session (208-233)

Symposium V: The Reliability Paradox: Current Issues, Partial Solutions, and Future Directions (SYM22-SYM25)

1:30-1:35 PM Introduction
1:35-2:00 PM Haines
2:00-2:20 PM Rouder, Haaf
2:20-2:40 PM Brown
2:40-3:00 PM Chen
3-3:20 PM Panel Discussion
3:20-3:30 PM Audience Discussion

Concepts and Categories (208-212)

1:30-1:50 PM Roark, Paulon, Sarkar, Chandrasekaran
1:50-2:10 PM Mukherjee, Yin, Sherman, Lessard, Schloss
2:10-2:30 PM Zhu, Minda
2:30-2:50 PM Malt, Marsh
2:50-3:10 PM Day, Apsel

Statistics and Methodology (213-217)

1:30-1:50 PM Addante
1:50-2:10 PM van Ravenzwaaij, Kovacs, Hoekstra, Aczel
2:10-2:30 PM Malejka, Vadillo, Dienes, Shanks
2:30-2:50 PM Chechile
2:50-3:10 PM Rouder, Haaf, Schnuerch

Human Learning and Instruction I (218-222)

1:30-1:50 PM Schuetze, Yan
1:50-2:10 PM Jolles, Van Tetering
2:10-2:30 PM Markant, Ruggeri
2:30-2:50 PM Uner, Roediger
2:50-3:10 PM St. Hilaire, Chan

Recognition Memory I (223-227)

1:30-1:50 PM Lucas, Hobbs, Cairney
1:50-2:10 PM Greene, Naveh-Benjamin
2:10-2:30 PM Brainerd, Chang, Bialer, Reyna, Nakamura
2:30-2:50 PM Shiffrin, Maxcey, Cutler, Nosofsky
2:50-3:10 PM Palma, Quarenta, Santos, Singh, Correll

Attention and Visual Search I (228-233)

1:30-1:50 PM Wolfe, Suresh
1:50-2:10 PM Henare, Kadel, Schubö
2:10-2:30 PM Withdrawn
2:30-2:50 PM Cox, Yousefi, Mitroff, Kravitz
2:50-3:10 PM Zsido, Stecina, Cseh, Hout
3:10-3:30 PM Doro, Dell'Acqua, Drisdelle, Brigadoi, Jolicoeur

3:30-5:30 PM US CDT (unless otherwise noted)
Spoken Session (234-266)

Cognition and Technology (234-239)

3:30-3:50 PM Taylor, Dey, Taylor
3:50-4:10 PM Lewandowski, Roozenbeek, van der Linden, Goldberg
4:10-4:30 PM Oie, Mitroff, Kravitz, Cox
4:30-4:50 PM Austerweil, Cao, Bockhorst, Fung
4:50-5:10 PM Wang, Ballew, Widdowson, Yoon, Merrill, Hovakimyan
5:10-5:30 PM Boutet, Guay, Chamberland, Collin

Working Memory I (240-244)

3:50-4:10 PM Oberauer, Awh
4:10-4:30 PM Brady
4:30-4:50 PM Thibodeau, Zhang
4:50-5:10 PM Majerus, Bouffier
5:10-5:30 PM Kowialiewski, Oberauer

CONDENSED SCHEDULE B



Saturday, November 6, 2021 3:30-5:30 PM US CDT (*unless otherwise noted*) Spoken Session (234-266) (*continued*)

Judgment and Decision Making II (245-250)

3:30-3:50 PM Pettibone, Wedell, Hayes
3:50-4:10 PM Withdrawn
4:10-4:30 PM Marsh, Kleinberg
4:30-4:50 PM Schneider, Katz, Cumberbatch, Hampton, Afroz, Pyo, Martin
4:50-5:10 PM Dhami, Mandel, Gray
5:10-5:30 PM Mandel, Irwin

Recognition Memory II (251-255)

3:50-4:10 PM Withdrawn
4:10-4:30 PM Nosofsky, Cao, Harding, Shiffrin
4:30-4:50 PM Fukuda, Kang, Tozios, Kolisnyk, Woodman
4:50-5:10 PM Tikhonenko, Brady, Utochkin
5:10-5:30 PM Withdrawn

Cognitive and Motor Control of Performance I (256-260)

3:50-4:10 PM Van den Bussche, Aben, Hughes
4:10-4:30 PM Withdrawn
4:30-4:50 PM Pfordresher, Greenspon, Pruitt, Halpern
4:50-5:10 PM Fischer-Baum, Englebretson, Holbrook
5:10-5:30 PM Meyerhoff, Sandra, Papenmeier, Gilbert

Visual Perception I (261-266)

3:30-3:50 PM Sadil, Cowell, Huber
3:50-4:10 PM Peterson, Skocypec
4:10-4:30 PM Vickery, Lebed
4:30-4:50 PM Menciloglu, Nakayama, Song
4:50-5:10 PM Merz, Spence, Frings
5:10-5:30 PM Krause, Herbert
5:10-5:30 PM Sandra, Papenmeier, Gilbert

Sunday, November 7, 2021 8:00-10:00 AM US CDT (*unless otherwise noted*) Spoken Sessions (268-300)

Attention and Visual Search II (268-273)

8:00-8:20 AM Withdrawn
8:20-8:40 AM MacInnes
8:40-9:00 AM Brockmole, Tighe, Vilanova-Goldstein
9:00-9:20 AM Drew, Murdock, Butner, Creem-Regehr, Stefanucci
9:20-9:40 AM Yu, Geng
9:40-10:00 AM Devenney, Coyle, Verster

Judgment and Decision Making III (274-279)

8:00-8:20 AM Brink, Karalun, O'Brien, Sarsour, Valdez, Mabida, Arango-Baloid
8:20-8:40 AM Bhui, Xiang
8:40-9:00 AM Besken, Filiz
9:00-9:20 AM Withdrawn
9:20-9:40 AM Scaltritti, Job, Sulpizio
9:40-10:00 AM Teal, Kusev

Human Learning and Instruction II (280-285)

8:00-8:20 AM Zepeda, Kim, Butler
8:20-8:40 AM Geller
8:40-9:00 AM Murphy, Castel, Hoover, Agadzhanian, Kuehn
9:00-9:20 AM Wang, Li
9:20-9:40 AM Forrin, Kalsi, Sana, MacLeod, Kim
9:40-10:00 AM Madan 🌟

Cognitive and Motor Control of Performance II (286-290)

8:00-8:20 AM Withdrawn
8:20-8:40 AM Han, Proctor
8:40-9:00 AM Withdrawn
9:00-9:20 AM Clayards, Amir, Otto
9:20-9:40 AM Pfeuffer, Huestegge, Kiesel

Perception and Action (291-295)

8:00-8:20 AM Hubbard, Ruppel
8:20-8:40 AM Hazeltine, Koch, Weissman
8:40-9:00 AM Weissman, Grant, Koch, Hazeltine
9:00-9:20 AM McBeath, Bills, Langley
9:20-9:40 AM Schwarz, Klaffehn, Muth, Hauke-Forman, Pfister

Language and Semantics (296-300)

8:00-8:20 AM Buchanan, Cuccolo, Lewis, Accelerator
8:20-8:40 AM Sehyr, Terhune-Cotter, O'Grady Farnady, Emmorey
8:40-9:00 AM Pexman, Dahm, Muraki
9:00-9:20 AM Oppenheim, Dhaliwal, Fisher, Nozari
9:20-9:40 AM Westbury, Harati



CONDENSED SCHEDULE B



Sunday, November 7, 2021
10:00 AM-12:00 PM US CDT (*unless otherwise noted*)
Spoken Sessions (301-331)


Discourse Processes (301-306)

10:00-10:20 AM Boland
10:20-10:40 AM Dahan
10:40-11:00 AM Nguyen, Fox Tree
11:00-11:20 AM Singer, Spear, Spence
11:20-11:40 AM Vibert, Darles, Ros
11:40-12:00 PM Bernstein, Derksen, Afşalg, Giesbrecht, Khera

Working Memory II (307-311)

10:20-10:40 AM Service, DeBorba, Lopez Ricote, Horzum
10:40-11:00 AM Schwering, Jacobs, MacDonald
11:00-11:20 AM Grinschgl, Papenmeier, Meyerhoff
11:20-11:40 AM Morey, Joseph
11:40-12:00 PM Souza, Krasnoff

False Memory (312-316)

10:20-10:40 AM Pillai, Fazio
10:40-11:00 AM Wang, Otgaar, Howe, Liu
11:00-11:20 AM Karanian, Mello, Torrance, Race, Thomas 
11:20-11:40 AM Xiong, Lee, Seo, Lee
11:40-12:00 PM Devitt, Foster

Visual Perception II (317-321)

10:00-10:20 AM Mathôt
10:20-10:40 AM Wu
10:40-11:00 AM Kellman, Jacoby, Massey
11:00-11:20 AM Withdrawn
11:20-11:40 AM Lin, Xiao

Mental Structures and Processes (322-326)

10:00-10:20 AM Saad, Hemmer, Musolino
10:20-10:40 AM Kenett, Hills
10:40-11:00 AM Tompary, Thompson-Schill
11:00-11:20 AM Hintz, Wolf, Rowland, Meyer
11:20-11:40 AM Campbell, Chen, Langer

Reasoning and Problem Solving (327-331)

10:20-10:40 AM Burgoyne, Engle
10:40-11:00 AM George, Mielicki
11:00-11:20 AM Valtonen, Ahn, Cimpian
11:20-11:40 AM Korovkin, Savinova
11:40-12:00 PM Withdrawn



Symposia and Spoken Abstracts



Welcome/Keynote Address

Thursday, November 4, 7:30 PM CDT

Gary Dell, University of Illinois Urbana-Champaign

The Adaptable Speaker: Speech Errors Reveal Implicit Learning in the Language Production System

Virtual Opening Session Immediately Following Keynote

Individual Differences in Attention

Friday, 8:00-9:40 AM CDT

8:00-8:20 am (1)

Measured Attention vs. the Subject Experience of Attention: An Exploratory Study. ZACH SHIPSTEAD, *University of Illinois Urbana-Champaign* – This study examined the distinction between people's beliefs regarding their attention control versus their measurable attentional abilities. Participants completed a novel inventory regarding their perceived attentional stability in day-to-day situations, along with classic measures of attention (antisaccade, PVT) and working memory capacity (visual arrays). Mind wandering (task-unrelated thoughts) while performing a processing speed test served as the dependent variable. Performance on the subjective and objective measures of attention was not correlated; however both constructs provided independent prediction of mind-wandering tendencies and beliefs regarding mind-wandering tendencies. Although these preliminary data indicated that people's experience of attention is not related to their actual attentional abilities, both constructs are important for explaining performance on cognitive tests.

Email: Zach Shipstead, zshipstead@gmail.com

8:20-8:40 am (2)

Uncovering the Structure of Individual Differences in Distractibility. HAN ZHANG, *University of Michigan*, AKIRA MIYAKE, *University of Colorado Boulder*, JAHLA OSBORNE, PRITI SHAH, and JOHN JONIDES, *University of Michigan* – Cognitive life depends on performing goal-directed activities in the face of distraction. Previous research has identified multiple sources of distraction, yet it is unclear how they empirically relate to each other. The current study examined this question from an individual difference perspective. In two large samples (651 online participants and 569 college students), participants completed scales measuring susceptibility to external and internal sources of distraction. Results from both samples show that susceptibility to external distraction, repetitive negative thinking, and mind-wandering were three correlated and yet distinct constructs. Our data also support the existence of a high-order general distractibility factor that explains the common variance across the specific types of distraction. Our model of general and specific distractibility components was found to have a similar factor structure across

the two samples. In sum, these results lay the groundwork for building a coherent construct to measure individual differences in distractibility.

Email: Han Zhang, hanzh@umich.edu

8:40-9:00 am (3)

Attention in Toddlers Is Related to Individual Differences in Executive Functioning and Parental Risk for Attention Deficits. AUGUST NAMUTH, ANASTASIA KERR-GERMAN, JAYLIN TUMAN, CHANELLE GORDAN, and STUART F. WHITE, *Boys Town National Research Hospital* – Research into the neurocognitive basis of attention in children under 5 is difficult using traditional neuroimaging methods (e.g., fMRI). The current study employed functional near-infrared spectroscopy (fNIRS) to assess the neurocognitive relationship between attention and executive functioning in children (2-5-years old, N=40), during a novel visual attention task (VAPP) and a novel working memory task (PWM). Parental ADHD symptoms (ASRSv1.1) were collected. PWM predicted differences in alerting and executive attention blocks of the VAPP, suggesting PWM is a downstream result of early attentional processing. Neural response within left frontal cortex predicted performance during PWM but not VAPP. Further, VAPP alerting and executive blocks and neural response in parietal cortex were associated with parental ADHD scores. These data are the first to report on the neural underpinnings of alerting and executive attention in toddlers. Moreover, reduced neural activation was associated with reduced performance and parental ADHD symptoms, suggesting a possible mechanism for clinically relevant attention problems.

Email: Anastasia Kerr-German, Anastasia.kerr-german@boystown.org

9:00-9:20 am (4)

The Synchrony Effect Is Not as General and Robust as Previously Thought! Evidence from a Latent-Variable Analysis. ALODIE REY-MERMET and NICOLAS ROTHEN, *UniDistance Suisse* – Cognitive performance is assumed to be better at the peak of circadian arousal than at off peak. This synchrony effect was repeatedly shown using maintenance tasks (i.e., tasks measuring the ability to store or retain access to information). However, evidence is mixed for interference-control tasks (i.e., tasks measuring the ability to avoid being distracted by irrelevant information). The goal of the present study was to test the synchrony effect for maintenance and interference control. To this end, 189 young participants—who were morning or evening types—performed at on- and off-peak times short-term memory (STM) and working memory (WM) tasks with verbal-numerical and spatial material. Using structural equation modeling, we measured maintenance as common factors from STM and WM tasks. Interference control was measured by separating WM-specific variance from maintenance. Contrary to the expectations, the results showed one verbal-numerical and one spatial maintenance factor across both on- and off-peak times. For interference control, we observed at best a latent change between peaks. To conclude, our findings suggest that the synchrony effect is not as general and robust as the past 30 years of research might put forward.

Email: Alodie Rey-Mermet, alodie.rey-mermet@fernuni.ch





9:20-9:40 am (5)

The Relationship Between the Subjective Experience of Real-World Cognitive Failures and Objective Performance in Rare-Target Visual Search. STEPHANIE GOODHEW and KATHERINE J. THOMSON, *The Australian National University* – Humans are much more likely to miss visual search targets when they are rare. This has important practical implications, because many professional visual search tasks (e.g., airport baggage screening), involve rare targets. Only a handful of previous studies have sought to understand individual differences in rare-target visual search performance, and they have focussed on objective performance-based measures. Here, we sought to test the explanatory capacity of variables derived from the rich informational source of participants' subjective experience of their cognitive function in everyday life. That is, we had participants complete a visual search with arrays containing multiple photorealistic objects, where their task was to detect the presence of gun target that was present on 2% of trials. Following this, they completed the Cognitive Failures Questionnaire (CFQ) and the Attentional Control Scale (ACS). We found that participants' scores on the False Triggering component of the CFQ were associated with accuracy in correctly detecting the presence of the rare target. This shows that objective performance in this important task can be predicted from subjective experiences of cognitive function.

Email: Stephanie Goodhew, stephanie.goodhew@anu.edu.au

Cognitive Aging I Friday, 8:00-9:40 AM CDT

8:00-8:20 am (6)

Bringing It All Together: Age and Memory Performance Interact to Predict Hippocampal Volume over the Adult Lifespan. LAUREN L. RICHMOND, TIMOTHY BRACKINS, and SUPARNA RAJARAM, *Stony Brook University* – Aging is known to have a negative impact on both long-term memory and structural brain markers, but there is also a wide degree of variability in both memory and brain preservation into late life. To understand the nature of this variability, we investigated all three variables—memory performance, age, and neural correlates—together. We drew on a large-scale lifespan dataset that includes indices of long-term memory, structural neuroimaging, and age (Nathan Kline Institute–Rockland Sample). We built regression models ($n=102$) to predict hippocampal volume from age alone ($M=61.27$ years, $SD=15.91$, $range=22-85$), age and scores on a 20-min delay test (15-item recall), and the interaction of age and memory scores. Model comparisons revealed that allowing age and memory scores to interact provides a significantly better fit than age alone and main effects of age and memory scores. Within this model, age and the interaction of age and delayed memory score were significant predictors; memory score alone was not a significant predictor. While both age and memory performance are associated with decline in hippocampal volume with age, the strength of these relationships may be reduced in older adults who exhibit preserved memory.

Email: Lauren L. Richmond, lauren.richmond@stonybrook.edu

8:20-8:40 am (7)

Temporal Dynamics of Motivated Remembering and Forgetting in Younger and Older Adults. HOLLY J. BOWEN, *Southern Methodist University*, MARY L. HARGIS, *Texas Christian University*, SARA N GALLANT, *USC Leonard Davis School of Gerontology* – The ability to forget is important and useful. Evidence of one's ability to intentionally forget comes from studies using directed forgetting tasks in which stimuli are cued as either to-be-remembered (TBR) or to-be-forgotten (TBF). Older adults typically have difficulties with intentional forgetting, potentially due to age-related deficits in cognitive control over memory encoding. We previously investigated the effect of reward motivation on directed forgetting and found little evidence that reward motivation improved older adults' intentional forgetting performance, but it did enhance memory for the words, regardless of the TBR or TBF instructions. A remaining question from this prior research is whether the timing of reward anticipation during the experimental trial influences remembering and forgetting, which we investigated in the current preregistered studies. In two experiments with healthy younger and older adult MTurk participants, we manipulated the timing of the reward cue: before or after the presentation of the TBR and TBF stimuli. We found no evidence that changing the temporal dynamics of reward motivation freed up cognitive resources to improve older adults' ability to intentionally forget.

Email: Holly J. Bowen, hbowen@smu.edu

8:40-9:00 am (8)

The Correction of COVID-19 Misconceptions in Older Adults with Alzheimer's Disease. RENEE DECARO, *VA Boston Healthcare System*, ANNA MARIN, KYLIE A. SCHILOSKI, GABOR P HAJOS, NAHEER C. LAHDO, and KALEIGH DONNELLY, *Boston University*, ANA VIVES RODRIGUEZ, THOR STEIN, and ANDREW E. BUDSON, *VA Boston Healthcare System* – The use of a refutational technique to correct health-related misconceptions is ubiquitous, yet little work has addressed whether older adults' cognitive status influences misconception correction. In our study, older adults ($N=26$) took a pretest of COVID misconceptions sourced from the CDC. Afterward, individuals received corrective feedback (i.e., the correct answer and an explanation). Individuals received a surprise retest after 25 minutes and again 1 week later. Cognitive status was assessed with a telephone-administered neuropsychological battery and Montreal Cognitive Assessment-Blind (MoCA-Blind). Individuals with Alzheimer's disease in the mild cognitive impairment and mild dementia stages demonstrated less correct knowledge on the pretest compared with healthy older adults (HOA). Only HOA made significant gains on the first delayed retest. MoCA-Blind recall scores were significantly and positively related to difference scores. Moreover, performance returned to baseline after a week. Results suggest that a widely used refutational technique may have limited effectiveness in this population.

Email: Renee DeCaro, rdecaro@bu.edu





9:00-9:20 am (9)

Discriminating Memory-Disordered Patients from Controls. ROGER RATCLIFF, *The Ohio State University*, DOUGLAS W SCHARRE, *The Ohio State University Wexner Medical Center*, GAIL MCKOON, *The Ohio State University* – One hundred five memory-disordered (MD) patients and 57 controls were tested on item recognition and lexical decision tasks and diffusion model analyses were conducted on accuracy and response time (RT) distributions for correct and error responses. The results replicated earlier studies with older adults and individual differences were consistent between the item recognition and lexical decision tasks. MD patients had lower drift rates (with mild Alzheimer’s disease [AD] patients lower than mild cognitive impairment [MCI] patients) as well as wider boundaries and longer nondecision times. The model parameters were used to examine how well MD patients could be discriminated from controls using simple machine-learning techniques, linear discriminant analysis, logistic regression, and support vector machines (all of which produced similar results). There was about 83% accuracy in separating MD from controls: AD patients had about 90% accuracy, MCI patients had about 68% accuracy, and controls had about 90% accuracy. These methods might offer an adjunct to traditional clinical diagnosis. Limitations are noted including difficulties in obtaining a matched group of control subjects as well as the possibility of misdiagnosis of MD patients.

Email: Roger Ratcliff, ratcliff.22@osu.edu

9:20-9:40 am (10)

Decisions About Gains and Losses Across Adulthood. SEBASTIAN S. HORN and ALEXANDRA M. FREUND, *University of Zurich* – People’s preferences are constructed in context. According to models of memory-based decisions, the preferences resulting in specific choices depend on previously experienced events. However, little is known about age-related differences in context-dependent sensitivity to gains and losses. In the present research, we investigated how manipulations of the proximate experimental context affect younger, middle-aged, and older adults’ loss aversion and their decisions about monetary gains and losses under risk. Past aging research indicates that younger and older adults can track the frequencies of positive and negative events relatively accurately and with little effort. However, age differences in motivational orientation may also influence how gains and losses are evaluated (e.g., older adults might be more motivated to prevent losses than younger adults). In a series of studies, we tested these propositions by manipulating the range, frequencies, and cognitive demands, with which participants (18-80 years old) encountered gains and losses of different magnitudes. The findings indicate that people’s extent of loss aversion depends strongly on the experienced context but does not change with age.

Email: Sebastian S. Horn, horn@psychologie.uzh.ch

Motivation, Reward, and Cognitive Processes

Friday, 8:00-9:40 AM CDT

8:00-8:20 am (11)


Gist, Motivation, Impulsivity, and Affect Explain Risk-Taking: Dual-Process and Fuzzy-Trace Theory Approaches. VALERIE F. REYNA, SARAH M. EDELSON, JOLIET M. STALLONE, BRIDGET HAYES, and SIMRAN SURTANI, *Cornell University* – Drawing on fuzzy-trace theory, framing biases have been used to index gist-based intuition, which, contrary to dual-process approaches, promotes adaptive decision-making. Paradoxically, but theoretically predicted, more rational thinkers (who show less bias) take more unhealthy risks. Recent research implicates dual-process predictors—sensation seeking (taking risks for the sake of rewards) and impulsivity (lack of cognitive control)—along with callousness as explaining criminal risk-taking. In a large sample of non-incarcerated young adults (N=501), we added framing biases to these measures. Regressions showed that dual-process and fuzzy-trace theory predictors, but not callousness, each contributed unique variance in predicting criminal risk-taking behavior and behavioral intentions. When antisocial risk-taking (regardless of criminality) was analyzed separately, as expected, callousness now was a significant predictor along with the other variables. Results support predictions about normative and nonnormative factors in risk-taking, including gist-based intuition, as well as motivation and affect.

Email: Valerie F. Reyna, vr53@cornell.edu

8:20-8:40 am (12)

Withdrawn

8:40-9:00 am (13)

Reasoning Skill Does Not Facilitate Motivated ‘Reasoning’. GORDON PENNYCOOK , *University of Regina* – Motivated reasoning is often construed as a deliberate process where people engage in reasoning to convince themselves that the things that they want to be true are in fact true. A key piece of evidence for this comes from the literature on global warming: Although Democrats with stronger reasoning skills are more likely to agree with the consensus on global warming (relative to the less skilled), this pattern is reversed for Republicans. Thus, it appears, reasoning skill is not being used to facilitate accurate beliefs (or those consistent with expert opinion). Instead, reasoning appears to facilitate motivated reasoning. For this talk, I will look beyond global warming to test the generalizability of this pattern. Across more than two dozen politically contentious issues, global warming emerges as the only consistent case where reasoning skill is associated with inaccuracy. I also find no evidence in other domains, such as fake news, opinions about the 2020 U.S. presidential election, and beliefs about COVID-19. The full pattern of data indicates that reasoning skill is overwhelmingly associated with having more accurate beliefs and that motivated “reasoning” may not actually involve reasoning (but rather the absence of it).

Email: Gordon Pennycook, grpennycook@gmail.com





9:00-9:20 am (14)

Evidence Accumulation or Reinforcement Learning? Modeling Sequential Decision-Making in the ‘Observe or Bet’ Task.

BETH BARIBAULT, MANON L. IRONSIDE, SHERI L. JOHNSON, and ANNE G.E. COLLINS, *University of California, Berkeley* – How do we decide whether to explore or to exploit in uncertain environments where feedback is intermittent? We compare two approaches to computational modeling of such decisions, using data from an “observe or bet” task. In this dynamic sequential decision-making task, participants must strike a balance between observing events in the sequence (and forgoing any gain or loss of points), versus betting on (but not seeing) which event will occur. Previous work used a “heuristic model,” which posits a crosstrial evidence accumulation process, to describe performance on this task (Navarro, Newell, & Schulze, 2016). We offer an alternative explanation, whereby a novel adaptation of Q-learning captures participants’ learning from intermittent outcomes. Across both classes of hierarchical Bayesian models, the modified reinforcement learning (“modified RL”) model with counterfactual learning and a declining value of observing provided the best description of the observed data. We emphasize how this challenges a strict conceptualization of RL, as it suggests that the same computations responsible for learning from rewards might also subserve learning from outcomes that are non-extrinsically (but potentially intrinsically) rewarding.

Email: Beth Baribault, baribault@berkeley.edu

9:20-9:40 am (15)

EEG Frequency Based Measures of Reward Prediction Errors.

ROBERT WEST and EMILY GOST, *DePauw University* – Reward prediction errors are fundamental to associative learning and adaptive behavior, and the disruption of prediction errors is observed in a variety of psychiatric disorders. This has led to efforts to identify robust neural biomarkers of prediction errors. As an example, the reward positivity (RewP) has been considered an index of positive prediction errors in studies using event-related brain potentials (ERPs). One limitation of the extant literature using ERPs represents the lack of evidence for distinct neural correlates of positive and negative prediction errors. In the current study, we demonstrate that measures of frequency derived from either the event-locked EEG or the averaged ERPs provide unique indices of the two predictions errors. In Experiment 1 we demonstrate that prediction errors are differentially related to delta and theta activity, and in Experiment 2 we demonstrate that this approach provides novel insight into the effect of aging on reward processing beyond an analysis of the ERPs.

Email: Robert West, robertwest@depauw.edu

Decision Making I
Friday, 8:00-10:00 AM CDT

8:00-8:20 am (16)

Implicitly Learned Bias Influences Perceptual Decision-Making under Conditions of Uncertainty.

BARBARA KNOWLTON, *University of California, Los Angeles* – People can implicitly

learn stimulus biases (or priors, in a Bayesian framework) in a perceptual learning task and use them to make decisions. Here, we examine whether the application of an implicitly learned bias is applied across all stimuli or only those in which sensory information is ambiguous. We used a two-alternative-forced-choice task first introduced in Perugini et al. (2016) in which participants judged the direction of moving dots in the dynamic Glass pattern stimulus (rightward or leftward). The stimuli, unbeknownst to participants, were biased toward one side more than the other depending on the color of the stimulus. A confidence rating on a Likert scale and audio feedback followed each orientation judgment. Consistent with recent research, participants were able to learn priors implicitly and used them to guide decision-making. There was a significant interaction between the orientation coherence and the effect of bias, with bias only influencing decisions at 0 or 13% coherence, but not for stimuli with more coherent orientations. Our results suggest that implicitly learned priors can influence decision-making when sensory information is unreliable, but do not contribute when sensory information is more robust.

Email: Julia M. Schorn, juliaschorn@g.ucla.edu

8:20-8:40 am (17)

Metacognitive Bandits: When Do Humans Seek AI Assistance?

AAKRITI KUMAR and MARK STEYVERS, *University of California, Irvine*, TRISHA PATEL and AARON BENJAMIN, *University of Illinois Urbana-Champaign* – Humans increasingly collaborate with AI systems to make complex decisions in the real world. While a lot of work is being done to make more accurate and interpretable AI, little is known about when and how humans decide to look to AI assistants for help. To address this gap, we develop metacognitive bandits: a computational model of a human’s advice-seeking behavior when working with an AI. The model describes a human’s metacognitive process of deciding when to rely on their own judgment and when to solicit the advice of the AI based on their assessment of the utility of the AI’s advice. It also accounts for the difficulty of each trial in making the decision to solicit advice. We illustrate that the metacognitive bandit makes decisions that are qualitatively similar to humans in a behavioral experiment.

Email: Aakriti Kumar, aakriti1kumar@gmail.com

8:40-9:00 am (18)

How Rational Individual Choice Strategies Create Polarization and Extremism.

PETER KVAM, ABHAY ALAUKIK, and MATTHEW BALDWIN, *University of Florida*, CALLIE E MIMS, *University of South Alabama*, ARINA MARTEMYANOVA, *University of Florida* – Polarization is often described as the product of biased information search, motivated reasoning, or other psychological biases. However, polarization and extremism can still occur in the absence of any bias or irrational thinking. In this paper, we show that polarization occurs among groups of decision makers who are implementing perfectly rational choice strategies that maximize decision efficiency. This occurs because extreme information enables decision makers to make up their minds and stop considering new information, whereas moderate information is unlikely to trigger a decision and is thus underrepresented in the information decision-makers





collect. Furthermore, our model predictions and results indicate that groups of decision makers will generate extremists—individuals who confidently hold extreme views despite actually being uninformed and impulsive. Polarization did not occur, however, when participants made an inference about the difference between two quantities as opposed to deciding which one is superior. Estimation therefore offers a theoretically motivated intervention that can increase the amount of information people consider and reduce the degree of polarization and extremism among groups of individuals.

Email: Peter Kvam, pkvam@ufl.edu

9:00-9:20 am (19)

Decision-Making under Alcohol Intoxication as a Rational Process. SARA MCMULLIN, DENIS MCCARTHY, and CLINTIN DAVIS-STOBER, *University of Missouri* – We present a new model of decision-making under alcohol intoxication. The scope of the model covers binary choice, where choice alternatives are allowed to have any (finite) number of attributes. The acute effects of alcohol intoxication on decision-making are accounted for by two parameters, one governing increased choice inconsistency due to “noisier” cognitive representations of the choice attributes, the other governing how attention to choice attributes changes, accounting for the well-known alcohol myopia effect. We demonstrate how our model can account for a variety of alcohol impaired decisions across many different contexts (e.g., decisions to drink and drive, sexual decisions). We show that our model contains a standard model of multiattribute decision-making, the probit random utility model, as a special case when the alcohol-impairment parameters are set equal to values corresponding to no alcohol impairment.

Email: Sara McMullin, sdmr82@mail.missouri.edu

9:20-9:40 am (20)

Nonlinear Probability Weighting Can Reflect Attentional Biases in Sequential Sampling. VERONIKA ZILKER and THORSTEN PACHUR, *Max Planck Institute for Human Development* – Probability weighting is a key construct in cumulative prospect theory (CPT), describing a nonlinear transformation of objective probabilities that captures each outcome’s impact. The attentional drift diffusion model (aDDM) formalizes how attention affects preference construction in a sequential sampling process. We demonstrate a link between probability weighting and attentional biases. We simulated choices between safe and risky options in the aDDM with varying option-specific attentional biases, and modeled them in CPT. Attentional biases had highly systematic signatures in the characteristics (curvature, elevation) of CPT’s weighting function. We also demonstrate this link between attentional biases and probability weighting in empirical data. The findings highlights that distortions in probability weighting can arise from simple option-specific attentional biases in information search. They point to novel, attention-based explanations for empirical phenomena associated with characteristic shapes of CPT’s probability-weighting function (e.g., certainty effect, description–experience gap). The results advance the integration of two major theoretical frameworks for risky choice.

Email: Veronika Zilker, zilker@mpib-berlin.mpg.de

9:40-10:00 am (21)

Time pressure impacts consumer preferences. GUY HAWKINS, JON-PAUL CAVALLARO, and SCOTT BROWN, *University of Newcastle* – Studies of consumer preference typically aim to infer the subjective value people place on options and their component features. This inference procedure is most often performed using patterns of stated or revealed choices, and it has informed much of the theoretical and applied study of consumer behavior. Inferring subjective value solely from patterns in choice behavior neglects the impact that decision time has on choice outcomes, which is well-known in the cognitive psychology literature. We tested the impact of decision time with direct manipulations of time pressure in five consumer preference experiments. Increasing time pressure systematically altered preferences and the latent subjective value inferred from conventional choice-based analyses. In contrast, a cognitive model of choices and response times attributed changes in preferences to less cautious responding under increased time pressure, and little-to-no change in the inferred subjective value. This result is consistent with decades of speed-accuracy tradeoff research in cognitive psychology and suggests that subjective values inferred from conventional analyses may have misleading outcomes in applied consumer contexts.

Email: Guy Hawkins, guy.hawkins@newcastle.edu.au

Language Production and Writing Friday, 8:00-10:00 AM CDT

8:00-8:20 am (22)

Toward a New Account of Error Repair in Language Production via Typing. NAZBANOU NOZARI, *Carnegie Mellon University*, SVETLANA PINET, *Basque Center on Cognition, Brain and Language (BCBL)*, MARION HANEY and ADHVIK KANAGALA, *Carnegie Mellon University* – Error awareness and error repair are two key aspects of monitoring language production, but the relationship between the two is unclear. In a series of typing-to-dictation experiments, we indexed error awareness by a metacognitive judgment task and repairs by the use of backspace. We first present an analysis of 7500-plus errors, showing their similarity to speech errors, thus establishing typing as a relevant medium for studying monitoring in language production. We then show the differential sensitivity of the two monitoring measures to the full or partial removal of visual information, with a much more dramatic decrease in repairs than metacognitive judgments. By applying signal detection theory to the data, we pin down this difference to the criterion shift in opposite directions for metacognitive judgments vs. repairs, to cope with the decreased d' resulting from impoverished visual input. Finally, we present data showing a double dissociation between error awareness and repair behavior, suggesting an underlying repair mechanism that does not depend critically on error awareness. We propose a new account of monitoring in typing that accommodates these data.

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8:20-8:40 am (23)

Withdrawn





8:40-9:00 am (24)

Unsupervised Re-estimation of Word Frequencies using Semantic Spaces and Word Recognition Data. RASTISLAV HRONSKÝ, *Jheronimus Academy of Data Science*, EMMANUEL KEULEERS, *Tilburg University* – In psycholinguistic research, text corpora are often used as a proxy of the language that participants have been exposed to. This assumption underlies findings such as the word frequency effect. However, when compiling word frequencies from a corpus, individual differences in exposure to content represented by different parts of the corpus are not accounted for. In earlier work, Johns et al. (2019) addressed this gap by dividing a corpus in small sections and using the hill-climbing algorithm to select a subset of the sections that would explain the most variance in performance on a linguistic task. A drawback of this method is that the corpus sections need to be explicitly crafted and labelled. We propose an unsupervised approach that uses topic modeling to identify semantically coherent themes in a text corpus that are associated with certain word probabilities. Then we combine them to fit behavioral measures using least squares optimization and evaluate how well the re-estimated word frequencies fit independent behavioral data. We report simulations evaluating the extent to which additional variance is explained due to re-estimated frequency across different tasks, such as lexical decision and eye-tracking.

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9:00-9:20 am (25)

The Influence of Overt Spoken and Typed Production on Novel Word Learning. SVETLANA PINET and CLARA MARTIN, *Basque Center on Cognition, Brain and Language (BCBL)* – Producing a word requires assembling motor programs specific to the modality for its production (i.e., moving articulators for speaking and fingers for typing). In this experiment, we evaluated the influence of overtly producing a word during training on the ability to learn and produce new words. We asked whether training in one modality (e.g., speaking) facilitates production in another (e.g., typing). We ran a novel word learning task in which each participant learned words in one of two training conditions that required overt production (speaking or typing) or without production (passive). At the end of training, learning was assessed through a spoken and a typed picture naming task. Training with overt production facilitated novel word learning relative to passive training as observed on both accuracy and reaction times. Training by typing led to fewer errors and shorter reaction times for spoken as well as typed production. Results demonstrate the benefit of overt production during training and suggest transfer from typing to speaking, but not the reverse. Results point towards stronger links between typing and spoken phonology than between spoken phonology and finger movements.

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9:20-9:40 am (26)

Typing as a Window on Linguistic Productivity. JORDAN GALLANT and GARY LIBBEN, *Brock University*, and LAURIE B. FELDMAN, *University at Albany, SUNY* – We report an effect of

increasing morphological family size of the first constituent (C1) of compounds (goldfish-lionfish) on word internal inter keystroke intervals (IKI) in production, even as we manipulate familiarity by comparing real, novel and headless compounds (goldfish-goldwork-goldfick). Morphological productivity due to C1 family size shows position sensitive increases in IKI within C2 that depend on compound familiarity. We also demonstrate that while hand switching across sequential letters and bigram frequency interact with typing skill, morphological family size of the first constituent does not. Where effects of morphological family size on IKI do and do not arise in production pose a challenge to segment-by-segment accounts of morphological processing.

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9:40-10:00 am (27)

Noise-Induced Differences in the Complexity of Language Production. CATHERINE PHAM and ELISABETH KARUZA, *The Pennsylvania State University* – Speaking in noisy environments is a common occurrence, yet, beyond the acoustic level, few studies have investigated how noise affects language production. This study examines the effect of noise on the syntactic complexity of language production and asks whether cognitive control predicts noise-induced changes. Paired with an experimenter, participants completed a picture description task against “loud party-level” multitalker babble. Results suggest a combination of speaker- and listener-oriented modifications. Speakers reduced the number of clauses, words, and unfilled pauses they produced in noise relative to silence. Interestingly, individuals with weaker cognitive control showed the greatest reductions. We consider these to be speaker-oriented modifications driven by the distracting nature of background noise. Speakers also produced fewer filled pauses and mazes in noise, but these presumably listener-oriented changes were not significantly associated with cognitive control. Thus, speakers may alter their speech both to alleviate cognitive burden on themselves and to facilitate listener comprehension.

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Speech Perception I Friday, 8:00-10:00 AM CDT

8:00-8:20 am (28)

Bat, Bet, or Bit? Adapting to Idiosyncratic Vowels in a Second Language. MATTHEW T. CARLSON, HAILEY E. ATIYEH, and JASON GIOVAGNOLI, *The Pennsylvania State University*, JAMES M. MCQUEEN, *Donders Institute for Brain, Cognition and Behaviour* – Listeners in a second language can adapt to subtle regional, social, and idiosyncratic phonetic variation. We hypothesize that the ease of this adaptation depends on which abstract phonological representations are available to the listener. Dutch-English bilinguals and L1 English controls identified words spoken by a native English speaker in a 2AFC task. The words were minimal pairs distinguished by [æ-ɛ] or [ɛ-ɪ] (e.g., bat-bet, bet-bit). The bat-bet contrast is notoriously difficult for Dutch listeners. For half the listeners this vowel series was artificially moved up in the talker’s vowel space, and for the other half it was moved down, such that half heard a bat-bet contrast that was





acoustically the same as the other's bet-bit. Listeners were familiarized with these artificial accents prior to the 2AFC task. The key finding was that the bilinguals, in contrast to the L1 controls, had substantial difficulty identifying [æ-ε] targets when shifted higher in the talker's vowel space but identified (acoustically equivalent) [ε-ɪ] targets easily when shifted down in the vowel space. Thus, the same acoustic information can be easier or harder to adapt to and identify in an L2, depending on which abstract categories are expected.

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8:20-8:40 am (29)

Effects of Speech-Rhythm Disruption on Selective Listening with a Single Background Talker. J. DEVIN MCAULEY, *Michigan State University*, YI SHEN, *University of Washington*, TONI SMITH, *Michigan State University*, GARY R. KIDD, *Indiana University* – McAuley et al. (2020) recently observed that altering the natural rhythm of target speech amidst background speech worsens target speech recognition (a target-rhythm effect), while altering background speech rhythm improves target speech recognition (a background-rhythm effect). Here, two experiments investigated the target and background rhythm effects with a single-talker background. Experiment 1 manipulated the sex of the background talker, presented with a male target talker, to assess target and background rhythm effects with and without a strong pitch cue to aid perceptual segregation. Experiment 2 used a vocoded single-talker background to examine target and background rhythm effects with envelope-based speech rhythms preserved, but without semantic content or temporal fine structure. While a target rhythm effect was present with all backgrounds, the background rhythm effect was only observed for the same-sex background condition. Results provide support for a selective entrainment hypothesis, while also showing that the background rhythm effect is not driven by envelope-based speech rhythm alone, and may be reduced or eliminated when pitch or other acoustic differences provide a strong basis for selective listening.

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8:40-9:00 am (30)

Selective Adaptation and Lexically Driven Recalibration: Two Phonetic Boundary Adjustment Processes with Very Different Recovery Times. ARTHUR G. SAMUEL, *Basque Center on Cognition, Brain and Language (BCBL)*, YI ZHENG, *Stony Brook University*, NICOLAS DUMAY, *University of Exeter* – There have been many studies of selective adaptation and lexically mediated recalibration, two phenomena in which listeners adjust their boundaries between two speech sounds. Despite the large literatures, little is known about how long these adjustments endure. We report the results of one study that assesses the recovery time after adaptation and one study that does so for recalibration. In each case, the stimuli were ones that had produced strong effects in prior research. The results thus provide a plausible estimate of the maximum time that each type of adjustment may last. Adaptation was conducted with “wa” on a “ba”-“wa” continuum; recalibration was conducted with both “s”-“sh” and “s”-“th” stimuli. Full recovery from adaptation was found after approximately 6 hours, whereas recalibration was quite robust after 24 hours—and

still measurable after one week for one of the continua. This striking difference in recovery time poses a major challenge for models that ascribe both of these phenomena to the same adjustment function, such as Kleinschmidt and Jaeger (2015).

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9:00-9:20 am (33)

Language-Specific Properties Shape the Contributions of Consonants and Vowels to Auditory Word Recognition: Evidence from Hebrew. AVITAL DEUTSCH and YAARA LADOR-WEIZMAN, *The Hebrew University of Jerusalem* – The study employs an auditory-auditory priming procedure to explore the roles of consonants and vowels in auditory word perception in Hebrew. One common finding is the asymmetrical contribution of consonants and vowels in spoken word processing, with consonants holding greater importance than do vowels (i.e., C-bias). What underlies the C-bias is a debated issue between the “acquired functional hypothesis” and the “initial-bias hypothesis.” Investigating the C-bias in Hebrew can help clarify this debate; Hebrew's peculiar morphological structure affects consonants' and vowels' roles in defining the structure of typical Hebrew words. In order to evaluate the consonant/vowel asymmetry in Hebrew, recognition of typical morphologically complex Hebrew words was compared with recognition of atypical Hebrew words, words without the typical Hebrew morphological structure. The results showed a significantly stronger C-bias for typical complex words than for atypical ones. We suggest that this internal variation supports the acquired functional hypothesis: even within one language, different patterns of consonant/vowel asymmetry are revealed depending on a word's internal morphological structure.

Email: Yaara Lador-Weizman, yaara.lador@mail.huji.ac.il

9:20-9:40 am (32)

Practice Makes Perfect But Slow Learners Are Still Left Behind in Speech Perception. KAREN BANAI, HANIN KARAWANI, and LIMOR L. LAVIE, *University of Haifa* – Perceptual learning, defined as long-lasting changes in the ability to extract information from the environment, occurs with both brief and prolonged experiences. Whether these two types of experience yield qualitatively distinct patterns of learning is not clear. We used time-compressed speech to compare the outcomes of brief and prolonged practice. Both types yielded robust and long-lasting learning, with larger gains after longer practice. Learning following either type of practice correlated with speech recognition in independent tasks (natural-fast speech and speech in noise). Correlations were not modulated by the amount of practice. It seems that learning occurs with brief exposure and then continues throughout practice without changing its characteristics over time. More training may strengthen learning and reduce individual differences in learning by allowing even slow learners to improve. Still, because perceptual learning is stimulus specific, even massive training is not expected to benefit speech perception beyond the constraint circumstances experienced in training. Rather, perceptual learning may support speech perception online when challenging speech is encountered, placing slow learners at a disadvantage.

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9:40-10:00 am (33)

Withdrawn

Test Effects on Memory and Learning
Friday, 8:00-10:00 AM CDT

8:00-8:20 am (34)

A Multicourse, Multidiscipline Study of the Effect of Spacing on Retention of STEM Content. KEITH LYLE, CAMPBELL BEGO, PATRICIA RALSTON, and JASON IMMEKUS, *University of Louisville* – STEM educators often provide opportunities for students to practice retrieving course material (e.g., on homework and quizzes). In laboratory studies, distributing (or spacing) retrieval attempts over time increases long-term memory for retrieved information. Recent studies from our group suggest that spaced retrieval practice can also help students remember authentic classroom content—specifically, precalculus knowledge. Here, we manipulated spaced versus massed retrieval in nine courses from a variety of STEM disciplines (e.g., biology, chemistry, engineering) in a single semester. All were barrier courses to discipline-specific majors. The manipulation was within-subjects and the same in all courses. For each of 24 learning objectives, three quiz questions were either spaced across three quizzes (with two-week intervals) or massed on a single quiz. Retention was assessed on a test at the end of the semester. The effect of spacing differed across courses, ranging from robust spacing-induced gains to no discernible effect. Implications for theory and application will be discussed.

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8:20-8:40 am (35)

A Behavioral Representational Similarity Approach Reveals How Pre-existing Semantic Associations Are Resculpted by Episodic Paired Associate Learning. CATHERINE WALSH and JESSE RISSMAN, *University of California, Los Angeles* – Episodic learning often builds on a scaffolding of pre-existing semantic knowledge. Using a novel behavioral approach to index the representational similarity of words before and after paired associate learning, we examined the degree to which learning resculpts semantic space. Participants (n=80) performed a drag-and-drop similarity rating task on 120 words and then learned pairs of these words through either restudy or retrieval practice. One day later, participants were tested with cued recall and made additional similarity ratings. Results showed a larger testing effect for semantically unrelated pairs than related pairs. However, related pairs were drawn closer together in semantic space, and a given pair's change in representational similarity was correlated with its likelihood of successful recall. Learning caused asymmetric shifts in semantic space for related pairs, with more representational change for cues than targets, whereas unrelated pairs showed symmetric change within pairs. These findings suggest that pre-existing semantic relationships are strengthened during learning, thereby reducing distance in semantic

space, while pairs without such relationships require novel elaborative encoding to support later recall.

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8:40-9:00 am (36)

Testing Practice Reduces Forgetting, But Studying Examples Focuses Encoding. PAULO CARVALHO and KEN KOEDINGER, *Carnegie Mellon University* – Both increasing testing and increasing examples during study have been shown to improve learning. To solve this apparent contradiction, we hypothesized that testing delays forgetting of all information studied, whereas studying examples increases selectivity and encoding of only the relevant information. We tested this hypothesis with a combination of experimental and modeling work. In a lab study, participants (N=96) learned either facts (“Area of the rectangle? L x W”) or applied the corresponding skill (“Area of the shape above: 6 x 4”), either by completing multiple tests or alternating between tests and examples. Consistent with our hypothesis, we found that testing led to better posttest performance when learning facts, but examples led to better posttest performance for the corresponding skill. We used an AI model that simulates human learning with 0 parameter fitting to demonstrate that these findings are likely the result of slower decay of information encoded during testing, which improves learning when there is no need to select information (facts) but hinders learning when a lot of irrelevant information is present (skills). Example study leads to better encoding of only the key information, improving learning of skills.

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9:00-9:20 am (37)

The Testing Effect: Robust, But Is It Reliable? RUTH A. SHAFER and KATHLEEN MCDERMOTT, *Washington University in St. Louis* – A small but growing literature has begun using an individual differences approach to explore the testing effect and how it relates to other individual difference factors—obtaining mixed results. However, the reliability of the testing effect has received little attention, and, to our knowledge, no work has yet examined the test-retest reliability of the effect over time. In order to draw meaningful conclusions about potential individual differences in the benefits of testing, it is necessary to assess the reliability and stability of the testing effect. To explore this question, subjects studied words, took cued-recall tests on half of the words, and then took a final recognition test on all words. Subjects then repeated the same procedure 2 days later using a completely new set of words. As expected, a robust group-level testing effect was observed at both sessions. However, the internal consistency reliabilities and test-retest reliabilities of the testing effect were relatively to extremely poor. Although the testing effect is clearly a robust phenomenon, reliable differences in the effect between people may not exist. Implications for individual differences research on the testing effect are explored.

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9:20-9:40 am (38)

Corrective Feedback on Practice Tests Can Sometimes Impair Later Test Performance. PHILIP HIGHAM and AESHAH ALAMRI, *University of Southampton* – Retrieval practice is generally good for long-term retention, but multiple-choice (MC) practice tests can introduce problems. For example, the lures gain familiarity during practice and can be erroneously endorsed on later tests (negative testing effect). In this talk, we describe a related problem caused not by lures, but by corrective feedback. Although normally good for learning, we have found that exposure to correct-answer feedback on MC practice tests increases the likelihood that the feedback is erroneously endorsed later on related final-test questions which have a different correct answer. However, at the same time, answering multiple-choice questions during practice causes retrieval of accurate information about the options which opposes this bias. In a series of experiments, we explore the interplay of these opposing memory influences in both experimental and educational contexts. Depending on factors such as practice-test format, final-test format, the degree of false recognition, and the temporal proximity of related questions, final test performance can be facilitated or impaired. We discuss both the theoretical implications of these results as well as offering some practical recommendations.

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9:40-10:00 am (39)

A Comparison of Covert and Overt Retrieval Practice Over Multiple Spaced Sessions. JADE S. PICKERING and PHILIP HIGHAM, *University of Southampton*, JULIE HADWIN, *Liverpool Hope University*, ROSALIND POTTS, *University College London*, KOU MURAYAMA, *University of Tübingen* – Retrieval practice can be covert or overt, with only the latter requiring spoken or written responses, and both enhance long-term retention in single study-test designs. However, the benefits of covert retrieval over multiple testing cycles, like those seen in successive relearning, have not been investigated. Participant cooperation with covert retrieval requests may lessen on later cycles, particularly if learners are metacognitively unaware of the benefits of repeated retrieval. In this preregistered study, we investigate whether covert retrieval can be encouraged on all testing cycles by inducing uncertainty about the need to produce a response by varying the proportion of overt trials and whether covert retrieval trials were blocked or interleaved during retrieval practice. We also consider participants' assessment of the accuracy of their own retrieval attempts and changes over the learning schedule in important individual differences measures of anxiety, mastery, intrinsic motivation, and attentional control. The data shed light on not only the best method of encouraging active retrieval, but also the affective and metacognitive changes that occur over a multi-session spaced retrieval practice schedule.

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Symposium I: The Information Exchange Between Working Memory and Long-Term Memory

Friday, 10:00 AM – 12:00 PM CDT

Chaired by Eda Mizrak, *University of Zurich*

10:00-10:20 am (SYM1)

Is Active Engagement in Working Memory Important for Long-Term Episodic Memory? VANESSA M. LOAIZA, *University of Essex*, ALESSANDRA S. SOUZA, *University of Porto* – Many theories assume that actively maintaining information in working memory (WM) predicts its retention in episodic memory (EM), as revealed by the beneficial effects of more WM time. Here, we examined whether affording more time for intentional WM maintenance does indeed drive EM. Participants either incidentally or intentionally encoded and maintained words presented during trials of simple, complex, and slow span. Interleaving presentation of the words, a pause of equivalent duration entailed a blank screen or an arithmetic problem to read aloud and solve during slow and complex span trials, respectively. To ensure similar encoding of the words across groups, participants decided whether each word was a living or nonliving thing (i.e., an animacy judgment). A surprise delayed recall test at the end of the experiment assessed EM. Unexpectedly, there were no advantages of complex and slow span (long maintenance) over simple span (short maintenance) in delayed recall for either group, suggesting that the animacy judgment abolished these effects. Thus, if more WM time is used to keep information active via elaboration, then imposing elaboration across conditions equates them in terms of process engagement irrespective of WM time.

10:20 - 10:40 am (SYM2)

Developmental Working Memory Limits Across the Human Lifespan: Implications for Long-Term Memory. ALICIA FORSBERG, ERYN J. ADAMS, NATHANIEL R. GREENE, DUANGPORN PATTANAKUL, MOSHE NAVEH-BENJAMIN, and NELSON COWAN, *University of Missouri*, DOMINIC GUI-TARD, *Université de Moncton* – Healthy young adults typically outperform both children and older adults on tests of working memory. We explored whether age-related working memory limitations also constrain the amount of information that children and older adults commit to long-term memory. Our participants (school-aged children, college students, and healthy older adults) performed a working memory task with unique everyday items, presented in groups of two, four, or six items. Presentation time was adjusted according to the number of items. Then, we tested participants' long-term memory for items from the working memory task. While young adults on average held more information in working memory, the ability to transfer information from working to long-term memory generally appeared consistent across the lifespan. We also explore age-related differences in confidence ratings in the working and long-term memory tasks. These results suggest that experimental, individual, and age-related working memory limitations act as a bottleneck for long-term memory performance and have theoretical and practical implications for cognitive development and cognitive aging.





10:40-11 am (SYM3)

When Does Episodic Long-Term Memory Contribute To Performance In A Working Memory Task? LEA M. BARTSCH, *University of Zurich*, PETER SHEPHERDSON, *University of Akureyri* – Previously, we found that episodic long-term memory (eLTM) enhances WM performance when both novel and previously learnt word pairs must be retained on a short-term basis. However, there is uncertainty regarding how and when WM draws on eLTM. Two possibilities are that (a) people draw on eLTM only if WM capacity is exceeded; or that (b) there is always a contribution of eLTM to WM performance. The former implies that, when the load on WM is low, performance is driven by representations stored in WM only, whereas at higher loads, people draw on both LTM and WM. We tested this prediction by familiarizing participants with some items before they completed a separate WM task. In accordance with possibility (a) performance deteriorated with the addition of stimuli from eLTM when WM load was low, but not when it was high; and it remained superior to performance with the matched set size comprising only new stimuli. In further experiments, we build on the assumption that under circumstances where eLTM contributes to WM task performance, these eLTM traces could benefit or hamper performance depending on the match between LTM traces and to-be stored information in WM, yielding proactive facilitation and interference, respectively.

11-11:20 am (SYM4)

Improving Working Memory Capacity Through Learned Knowledge Is Not Done via Pointers to Long-Term Memories, But Rich, Hierarchical Memory Traces. TIMOTHY F. BRADY, MICHAEL ALLEN, and ISABELLA C. DESTEFANO, *University of California, San Diego* – Previously acquired knowledge improves our ability to represent information in working memory, including via chunking. When we use chunks, it is often assumed we are reducing the load on working memory by storing only pointers to previously acquired long-term memories. By contrast, our recent work suggests a fundamentally different view: that chunks are not content-free pointers, but instead serve as cues that facilitate the encoding and retention into memory of additional perceptual details as part of structured, hierarchical memories. This provides a contrast to accounts in which working memory capacity is assumed to be exhaustively described by the number of chunks remembered. In particular, we find that participants actually have enhanced knowledge of the trial-specific perceptual details of items that can be chunked, rather than losing such details; and that stimuli that are recognized as a real object (i.e., a face) elicit more working memory usage (as though more features can be stored for them), rather than less working memory usage (as expected if pointers were used to store them). Overall, we suggest a rethinking of the nature of chunking and the role of previous knowledge in working memory.

11:20-11:40 am (SYM5)

How Does Working Memory Benefit from Long-Term Memory? EDA MIZRAK, VENCISLAV POPOV, and KLAUS OBERAUER, *University of Zurich* – Working memory (WM) can harness knowledge from long-term memory (LTM) when it is useful.

For example, WM for novel stimuli is better when they are encoded in a list with familiar chunks compared to a list with no familiar chunks. LTM could benefit WM in two ways: 1) familiar chunks are encoded in a compressed form that takes less WM capacity (e.g., a pointer to LTM), freeing WM capacity for other items; 2) familiar chunks are easier to encode, leaving more encoding resources for other items. These accounts make different predictions and we tested them across multiple experiments by manipulating the presence of familiar chunks and free time during encoding. According to the encoding resource account (Popov & Reder, 2020), encoding resources replenish with free time. The first account predicts that the LTM benefit on WM should not change with extra free time; the second account predicts that the effects of extra free time and LTM benefit on WM should interact. We found that the LTM benefit did not change with extra free time. However, it is possible that additional mechanisms could mask the interaction. These results raise more questions than answers and we discuss additional steps required to distinguish between the two hypotheses.

Neural Mechanisms of Memory and Cognition Friday, 10:00 AM-12:00 PM CDT

10:00-10:20 am (45)

Medial Temporal Lobe Theta Oscillations During Ongoing Experience Shape Memory Organization. NICHOLAS DIAMOND and MICHAEL KAHANA, *University of Pennsylvania* – Recall dynamics—the order in which people recall events from their past—reveal underlying structure in memory, and temporal and spatial proximity strongly shape these dynamics. Rodent models of episodic memory suggest that, during active exploration, hippocampal theta oscillations provide a physiological mechanism for the formation of such spatiotemporal associations. There is little evidence, however, for the proposed link between theta oscillations during online behavior and subsequent memory organization. We tested this predicted association using intracranial neural recordings in human epilepsy patients performing a navigation and memory task. Participants navigated a virtual town, delivering a sequence of items to different locations and then freely recalled the items. We found that medial temporal lobe theta power during both ongoing navigation and item encoding was positively associated with subsequent spatial (but not temporal) organization in recall dynamics, measured as the tendency to cluster items encoded nearby. This finding is consistent with the notion that theta oscillations provide an internal reference frame for associating events that are close in space, even when far in time.

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10:20-10:40 am (46)

Withdrawn

10:40-11:00 am (47)

Hippocampal Biomarkers of False Recall. NOA HERZ, *University of Pennsylvania*, BERNARD R. BUKALA, *University of*





Oxford – The hippocampus plays a crucial role in retrieving memories bound to a specific temporal context. Failure of contextual retrieval can lead to false recollection, wherein people recall an experience that did not occur. Using direct electrical recordings from the human hippocampus and key neocortical regions, we investigated the electrophysiological correlates of false recall. We found that false recalls (prior and extra-list intrusions), as compared with correct recalls, exhibited a tilt in the hippocampal power spectrum, with diminished high-frequency (>40 Hz) and enhanced low-frequency activity. This tilt was time-specific, appearing prior to retrieval and fading rapidly afterward. This pattern replicated in an independent dataset in which subjects studied and recalled lists of semantically organized items. Applying multivariate decoding methods to distribution of spectral power across electrodes, we were able to reliably predict whether the to-be-recalled item would be a veridical or false memory. These findings support the role of the hippocampus in retrieving contextually bound information, and they open new avenues for interventions aimed at preventing false recalls.

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11:00-11:20 am (48)

Learning Exceptions to the Rule in Human and Model via Hippocampal Encoding. EMILY M. HEFFERNAN and MARGARET L. SCHLICHTING, *University of Toronto* – Category learning helps us process the influx of information we encounter. A common category structure is “rule plus exceptions,” in which most items follow a general rule, but exceptions violate this rule. People are worse at learning to categorize exceptions than rule-followers, but improved exception categorization has been positively associated with hippocampus (HC) function. In light of model-based predictions that the nature of existing memories of related experiences should impact memory formation, here we use behavioural and computational modelling data to explore the impact of learning sequence on performance in rule-plus-exception categorization. Behavioural findings indicate that exception categorization improves when exceptions are introduced after rule-followers. Simulations of this task using a computational model of HC replicate these findings. Model representations are also impacted by learning sequence: delaying the introduction of an exception shifts its representation closer to those of its own category members in a manner consistent with behavioural findings. Our results provide novel computational evidence of HC’s sensitivity to learning sequence and support HC’s proposed role in category learning.

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11:20-11:40 am (49)

Non-Invasive Brain Stimulation of Right Dorso-Lateral Prefrontal Cortex Enhances Cognitive Reflection Performance. VOLKER THOMA, *University of East London* – Transcranial direct current stimulation (tDCS) was used to investigate whether stimulating the left or right dorso-lateral prefrontal cortex (DLPFC) compared to a sham group modulated performance on a number of judgment and thinking tasks. There were three tasks: vignettes assessing heuristic thinking, logic syllogisms, and the cognitive reflection test

(CRT). Results showed that anodal tDCS to the right DLPFC was associated with an increase in cognitive reflection performance (cognitive inhibition) compared to performance after left DLPFC and to sham (n=18 in each group) stimulation. Syllogistic thinking performance was reduced following anodal tDCS to the left DLPFC. A second experiment focusing on the right DLPFC confirmed these results, and further showed that once-repeated stimulation also increased performance in the CRT (compared to repeated stimulation plus sham). Individual differences in cognitive ability and thinking style cannot account for these findings, which are broadly consistent with a dual process framework of thinking processes. The results demonstrate the causal involvement of the right DLPFC in cognitive reflection and suggest the possibility of improving judgment performance through tDCS.

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11:40-12:00 pm (50)

Neural Correlates of Memory During Sleep: An Exploration of Typical and Atypical Sleep Oscillations Using Intracranial Electroencephalography. ELIZABETH ESPINAL, *Drexel University*, STEPHAN BICKEL and ASHESH MEHTA, *North Shore University Hospital* – Long-term consolidation of episodic memory requires a series of highly connected neural networks that must work together to encode, store, and retrieve information. The precise orchestration of electrophysiological oscillations, or oscillation coupling, facilitates consolidation of memory traces in the brain, particularly in offline sleep states. Hallmark sleep oscillations, slow oscillations, and thalamocortical spindles, couple with hippocampal sharp wave ripples to establish a cortical-subcortical dialog necessary for long-term memory consolidation. We explored the consequences of alterations to typical sleep oscillation coupling for long-term memory using intracranial electroencephalography (iEEG) to directly record hippocampal and neocortical oscillations from within the brain and correlate them with performance on an auditory verbal learning task designed to assess long-term memory function. Our results establish a criterion for characterizing a relationship between subcortical and cortical oscillations as they relate to memory performance, with potential implications for the prediction of memory decline.

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Eyewitness Memory

Friday, 10:00 AM-12:00 PM CDT

10:00-10:20 am (51)

Attention, Eyewitness Memory Construction, and Unconscious Transference. IRA E. HYMAN, CODY CORDERO, PETRA ARMSTRONG, DAVIS COLLIE, and LORI M. REYNA, *Western Washington University* – People do not constantly watch for crimes. People may fail to notice unusual events, become aware when they start, or become aware later. We investigated how timing of awareness affects memory. We showed people a complex video with a theft and varied attention instructions. Participants were asked





to either watch for the theft (eyewitness condition), count the number of people in white shirts (inattentive blindness condition), or simply watch the video (control condition). Participants then described the thief and were given a photo montage lineup. Lineups included either the thief or an innocent bystander from the video. Participants also were asked questions about the event. Some questions concerned the actions of the thief early in the video whereas others concerned later actions. The timing of awareness affected the ability to identify the thief and to answer questions. We found that watching for a theft made people more likely to display unconscious transference; that is, falsely select an innocent bystander in a lineup. Furthermore, people who became aware of the crime late nonetheless answered questions about aspects that occurred before awareness. In these situations, people construct a more complete memory.

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10:20-10:40 am (52)

Modeling Face Similarity in Police Lineups. JOHN T. WIXTED, *University of California, San Diego*, MELISSA COLLOFF, *University of Birmingham*, ED VUL, *University of California, San Diego*, BRENT M. WILSON, *University of California, Los Angeles* – A typical lineup consists of one suspect (who is innocent or guilty) plus five or more fillers who resemble the suspect (and who are all known to be innocent). A question that has bedeviled the field for decades is how similar the fillers in the lineup should be to the suspect to optimize discriminability. Here, we model the effects of manipulating filler similarity to better understand why such manipulations have the intriguing effects they do. Our findings suggest that the witnesses rely on a decision variable consisting of the degree to which the memory signal for a face in the lineup stands out relative to the crowd of memory signals generated by the set of faces in the lineup. The use of that decision variable helps to explain why discriminability is maximized by choosing fillers that match the suspect in terms of basic facial features described by the eyewitness (e.g., age, race, gender) but who are otherwise maximally dissimilar to the suspect.

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10:40-11:00 am (53)

Revisiting Signal Detection Model for Eyewitness identification: A Multidimensional Approach. YUERAN YANG, SARAH A. MOODY, and JANICE BURKE, *University of Nevada, Reno* – This paper proposes a multidimensional signal detection model for eyewitness identification. Particularly, the model presents eyewitnesses' identification processes in a three-dimensional space, which incorporates memory signals from suspects and the fillers with the strongest signals (max fillers). To facilitate understanding, we present the three-dimensional model as a contour plot. The contour plot includes two distributions: a joint distribution for the guilty suspect and maximum filler memory signals and a joint distribution for the innocent suspect and maximum filler memory signals. The MAX rule partitions the plot into three regions: suspect identifications, filler identifications, and rejections. By mapping eyewitness memory signals onto a three-dimensional space, the model is useful

in understanding the effects of fillers siphoning, the relation between discriminability and suspect identification rates, and the effects of several lineup factors including lineup fairness, lineup size, and filler similarities.

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11:00-11:20 am (54)

A Comprehensive Measure for Comparing Eyewitness Identification Procedures. JEFFREY J. STARNES, ANDREW L. COHEN, and CAREN M. ROTELLO, *University of Massachusetts Amherst* – Eyewitness identifications play a key role in many criminal investigations. Investigators have a wide range of options for how they conduct an identification attempt, and eyewitness researchers have explored many of the relevant variables, such as whether a suspect is shown to a witness individually (a “showup”) or together with a number of fillers (a “lineup”). Unfortunately, different measures of identification effectiveness often support different research conclusions and policy recommendations. We show that existing measures, while useful in many ways, are incomplete in the sense that they do not use all of the information from the reference population defining witness performance. We introduce a complete measure, Expected Information Gain (EIG), by applying information-theory principles to identification data. EIG identifies the procedure that produces the most information about suspect guilt or innocence across all of the possible witness responses. Thus, EIG is a useful measure for policy-focused research, and it also allows researchers to test theoretical predictions for how different variables affect the informational value of an identification procedure.

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11:20-11:40 am (55)

Implications of Using a Comprehensive Measure for Comparing Eyewitness Identification Procedures. ANDREW L. COHEN, JEFFREY J. STARNES, and CAREN M. ROTELLO, *University of Massachusetts Amherst* – We explore implications of a novel method for measuring the efficacy of eyewitness identification procedures based on the fundamental principles of information theory. This measure evaluates the Expected Information Gain (EIG) for an identification attempt, a single value that summarizes an identification procedure's overall potential for reducing uncertainty about guilt or innocence across all possible witness responses. EIG has substantial potential to inspire new discoveries in eyewitness research and provide a new perspective on policy recommendations for the use of identifications in real investigations. We briefly introduce EIG and then focus on a set of demonstrations designed to highlight key properties of EIG and illustrate how it differs from existing measures including diagnosticity ratios, deviation from perfect performance, and area under the ROC and other signal-detection measures. Of particular interest, we show that EIG exposes a surprising “filler curtain” effect in which adding fillers to a lineup actually degrades the evidentiary value of witness responses.

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11:40-12:00 pm (56)

Sleep, Not Time of Day, Benefits Eyewitness Memory.

JAKKE TAMMINEN, *Royal Holloway, University of London* – Sleep is thought to strengthen new memories but the evidence for this in the eyewitness memory literature is mixed. For example, sleep does not benefit participants' ability to pick a perpetrator from a lineup (Morgan et al., 2019; Stepan et al., 2017). However, such recognition memory tasks are different from the cued or free recall tasks where sleep benefits are typically seen. In the current study, the Self-Administered Interview (SAI) was used to measure how many details of a crime participants (N=200) could recall. Participants watched a video of a nonviolent mock crime and filled in the SAI after a night of sleep or an equivalent period of daytime wake. Participants in the sleep group recalled significantly more details than those in the wake group. Because the sleep group was tested in the morning and the wake group in the evening, a second experiment sought to exclude time of day as an alternative explanation. Participants viewed the video in the morning or in the evening and after a brief delay filled in the SAI. No significant difference was found between the groups. The impact of sleep was larger than the impact of time of day, as confirmed by a significant interaction when combining data from both experiments.

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Attention Capture

Friday, 10:20 AM-12:00 PM CDT

10:20-10:40 am (57)

Attentional Suppression of Highly Salient Distractors.

NICHOLAS GASPELIN and BRAD T. STILWELL, *Binghamton University SUNY*, HOWARD E. EGETH, *Johns Hopkins University* – A longstanding question has been whether physically salient objects—such as color singletons—can automatically capture visual attention. Recent research has indicated that observers can learn to prevent attentional capture via proactive suppression of salient items. However, that research has been challenged on the grounds that the singletons that were used had low salience. According to stimulus-driven accounts, salient stimuli can override proactive suppression but only when they are highly salient. The current study directly tested this claim by adapting previous approaches to make the singleton even more salient. Specifically, we increased the set size of search displays, which should massively increase the salience of the color singletons. Both psychophysical and electrophysiological evidence (the Pd component) indicated that salient items were suppressed and did not capture attention. The results support the signal suppression hypothesis and refute the claim that highly salient color singletons cannot be suppressed.

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10:40-11:00 am (58)

Dissociable Influences of Gain- and Loss-Signalling Distractors During Decision-Making.

HAENA KIM, ALEX OGDEN, ANGELA S. CABRERA, NADIA V. BIBB, and BRIAN

ANDERSON, *Texas A&M University* – Stimuli signalling reward and aversive outcomes both capture attention even when nonsalient and task-irrelevant, suggesting that rather than a particular emotional valence, motivational salience influences the attentional system. We examined whether this motivational salience account extends to the influence of attention on decision-making. Previous research has demonstrated that a task-irrelevant, high-value distractor captures attention and results in slower and less optimal decisions. In the present study, we modified this experiment approach to include loss-associated stimuli. Participants selected between two peripherally presented colour stimuli while ignoring a centrally-presented colour stimulus, each of which could be associated with high-value, low-value, or monetary loss equivalent in magnitude to high-value gains. We replicated the finding that high-value distractors disrupt decision-making. However, loss-associated distractors did not result in slower and less optimal decisions. These results imply that in the context of gain-maximisation, high-value stimuli are prioritised by the attentional system but loss-signalling stimuli are not.

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11:00-11:20 am (59)

Distraction Disrupts Attentional Filtering: Neural and Behavioral Evidence for the Filter Disruption Theory.

BLAIRE DUBE and JULIE D. GOLOMB, *The Ohio State University* – What are the consequences of distraction? Aside from spatial capture of attention and slowed visual search, we propose a broader Filter Disruption Theory (FDT): distraction also disrupts nonspatial filters that gate feature-based attention and working memory encoding. To test this theory, we used fMRI to assess filters controlling category-based attentional selection (E1) and a behavioral memory-driven capture paradigm to assess filters gating working memory access (E2). In E1 participants viewed arrays of hybrid face/house images while performing a 1-back task. On no-distractor trials, we found the standard pattern of attentional modulation (greater activation in FFA during attend-faces and PPA during attend-houses). However, on trials containing a salient abrupt-onset distractor, attentional filtering was disrupted, resulting in increased neural processing of the irrelevant category. In E2, participants performed two consecutive search tasks on each trial. In the absence of a distractor on search 1, irrelevant color information was filtered from VWM. However, when a salient distractor appeared, the irrelevant features of the distractor were incidentally encoded into memory and then drove subsequent attention on search 2.

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11:20-11:40 am (60)

On Preventing Attention Capture: Is Singleton Suppression Actually Singleton Suppression?

MEI-CHING LIEN, *Oregon State University*, ERIC RUTHRUFF, *University of New Mexico*, CHRISTOPHER HAUCK, *Oregon State University* – The signal-suppression hypothesis proposes that salient singletons generate an “attend-to-me signal” which causes suppression to develop over time, eventually preventing capture. Although it is widely assumed that salience plays a critical role in suppression (hence the name





“singleton suppression”), this has not actually been demonstrated yet. We point out that distractors might be suppressed simply because they are distractors, even when nonsalient. To address this issue, we had participants search for a target shape among distractors, which sometimes included a color singleton. On 30% of trials, probe letters were presented briefly inside each shape and participants were to report those letters. The critical manipulation was whether the irrelevant-colored distractor was a salient singleton or a non-singleton triplet. We showed that even nonsalient distractors are sufficient to cause strong suppression. These findings raise the thus-far neglected question of whether salience plays any role in suppression.

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11:40-12:00 pm (61)

Is Deviance Distraction Immune to the Prior Sequential Learning of Stimuli and Responses? FABRICE PARMEN-TIER and LAURA GALLEGU, *University of the Balearic Islands* – Unexpected auditory stimuli presented in the context of an otherwise repeated standard sound captures participants’ attention away from a focal task and yield distraction. While making such sounds predictable reduces distraction, the effect of making target stimuli and responses predictable is unknown. Using a modified serial reaction time task, we installed the learning of a sequence of target stimuli before testing the impact of unexpected sounds on performance. In the learning phase, participants pressed response buttons corresponding to visual cues appearing in one of four spatial locations arranged horizontally. Unbeknownst to participants, the sequence of locations followed a pattern during several blocks before being replaced by a new pattern. The data provided solid evidence of sequence learning for the repeated sequence. In the auditory distraction phase, auditory distractors were presented immediately before each visual target. Unexpected sounds lengthened response times compared to the standard sound (novelty distraction) equally for learned and new sequences. We conclude that the anticipation of target stimuli and responses does not shield participants from deviance distraction.

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Associative Learning

Friday 10:20 AM-12:00 PM CDT

10:20-10:40 am (62)

Strategy Variations in an Association Learning Task. JARROD MOSS and PHILIP NEULIN, *Mississippi State University* – Examining the interaction between cognitive systems can be challenging because the way these systems interact can be affected by the task strategy used. Data from an association learning task were separated into clusters based on response time and accuracy patterns that are indicative of different learning strategies. Prior work on this task has concluded that reinforcement learning and working memory processes interact in the learning of this task. Our empirical data along with a computational model show that data from this association learning task can be accounted for as an interaction between declarative memory and working memory without a role for reinforcement

learning processes. In addition, variations in performance as captured by the different identified clusters can be explained by the strategies that the model and participants use to perform the task. These results indicate that either controlling strategy use or modeling it may be required to understand which cognitive systems are involved in a task and how they interact.

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10:40-11:00 am (63)

Semantic Relatedness Between Initial and Later Learning Retroactively Benefits Memory and Promotes Integration. JAMES ANTONY, *University of California, Davis*, KELLY A. BENNION, *California Polytechnic State University* – When do two experiences aid versus interfere with each other in memory? When do their fates become linked versus remaining independent? Here, across five paired associate learning experiments, we address these questions by systematically varying the semantic relatedness between cues, targets, or both during new learning. Memory performance showed retroactive benefits due to the presence of related associates (versus unshown control words), and these effects increased linearly with target and cue + target relatedness. Retroactive benefits also increased with longer delays before the final test. Critically, memory dependence between initial and later pairs linearly increased with target and cue + target relatedness, suggesting memories formed across-episodes became more interdependent with relatedness. Additionally, these retroactive benefits, but not memory interdependencies, emerged when learning only involved studying rather than practice testing. These experiments show that semantic relatedness during new learning retroactively strengthens old associations while scaffolding new ones into well-fortified memory traces.

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11:00-11:20 am (64)

Memories Retained after 22 and 67 years. ASHLEIGH M. MAXCEY, *Vanderbilt University*, RICHARD SHIFFRIN, *Indiana University*, DENIS COUSINEAU, *University of Ottawa*, RICHARD C ATKINSON, *University of California, San Diego* – We report two case studies of extremely long-term retention, one showing retention of visual search for 22 years and the other showing retention of word sequences for 67 years. Denis Cousineau trained for over 70 sessions searching displays of initially novel objects for presence of one of four never-changing targets. Twenty-two years later, the gains in speed and rate of search were largely retained. The retention could be due to the lack of interference, with no similar search being carried out by Cousineau before or after. Richard C. Atkinson learned fixed sequences of adjectives in the course of his 1954 thesis. Sixty-seven years later he relearned sequences of the same adjectives half in the original order, half in scrambled order. The number correct was about twice as high in the original order, although Atkinson had no conscious awareness that the words were even those used on the thesis. The failure of awareness could be due to massive interference and context change, the adjectives having been encountered numerous times over 67 years. The retention could be due to lack of





interference, the original adjective pairs seldom if ever having been encountered in immediate succession during the retention period.

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11:20-11:40 am (65)

An instance-based theory of associative inference. RANDY JAMIESON, *University of Manitoba*, MATTHEW CRUMP, *Brooklyn College* – People make intuitive inferences all the time. For example, after observing that people who take drugs A and B are cured of a headache, people tend to infer that both drugs are beneficial. However, if that is followed by an observation that people who take drug A alone are cured, people re-value the benefits of B (i.e., “Now that I know A works, I have my doubts about B...”). We present experimental data to characterize the conclusions that people reach in a simple inference task. We present a computational model of human memory to explain people’s performance in that task. Based on the theory’s match to data, we argue that the patterns in people’s intuitive inferences are consistent with an instance-based approach to understanding learning and memory. We present the approach as a method for bridging theory and data across the domains of learning, memory, and decision.

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11:40-12:00 pm (66)

Eye Movement Patterns to Pictorial Stimuli Are Modulated when Associative Learning Occurs under the Differential Outcomes Procedure. LORENA A. ARNAL, *Universidad Internacional de La Rioja (UNIR)*, VICTORIA PLAZA, *Universidad Autónoma de Madrid*, PETER C. GERHARDSTEIN, *Binghamton University SUNY*, ÁNGELES F. ESTÉVEZ, *Universidad de Almería*, LUIS J FUENTES, *Universidad de Murcia* – Associative learning improves when each to-be-learned association is followed by a unique outcome (differential outcomes procedure, DOP) relative to when outcomes are randomly assigned (nondifferential outcomes procedure, NOP). In this study, participants first viewed pairs of sample-comparison stimuli under DOP or NOP. Then, eye movements were registered when four comparison stimuli that followed one sample stimulus came up: one associated with the sample (target), one associated with the nonpresented sample (nontarget), and two distractors. Stimuli were easy or difficult to discriminate. Under the DOP, eye regressions were more frequent to the nontarget than to the target only in the difficult condition. We suggest that target and nontarget activated their correspondent pairs, and, under the DOP, the absent pair could be more effectively inhibited. Thus, the nontarget promoted more eye regressions to be fully identified. The relevance of the DOP extends to specific patterns of eye movements to stimuli that belong to sequences previously learned.

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Bilingualism I

Friday, 10:00 AM-12:00 PM CDT

10:00-10:20 am (67)

Multimodal Approaches Reveal Dynamic Effects of Bilingualism for Theory of Mind. ESTER NAVARRO, *Tufts University* – Theory of mind (ToM) is an extensively studied area that examines humans’ ability to understand behaviors and intentions. Being bilingual has been shown to positively influence ToM performance (Navarro & Conway, 2021; Rubio-Fernandez & Glucksberg, 2012). However, it is still unclear what modulates this effect. Here, utilizing a novel multimodal approach that combines social network analysis, ToM indices and linguistic measures we explored how online ToM performance is affected by a) the density of one’s bilingual network, b) multiple variables of an individual’s bilingualism experience, and c) metalinguistic ability. The preliminary findings indicate that all of these variables influence ToM performance to some extent, suggesting that the mechanisms behind ToM are more dynamic than previously thought and depend on multiple aspects of the bilingual experience. Critically, we encourage researchers to use multiple measures of bilingualism to assess the effect of being bilingual on cognitive processes.

Email: Eleonora Rossi, eleonoraros@gmail.com

10:20-10:40 am (68)

Cross-Language Activation at the Lexical Level Affects Performance on the Reading Span Task. ANA SCHWARTZ, *The University of Texas at El Paso* – Numerous studies have demonstrated facilitated processing of cognates in comprehension and production of language. Recent studies demonstrate that cognate benefits feed-forward into later stages of processing larger units of meaning such as pronoun attachment. We tested if cognate facilitation effects free up working memory resources during reading, potentially increasing reading working memory capacity. Proficient Spanish-English bilinguals completed two versions of the Daneman & Carpenter (1981) reading span task. Participants made sense/nonsense judgements on sentences, and were asked to retain follow-up target words, which were unrelated to the sentences. Set sizes ranged from 3 to 6, and there were two blocks of each set. Sentences contained a relative clause and were in the passive voice. In one version of the task all content words of the sentences were cognates. In the other version no cognates were in any of the sentences. All of the to-be-recalled, follow-up words were noncognates. Participants performed significantly better in judging the sentences for the cognate and recalled a higher percentage of follow-up words for the cognate version of the task relative to the noncognate version.

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10:40-11:00 am (69)

Bilingual Language Evolution in the Lab: Evidence from the Iterated Learning Paradigm. PAULINE PALMA and SARAH LEE, *McGill University* – Iterated learning reveals how linguistic structure evolves through “cultural” transmission, that is,





the amplification of individual cognitive biases over generations (e.g., Kirby et al., 2008; Raviv & Arnon, 2018). However, individual biases derive from individual experience. Thus, the process and outcome of cultural transmission might vary based on prior experience as well as how languages inherently differ. To investigate this, 30 English-French bilingual adults (data collection is ongoing), over three generational chains, where each person learned two low-structured artificial lexicons, counterbalanced. One lexicon shared French's phonological/orthographical features, including diacritics (kâtur); the other was more similar to English (palpo). Preliminary results suggest that both lexicons became increasingly learnable and structured across generations, but this was modulated by both language type, as well as participant- and chain-level experiential attributes. Thus, bilingual experience and the unique properties of different languages can potentially modulate culturally driven language evolution as revealed by iterated learning.

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11:00-11:20 am (70)

Bilingualism Caught in a Net: A New Approach to Understanding the Complexity of Bilingual Competence. PATRYCJA KAŁAMAŁA and ADAM CHUDERSKI, *Jagiellonian University*, JAKUB M. SZEWCZYK, *Donders Institute for Brain, Cognition and Behaviour*, MAGDALENA SENDERECKA, ZOFIA WODNIECKA, and ZOFIA WODNIECKA, *Jagiellonian University* – This study aimed to establish the first psychometric model of bilingualism. We asked whether bilingualism is better described by the factor structure (some generalizable dimensions potentially explained by a higher-order construct) or by the network structure (direct and low-level interactions between the indices of bilingualism). The factor and network structures were established for Polish-English bilinguals on one dataset (N=171) and validated on another dataset (N=122). The network model provided the best fit to the data. Further analyses showed that there is no central index that explains most variability in bilingual experience. Importantly, improvements within some indices came at the expense of other indices. The results imply that individual differences in bilingual experience cannot be reduced to a universal quotient, but instead, bilingualism should be conceptualized as an emergent network of low-level, idiosyncratic dependencies between specific language skills, language-use habits, and language-acquisition history. Overall, the study showcases how network modeling can provide insights into complex cognitive phenomena.

Email: Patrycja Kałamała, patrycja.kalamala@gmail.com

11:20-11:40 am (71)

The Efficacy of Different Tasks for Modeling Individual Differences in Bilingual Language Proficiency. LAURA MATZEN, CHRISTINA L. TING, MALLORY C. STITES, and KYRA L. WISNIEWSKI, *Sandia National Laboratories* – Many studies of language processing in bilingual or multilingual individuals seek participants who meet specific characteristics related to proficiency, language exposure, and age of acquisition. The participants are assigned to groups based on these criteria and performance on experimental

tasks is averaged across the groups. While this approach is effective for addressing some questions about bilingual language processing, it does not capture individual differences that could be important for furthering theories of bilingual language comprehension. In our research, we use machine learning (ML) to develop predictive models of language proficiency based on behavioral and event-related potential (ERP) data. Rather than averaging across items or groups, we use trial-by-trial data to identify patterns of performance that are predictive of proficiency in one or more languages. In this presentation, we describe the tasks we have tested, including semantic priming, word length judgment, picture priming, and variants of the Stroop task. We will discuss which of these tasks were most effective for building predictive models of language proficiency. In addition, we will discuss how this approach can be used for item analysis.

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11:40-12:00 pm (72)

Withdrawn

Reasoning

Friday, 10:20 AM-12:00 PM CDT

10:20-10:40 am (73)

The Effect of Fixed and Growth Mindsets on Withholding Riddle Solutions. RAKEFET ACKERMAN, BAILLIE S. SHUSTER, and LIAT LEVONTIN, *Technion – Israel Institute of Technology* – Metareasoning research explores the metacognitive aspects of reasoning challenges, including solving riddles. Overall, people are reluctant to withhold solutions with an “I don’t know” response. This is the case even when having low confidence in a solution and when providing incorrect answers is costly. We examined the combined effects of two factors on withholding behavior: (a) mindsets, growth versus fixed perception of intelligence and (b) two withholding frames, “I don’t know” versus “better skip it,” relative to a control condition, which required providing solutions to all riddles. In Experiment 1, we found no difference between the conditions when the reward scheme was balanced for correct and incorrect responses. In Experiment 2, we used a reward scheme emphasizing loss, so that participants could withhold every answer to maximize their bonus. Under emphasized losses, the overall rate of “I don’t know,” in contrast with skipping, increased. This was the case for both spontaneous and manipulated mindsets. These findings suggest that mindsets and response framing matter in metareasoning processes and that, despite favorable opportunities being right in front of us, we often fail to take advantage of them.

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10:40-11:00 am (74)

Can't Take a Hint? STEVEN M. SMITH and SHIVANI MANSHARAMANI, *Texas A&M University* – If a good hint appears during work on a tractable but unsolved problem, does it automatically trigger a solution? On the one hand, Maier (1931) reported that hints facilitated solutions of his two-string problem without the





participant's awareness. Furthermore, Seifert et al. (1994) described a spreading activation explanation of how serendipitous hints trigger resolution of initially failed problems. On the other hand, studies of inattention blindness (e.g., Rock et al., 1992) show that easily visible stimuli can hide in plain sight when attention is elsewhere; benefits of hints might not occur if attention is diverted. Using remote associates problems (e.g., HOLD, PRINT, STOOL), we found higher solution rates when problems were shown superimposed over large photographs of objects whose names were solutions (e.g., a photograph of a foot), as compared to photographs of nonsolutions (e.g., a photograph of a bell). However, participants trained to look for solution words spelled out in letter squares were less likely to benefit from the photographic hints when unhelpful letter squares distracted attention from the jumbo-sized hints. We report experiments that examined some of the properties of this hint blindness effect.

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11:00-11:20 am (75)

Rock, Paper, Scissors Agents Exploit Patterns in Human Sequential Behavior. ERIK BROCKBANK and EDWARD VUL, *University of California, San Diego* – The ability to recognize and undo maladaptive patterns in one's behavior is key to human learning and strategic reasoning. We ask how well people detect and alter regularities in their decisions through iterated play of the rock, paper, scissors game (RPS). Participants (N=194) played 300 rounds of RPS against one of eight bot opponents; each bot employed a model-based strategy that exploited a different sequential dependency in human move selection. Bot strategies varied in the memory complexity of the regularity they exploited. We assess participants' ability to revise these exploitable patterns in their behavior. First, we find that performance against the bots is related to how much people exhibit these patterns naturally in human dyad play. Second, we show that the extent to which people can undo regularities in their own behavior is well explained by the memory complexity of the behavioral pattern itself; people reliably lose to the most complex bots, perform at chance against intermediate bots, and show evidence of counter-exploiting the simplest bots. Our results have implications for domains like explainable AI, where agent decisions rely on a model of what patterns in their own behavior people can recognize and avoid.

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11:20-11:40 am (76)

Individual Differences in Assessing Risks, Myths, and Arguments on COVID-19. CHRISTOPHER R. WOLFE, *Miami University*, AUDREY M. WEIL, *Washington College* – The COVID-19 pandemic has been characterized by misinformation, politicization of public health, and extreme differences in risk assessment. In two studies, we sought to understand factors that contribute to differences in people's understanding of the virus and associated risks. We assessed participants' political ideology, impulsivity, numeracy, cognitive reflectiveness, and the presence of risk factors, investigating how they impacted participants' assessment of COVID-19 risk and misinformation. In both studies we found that conservative

participants reported higher levels of acceptable risk, underestimated the risk of activities, and endorsed more misinformation. Participants who had a personal risk factor rated COVID-19 risks as higher, more reflective participants had lower acceptable risk levels, and impulsive participants endorsed more misinformation. In our second experiment, we replicated all these findings and also found that reflective participants were more likely to wear a mask, get vaccinated, and maintain social distancing. Additionally, while assessing COVID-19 arguments, argument claims, rather than supporting reasons, predicted agreement and judgments of argument quality.

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11:40-12:00 pm (77)

The Influence of Information on Environmental Decision-Making: Modes of Delivery and Depth of Processing. MATTHEW J. SHARPS, SIMRAN K. NAGRA, ANDERS D. PAULSEN, JASMIN C. MORENO, STEVIE R. MORTENSEN, TROY L. FOLMER, and CONSTANCE J. JONES, *California State University, Fresno*, JANA L. PRICE-SHARPS, *Walden University* – This research addressed modalities of information delivery in the cognitive determination of the importance of climate change in natural scenes. Respondents were presented with natural scenes involving ice and water, in which there were before-and-after changes between the scenes. They were asked to rate the degree to which the changes were due to global warming, even though this inference was not supported by the information at hand. Prior to this, respondents were given information on climate change, orally, in written form, or in combined oral and written form. Presentation format significantly influenced respondent ratings; oral presentation resulting in higher levels of attribution of change to global warming than did written or combined information, which require more feature-intensive processing, contributing to depth of processing. These results unite the levels-of-processing framework with the gestalt/feature-intensive processing theory of cognition in the environmental realm; oral processing resulted in lower feature-intensive processing of environmental information, with greater respondent acceptance of unsupported hypotheses. Results are discussed in terms of the cognitive bases of scientific understanding.

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Friday, 12:00-1:30 pm (WS1)

Information Session: Funding at the National Science Foundation. BETTY TULLER, *National Science Foundation* – NSF opportunities change all the time! Come hear the latest and get your questions answered. This presentation and Q&A session will provide information on current funding opportunities relevant to the Psychonomics community, NSF merit criteria, and the review process. Program officers will discuss. We will also cover 1) how to find the appropriate program for your work, 2) how to apply for National Science Foundation (NSF) funding, 3) the grant-writing process, and 4) tips for writing successful proposals. Program Directors will also





be available to schedule one-on-one virtual meetings, to discuss specifics of your research and how to get it funded.

Symposium II: Beyond the Button Press: Studying the Mind Through Drawings

Friday, 1:30-3:30 PM CDT

1:30 - 1:50 pm (SYM6)

Drawing Out Our Visual Memories. WILMA A. BAINBRIDGE, *University of Chicago* – In spite of the clear richness of our visual memories, there are still many open questions about the specific content underlying their mental representations. Traditionally, verbal recall or visual recognition tasks have tried to quantify these memories but with limited resolution. In a series of recent studies, we have developed new ways to use drawing as a form of visual free recall, combined with large-scale crowd-sourced scoring to objectively quantify these drawings. These new methods allow us to observe the object details, spatial details, and false memories within a mental representation. In this talk, I will present what drawings have shown us about visual memory for scenes, including recent findings characterizing aphantasia (a lack of visual imagery). I also will provide advice on how to conduct your own online rapid drawing experiments and ideas for how these tools could be extended to other topics.

1:50-2:10 pm (SYM7)

Visual Content and Social Context Jointly Determine Pictorial Meaning. JUDITH FAN, *University of California, San Diego* – Drawing is a versatile technique for visual communication, ranging from photorealistic renderings to schematic diagrams consisting entirely of symbols. How does a medium spanning such a broad range of appearances reliably convey meaning? A natural possibility is that drawings derive meaning from both their visual properties as well as shared knowledge between people who use them to communicate. In this talk, I'll describe two studies exploring this possibility using drawing-based communication games. In the first study, we investigated how semantic context affects what information people consider relevant to include in their drawings; in the second, we investigated the consequences of accumulating shared knowledge via extended communication on how people depicted the same object over time. Taken together, our findings show that both visual information and social context are crucial for determining how drawings derive referential meaning during visual communication, and suggest that a critical factor affecting the balance between the two may be the type and amount of shared knowledge between communicators.

2:10-2:30 pm (SYM8)

Drawing as a Window onto Perceptual Expertise. REBECCA CHAMBERLAIN, *Goldsmiths, University of London* – Do artists see the world differently? One of the most ecologically valid ways of measuring perceptual differences in artists is to study the act of art making itself. By measuring the way in which individuals draw and their eye movements while doing so, across two studies we have been

able to show that drawing expertise is coupled with a shift to more global attentional strategies. Artists draw more global perceptual features first and demonstrate more global-to-local saccades and fixations while drawing but not while free-viewing. Such research illuminates the perceptual changes artists undergo as they learn how to see by learning how to draw and provides clues to the domain-specificity of artistic expertise.

2:30-2:50 pm (SYM9)

When Scenes Look Like Materials: René Magritte's Reversible Figure-Ground Motif. J. BRENDAN RITCHIE, *National Institutes of Health*, BENJAMIN VAN BUREN, *The New School* – We draw attention to a frequent motif in the work of the Belgian surrealist René Magritte (1898-1967). In the motif, a scene is depicted that contains a silhouette, which itself contains another depicted scene. The silhouette is bistable, appearing either as a figural region whose positive space is covered, or filled, with the interior scene texture, or as a ground region providing a window onto a more distant scene. We call this the “reversible figure-ground motif.” Because the stimulus does not change when our percept changes, the motif's appearance at any particular moment cannot be explained by its local or global image statistics. Instead principles of perceptual organization, and in particular image segmentation and figure-ground assignment, appear crucial for determining whether the interior of the silhouette is processed as a material vs. a scene—which in turn supports a fundamental role for visual segmentation processes in material and scene perception more generally. From this, we conclude that image-based models are fundamentally limited in their ability to describe human scene and material perception.

2:50-3:10 pm (SYM10)

What Do Visual Narratives Teach Us About Psychological Event Representations? BENJAMIN VAN BUREN, *The New School*, J. BRENDAN RITCHIE, *National Institutes of Health*, PASCAL LEFÈVRE, *LUCA School of Arts*, JOHAN WAGEMANS, *KU Leuven* – We experience the world not as a continuous stream of sensory data, but rather as a series of discrete events. Often, this is studied by asking subjects to view movies and to mark moments that they judge to be “event boundaries.” This assumes that event representations are contiguous, with each passing moment captured in one representation or another. However, glancing at any comic strip suggests that a sequence of images depicting temporally disconnected moments can convey a rich narrative and that event representations may thus omit stretches of time. In an initial experiment, we asked comic artists to draw comic versions of movies, and a second group of subjects indicated which parts of the movie each panel represented. This confirmed that comics are a sparse form of event representation, omitting on average 33% of movies. In a second experiment, we modified the classical “boundary marking” task, asking subjects to mark a movie timeline to indicate not the boundaries between events, but rather each event's start and end frames. When allowed to mark events in this way, subjects omitted large portions of each movie from any event. We conclude that psychological event representations, like comics, are discontinuous in nature.





3:10-3:30 pm (SYM11)

Drawing for Communication: Simplification and Complication as Contextually Dependent Adaptive Strategies. ELINE VAN GEERT, LIESSE FRÉRART, and JOHAN WAGEMANS, *KU Leuven* – The Gestalt psychologists posited that we will always organize our visual input in the best way possible. Both the removal of unnecessary details (simplification) and the exaggeration of distinctive features (complication) can contribute to reach a better organization. When will a feature be simplified or complicated, however? We investigated whether the importance of a feature for discrimination influences which organizational tendency occurs. We simultaneously presented participants with four figures composed of simple geometrical shapes and asked them to reconstruct one of these figures in such a way that another participant would be able to recognize the target figure amongst the alternatives. The four figures differed either quantitatively or qualitatively (close or far context). In case of quantitative differences, two feature dimensions were varied, with one manifesting a wider range of variability across the alternatives than the other. As expected, the results indicate that complication occurred more often for the feature exhibiting more variability and in the close context, than for the feature exhibiting a smaller range of variability or in the far context.

Attention Control Friday, 1:30-3:30 PM CDT

1:30-1:50 pm (86)

Induced Alpha Suppression Indexes a Focus of Attention that Selects Both Perceptual and Memory Representations. GEOFFREY F. WOODMAN, SISI WANG, and DAVID W. SUTTERER, *Vanderbilt University*, ROBERT M. REINHART, *Boston University*, KEISUKE FUKUDA, *University of Toronto Mississauga* – Although researchers have been recording the human electroencephalogram (EEG) for almost a century, we still do not completely understand what cognitive process is measured by the 8-12 Hz activity in the alpha band. Recent perspectives have suggested that the suppression of alpha-band power following the onset of a stimulus array may either measure attentional selection or the buffering of the task-relevant representations in working memory. We review recently accrued evidence showing that modulations of alpha-band activity following the presentation of stimuli appear to be due to the operation of an attentional selection mechanism, with characteristics that mirror the classic views of attention as selecting both perceptual inputs and memory representations.

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1:50-2:10 pm (87)

Evidence for Conflict Monitoring During Speech Recognition in Noise. SUSAN TEUBNER-RHODES and ANDREW LUU, *Auburn University*, KENNETH I. VADEN, *Medical University of South Carolina* – Cognitive control refers to executive processes that support goal-directed behaviors. Conflict monitoring states that people upregulate cognitive control to improve performance when conflict occurs (i.e., conflict adaptation). Other theories attribute these

performance changes to stimulus features/patterns that co-occur with conflict in traditional cognitive control tasks. We show that conflict adaptation can occur in the absence of such confounds in a novel picture-speech conflict task where every stimulus is unique. Participants (N=22) listened to and repeated spoken words (“cat”) presented in multitalker babble while viewing congruent (cat) or incongruent (bat) pictures to manipulate phonological conflict. Following conflict, word recognition accuracy improved significantly (+17%) on incongruent but not congruent trials. The postconflict performance boost was observed even when trials following errors were excluded from the analysis. Results demonstrate robust conflict adaptation when feature binding and contingency confounds are eliminated, providing new evidence for conflict monitoring. These results suggest that cognitive control is instrumental in phonological conflict resolution during speech recognition in noise.

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2:10-2:30 pm (88)

Model of a Brain Saliency Processing System. GEORGE SPERLING, *University of California, Irvine*, PENG SUN, *Canon, USA*, LINGYU GAN, *University of California, Irvine* – Consider centroids (average positions of multiple-item arrays) as representative of statistical summary representations. In 300 msec exposures of 24-dot arrays containing a mixture of dots, 8 dots of each of 3 colors, subjects can make accurate judgments of all three color centroids (whole report). When the to-be-reported color is postcued (partial report), they can judge up to 6 centroids. The model consists first of attention-color filters to form items of a particular color into a group, then a representation of the x,y locations of the group items in a within-group saliency map. Analogous to a binary figure-ground (x,y) map, saliency (x,y) is a real number scalar that is subject to attentional modification (e.g., weight all items equally, weight proportionally to contrast or to size, etc.) Average location is a computation made on the contents of the saliency map. Some other computations are other averages, search priority, inter-item distances, third-order motion, and shape identification. Saliency maps are extremely efficient because the same maps and same operations on the maps serve all kinds of items independently of their features. The saliency processing stream is parallel to the brain’s feature and the location streams.

Email: George Sperling, sperling@uci.edu

2:30-2:50 pm (89)

Response-Repetition Costs During Task Switching Remain Robust in a Three-Choice Task: Evidence Against a Simple Response-Switching Heuristic. IRING KOCH, *Rheinisch-Westfälische Technische Hochschule Aachen University*, ELIOT HAZELTINE, *University of Iowa*, GRETA PETERSEN, *Rheinisch-Westfälische Technische Hochschule Aachen University*, DANIEL WEISSMAN, *University of Michigan* – Response repetitions (RR) aid performance if the task repeats but impair performance if the task changes. Such effects may index the retrieval of episodic task-response bindings that match the current trial when the task and response repeat but produce a partial mismatch when only





one repeats (i.e., produce partial repetition costs). Such effects may also index inhibition of the previous response, which positive category (i.e., task) priming can overcome if the task repeats but not if the task switches. Finally, as prior data come from two-choice tasks, such effects may index a simple heuristic bias that repeats the response if the task repeats but switches the response if the task switches. To investigate the latter possibility, we employed a predictable (i.e., uncued) task switching protocol with univalent targets and two (Experiment 1, $n=40$) or three (Experiment 2, $n=60$) possible responses. A bias to switch the response if the task switches cannot lead to the preparation of a specific response alternative in a 3-choice task. Nonetheless, we observed similar RR costs in the 2- and 3-choice tasks. This outcome favors the episodic binding and response inhibition accounts over the heuristic bias account.

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2:50-3:10 pm (90)

Interactions of Top-Down Attentional Control and Selection History. NANCY B. CARLISLE, *Lehigh University* – Attention can be influenced by bottom-up factors, top-down control, and selection history. These three types of influence are often conceptualized as independent influences. In my lab, we have recently found some interesting interactions between top-down control and aspects of selection history. In one line of research, we examined whether top-down control can activate a target-specific selection history in spatial statistical learning. We found that specific targets and target categories activated separate spatial maps, indicating a trial-by-trial activation of statistical learning. In another study, we found that selection history can prime top-down control. Certain screen locations had a high or low probability of being associated with specific types of attentional cues. We found that participants got stronger benefits from the cues at the high probability locations. Both of these lines of data suggest that the different sources of attentional control may interact in the guidance of attention. One interesting implication of this work is that our top-down control interacts with the more automatic processes involved in selection history.

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3:10-3:30 pm (91)

Attention and Visual Sensory Memory in Simulated Driving. TYLER N. MORRISON, RICHARD J. JAGACINSKI and JORDAN PETROV, *The Ohio State University* – Participants tracked the center of a simulated winding roadway with preview of the upcoming roadway that ranged from 0.3 to 1.0 seconds. Participants' spatial distributions of attention were measured by perturbing the upcoming roadway with different frequency sinusoids at different roadway positions and then measuring the degree to which those frequencies were present in participants' tracking movements. Participants exhibited a continuous range of attention to preview, and it lengthened with the amount of displayed preview. When preview briefly disappeared, larger amounts of preview were associated with longer times for participants' movement patterns to regress from preview-based anticipation to more reactive error nulling. During preview withdrawal, attention may be shifted to more distant roadway preview in

visual sensory memory beyond the usual range of attention to prolonged anticipatory tracking. In contrast, when displayed preview was restored after 5 seconds, the time to progress from error nulling to anticipatory tracking lengthened with the range of attention. The cognitive processes associated with preview withdrawal and restoration are thus distinct in their respective dependence on amount of preview vs. range of attention.

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Bilingualism II Friday, 1:30-3:30 PM CDT

1:30-1:50 pm (92)


Withdrawn

1:50-2:10 pm (93)

Proactive Language Control Within and Across Modalities—Evidence from the Blocked Language Order Effect. TAMAR DEGANI, *University of Haifa*, HAMUTAL KREINER, *Ruppin Academic Center*, MATHIEU DECLERCK, *Vrije Universiteit Brussel* – A contested issue in the bilingual literature is whether language control is shared across bilingual language production and comprehension. However, little to no research has examined this with respect to proactive language control, a control process implemented in anticipation of any nontarget language interference. To investigate this modality issue, 140 Hebrew-English bilinguals performed a blocked language-order task either within modality or across modalities. All participants completed an L1 picture naming production task in the first and third blocks. The second block included a production (within modality) or a comprehension (across modality) task, in either the L1 or the L2. Results showed more errors and filled pauses in the third block relative to the first block for bilinguals exposed to their L2 in the second block. Moreover, the size of this block language-order effect was similar following production and comprehension tasks, suggesting that proactive language control might be shared across modalities.

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2:10-2:30 pm (94)

Bilingualism in Different Forms: How Cultural Identity and Cognitive Control Shape Code-Switching Preferences. ARIEL CHAN, *University of California, Los Angeles & University of California, Irvine*, SHOICHI IWASAKI, *University of California, Los Angeles*, JUDITH F. KROLL , *University of California, Irvine* – We report the results of an online study that examined the impact of cultural identity on cognitive control and code-switching practices in two groups of highly proficient Cantonese-English bilinguals who differed in their language experience. One group were heritage speakers of Cantonese, born and raised in the U.S. The other group were international students born and raised in a Cantonese-dominant context but immersed in English as they studied abroad in the U.S. All bilinguals completed an identity questionnaire, a code-switched word recognition experiment, and the AX-continuous performance





task to assess proactive and reactive cognitive control. Although recent studies have demonstrated the importance of interactional contexts and social networks in shaping bilingual language processing, little attention has been paid to cultural identity. Like past studies, we expect that immersion in the second language will enhance proactive cognitive control in language processing, but that cultural identity will further modulate code-switching preferences.

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2:30-2:50 pm (95)

Validating Measures of Procedural Memory Used in Second Language Acquisition Research. JOSHUA BUFFINGTON, ALEXANDER P. DEMOS, and KARA MORGAN-SHORT, *University of Illinois Chicago* – Recent research suggests a role for procedural memory in second language (L2) acquisition. However, little is known about the validity of procedural memory tasks. We examined the validity for three tasks of procedural memory learning ability used in L2 research: dual-task Weather Prediction Task (DT-WPT), Alternating Serial Reaction Time Task (ASRT), and Tower of London (TOL). Three declarative memory learning ability tasks were also administered. A factor analysis did not provide evidence for convergent validity for the procedural memory measures, but the ASRT and TOL showed reasonable discriminant validity with declarative memory measures. A subset of participants also completed a follow-up session that included a Serial Reaction Time (SRT) task and an L2 (morphophonology) learning task (Ettliger et al., 2014). Results suggest that the ASRT and SRT correlate positively and that the SRT predicts L2 learning performance. We discuss implications for how procedural memory should be examined in future language-related research.

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2:50-3:10 pm (96)

Can Bilinguals Control Entry into Consciousness Better than Monolinguals? KENNETH PAAP, STEPHANIE MACHUCA and BRANDON ZIMIGA, *San Francisco State University* – In the Reflexive Imagery Task (RIT) explored extensively by Morsella and colleagues, participants are instructed to not subvocalize the name of objects displayed on a computer screen. It is very difficult to prevent the name of the object from entering consciousness. If bilinguals are better at inhibiting or suppressing prepotent behavioral responses, they might also be better at the RIT. However, there were no significant differences between bilinguals and monolinguals in the proportion of failures to suppress. Based on both self-ratings and MINT scores the Spanish-English bilinguals were English dominant. Each bilingual completed one session conducted in English and the other session entirely in Spanish. During the English session ALL failures to suppress were English words. During the Spanish session the failures occurred equally often for both languages. The proportion of failures to suppress increased with Spanish proficiency, but the correlation with English proficiency was not significant.

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3:10-3:30 pm (97)

Mixed-Effects Modeling of Executive Function: Evidence from Bilingual Speakers. ADAM JOHN PRIVITERA, *University of Hong Kong*, MOHAMMAD MOMENIAN, *The Hong Kong Polytechnic University*, MEHDI BAKHTIAR, *University of Hong Kong*, and BRENDAN S. WEEKES, *University of Hong Kong, University of Melbourne, & University of Cambridge* – Tasks measuring executive functions (EF) including Attention Network Test (ANT), Simon, and Flanker reveal individual differences in controlled performance. Despite variability, reported analyses focus on fixed-effects models averaging across participants, thus narrowing the impact of results. Linear mixed-effects (LME) models consider the range of individual differences in performance and allow tests of predictions about fixed effects of interest against the random variability in participant characteristics, thus allowing non-trivial differences to be considered when testing hypotheses about putative differences in EF across groups. For example, the bilingual advantage hypothesis assumes that bilingual experience has an independent (positive) effect on EF. Using LME, we tested whether individual differences in bilingual experience are correlated with performance on a range of EF tasks. Mandarin-English bilingual participants completed online ANT and Simon tasks. Flanker task performance was derived from no-cue trials on the ANT. LME revealed a pattern of effects showing individual differences in bilingual experience correlate with performance benefits on EF tasks. Implications for the bilingual advantage hypothesis are discussed.

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Judgment and Decision Making I Friday, 1:30-3:30 PM CDT

1:30-1:50 pm (98)

On Sharing the Benefits of Costly Help. YAAKOV KAREEV and JUDITH AVRAHAMI, *The Hebrew University of Jerusalem*, DAVID V BUDESCU, *Fordham University*, TAMAR KUGLER, *The University of Arizona*, VERED TZAMERET and TALYA SHMUELL, *The Hebrew University of Jerusalem* – Cases abound in which a costly helping act by a benefactor can greatly improve the outcomes of a beneficiary. Such help conforms with prevalent social norms and can increase collective welfare. We ask how the surplus created through such help would be shared by the benefactor and the beneficiary. Theoretically, the surplus is expected always to be shared equally, but we hypothesized that aspects of the situation, such as relative wealth, social distance, and perspective may result in variations in this division. In two experiments we compare participants' judgement (N=339) to participants' bargaining choices (N=652 in 326 dyads). Results show that a) the benefactor share is smaller in judgment than in bargaining, reaching equal sharing only in the latter, b) a poorer benefactor is both judged to deserve and actually receives more of the surplus than a richer benefactor, and c) comparing the different bargaining types we find that, surprisingly, poorer agents in either role gain more in the ultimatum than in the one-round simultaneous bargaining.

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1:50-2:10 pm (99)

One Reason Why Entrepreneurs Are Overconfident. J. EDWARD RUSSO, *Cornell University*, PETER BOYLE, *Central Washington University*, JUYOUNG KIM, *Sogang University* – We identified one source of the notoriously high levels of confidence in the investment decisions of entrepreneurs. During such a decision new information is distorted toward supporting whichever action is currently leading, whether to invest or not to invest, and thereby increasing confidence in that leading action. Over several items of information, information distortion (ID) drives a cycle of increasing confidence-ID-confidence in which larger ID creates a larger increase in confidence. More confidence in the leading action then drives more ID of the next information, hence the confidence-ID-confidence cycle. In three studies of two investment decisions with entrepreneurs from the U.S. and Korea involving nondiagnostic information, ID drove a substantial increase in confidence, unwarranted because the information was nondiagnostic. Those entrepreneurs who chose to invest exhibited greater (a) initial confidence, (b) impact of a unit of ID on the increase in confidence, and importantly (c) final confidence. Higher initial confidence was traced back to greater entrepreneur-specific optimism. One import of this work for judgment and decision-making is its focus less on the decision itself but more on confidence in that decision.

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2:10-2:30 pm (100)

Taking Advice from Models and Humans. DAVID V. BUDESCU and MARK HIMMELSTEIN, *Fordham University* – We report results of three studies of forecasters' willingness to rely on algorithmic or human advice in a judge-advisor system: Judges forecast an event, are provided advice from human(s) or model(s), and are given the opportunity to revise their forecasts. Overall, judges revise about half of their forecasts. In most cases, and on average, accuracy improves as a function of exposure to advice. Judges report a preference for algorithmic advice for economic events and for human advice when forecasting political events, but this is not reflected in their behavior. We find no evidence of either algorithm aversion or algorithm appreciation, as the source of advice has little impact on the judges' willingness to accept advice or accuracy in either domain. We fit and validate a model of the forecasters' propensity to revise forecasts based on advice. The key predictors are related to the similarity between the judges' initial forecast and the advice, such as the distance between them, their relative entropy, and (dis)agreement on the most likely outcome. Most critically, the distance between the forecast and the advice has a significant quadratic effect: Judges are least likely to update when the distance is either small or very large.

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2:30-2:50 pm (101)

Low Numeracy Around the World: Implications for Financial Well-Being. WANDI BRUINE DE BRUIN, *University of Southern California*, PAUL SLOVIC, *Decision Research & University of Oregon* – Numeracy refers to the ability to use numbers, such as converting percentages (10%) into frequencies (1 in 10). Numeracy is

deemed central to financial decisions, but studies have almost exclusively focused on high-income countries. Here, we report three findings from the Lloyd's Register Foundation World Risk Poll, which assessed numeracy in 141 countries from all four World Bank country income categories. First, low numeracy was more common in low-income countries (76%) than in high-income countries (32%), with upper middle income countries (58%) and lower middle countries (73%) falling in between—and these differences held after accounting for educational attainment and other demographics. Second, across the world and within each country-income category, low-numerate individuals were more likely to be among the poorest 20% in their country, even after accounting for education and income, as well as other demographics. Third, low-numerate individuals reported finding it difficult to live on their income, even after accounting for whether or not they were among the poorest 20% in their country as well as education and other demographics. Implications for educational interventions are discussed.

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2:50-3:10 pm (102)

Over- vs. Underweighting of Extreme Values in Number Integration Depends on the Computational Demands of the Task. THORSTEN PACHUR, VERENA CLARMANN VON CLARENNAU, and BERNHARD SPITZER, *Max Planck Institute for Human Development* – Decisions are often based on sequential samples of numerical values (e.g., when deciding which of two online shops is cheaper). Empirical studies requiring sequential number integration in behavioral economics and in numerical cognition have come to opposite conclusions about whether people subjectively underweight (compression) or overweight (anticompression) extreme values in their internal representation. Here we test whether this discrepancy in conclusions could be due to the differences in computational demands posed by the tasks usually used in the two experimental traditions. In empirical experiments, we asked N=800 participants to judge rapid sequences of numbers and manipulated the computational demands of the task by asking participants to either judge the average of a single number stream (low demand) or to compare two streams (high demand). Modeling the data with the selective integration (SI) model revealed that participants in the single-stream task showed compression, whereas participants in the dual-stream task showed anti-compression. Computer simulations with the SI model indicated that the different distortions could be an optimal adaptive response to differences in computational demands.

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3:10-3:30 pm (103)

Views about the Fairness of Voting Systems: Plurality, Ranked-Choice, and Cardinal Voting. ZACHARY A. CAD-DICK and BENJAMIN ROTTMAN, *University of Pittsburgh* – There are ongoing debates about whether the U.S. should switch from plurality voting to alternative systems (e.g., ranked-choice voting; RCV) and debates about the relative fairness and ease of learning different systems. In this study participants judged which candidate should win an election based on the election results—different





options corresponded to different voting systems (plurality, RCV, and cardinal) and also rated the voting systems for how fair they thought that they were. We found that choices in the election decision-making task were able to predict the fairness ratings for those who preferred plurality and cardinal voting, but not RCV. Participants who viewed cardinal voting as being the most fair tended to choose cardinal candidates in the election task and have higher cognitive reflection, utilitarianism, and numeracy scores. Additionally, participants typically thought that RCV was the most fair, despite not choosing candidates who won according to RCV in the election task and having difficulty understanding how RCV works. This research has implications for persuading the public to change voting systems for elections as well as how groups should make collective decisions (e.g., hiring decisions).

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Psycholinguistics Friday, 1:30-3:30 PM CDT

1:30-1:50 pm (104)

Do Automated Coherence Measures Index Gist Extraction?

DAVID A. BRONIATOWSKI, *The George Washington University*, VALERIE F. REYNA, *Cornell University* – Extracting a gist from a large number of documents is a human competence that has long been a goal of automated machine-learning systems. Although several such systems have been developed, they have not, to date, been assessed using psychologically valid measures. We employed Latent Dirichlet Allocation (LDA)—a widely used, unsupervised machine learning model—to generate 50 topics each for millions of Twitter and Facebook posts about COVID-19. For each topic, the LDA model generated a list of 10 keywords and a topic coherence score. We next compared these coherence scores to average coherence judgments generated by roughly 50 human subjects who were shown the same lists of keywords and, in some cases, example posts. Across both Twitter and Facebook, automated coherence scores were consistently significantly correlated with human ratings for keyword lists. Results provide preliminary evidence suggesting that automated coherence measures may index gist extraction under some circumstances.

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1:50-2:10 pm (105)

Withdrawn

1:50-2:10 pm (106)

The Laboratory Discovered: Place-for-Institution Metonyms Appearing in Subject Position Are Processed as Agents.

MATTHEW W. LOWDER and ADRIAN ZHOU, *University of Richmond*, PETER C. GORDON, *University of North Carolina* – “Hospital” can refer to a physical place or more figuratively to the people associated with the hospital. Place-for-institution metonyms are common in everyday language, but there are lingering questions about how they are processed. The goal of the current eyetracking experiments was to investigate how metonyms are interpreted when they appear

as sentence subjects in structures that are temporarily ambiguous vs. unambiguous (The hospital [that was] requested by the doctor...). If comprehenders have a bias to interpret metonyms in subject position as agents (Fishbein & Harris, 2014), they should initially access the figurative, institution sense of the metonym. This interpretation is rendered incorrect at the disambiguating by-phrase, which should lead to reanalysis (garden-path effects). In Experiment 1, we observed larger garden-path effects for metonyms compared to inanimate control nouns. In Experiment 2, we observed that the magnitude of the garden-path effect for metonyms was equal to the effect when the sentence subject was animate. The results suggest that the subject-as-agent heuristic is a powerful cue during sentence processing, which can prompt the comprehender to initially access a figurative interpretation of a metonym.

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2:10-2:30 pm (107)

Effects of Prior Information on Memory and Production of Singular “They” Pronouns.

BETHANY GARDNER and SARAH BROWN-SCHMIDT, *Vanderbilt University* – The use of singular they pronouns is becoming increasingly common as non-binary identities gain visibility. An exciting opportunity surrounding this cultural and linguistic change is to examine how people learn to associate pronouns with a person, and we examine how different types of information support people remembering and producing singular “they.” Participants read 1) a PSA about gendered pronouns or a neutral topic and/or 2) biographies using “they” or “he/she” pronouns. Then, participants were introduced to 12 characters, each of whom had four associated facts: name, pronouns, job, and pet; whether a character used “they” could not be predicted from the name. We measured memory for pronouns in a 3AFC task and production of pronouns in a sentence completion task. Our primary finding is that reading the PSA about pronouns reduces the relative difficulty of remembering “they” as compared to “he” and “she,” and strongly reduces the relative difficulty of producing “they.” Seeing “they” modeled in biographies modulates the effect of PSA but does not affect accuracy on its own. This suggests that information motivating people to pay attention to gendered language can successfully affect their ability to use new language forms and gender people correctly.

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2:30-2:50 pm (108)

Choosing Your Words: Effects of Linguistic Packaging on the Persuasiveness of COVID-19 Health Messages.

ELSI KAISER, *University of Southern California* – How do you persuade people to wear masks, get vaccinated, or practice social distancing? We (i) investigate what modulates the persuasiveness of COVID-19 health messages and (ii) test language processing theories using texts with real-world relevance. Language research shows early mentioned information is privileged: Speakers mention the most prominent information early in the sentence; comprehenders construe early information as most topical. But it is unclear to what extent order-of-mention effects exist “in the wild” (e.g., assessing risk, receiving





advice). We report two studies on the persuasiveness of COVID-related messages, testing (i) effects of order-of-mention (Experiment 1: virus or victim first, Experiment 2: agent or behavior first); (ii) how they interact with other information (Experiment 1: numbers, Experiment 2: pronominal perspective: you/we/people); and (iii) individual differences (COVID anxiety levels, political views). Results: Although there is no one-size-fits-all solution for message design—individual differences modulate effectiveness of our linguistic manipulations—we show that order-of-mention interacts in previously undiscovered, systematic ways with other aspects of language and cognition (perspectival cues and political views).

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2:50-3:10 pm (109)

A Single Exposure to Both Meanings of Ambiguous Words Helps, Rather than Hinders, Processing of Subordinate Meanings. CESAR A. GUTIÉRREZ, J. S. TAYLOR, LENA M. BLOTT, and JENNIFER M. RODD, *University College London* – Many English words have multiple meanings. Less frequent (subordinate) meanings are harder to access than dominant meanings. Studies have shown that one encounter with subordinate meanings reduces this difficulty. However, natural language exposure includes both meanings, and this could increase processing difficulty due to competition. In Experiment 1, 60 native English speakers read natural sentences containing ambiguous words (one per meaning) and control sentences containing unambiguous words. Results from a semantic relatedness posttest showed that mixed exposure made subsequent processing of subordinate meanings nonsignificantly faster and significantly more accurate, with no change for dominant meanings and unambiguous words. Experiment 2 (preregistered, N=182) replicated the mixed-training boost for subordinate meanings in both reaction times and error rates. In addition, we found an unexpected training benefit for the unambiguous items. These results reveal that exposure to both meanings of an ambiguous word enhances performance for the more difficult subordinate meaning.

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Recall I

Friday, 1:30-3:30 PM CDT

1:30-1:50 pm (110)

The Testing Effect with Free Recall: Organization, Attention, and Order Effects. NEIL W. MULLIGAN, *University of North Carolina at Chapel Hill*, ZACHARY BUCHIN, *Union College* – Memory retrieval not only reveals but can also change memory as shown by direct and indirect (e.g., forward) testing effects. Two experiments examined the testing effect with free recall, with respect to attention, organization and forward testing effects. In Experiment 1, participants learned two categorized word lists, one followed by repeated retrieval practice and the other followed by repeated restudy; memory for both lists was assessed on a final free recall test 2 days later. Final recall was significantly diminished by divided attention in the restudy but not retrieval condition, indicating that the testing effect is

relatively resistant to distraction. However, a negative testing effect was found on final recall. Experiment 2 implemented a between-subjects design in which both learning blocks were in the retrieval or restudy condition. Final recall now exhibited a positive testing effect. Analyses of the order of learning blocks revealed strong forward-testing effects in which the study list following the retrieval block produced superior final recall, a benefit accruing to the restudy condition in the within-subject design and to the retrieval condition in the between-subjects design.

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1:50-2:10 pm (111)

Boosting Memory with Temporal Regularities. GAËN PLANCHER, BARBARA TILLMANN, and LAURA FERRERI, *University of Lyon* – Music cognition research has provided evidence that temporally regular structures guiding attention over time benefit perception and cognition. In recent studies, we observed that the presence of a regular rhythm during the working memory maintenance interval resulted in improved memory performance compared to a silent condition (Plancher et al., 2017; Fanuel et al., 2018, 2020). In the present study, we investigated whether long-term memory can also benefit from these regularities. In Experiment 1, we asked participants to remember series of 12 words for further recall. We compared a condition where a sound was presented three times with a regular stimulus-onset-asynchrony before the encoding of each word to a silent condition and to a condition with a sound presenting three times, but with irregular stimulus-onset-asynchronies. Experiment 2 was the same as Experiment 1 except that within a list the words were all semantically related, like in the DRM paradigm known to produce false memories. Taken together, our results indicated that an isochronous rhythm increases true memories but decreases false memories. One possible interpretation could be that auditory temporal regularities enable better encoding of memory traces.

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2:10-2:30 pm (112)

Retrieval Dynamics of Encoding Effects and Context Change. LILI SAHAKYAN, *University of Illinois Urbana-Champaign* – A series of well-established memory encoding phenomena (e.g., generation, enactment, production effect) emerge in mixed lists but not in pure lists (for a review, see McDaniel & Bugg, 2008). To provide a unifying explanation for these design effects, I assessed the retrieval dynamics in free recall of pure lists, including examining time estimation measures. Experiment 1 involved the enactment effect, Experiment 2 involved the production effect, and Experiment 3 involved orthographic distinctiveness effect. Participants studied and recalled multiple lists of items, using the same encoding instruction (i.e., all pure lists). Across all experiments, despite the equivalent accuracy across the experimental and control conditions, the experimental conditions were associated with enhanced recency in the serial position function and reduced temporal contiguity in response transitions. Retrospective time estimation measures were included in all experiments to assess the hypothesis that distinctive encoding contributes to the accelerated drift of mental context, producing representations





that are not only differentiated in terms of the item content, but also more contextually differentiated representations.

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2:30-2:50 pm (113)

Cognitive Modeling of Free Association. SUDEEP BHATTIA, *University of Pennsylvania* – Free association among words is a ubiquitous memory task, yet there have been few attempts to apply established models of memory search to free association data. We address this by using a variant of the Context Maintenance and Retrieval (CMR) model, which we fit on a very large free association dataset. We find that this network, with response biases and asymmetric cue-context and context-cue weights, outperforms previous models without these components (which emerge as special cases of our model), on a variety of metrics. We also find that continued free association, where the participant provides multiple responses to a single cue, is best described with a combination of (a) a partially decaying context layer and (b) a weak but persistent and nondecaying effect of the cue. This network also accounts for “response chaining” effects in continued free association. Finally, we show that training our CMR variant on free association data generates improved predictions for list-based recall. Overall, our analysis provides new explanations for empirical findings on free association, predicts free association with increased accuracy, and integrates theories of free association with established cognitive process models of memory.

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2:50-3:10 pm (114)

Proximate Mechanisms of the Survival-Processing Advantage: Predicting Memory from Object and Scenario-Specific Judgment Parameters. MARK NIEUWENSTEIN, SALLY J AINSWORTH, LAUREN HANSEN-MANGUIKIAN, and BUGAY YILDIRIM, *University of Groningen* – Judging whether an object is relevant for a scenario in which one is stranded and in need of shelter, food, and water is a powerful mnemonic compared to other encoding strategies. Here, we examine why such survival-relevance judgments lead to better memory than relevance judgments for a control scenario (i.e., a moving scenario). Using objects that elicited high, low, or mixed relevance ratings in a previous study, we compared how often survival and moving-relevance judgments would change from a first, quick intuitive response to a second, deliberated response. Results (N=190) showed that survival-relevance judgments more often changed from irrelevant to relevant than moving-relevance judgments, but only for objects that received mixed ratings in our previous study. In our next study (<https://osf.io/tcevb/>), we will test the hypothesis that the possibility and likelihood of a change of judgment predict which objects underlie the finding of enhanced memory following survival-relevance judgments.

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3:10-3:30 pm (115)

Two Types of Retroactive Interference in Episodic Memory? Disentangling Similarity and Diversion Interference. JULIAN QUEVEDO PÜTTER and EDGAR ERDFELDER, *University of Mannheim* – Is similarity between original learning and interpolated activities necessary to induce retroactive interference in episodic memory? In an attempt to resolve this surprisingly complicated problem, Dewar et al. (2007) proposed two different types of retroactive interference: similarity interference and diversion interference. Whereas similarity interference is thought to impair the retrievability of previously encoded materials, diversion interference is assumed to inhibit consolidation processes. Evidence for the very existence of diversion interference stems from a wide range of studies showing that a brief period of wakeful resting after learning benefits subsequent memory performance. However, it remains to be shown empirically that similarity and diversion interference indeed differ with respect to their assumed effects on consolidation and retrieval processes. To this end, we propose the timely application of multinomial processing tree (MPT) modeling. More specifically, storage-retrieval MPT models allow researchers to directly disentangle storage and retrieval contributions. By means of two online experiments, we show how this innovative approach can be the key to effectively differentiate similarity and diversion interference.

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Multisensory Perception Friday, 1:30-3:30 PM CDT

1:30-1:50 pm (116)

Conceptual Metaphor, Embodiment, and Nonnative Lexical Tone Learning. LAURA MORETT and JACOB FEILER, *The University of Alabama*, LAURA M. GETZ, *University of San Diego* – This work examined the effects of conceptual metaphor (upward-high/downward-low vs. arbitrary) and embodiment (gesture vs. moving dot) on perception of lexical tones in words and sine wave sweep analogs. In an Internet-based experiment, native English speakers (n=60) first completed a pretest in which they heard sets of Mandarin words or analogs differing in lexical tone and attempted to identify their tones based on visual depictions of pitch contours. Subsequently, participants learned Mandarin word or analog sets presented in the pre-test with videos depicting congruent pitch gesture, dot motion, or no motion. Next, participants completed a posttest identical to the pretest. Participants then repeated this sequence with the other sound type, except that it was learned with videos featuring gestures or dot motion incongruent with pitch contours. The results revealed a significant interaction of test, congruency, and sound type, indicating that incongruence hindered improvement in lexical tone identification from pretest to posttest to a greater extent in analogs than words, but no interaction with condition (gesture vs. moving dot). These findings suggest that conceptual metaphor affects tone acquisition more than embodiment.

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1:50-2:10 pm (117)

Speech and Nonspeech Measures of Audiovisual Integration Are Not Correlated. JONATHAN WILBIKS, *University of New Brunswick Saint John*, VIOLET BROWN, *Washington University in St. Louis*, JULIA STRAND, *Carleton College* – Individuals appear to differ markedly in their ability or propensity to combine what they hear with what they see. These individual differences in audiovisual integration have been demonstrated using simple, nonspeech stimuli such as dots and beeps, as well using more complex and naturalistic speech stimuli. The current preregistered study tested 150 participants on four commonly used measures of audiovisual integration: two that use speech stimuli (susceptibility to the McGurk effect and a measure of audiovisual benefit), and two that use nonspeech stimuli (the sound-induced flash illusion and audiovisual integration capacity). We replicated previous work showing large individual differences in each measure, but found no significant correlations among any of the measures. Supplemental analysis with Bayesian correlations also suggested moderate support for the null hypothesis. These results suggest that tasks that are commonly referred to as measures of audiovisual integration may not be tapping into the same underlying construct, indicating weak convergent validity. Future research should assess which integration tasks measure the same construct, and identify underlying structural overlaps leading to these similarities.

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2:10-2:30 pm (118)

Withdrawn

2:30-2:50 pm (119)

A Weight-Size Illusion? JEROEN SMEETS, *Vrije Universiteit Amsterdam* – The size-weight illusion is well-known: if two objects that have the same mass differ in size, the large one feels lighter than the small one. Most explanations for this illusion assume that because the information about the relevant attribute (weight itself) is unreliable, information about an irrelevant but correlated attribute (size) is used as well. If such reasoning is correct, one would expect that the illusion can be inverted: if size information is unreliable, weight information will be used to judge size. I explored whether such a weight-size illusion exists by asking participants to lift Styrofoam balls that were coated with glow-in-the-dark paint. The balls (two sizes, three weights) were lifted using a pulley system in complete darkness at two distances. Participants reported the size using free magnitude estimation. The visual size information was indeed unreliable: balls that were presented at a 20% larger distance were judged 15% smaller. Nevertheless, the judgments of size were not systematically affected by the 20% weight change (differences < 0.5%). I conclude that because the weight-size illusion does not exist, the mechanism behind the size-weight illusion is specific for judging weight.

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2:50-3:10 pm (120)

Time to Imagine Moving: Simulated Motor Activity Affects Time Perception. MICHIEL SPAPE, VILLE J. HARJUNEN, and NIKLAS RAVAJA, *University of Helsinki* – Sensing the passage of time is important for countless daily tasks, yet time perception is easily influenced by perception, cognition, and emotion. While most accounts of subjective time perception have given time perception a central role in cognition, studies of proprioception and music performance suggest late, action execution stages may alter the experience of the passage of time. We investigated the role of perception-action integration in time perception using two prospective timing tasks in which the duration of a visual stimulus conveying optical flow was estimated, while participants additionally engaged in imagining themselves as moving at increasing or decreasing speed. In the direct estimation task, in which the duration was explicitly judged in seconds, accelerating imagery resulted in relative overestimation of time. In the motor timing task, the imagery was found to also accelerate tapping speed. The experiments show motor imagery affects time perception, suggesting a causal role of simulated motor activity. In other words, as time is relative to motion, so too is perception of subjective time relative to our own subjective motion.

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3:10-3:30 pm (121)

Musical Training and Audiovisual Recalibration of Timing and Spatial Judgements. MATTHEW P. O'DONOHUE, NAOHIDE YAMAMOTO, and PHILIPPE P. LACHEREZ, *Queensland University of Technology* – Audiovisual recalibration refers to how our brain often minimises small temporal or spatial misalignments between sensory stimuli, resulting in a perceptual aftereffect. Both temporal and spatial recalibration have been shown to occur at two seemingly independent timescales: a cumulative form of recalibration where several minutes of adaptation leads to a sustained recalibration effect, and a rapid form where large but transient recalibration effects can be seen between individual trials. While recalibration is presumably an adaptive process that helps account for both long-term and short-term changes in our physiology and in the environment, it is largely unknown whether perceptual expertise can modulate these processes. Hence, we assessed whether musical training (a prominent model of multisensory expertise) influences temporal and spatial recalibration. We found evidence that musical training improves the precision of audiovisual integration. These findings provide insight into how expertise and perceptual precision affect the adaptability of low-level audiovisual perception.

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Symposium III: Moving Beyond Cognitive Universals (Special Symposium)
Co-Sponsored by the SPARK Society
Friday, 3:45-5:45 PM CDT





3:45-4:05 pm (SYM12)

Reconstructing the Study of Human Cognition by Abandoning Cognitive Universals. RICHARD WILLIAM PRATHER II, *University of Maryland* – I address concerns with how human cognition is currently studied: (1) reliance on homogenous population samples when trying to generalize behavior on artificial lab-based tasks and homogenous samples to real-world contexts, (2) focus on controlling for or ignoring “extraneous” variables, (3) assumption of a generic human actor instead of a focus on individual and contextual variation, and (4) insufficient theory building. I contend that these concerns are deeply connected and that the solution is a significant change in how we study human cognition, similar in scope to the cognitive revolution. We need to reconsider the assumption of cognitive universals and how that assumption is built into the norms of the discipline. I propose a reconstruction of how researchers study human cognition by implementing a combination of methodological approaches and theoretical positions.

4:05 – 4:25 pm (SYM13)

Beyond White Monolingual Hegemony in Cognition: Interrogating our Complicity. BELEM G. LÓPEZ, *University of Texas at Austin* – Bilingualism researchers and cognitive psychologists must question how we have continuously, implicitly and explicitly, marginalized racialized communities in research inquiry and the field. Bilingual experiences are the global norm, yet through processes of colonization, monolingualism (in particular white monolingualism) is privileged, especially in the United States. Researchers must interrogate what it means to examine cognition while continuously ignoring important societal power structures that directly impact our study populations. As such, researchers must grapple with how outcomes are often interpreted within white monolingual ideological frameworks. This talk highlights the importance of addressing the white monolingual hegemony in our field to move toward a more nuanced understanding of human cognition as it exists among different racial and ethnic groups, and how their experiences are affected by different micro-and macro-systems. Further, I stress the need for researchers to incorporate interdisciplinary methods and theories to better understand human cognition in its diversity.

4:25 – 4:45 pm (SYM14)

Creating an Inclusive Science: Considerations for Increasing the Representation of Minoritized Populations in Cognitive Psychology. TISSYANA C. CAMACHO, *California State University, Northridge* – In 2006, a flagship journal in developmental science provided a special topic issue centered on race, ethnicity, and culture (Quintana et al, 2006). This special issue did not include a single study on cognitive development. More recent research demonstrates that cognitive psychology severely lags behind developmental and social psychology in highlighting race (Roberts et al, 2021). These findings suggest there are issues in the field of cognitive psychology surrounding who does the science, who participates in the science, and who teaches the science. Thus, a pressing question for the field of cognitive psychology is how its scientists can promote inclusion of racial-ethnic diversity at all levels of the science. This talk will focus on how the field of cognitive psychology

can increase its representation of minoritized populations in research. Issues and strategies for creating inclusive research questions and research designs will be discussed.

4:45 – 5:05 pm (SYM15)

Racial/Ethnic Disparities in Sleep Quality Impact Neural Activity Patterns Supporting Episodic Memory Performance. AUDREY DUARTE, *University of Texas at Austin* – Sleep facilitates episodic memory and individual differences in habitual sleep quality contribute to those in memory performance. Epidemiological research shows reductions in sleep quantity and quality in racial/ethnic minorities compared to non-Hispanic Whites. However, the impact of these racial/ethnic sleep disparities on memory and its neural underpinnings is unknown. To address this question, we collected actigraphy sleep data for one week and recorded EEG during performance of a paired associate learning task in racial/ethnic minorities and non-Hispanic Whites across the adult lifespan. Racial/ethnic minorities had reduced sleep duration and more variable sleep quality than non-Hispanic Whites, and individuals reporting greater exposure to racial/ethnic discrimination showed the poorest sleep. These sleep patterns were, in turn, related to a greater dependence on familiarity-based and a lower dependence on recollection-based neural patterns in racial/ethnic minorities. These results highlight the importance of social and health disparity factors on interactions between race/ethnicity and neurocognitive function.

5:05 – 5:25 pm (SYM16)

Social and Contextual Forces Drive Inequalities in Cognitive Aging. JENNIFER MANLY, *Columbia University Irving Medical Center* – Research on cognitive aging has operated in settings that has limited applicability to the world’s diverse population. This narrow focus is inconsistent with the fundamental principles of our field, which include understanding the brain’s flexible adaptation to different contexts and the neural and environmental mechanisms underlying cognitive aging among all people, not just a select, privileged few. I will describe an alternate approach of forming equal partnerships with research participants from minoritized backgrounds that has produced rigorous study designs and outcomes. I will present lessons learned from interdisciplinary research that has linked cognitive aging trajectories to lifecourse social exposures, such as structural racism, educational experiences, immigration, bilingualism, occupational opportunities, neighborhood investment, and residential segregation. I will show examples of cognitive aging research that is informed by the principles of public health and health justice.

Cognitive Aging II

Saturday, 8:00-9:40 AM CDT

8:00-8:20 am (127)

The Young & the Restless: Differences Between Young and Older Adults in Boredom Proneness & Mind-Wandering Tendencies. CAROLYN M. CRAWFORD, *University of Guelph*, GURJIT SINGH, *Phonak Canada* – Attempts to better understand the aversive experience of boredom have highlighted its inextricable





link with attention. Here we explore the nature of this link at different periods of the lifespan by measuring the tendency to experience boredom (boredom proneness) and difficulties in the ability to maintain task-focused attention (spontaneous mind-wandering) in large samples of older adults (N=918; mean age=64.6 years) and younger adults (N=331; mean age=18.9 years). Older adults reported dramatically lower levels of both boredom proneness and mind-wandering relative to younger adults. Despite this age-related change in overall occurrence, the strength of the correlation between boredom proneness and mind-wandering was consistent across the two groups. We interpret these results within the context of prior research on age-related changes in affect and spontaneous thought activity and the support they provide for theories that define boredom in terms of attention.

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8:20-8:40 am (128)

Withdrawn

8:40-9:00 am (129)

Cognitive Training in Middle-Aged Adults with Generalized Anxiety Disorder: Impact on Sleep and Daytime Functioning. ASHLEY F. CURTIS, ANTHONY SCHMIEDELER, KENDA EBERHARDT, JACOB WILHELM, NELSON COWAN, and CHRISTINA S. MCCRAE, *University of Missouri* – Generalized anxiety disorder (GAD) and insomnia are prevalent in middle-age and increase risk of cognitive impairment. Behavioral treatments are recommended for chronic anxiety and insomnia but require trained therapists and generally do not improve cognition. We examined whether a computerized cognitive training intervention improves sleep, mood, stress/arousal, and cognition. Middle-aged adults with GAD (N=11) completed 8 weeks of cognitive training (CogniFit; 45 minutes three times per week). At baseline and post-intervention participants completed daily sleep diaries, Insomnia Severity Index, State-Trait Anxiety Scale, Beck Depression Inventory, Perceived Stress Scale, Cognitive Failures Questionnaire, and objective cognitive tasks (Stroop and Sternberg). Paired t-tests showed that cognitive training improved insomnia severity, sleep onset latency, total sleep time, anxiety, depression and stress/arousal (moderate-large effects), processing speed (Stroop control trials; small effect) and working memory (Sternberg; large effect). Cognitive training shows promise as a potential behavioral intervention for sleep and a range of daytime functions for GAD in middle-age. Follow-up in larger samples and comparison to active controls is warranted.

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9:00-9:20 am (130)

Withdrawn

9:20-9:40 am (131)

Reduced Differentiation of Declarative Memory Subtypes in Ageing: An ERP Study. ANN-KATHRIN JOHNEN, *University of East Anglia*, ANNICK TANGUAY, *University of*

Ottawa, IOANNA MARKOSTAMOU, *University of Hertfordshire*, RACHEL LAMBERT and MEGAN RUDRUM, *University of East Anglia*, PATRICK DAVIDSON, *University of Ottawa*, LOUIS RENOULT, *University of East Anglia* – Self-knowledge, a type of personal semantics concerning one's self-image can be dissociated from general semantic and episodic memory in young adults, but might be less distinct from these memory types in older adults due to dedifferentiation (i.e., loss of distinctiveness of neural representations). We investigated this in an event-related potential study with 28 young and 26 older adults while they categorised personality traits for their self-relevance in the past, present, and future (self-knowledge conditions), and their relevance to certain groups of people (general semantic condition). Participants then performed a recognition test for previously seen traits (episodic condition). The amplitude of the late positive component, associated with episodic recollection processes, differentiated the self-knowledge, general semantic, and episodic conditions in young adults, but not in older adults. However, in older adults, higher composite episodic memory scores were associated with more differentiated LPC amplitudes across self-knowledge conditions. Taken together, these findings suggest that declarative memory subtypes are less distinct in ageing, but that the amount of differentiation varies with episodic memory function.

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Decision Making II Saturday, 8:00-9:40 AM CDT

8:00-8:20 am (132)

Metacognition of Agency and Felt Culpability. JANET METCALFE, SONIA KIM, and MAAYAN MALTER, *Columbia University* – We will present several experiments investigating the relation between people's metacognition of agency and their feelings of responsibility for their actions. In the high agency conditions, participants imagined themselves to be a programmer who both made a decision and wrote the code for the behavior of a self-driving car in a trolley-car dilemma in which the car, in the event of an accident, would choose between saving the driver or saving the maximum number of people. In the low agency condition, participants imagined obeying the CEO's decision about how to program the car. They then learned of a catastrophic accident, in which the car had behaved according to their programming and were asked to report on their felt culpability. Although the legal system holds that individuals who make the decision (i.e., those in the high agency condition) are more culpable for a negative outcome (per the Nuremberg defense), our results indicated that individuals who "obeyed orders" felt more culpable (responsible, guilty, and regretful). Results from two additional moral-dilemma scenarios, with the same high versus low agency structure, but directed at COVID-19 decisions, also will be presented.

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8:20-8:40 am (133)

The Interrelationship Between Categorization and Action Decision Underlying the Interference Effect in Choice Behavior. YANJUN LIU, *Vanderbilt University*, JAMES T. TOWNSEND, *Indiana University Bloomington* – Revolving around a two-stage decisional paradigm where a categorization decision is followed by an action decision, it has been revealed and replicated in the past 2 decades that the choice behavior when both decisions were explicitly measured is inconsistent to that when only the action decision was measured. Such an inconsistency in choice behavior, referred as the interference effect, violates the fundamental properties of probability theory (the law of total probability and the Markov property) and thus challenges a wide range of classical cognitive models of decision-making. By extending the application of a set of theory-driven response-time based measurements, the current study probed the underlying cognitive structure of the categorization and action decisions within the two-stage decisional paradigm. The results suggest that the interference effect is closely pertinent to the cognitive systems that deliberate the categorization and action decisions in a parallel manner, and moreover positively interact the processing of these two deliberations. These findings set a solid foundation for further theoretical modeling efforts of interpreting the underlying cognitive mechanisms that can produce the interference effect.

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8:40-9:00 am (134)

When a Gain Becomes a Loss: The Effect of Wealth Predictions on Financial Decisions. JENNIFER TRUEBLOOD, *Vanderbilt University*, ABIGAIL SUSSMAN, *University of Chicago* – When people make financial decisions, they need not only think about their current financial situation but also about changes in future wealth. This work investigates people's beliefs about their future wealth and how these beliefs impact financial decisions. Using a joint experimental and computational cognitive modeling approach, we show that people's future beliefs serve as reference points when making investment decisions. These results are further supported by data from a large-scale crosssectional survey (n=4,606) showing that people's beliefs about the future value of their assets are related to investment decisions between risky (i.e., stock market index) and safe (i.e., bond earning a fixed amount per year) options. In both the experiments and survey, we hypothesize that outcomes that are nominally stated as sure gains can become coded as losses due to belief-based reference points. This pattern leads to an increase in riskier choices across positive outcomes for individuals with optimistic beliefs about their future wealth.

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9:00-9:20 am (135)

Anticipatory Emotions Guide Intertemporal Choice and Health Risk Management During COVID-19. X.T. (XIAO-TIAN) WANG, *Chinese University of Hong Kong, Shenzhen*, PENG WANG, *East China Normal University*, JUNSONG LU, JIANJUN ZHOU, GUANTING LI, and STEVEN M. GARELIK, *Chinese*

University of Hong Kong, Shenzhen – By synthesizing several influential theories concerning the roles of emotion in decision-making, we developed a hypothesis of anticipatory emotions as an information source of social risks. We define anticipatory emotions as any discrete emotions that felt at the time of decision-making when anticipating what might happen given possible decision actions. We view anticipatory emotions as mental representations of social risks. We predict that as an essential part of emotional intelligence, anticipatory emotions help decision-makers to utilize emotions for assessing expected risky outcomes when making time-bound decisions in public. In an online study conducted in China during the lockdown period of the COVID-19 pandemic, anticipatory emotions were induced by asking participants to imagine being infected by COVID-19 in comparison to the current emotions without the anticipatory induction in the control condition. The results showed that anticipatory emotions promoted precautionary health behaviors and reduced delay discounting when making intertemporal choices. In contrast to instant reactive emotions, anticipatory emotions facilitate rational decision-making.

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9:20-9:40 am (136)

A Sequential Sampling Account of Confidence in Source Memory Decisions in Young and Older Adults. KEVIN P. DARBY, JESSICA N. GETTLEMAN, and CHAD DODSON, *University of Virginia* – How does subjective confidence in our decisions arise? We propose a theory within the sequential sampling model framework whereby confidence is derived from the distance of the evidence supporting competing choices from the decision threshold. We implemented this theory in a series of models in which evidence accumulates with different competitive dynamics and with different mappings between evidence and confidence. We applied these models to a source memory task in young and older adults, as prior work has found age-related deficits in the calibration of subjective confidence to source memory performance. A leaky competing accumulator model with a sigmoid function mapping evidence to confidence was best able to fit the data, suggesting that confidence may be affected by competitive dynamics between response options. Examination of model parameters suggested greater passive decay of evidence in older adults, and a greater tendency toward high confidence responses in this age group. These results improve our understanding of the origins of confidence in the decision-making process, as well as aging effects therein.

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Speech Perception II

Saturday, 8:20-9:40 AM CDT

8:00-8:20 am (137)

Withdrawn



**8:20-8:40 am (138)****Revisiting the Relationship Between Implicit Racial Bias and Audiovisual Integration of Nonnative-Accented Speech.**

DREW J. MCLAUGHLIN, VIOLET BROWN, SITA CARRATURO, and KRISTIN VAN ENGEN, *Washington University in Saint Louis* – Speech intelligibility is improved when the listener can see the talker in addition to hearing their voice (audiovisual benefit). Notably, however, previous work has suggested that the audiovisual benefit for nonnative (foreign-accented) speech is smaller than for native speech, an effect that may be partially accounted for by listeners' implicit racial biases (Yi et al., 2013). In the present study, we sought to directly replicate these findings in a larger sample of participants. We did find that the audiovisual benefit was smaller for nonnative- relative to native-accented speech, but our results did not support the conclusion that implicit racial biases are related to differences in audiovisual benefit for native and nonnative speech. In light of this finding, we discuss alternative explanations of reduced audiovisual benefit for nonnative speech and methodological considerations for future work examining the intersection of social, cognitive, and linguistic processes.

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8:40-9:00 am (139)**Resolving Competing Predictions in Speech Perception.**

ANNE CRINNION, SAHIL LUTHRA, and PHOEBE GASTON, *University of Connecticut*, JAMES S. MAGNUSON, *University of Connecticut & Basque Center on Cognition, Brain and Language (BCBL)* – Listeners use many types of predictions to resolve ambiguities in speech. One example is compensation for coarticulation (CfC): speakers are less likely to reach the canonical place of articulation (POA) for one segment when the preceding segment has a distant POA, and listeners are sensitive to this contingency. For example, after maniac (ending in back POA), identification of a following front-back ambiguity (e.g., between /s/ and /ʃ/) shifts towards /s/ (front POA). Work in predictive coding frameworks suggests that priming-based expectations (e.g., from a written word to a spoken ambiguity) can modulate perception. We examined how predictions from cross-modal identity priming (written prime, spoken target) and CfC might interact. We first established that priming could robustly modulate front-back identification (a novel finding). We then crossed priming and CfC (n=40), and found additive effects, without interactions. Thus, predictions from multiple sources can simultaneously influence identification—and possibly perception.

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9:00-9:20 am (140)

Withdrawn

9:20-9:40 am (141)

Listening to Speech Rates at a Cocktail Party. HANS RUTGER BOSKER, *Max Planck Institute for Psycholinguistics*, CHRISTOPHER C HEFFNER, *University at Buffalo, SUNY* – The acoustic context in which a speech sound is embedded can influence its

perception. For instance, the perception of Dutch vowels ambiguous between short /a/ and long /a:/ is biased towards long /a:/ if embedded in a sentence with a fast speech rate (distal rate effect). Moreover, even the global speech rate heard over the course of an entire experimental session influences vowel perception: the same vowel produced by Talker A on a given trial is heard differently depending on whether listeners hear a fast or slow Talker B on other trials (global rate effect). The present study assessed whether distal and global rate effects involve distinct processing mechanisms by comparing modulation by selective attention in multitalker settings (“cocktail party listening”). Distal rate effects were surprisingly immune to selective attention: even the speech rate of a successfully ignored talker still influenced the perception of a following target. In contrast, global rate effects disappeared entirely once Talker B's attended speech was mixed with an unattended Talker C. This suggests that while distal rate effects involve early perceptual normalization, global rate effects involve rather “fragile” cognitive adjustments.

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Recall II**Saturday, 8:00-9:40 AM CDT****8:00-8:20 am (142)**

Spatial Shifts and Memory Retention. JERRY S. FISHER, *Grande Valley State University*, GABRIEL A. RADVANSKY, *University of Notre Dame* – Changes in narrative spatial context can influence subsequent memory. According to the Event Horizon Model (Radvansky & Zacks, 2014), narrative spatial shifts can serve as event boundaries. During this time, readers must update their event models. Moreover, event cognition research has revealed that people tend to remember information at event boundaries better than at non-boundaries (Swallow, Zacks, & Abrams, 2009). The current study assessed the influence of spatial shifts on memory retention up to a week later at the surface form, textbase, and event model levels. We found that while overall retention was largely consistent with previous findings, and some memory was better for sentences conveying an event shift, memory for sentences just prior to or after such a shift did not appear to differ. These results are interpreted using the Retention Accuracy from Fragmented Traces (RAFT) model.

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8:20-8:40 am (143)

Event Segmentation Relies on Information Encountered Over a Narrow Time Window. KAREN SASMITA, *Cornell University* – The cognitive system divides continuous everyday experiences into meaningful events (event segmentation). Event segmentation is sensitive to changes in ongoing experience, which require the integration of information over time to detect. Some changes require integration over brief temporal windows (e.g., motion onsets), and others over long temporal windows (e.g., goal changes). How much information is necessary to segment ongoing events? We asked participants to segment videos from commercial films. We divided the videos into 1-minute or 5-second clips, and presented them in





one of three conditions: chronologically with no interruption (uninterrupted), chronologically with brief interruptions between clips (interrupted), or out of order with brief interruptions between clips (jumbled). Jumbling at 5-seconds intervals severely disrupted segmentation behavior, but interrupting and jumbling at 1-minute intervals did not. However, despite preserved segmentation, when clips were jumbled at 1-minute intervals recall of the videos was impaired. While event segmentation may rely on information accumulated over a narrow time window, event memory appears to benefit from the accumulation of information over much longer windows.

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8:40-9:00 am (144)

How Far Does Having Expectations Go? Evaluating the Influence of Color Expectations on Memory for Object-Color and Object-Shape. KIMELE PERSAUD, *Rutgers University – Newark*, ELIZABETH BONAWITZ, *Harvard University* – Previous research has demonstrated that category expectations can boost recall accuracy when expectations are either consistent (e.g., Hemmer & Steyvers, 2009) or surprisingly inconsistent (e.g., Sakamoto & Love, 2004) with studied information. In two studies, we manipulated the degree to which object-color pairs aligned with people's expectations (e.g., yellow versus purple bananas) and measured recall for the manipulated feature (object-color) and an unaltered feature (object-shape). For object-color, we found a boost in recall accuracy for strong-matches suggesting prior expectations helped boost memory accuracy relative to expectation-mismatches or no-expectations. However, for object-shape, we found no significant differences between strong-matches and mismatches, with worse performance for no-expected matches, suggesting that participants rely on prior expectations to simplify encoding, which are not available when prior knowledge cannot be leveraged. These results support the hypothesis that category expectations and surprise may play a role in how features of objects are bound together in memory.

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9:00-9:20 am (145)

The Enactment Effect: A Meta-Analytic Review of Behavioural, Neuroimaging, and Patient Studies. BRADY R. ROBERTS, COLIN M. MACLEOD, and MYRA A. FERNANDES, *University of Waterloo* – The enactment effect refers to the finding that physically performing an action represented by a word (e.g., clap) results in better memory than simply reading that word. In an integrative meta-analytic review, we examined data from 148 behavioral, 7 neuroimaging, and 31 neurological patient studies. Random effects meta-regression with robust variance estimation revealed an average enactment effect size of $g=1.23$, with certain parameters moderating the effect size (e.g., study design) while others did not (e.g., use of objects). Neuroimaging studies reported enactment-related activation to be most common in the motor cortex and inferior parietal areas. Patient studies indicated that, regardless of whether impairments were based in memory (e.g., Alzheimer's) or motoric capability (e.g., Parkinson's), participants still often benefitted from enactment. Findings highlight the considerable power of multimodal

encoding techniques in boosting later memory performance and demonstrate enactment's broad efficacy as a mnemonic tool for various patient groups.

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9:20-9:40 am (146)

Framing Multiple Intentions in Time-Based Prospective Memory. FABIO DEL MISSIER, MARTA STRAGÀ, GIULIO MUNARETTO, and DONATELLA FERRANTE, *University of Trieste*, TIMO MÄNTYLÄ, *Stockholm University* – Considering that research on time-based prospective memory has paid no attention to the way in which the intentions to be remembered are framed, we carried out two studies in which participants had to remember multiple delayed intentions framed as time rules (i.e., respond every 7 minutes) or as a series of corresponding instances (i.e., respond at times 7, 14, 21, etc.). Study 1 (with three rules and corresponding instances) showed that intention frames shaped the way intentions were mentally represented. The rule frame was also associated with a more cognitively demanding incremental planning strategy to establish the upcoming intention, whereas the instance frame promoted the serial recall of intentions. Study 2 (with four rules and corresponding instances) replicated the results on representations and strategies, and it showed better prospective memory performance following the instance frame than rule frame. The findings of the studies showed that alternative ways of framing multiple delayed intentions in the same prospective memory task induce significant differences in the way intentions are represented in the cognitive strategies used to set the upcoming intention and in performance.

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Emotion and Cognition

Saturday, 8:00-10:00 AM CDT

8:00-8:20 am (147)

Can Online Questionnaire Fonts Affect Responses to an Emotion Inventory? MARCY HUDSON and MICHAEL F. SCHÖBE, *The New School* – To what extent can the font in which an online questionnaire is presented affect the answers that respondents give? In the experiment reported here, online panel respondents ($n=420$, selected to match U.S. Census ranges of ages, genders, and ethnicities) were randomly assigned to answer the same questionnaire—the Positive and Negative Affect Schedule (PANAS), which asks participants to report about their current feelings—in one of four fonts (Comic Sans, Courier New, Tahoma, and Times New Roman), which vary on serifs, weights, and x-heights. Respondents assigned to the Courier New font reported significantly more positive affect than those assigned to Comic Sans, and marginally more positive affect in Times New Roman, while the assigned font had no effects on reported negative emotions. For all four fonts, respondents who reported noticing fonts frequently or more were significantly more likely to report more positive affect (i.e., people who reported more positive affect were significantly more likely to report attending to fonts frequently or more). Findings provide initial evidence





that randomly assigned fonts can affect self-report, at least for this questionnaire about currently experienced emotions in this online setting.

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8:20-8:40 am (148)

Negative Emotion Increases False Memory for Person/Action Conjunctions. ALAN W. KERSTEN, JULIE L. EARLES, LAURA L. VERNON, NICOLE MCROSTIE, and ANNA E. RISO, *Florida Atlantic University* – Two experiments demonstrate that eyewitnesses falsely recognize people performing actions that had actually been performed by someone else, even if the actions involve negative emotion and the person in question had only appeared in emotionally neutral contexts. Participants viewed videos, each involving an actor performing a neutral (e.g., making oatmeal) or negatively valenced (e.g., killing a roach) action, and were asked to remember the events (Experiment 1) or rate them for valence and arousal (Experiment 2). In both experiments, participants remembered negative actions better than neutral actions. Participants were also especially likely, however, to falsely recognize a different person performing a negative action. Experiment 2 revealed that this effect was modulated by the prior emotional contexts in which an actor had appeared. Participants were still just as likely, however, to falsely recognize an actor who had only appeared in neutral contexts now performing a negative action as they were to falsely recognize this actor performing a different neutral action. These results suggest that individuals seen only in benign contexts can be falsely remembered as having participated in emotionally charged events (e.g., crimes).

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8:40-9:00 am (149)

Emotional Intensity Increases Information Believability. ALLISON M. WILCK, *Eastern Mennonite University*, JEANETTE ALTARRIBA, *University at Albany, SUNY* – As the presence of misleading and false information continues to persevere, the need to discriminate fact from fiction is of utmost importance. Recent work has suggested that the engagement of emotions leads to enhanced belief in fake news (Martel et al., 2020). The current series of experiments further distinguishes the impact of emotional valence and arousal as contributors to information believability. In Experiment 1, participants evaluated real internet headlines for their perceptions of accuracy, emotionality, and other factors. In Experiment 2, following an arousal induction manipulation, participants judged headlines for accuracy as well as provided a confidence rating to their judgments' accuracy. Results revealed a significant contribution of emotional intensity/arousal as a predictor of perceptions of claim accuracy, as depicted by a headline's content (Experiments 1 & 2) as well as the emotional state of the reader (Experiment 2). Metacognitive judgments of confidence revealed similar patterns (Experiment 2). The findings support an explanation for the popularity of "fake news" content as routed through emotional engagement and individual differences in emotion processing.

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9:00-9:20 am (150)

Emotion Impacts Belief in Fake News, But Not Memory for Its Source. NADIA M. BRASHIER, JENNA D. LANG, and DANIEL L. SCHACTER, *Harvard University* – Misinformation often includes provocative details that incite emotional reactions. We tested whether positive and negative content influences evaluations of political news and memory for its source. We took headlines from social media that were positive (e.g., Obamas serve Thanksgiving dinner to the homeless), neutral (e.g., Melania Trump is set to be a long distance first lady), or negative (e.g., Antifa set wildfires in Oregon). Participants judged headlines' accuracy and indicated their willingness to share them. Later, they completed a source memory test for which outlet published each headline (e.g., CNN or Slate). In two experiments, participants (1) believed negative headlines less than neutral or positive ones, especially when news did not align with their political views; (2) better discerned true from false headlines when they contained positive, rather than negative or neutral, details; and (3) were more willing to share positive headlines than neutral or negative ones. Surprisingly, neither positive nor negative content impacted source memory. Our findings suggest that emotion shapes direct evaluations of headlines but not necessarily processing of peripheral details such as source tags.

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9:20-9:40 am (151)

Disgust Provides More Accurate and Liberally Biased Recognition Memory for Associated Neutral Stimuli. AYCAN KAPUCU and SINEM SÖYLEMEZ, *Ege University* – Disgust has a contagious nature and nearby neutral stimuli can acquire disgusting properties via associations with disgust-related stimuli and can gain an advantage in recognition memory. To test this hypothesis, we used the categorical conditioning paradigm in which objects from two different categories were associated with disgust (US+) or neutral pictures (US-). That is, images from one category (CS+) were followed by disgust-related pictures while the others (CS-) were followed by neutral pictures. A recognition test was given either immediately after the learning phase or 24 hours later. Participants rated CS+ stimuli as more disgusting after the conditioning procedure. ROC analysis showed that there were no accuracy differences between CS+ and CS- stimuli on the immediate recognition test, but CS+ stimuli were recognized better and led to a more liberal response bias than CS- stimuli on the delayed test. This study suggests that the advantage of disgust-related stimuli in memory can be extended to neutral stimuli that are associated with disgust.

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9:40-10:00 am (152)

Imagining Missing Features in Upright and Inverted Faces and Houses. OLESYA BLAZHENKOVA and ROBERT W. BOOTH, *Sabancı University* – Considerable evidence suggests that faces and objects utilize different cognitive processing mechanisms. Face processing is orientation sensitive, while processing of other objects, such as houses, is less susceptible to the effects of inversion. Another distinctive characteristic of face processing is a preference





for looking at the upper part of the image which has not been found for objects or scenes. We aimed to examine whether these special characteristics of face perception generalize to face imagery processing. Our research explored imagination of missing features in upright and inverted house and face images. Participants were presented with inverted and normally oriented faces with removed facial features, including eyes, nose, and mouth, as well as two-storey houses with removed windows. They were asked to perform an imagery task that involved mental visualization of the missing features. Eye-tracking data were recorded. The results revealed top-biased gaze for empty face images, both upright and inverted. That is, participants spent more time looking at the top part (from their own perspective) of the face, irrespective of whether faces were upright or inverted. However, no such bias was observed for house images.

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Letter Word Processing Saturday, 8:00-10:00 AM CDT

8:00-8:20 am (153)

Lexical Connectivity Effects in Immediate Serial Recall of Words. MATTHEW MAK, *University of York*, YALING HSIAO and KATE NATION, *University of Oxford* – In seven experiments, we tested whether immediate serial recall is influenced by a word’s degree centrality, an index of lexical connectivity. Words of high degree centrality (e.g., food) are associated with more words in free association norms than those of low degree centrality (e.g., bless). We re-analysed four existing datasets and made use of a range of list composition: 1. Scrambled (e.g., HHHLHL, LHHLLH), 2. Pure (e.g., HHHHHH vs. LLLLLL), 3. Alternating (e.g., HLHLHL vs. LHLHLH), and 4. Half-Half (e.g., HHHLLL, LLLHHH). The seven experiments converged to show that (i) High-degree words have greater accessibility than low-degree words, (ii) High-degree words can facilitate the formation of inter-item association, and (iii) The effect of degree centrality on serial recall is distinct from that of frequency. Overall, this study provides support for the notion that the adult lexicon continues to grow in accordance with the principle of preferential attachment (Mak & Twitchell, 2020).

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8:20-8:40 am (154)

Online masked priming passes the test: The effects of prime exposure duration on masked identity priming. BERNHARD ANGELE, *Bournemouth University*, ANA BACIERO, *Universidad Nebrija*, PABLO GOMEZ, *California State University*, MANUEL PEREA, *University of València* – Masked priming is one of the most important paradigms in the study of visual word recognition, but it is usually thought to require a laboratory setup with a known monitor and keyboard. To investigate if this technique can be used in an online setting, we conducted two online masked priming lexical decision task experiments using PsychoPy/PsychoJS. In particular, we wanted to compare our online results to the data collected by Gomez, Perea, and Ratcliff (2013), who compared

masked and unmasked priming. Furthermore, we also tested the role of prime exposure duration effectively in an online experiment (33 vs. 50 ms in Experiment 1 and 16 vs. 33 ms in Experiment 2). We found that our online data are indeed very similar to the masked priming data reported by Gomez et al. Additionally, we found a clear effect of prime duration, with the priming effect (measured in terms of response time and accuracy) being stronger at 50 ms than 33 ms and no priming effect at 16 ms prime duration. These findings provide us with confidence that masked priming can be used online, thus allowing us to reach participants and populations that are hard to test in a laboratory.

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8:40-9:00 am (155)

Parallel Word Reading Revealed by Fixation-Related Potentials. JOSHUA J. SNELL, *Vrije Universiteit Amsterdam*, JEREMY YEATON, *University of California*, JONATHAN MIRAULT, *Aix-Marseille University & Centre National de Recherche Scientifique (CNRS)*, JAN THEEUWES, *Vrije Universiteit Amsterdam*, JONATHAN GRAINGER, *Aix-Marseille University & Centre National de Recherche Scientifique (CNRS)* – During reading, does lexical processing occur for multiple words simultaneously? Cognitive science has yet to answer this prominent question. Recently it has been argued (Snell & Grainger, 2019, TICS) that the issue warrants supplementing the field’s traditional toolbox (eye-tracking) with neuroscientific techniques. Indeed, according to the OB1-reader model, upcoming words need not impact oculomotor behavior per se, but parallel processing of these words must nonetheless be reflected in neural activity patterns. Here we combined EEG with eye-tracking, time-locking the neural window of interest to the fixation on target words in sentence reading. During these fixations, we manipulated the identity of the subsequent word so that it posed either a syntactically legal or illegal continuation of the sentence. In line with previous research, oculomotor measures were unaffected. Yet, syntax impacted brain potentials as early as 350 ms after the target fixation onset. As prior EEG studies show that syntactic processing unfolds approximately 600 ms into viewing a word, the presently observed timings support parallel word processing. We reckon that OB1-reader is a particularly promising platform for theorizing about the reading brain.

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9:00-9:20 am (156)

Letters Are Not Special: Equal Transposition Costs with Letters, Symbols, and Digits. SACHIKO KINOSHITA, *Macquarie University* – The first stage of visual word recognition involves the encoding of letter identity and order. Grainger (2018, *QJEP*) has argued that there is a special mechanism for coding the order of letters, citing the findings from the same-different match task. In Experiment 1, we closely followed the procedure used in one such study by Duñabeitia et al. (2012), which compared the “different” stimuli generated by transposing or substituting two middle characters in 4-character strings of letters (e.g., SQDH), symbols (#!\$&), and digits (2136). Contrary to Duñabeitia et al., we found the transposition





cost was no greater for the letter strings. In Experiment 2, we used 3-character strings and presented the referent string for longer (1,000 ms rather than 300 ms) and found no transposition cost with any of the stimulus types. These results provide little evidence for a special order coding mechanism specific to letters. Instead, the results indicate noisy perceptual sampling common to all visual objects, as suggested by Norris and Kinoshita (2012).

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9:20-9:40 am (157)

A Megastudy of Lexical Stress Assignment to Nonwords in Italian: Which Cues Do Italian Readers Use to Assign Stress?

LUCIA COLOMBO, *Università di Padova*, GIACOMO SPINELLI and STEPHEN LUPKER, *University of Western Ontario* – In languages in which the position of lexical stress in a polysyllabic word is not always predictable from print, such as English or Italian, readers are assumed to assign stress by using cues within the word (or nonword) based on stress-related distributional information specific to their language. Research for Italian has examined some of those cues, however, it has done so exclusively in factorial experiments, preventing the examination of multiple cues simultaneously. To overcome this limitation, we conducted, for the first time for Italian, a megastudy in which participants (N = 45) assigned stress to nonwords (N = 800), stimuli that have no predefined stress pattern and are, therefore, particularly revealing of stress cue use. Hierarchical regression results provided information concerning the stress cues readers use and revealed a role for cues not examined so far, for example, syllabic cues, morphological cues, and the resemblance of the nonword to an existing word (a lexical cue). These results may be particularly informative for computational models of reading, as it is not obvious that extant models would capture the pattern of effects that we observed.

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9:40-10:00 am (158)

Spontaneous Humanlike Bigram Processing in Rats. DAVIDE CREPALDI, JAROSLAW R LELONKIEWICZ, ANTONELLA A TORRISI, ANGELINA TADIĆ, and DAVIDE ZOCCOLAN, *Scuola Internazionale Superiore di Studi Avanzati (SISSA)* – Written language is a recent cultural invention and it seems unlikely that there are mechanisms that have developed specifically for reading. Instead, reading may capitalize on evolutionary older mechanisms that originally supported other tasks. In line with this account, recent work has shown that nonhuman animals can perform tasks akin to visual word identification. Here we extend this work by exposing the precursors of orthographic processing in rats. Once trained to recognize individual letters, rats spontaneously: (i) identify these letters as abstract objects within bigrams; (ii) code for position flexibly enough to understand the common letter in AB and BC; (iii) code for position precisely enough to distinguish AB from BA; and (iv) gather information from multiple letters to uniquely identify bigrams. Taken together, our results demonstrate that the visual system in rats holds the building blocks of orthographic processing. In addition to grounding the cognition of visual word identification into

its evolutionary pathway, this work paves the way for a neurophysiological investigation of string processing in the brain at an unprecedented temporal and spatial resolution.

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Visual Working Memory Saturday, 8:00-10:00 AM CDT

8:00-8:20 am (159)

Storage in Visual Working Memory Engages a Content-Independent Pointer System. ED AWH and WILLIAM THYER, *University of Chicago*, KIRSTEN ADAM, *University of California, San Diego*, GISELLA DIAZ and EDWARD VOGEL, *University of Chicago* – Storage in visual working memory (WM) is highly limited. “Slot” models assert that capacity is limited by the number of individuated items stored, independent of each item’s information load. Why would WM capacity be item-based rather than information-based? One possibility is that WM storage entails the operation of a limited number of spatiotemporal “pointers” (e.g., Khaneman’s object files; Pylyshyn’s FINSTs) that are necessary for individuating and tracking items through time and space, but that are separable from the specific features stored. Here, we used multivariate analysis of EEG activity to observe load-sensitive neural activity that precisely indexes the number of items stored, while matching the predicted profile of a content-independent pointer system. Crosstraining analyses revealed generalization across stimuli with distinct relevant features, as well as to stimuli with twice as many stored features as those in the training dataset. These findings provide clear evidence for load-sensitive neural activity that is separable from the specific features maintained, pointing to a cognitive operation that may explain slotlike empirical patterns in behavioral and neural studies of working memory.

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8:20-8:40 am (160)

Withdrawn

8:40-9:00 am (161)

Withdrawn

9:00-9:20 am (162)

Reward Influences the Flexible Allocation of Resources in Visual Working Memory. JAMES A. BRISSENDEN, *University of Michigan* – Visual working memory (VWM) has strict capacity constraints which place limits on the availability of resources for encoding information. Studies have shown that prospective rewards improve performance on VWM tasks, but it remains unclear whether rewards increase total resource availability or rather influence the allocation of resources without affecting availability. On each trial of a continuous report VWM task with grating stimuli, participants were presented with a priority cue, which signaled the item most likely to be probed, and a reward cue, which signaled the magnitude of a





performance-contingent reward. We showed that rewards decreased recall error for cued items and increased recall error for noncued items. We further found that rewards produced a tradeoff in the probability of successfully encoding a cued versus a noncued item rather than a tradeoff in recall precision or the probability of binding errors. Lastly, we showed that rewards only affected resource allocation when participants were given the opportunity to engage proactive control prior to encoding. These findings indicate that rewards influence the flexible allocation of resources during selection and encoding in VWM, but do not augment total capacity.


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9:20-9:40 am (163)

Uncertainty Ratings Can Improve the Estimation of Memory Precision by Several Orders of Magnitude. VENCISLAV POPOV, *University of Zurich*, HUICHAO JI, *Sun Yat-sen University*, KLAUS OBERAUER, *University of Zurich* – Visual working memory representations vary continuously in the precision with which they are encoded. Currently, there exists no method to directly measure the precision of individual visual working memory representations. Instead, researchers use the continuous reproduction paradigm to obtain a distribution of responses over many trials, and then apply measurement models to extract the precision of that distribution. As a result, this procedure requires a large amount of trials and only provides an overall measure of precision. We propose that a novel “uncertainty ratings” procedure in which participants select a range of plausible response values on the same analogue scale allows us to measure memory precision directly for individual trials. This procedure has approximately seven times less measurement noise relative to the standard continuous reproduction task, which allows us to obtain the same level of estimation precision with much fewer trials. We provide evidence from a psychometric study that the uncertainty ratings procedure is a direct measure of working memory precision and that it can be used to evaluate computational models of visual working memory.

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9:40-10:00 am (164)

More Attention with Less Working Memory: The Active Inhibition of Attended but Outdated Information. HUI CHEN  and MOWEI SHEN, *Zhejiang University* – Attention has traditionally been regarded as a gateway to working memory, and almost all theoretical frameworks of attention and working memory assume that individuals always have a better memory for information that has received more attention. Here, we provide a series of counterintuitive demonstrations which show that paying more attention to a piece of information impedes, rather than enhances, the selection of this information into working memory. Experiments 1–4 provide converging behavioral and eye-tracking evidence for an even weaker working memory trace of fully attended but outdated features, compared with baseline irrelevant features that were completely ignored. This indicates that the brain actively inhibits attended but outdated information to prevent it from entering working memory. Experiment 5 demonstrates that this inhibition processing is subject to

executive control. These findings lead to a substantial reinterpretation of the relationship between attention and working memory.

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Symposium IV: Working Memory and Long-Term Memory: State of the Relationship (Leading Edge Workshop)

Saturday, 10:00 AM – 12:00 PM

10:00-10:20 am (SYM17)

Integrated Cognition from Multiple Components for Mental Workspace and Stored Knowledge. ROBERT H. LOGIE, *University of Edinburgh* – The assumption that working memory (WM) comprises specialized components, distinct from long-term memory (LTM) has been supported by a wide range of data. But it faces contrary evidence and questions about how WM components interact with each other and with LTM. Also, WM contents are widely assumed to be interpreted from stored knowledge, not raw sensory images, so WM cannot act as a gateway between sensory input and LTM. A possible solution is that WM is currently activated LTM with rapid learning from the focus of attention. But this faces challenges from studies that demonstrate neuropsychological dissociations, limited impact on performance of dual task demands, and lack of learning from repeated presentation of a stimulus array. Examples will be presented of the latter evidence and of participants changing how they perform the same task under different experimental conditions. The talk will conclude by arguing that multiple components of cognition, including components of WM and LTM, continuously interact as a flexible integrated system; that different combinations of components may be deployed for any given experimental condition; and that control arises from local interactions between components.

10:20 – 10:40 am (SYM18)

Embedded Processes and the Route from Working-Memory to Long-Term-Memory. NELSON COWAN, *University of Missouri* – This talk clarifies concepts of long-term memory, its formation, and its activation within the embedded-processes view of information processing. Working memory is said to comprise activated elements of long-term memory and, embedded within them, the focus of attention. Making that description workable, activated long-term memory can include rapidly learned information added during an immediate memory trial and used on that same trial, before the new information has ever been inactive. The process of learning involves associations between objects or concepts held concurrently in the focus of attention. In support of this approach, I will discuss research indicating that the instantaneous content of working memory of an array is a good predictor of how much information will be retrievable later. I also will discuss research indicating that when two list items occupy the focus of attention at once, an enduring association forms between them. Unresolved issues will be discussed.





10:40 – 11:00 am (SYM19)

Three Controversies in Event Perception. JEFFREY M. ZACKS, MATTHEW M. BEZDEK, and TAN T. NGUYEN, *Washington University in St. Louis* – It is well established that people form stable representations of current ongoing events—event models—and update those representations when events change. The updating of event models has been linked to the conscious experience of event segmentation and to changes of availability of information in memory. However, there are several current controversies about the mechanisms of event model updating. What determines when event models are updated? Is event model updating an all-or-none proposition, or is updating incremental? Are some event boundaries more salient or stronger than others, or is being an event boundary an all-or-nothing proposition? In this talk I will introduce each of these issues, describe the current state of the data, and try to highlight how these constructive debates are furthering our understanding of perception and memory.

11:00 – 11:20 am (SYM20)

Prediction Errors Disrupt Hippocampal Representations and Update Episodic Memories. MORGAN D. BARENSE, *Rotman Research Institute* – How does the brain link past, present, and future? The concept of predictive coding provides a framework that bridges memory and perception. We draw on past experience to make predictions and then compare those predictions to present perceptual input. This comparison process allows the brain to segment continuous experience, learn from error, and adaptively integrate new information into memory. Past studies have demonstrated that the hippocampus signals prediction error, or surprise, but have not linked this neural signal to memory updating. In my talk, I will provide evidence for this missing connection. Using fMRI, we elicited prediction errors by interrupting familiar narrative videos immediately before the expected endings. We found that the same amount of hippocampal activity exerted opposing effects on memory: hippocampal activity preserved memories after expected endings, but updated memories after prediction errors. We examined the mechanisms of this processing shift, showing that prediction errors disrupt the temporal continuity of hippocampal patterns. We conclude that prediction errors create conditions that favor memory updating, prompting the hippocampus to abandon ongoing predictions and render memories malleable.

11:20 – 11:40 am (SYM21)

A Computational Systems Neuroscience Perspective on Interacting Memory Systems. RANDALL C. O'REILLY, *University of California, Davis* – Neocortex is densely interconnected. While studies have identified coactivated networks of brain areas, it is difficult to argue that any significant cognitive function is supported exclusively by any one area or network. This presents a challenge for scientific theory: how do these networks interact, and in what ways are they specialized? Biologically based computational modeling has addressed this problem by developing models based on specific anatomical features of different areas, and their interconnectivity (e.g., we can identify hippocampal properties that are critical to rapidly form new episodic memories and can understand the nature

of these memories in terms of separate dorsal and ventral pathways feeding into the hippocampus). Prefrontal cortex has neural specializations supporting active maintenance, long associated with the psychological construct of working memory, but hippocampal episodic memory can support similar cognitive demands. We are developing large-scale systems neuroscience models that learn ground-up through predictive learning, in ecologically based foraginglike environments, to gain insight into how such systems might interact more organically to support a range of basic cognitive functions.

Cognition in Non-Human Animals Saturday, 10:20 AM-12:00 PM CDT

10:40-11:00 am (171)

Delayed Gratification: A Grey Parrot (*Psittacus erithacus*) Will Wait for More. IRENE M. PEPPERBERG, *Harvard University* – Delay of gratification, the ability to forgo an immediate reward to gain either better quality or quantity, has been used as a metric for temporal discounting, self-control, and the ability to plan for the future in both humans (particularly children) and nonhumans. Several avian species have been able to wait for better quality rewards for up to 15 minutes, but none seem able to wait for better quantity for any significant period of time. Using a token system (each wooden heart representing one nut piece), we demonstrated that a Grey parrot who had previously waited for better quality would wait for better quantity for up to 15 minutes. Thus, symbolic distancing—i.e., removal of the immediate presence of the hedonic item—enabled him to perform at levels comparable to young children on the classic test and might be a method for training executive function. Preliminary data (experiment in progress) suggest that such training may be successful.

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11:00-11:20 am (172)

The Effect of Extended Practice on Chunking in Nonhuman Primates. LAURE TOSATTO and JOËL FAGOT, *Centre National de Recherche Scientifique (CNRS) & Aix-Marseille University*, DEZSO NEMETH, *Université Claude Bernard Lyon 1* – Chunking mechanisms are central to several cognitive processes and notably to the acquisition of visuomotor sequences. Individuals segment sequences into chunks of items to perform visuomotor tasks more fluidly, rapidly, and accurately. However, the exact dynamics of chunking processes in the case of extended practice remain unclear. Using an operant conditioning device, 18 Guinea baboons (*Papio papio*) produced a fixed sequence of nine movements during 1,000 trials by pointing to a moving target on a touchscreen. Response times analyses revealed a specific chunking pattern of the sequence for each baboon. More importantly, we found that these patterns evolved during the course of the experiment, with chunks becoming progressively fewer and longer. We identified two chunk reorganization mechanisms: the recombination of preexisting chunks and the concatenation of two distinct chunks into a single one. These results





provide new evidence on chunking mechanisms in sequence learning and challenge current models of associative and statistical learning.

Email: Arnaud Rey, arnaud.rey@univ-amu.fr

11:20-11:40 am (173)

A Test Battery to Assess General Cognitive Abilities in the Pigeon, *Columba livia*. MARY FLAIM and AARON BLAISDELL, *University of California, Los Angeles* – In humans, performance positively correlates across a wide variety of cognitive tasks. Factor analysis consistently extracts one factor that can account for approximately half of the variance in performance. This factor is termed *g* and all cognitive tasks positively load onto this factor. Recently, when mice and some avian species have been given cognitive test batteries, performance positively correlates, and the first component extracted is similar to *g*. There are some limitations to the species tested thus far, including comparability in the cognitive domains assessed across species. The pigeon is an ideal subject to overcome these issues since pigeons, primates, and humans are frequently given similar tasks. We created a test battery that assessed different domains, including associative learning, memory, cognitive flexibility, and reaction time. Yet, instead of a *g* like factor, analyses indicated a two-component structure with differential task loadings. Tasks that loaded onto the first component required rote memorization or responding to stimuli presented in random locations, while tasks that loaded onto the second component could be solved using a more general rule, reflecting a nonstrategy versus strategy task demand.

Email: Mary Flaim, meflaim@ucla.edu

11:40-12:00 pm (174)

Emotion Labeling with Visual Stimuli in Pigeons. KENNETH LEISING, JORDAN NERZ, and CHEYENNE ELLIOTT, *Texas Christian University*, WILLIAM D. STAHLMAN, *University of Mary Washington* – Emotion labeling occurs when one learns to discriminate interoceptive sensations caused by external events. Often, emotion labeling is facilitated by language, such as labeling an increase in heart rate in the presence of a grizzly bear as “fear.” However, for nonverbal animals, the evidence for something like emotion labeling is limited. By using visual labels, one can investigate the extent to which nonhuman animals can discriminate and report their internal states. The current study aimed to evaluate emotion labeling in pigeons. Pigeons were trained to peck discriminative stimuli that resulted in the delivery of food on some trials and the absence of food on others. Two visual labels were then presented and a peck to the visual label assigned to the preceding event (one label for delivery and another label for absence) was required for the session to continue. Pigeons learned the task and transferred labeling. Follow-up tests evaluated the excitatory value of the labels and whether external stimuli controlled labeling. A cross-species comparison with humans also will be discussed.

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Social/Cultural Influence on Cognition

Saturday, 10:20 AM-12:00 PM CDT

10:20-10:40 am (175)

Beyond the Physical Divide of Greek-Cypriots and Turkish-Cypriots: Social and Political Variables Shape Geographical Estimates. ALEXIA GALATI, *University of North Carolina at Charlotte*, MIRIA N. PLASTIRA, *University of Cyprus*, ALINDA FRIEDMAN, *University of Alberta*, MARIOS N. AVRAAMIDES, *University of Cyprus* – Many nongeographic factors influence spatial judgments of real-world locations, which implies that spatial representations are not metrically veridical. We investigated the influence of social and political factors in the geopolitical context of Cyprus—an island divided since 1974 into the Turkish- and Greek-Cypriot communities in the north and south, respectively. Participants from each community estimated the locations of 19 towns and the straight-line distance between them. They also rated their attitudes toward the “other” community. Location estimates were more accurate for towns in participants’ own community. Further, the divide established by the physical UN buffer zone increased subjective distance: when controlling for actual distance differences, crossborder distances between towns were overestimated relative to within-border pairs of towns in one’s own community. Finally, bias in estimates increased as a function of increasing negative attitudes towards the other group. The data support the notion that representations of global-scale environments have multifaceted origins, which include social factors (e.g., history, ethnic identity, political attitudes) that are not usually associated with spatial representations.

Email: Alexia Galati, agalati@unc.edu

10:40-11:00 am (176)

Gaze Signals Include Complex Representation of Other People’s Minds. SARAH D. MCCRACKIN, FLORENCE MAYRAND, and JELENA RISTIC, *McGill University* – Social orienting is thought to be driven by both cue directionality and gazer’s inferred mental content. Here we examined the nature of the gaze signal’s mentalistic representation. Participants fixated a central avatar while locating a peripheral target. Three variables were manipulated orthogonally in order to dissociate the contribution of avatar’s gaze direction from its mental content and the representation of mental perspective—(1) Gaze direction (avatar looking at or away from the response target), (2) Target mental content (avatar seeing or not seeing the target), and (3) Mental perspective (avatar seeing the same or different display as the participant). Target responses were facilitated when gaze direction, target mental content, and mental perspective combined (all congruent and all incongruent). Importantly, reliable performance slowing was found both when gaze direction was dissociated from the target mental content and from mental perspective. Thus, along with basic information about cue direction, social attention appears to also signal sophisticated representations of the gazer’s mental content and their mental perspective.

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11:00-11:20 am (177)

Language Production in Social Interaction: Picture-Word Interference in Communicative Settings. ANNA K. KUHLEN and RASHA ABDEL RAHMAN, *Humboldt-Universität zu Berlin* – When speakers process in close temporal proximity semantically related words, language production is typically delayed. To investigate whether semantic interference is also observed in communicative settings, we embedded a picture-word interference task in a card game: one speaker read the distractor word and, after a stimulus-onset-asynchrony (SOA) of either -150 ms or -650 ms, the second speaker was prompted to name a semantically related or unrelated target picture. In two experiments (N=32 each), speakers did not demonstrate semantic interference in this setting at either SOA. In fact, when processing the conceptual relationship between distractor and target was further encouraged, speakers experienced facilitation at SOA-650. In a third experiment (N=32), we inserted identical timing parameters and stimuli in a single-speaker setting. Here, speakers experienced semantic interference. The striking differences between the pattern of results found in communicative compared to single-speaker settings highlights the importance to investigate language production in settings in which it typically occurs, namely in social interaction.

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11:20-11:40 am (178)

Validation of the Wiseheart Socioeconomic Status Scale. MELODY WISEHEART, *York University*, SANDI WISEHEART, *independent researcher* – Socioeconomic status (SES) impacts most domains of psychological functioning, including cognition. Researchers often assume that cognitive factors, especially low-level cognition, are invariant of these socioeconomic factors, an assumption that remains underinvestigated. We posit that theory development will be improved if researchers take into account the full range of SES, including educational, occupational, and financial influences, as well as relationship supports and stressors, environmental influences, health, and spirituality. This will require testing demographically broad samples of participants, and access to a validated scale that measures a range of SES factors. Through 15 years of scale development, we have created and validated a new SES scale that takes into account all of these factors. This scale will allow researchers to investigate a wide range of influences on cognition, beyond known correlations between cognition and education and between cognition and income.

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11:40-12:00 pm (179)

Social Information Rapidly Prioritizes Visual Attention in a Joint Spatial Cueing Task. MATTHIAS S. GOBEL, *University of Exeter* – Coordinating visual attention with others facilitates joint actions and is a crucial mechanism for our species' survival. Here, we examined the neural basis of these social effects on visual attention. We used a joint spatial cueing task in which participants saw a cue (a dot) and then had to detect a subsequent target (a square) alongside an unseen partner of either higher or lower social rank. In

a novel twist, participants were led to believe that the cue was connected to the gaze location of their partner. All participants saw the exact same nonsocial stimuli with the exact same low-level features, and the only thing that we manipulated was the social meaning of the cue. We measured behavioral cue-target spatial compatibility effects and the underlying neural activity using electroencephalography. We found that inhibition of return effects (slower responses to cued than uncued targets) were modulated by the partner's social rank. Analyses of event-related oscillations and event-related potentials showed that the effect of social information on visual attention penetrated even early stages of information processing. Our findings suggest a rapid and perhaps reflexive prioritization of visual attention in social contexts.

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Autobiographical Memory

Saturday, 10:20 AM-12:00 PM CDT

10:20-10:40 am (180)

Temporal Dynamics of Emotional Well-Being and Loneliness in Older Adults During the First Year of the COVID-19 Pandemic: Insights from the Cognitive and Social Well-Being (CoSoWELL) Corpus. VICTOR KUPERMAN and AKI-JUHANI KYRÖLÄINEN, *McMaster University* – In view of the fallout of the COVID-19 pandemic, psychologists face a challenge to document the pandemic-related change in emotional well-being of individuals and groups and to evaluate emotional resilience to this fallout over time. We contribute to this goal by analyzing the new CoSoWELL corpus, a collection of narratives written by more than 1,000 older adults (ages 55 years and older) in the five sessions before and during the pandemic. We identified a range of linguistic markers of distress—lower optimism, increased anxiety, increased abstractness of ideation, heightened levels of fear, anger, and disgust—and charted their temporal trajectory of emotional resilience from the prepandemic baseline throughout the first year of the global lockdown. We also used demographic and psychological participant data to pin down factors signalling individual vulnerability. Major findings were that (i) all linguistic markers showed an increased level of distress, (ii) the emotional reserve of older adults enabled the prepandemic level of emotional functioning for roughly 4 months post-onset after which a “new normal” lower level plateaued, and (iii) self-reported loneliness undermined emotional resilience throughout the pandemic.

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10:40-11:00 am (181)

Narratives of Personal Life Events by Older Adults Before and During the Pandemic: First Findings from the CoSoWELL Corpus. AKI-JUHANI KYRÖLÄINEN and VICTOR KUPERMAN, *McMaster University* – We present the Cognitive and Social Well-being (CoSoWELL) corpus, i.e., a large collection of narratives written by North American older adults (55+ years old), supplemented by demographic and psychological participant data. The





corpus consists of over 1.2 million tokens produced by over 1,000 participants in five test sessions, with a pre-pandemic baseline in March 2019 and four sessions during the pandemic. We elicited narratives about personal life events in the distant and recent past, and future, tapping into distinct facets of autobiographical memory, as well as a narrative based on the Cookie Theft picture. We also administered a questionnaire on social and demographic information including loneliness and social isolation. We conducted computational topic modeling and linguistic analyses of the narratives to track the time-locked impact of the COVID-19 pandemic on the content of autobiographical memories and representation of oneself through language. Results demonstrated a high external validity of the data and pointed to both the locus of topical shifts (narratives about recent past and future) and their detailed timeline. The findings are discussed in relation to research on aging and autobiographical memories.

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11:00-11:20 am (182)

Personal Future Likelihood and Past Familiarity in the Simulation of Future Events. CLAUDIA C. MORALES-VALIENTE and KEN MCRAE, *University of Western Ontario* – Episodic future thinking is the ability to project the self forward in time to pre-experience an event (Atance & O’Neill, 2001). Understanding how people think about potential future events is an important component of human memory research. We investigated whether and how episodic future thinking is influenced by a person’s familiarity with that type of event based on their past experience, as well as a person’s belief of the likelihood of its future occurrence in their lives. The individual and combined effects of these variables have been little studied, particularly likelihood. We used three norming studies to develop participant-specific sets of future events that varied by familiarity and likelihood. Participants generated events and rated phenomenological aspects of their simulations. Familiarity and likelihood interacted in influencing people’s simulation of future events, specifically on the simulated perceptual information. Both variables influenced episodic future event simulations on their own as well. The enhancement of future event simulations by the likelihood of an event occurring in a person’s future suggests that it is an important part of the underlying mechanisms that support episodic future thinking.

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11:20-11:40 am (183)

The Stability of Life Script and Life Story Events of Nigerians across Gender and Religion. RAHILA RACHEL JATAU and BURCU KAYA KIZILÖZ, *Eastern Mediterranean University* – The life script account explains the reminiscence bump as a consequence of cultural expectations of a typical life course. While life scripts have been studied in several societies, there have been no studies carried out on non-WEIRD (Western, educated, industrialized, rich and democratic) populations in Sub-Saharan Africa. We investigated the stability of the life scripts (LSCs) and life stories (LSTs) of Nigerian young adults across gender and religion. Although the bump emerged for positive events in the second and third decades of life in line with

previous studies, Nigerian LSCs and LSTs contained more religious events compared to other cultures (e.g., West Europe). Additionally, LSCs are more stable than LSTs across gender and religion. These results support the life script account but also highlights the importance of conducting studies in other non-WEIRD cultures.

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11:40-12:00 pm (184)

Looking at Remembering: Eye Movements, Pupil Size, and Autobiographical Memory. STEVE M. JANSSEN, ALICIA FOO, and SHEENA N. JOHNSON, *University of Nottingham Malaysia*, ALFRED LIM, *Nanyang Technological University*, JASON SATEL, *University of Tasmania* – To examine the relationship between visual imagery and autobiographical memory, eye position and pupil size were recorded while participants first searched for memories and then reconstructed the retrieved memories (Experiment 1), or only searched for memories (Experiment 2). In Experiment 1, we observed that, although recollective experience was not associated with the number of fixations per minute, memories that took longer to retrieve were linked to increased pupil size. In Experiment 2, we observed that directly retrieved memories were recalled more quickly and were accompanied by smaller pupils than generatively retrieved memories. After correcting for response time, retrieval mode also produced an effect, showing that decreased pupil size is not simply due to directly retrieved memories being recalled more quickly. These findings provide compelling evidence that objective measures, such as pupil size, can be used alongside subjective measures, such as self-reports, to distinguish between directly retrieved and generatively retrieved memories.

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Reading

Saturday, 10:00 AM-12:00 PM CDT

10:00-10:20 am (185)

An Information-Theoretic Account of Proficient Word Recognition. BLAIR ARMSTRONG, *University of Toronto Scarborough*, RAQUEL G. ALHAMA, *Tilburg University*, NOAM SIEGELMAN, *Haskins Laboratories*, RAM FROST, *The Hebrew University of Jerusalem* – We explored whether key reading phenomena emerge from interactions between (a) where a word is fixated, (b) perceptual constraints on letter recognition, and critically, (c) the statistics of the written language. We first trained an auto-encoder to reconstruct all letters of a word based on a partial set of the word’s letters. This partial input simulated perceptual limitations on how letters are recognized as a function of distance from fixation. After training the model on English and Hebrew, we observed that the model simulated the well-established better recognition of words when fixated near their center, but importantly, that some words are better perceived if fixated near word onset and some near word offset, given entropy considerations as predicted by information theory. We tested these predictions behaviorally by comparing the model’s word recognition accuracy against that of participants who saw words in English





and in Hebrew at different fixation locations. The results supported the model predictions, and suggest a novel, parsimonious information-theoretic account of how the reading system has been optimized to recognize words given their predictability at different fixation locations.

Email: Blair Armstrong, blair.armstrong@utoronto.ca

10:20-10:40 am (186)

Working Memory, Prior Knowledge, and Text Comprehension: Cohesion Matters. ANDREW F. JAROSZ, *Mississippi State University*, SARAH D. CREER and LAURA K. ALLEN, *University of New Hampshire* – Individual differences in successful text comprehension are related to both the individual's working memory capacity (WMC) and their prior knowledge (PK), though these traits have rarely been assessed concurrently and the qualities of the target text have often been poorly controlled. The present study examined the relationship between WMC, PK, and text comprehension while simultaneously manipulating the coherence of the target text. The role of WMC in text comprehension was found to depend on text coherence, with WMC predicting the comprehension of only highly-coherent texts and PK predicting performance on all texts. Additionally, a three-way interaction indicated that low-WMC individuals particularly benefited from PK on low-coherence texts, with PK's benefits being independent of WMC on high-coherence texts. Results are discussed in terms of their implications for the roles of WMC and PK during text comprehension, particularly as they relate to text difficulty.

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10:40-11:00 am (187)

Cognitive Influences on English Spelling. ANASTASIA ULICHEVA and KATHLEEN RASTLE, *Royal Holloway, University of London* – Modern English spelling is often described as “broken,” “crazy,” and “irregular.” However, our recent work suggests that the complexity of English writing (e.g., spelling serious differently from atl-as) may serve a purpose, such that it helps to recover the meaning of the written word more easily. We present new corpus analyses of modern English spelling that develop this idea. In particular, we compare spoken words with their written counterparts and demonstrate that English spelling carries a disambiguating function more often than would be predicted based on the properties of the English alphabet, and this extends beyond morphology. Further, we present evidence that spelling distinctions are introduced specifically when words sound similar to each other. Finally, we present a series of computer simulations investigating what would happen to the lexicon if the English writing system were simpler. In sum, our findings suggest that modern English spelling carries cognitive footprints. We discuss these results in the context of language evolution literature and the idea that “languages get the writing systems they deserve.”

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11:00-11:20 am (188)

Eye-Movement Behaviour Is Shaped by Prediction of Specific, Upcoming Words: Insights from Predictive Natural Language Models. KATHLEEN RASTLE, BENEDETTA CEVOLI, and CHRIS WATKINS, *Royal Holloway, University of London* – Eye-movements in reading are strongly influenced by a word's predictability in context. However, there is debate about the extent to which these effects reflect anticipatory processing of specific words. We computed predictability metrics for every word in the Provo Corpus (Luke & Christianson, 2018) using a modern natural language model trained to predict the next word (GPT-2) and then studied the fit of these metrics to eye-movement data in the corpus. Results showed that model-based target predictability influenced all eye-movement measures. Critically, however, this effect was modulated by the strength of model predictions prior to the target: low target predictability lengthened first fixations to a greater extent in high certainty contexts (i.e. a prediction error cost). In cases where the target was not one of the model's top predictions, the impact of low target predictability was reduced when the target was semantically similar to the predicted target, but this reduction was apparent only in later measures. These findings suggest that readers' fixation behaviour is guided by predictions about specific, upcoming words, and they reveal the potential of natural language models in studies of human language comprehension.

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11:20-11:40 am (189)

Withdrawn

11:40-12:00 pm (190)

The Impact of Hyperlinks, Skim Reading, and Perceived Importance when Reading on the Web. DENIS DRIEGHE, GEMMA FITZSIMMONS, and MARK J WEAL, *University of Southampton*, JOHANNA K. KAAKINEN, *University of Turku*, LEWIS T. JAYES, *University of Surrey* – Across two experiments, we explore how hyperlinks and perceived importance affect reading behaviour. In Experiment 1, participants rated the importance of sentences across passages of Wikipedia text, while in Experiment 2, different participants read these passages, with the task being either reading for comprehension or skim reading. Reading times of sentences were analysed in relation to the type of task and the importance ratings from Experiment 1. Results from Experiment 1 show readers rated sentences without hyperlinks as less important than sentences that did feature hyperlinks, especially when sentences are lower on the page. Short sentences with more links were rated as more important, but only at the top of the page. Long sentences with more links were rated as more important regardless of their position on the page. In Experiment 2, higher importance scores resulted in longer sentence reading times. When skim reading, however, importance ratings had a lesser impact on reading behaviour than when reading for comprehension, suggesting readers are less able to establish the importance of a sentence when skim reading even though





some indicators (e.g., presence of hyperlinks) would be easy to quickly extract from the text.

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Metacognition

Saturday, 10:00 AM-12:00 PM CDT

10:00-10:20 am (191)

Fluency Is in the Eye of the Beholder: Insights from Pupillometry on the Effects of Associative Relatedness on Judgments of Learning. ROBERT ARIEL, *Virginia Wesleyan University* – People give higher judgments of learning (JOLs) to related word pairs than unrelated word pairs. A common explanation for this effect is that JOLs are sensitive to differences in subjective fluency experienced when studying related vs. unrelated material. The current experiment investigated the role of fluency in the effects of associative relatedness on JOLs using pupillometry. Subjects studied related and unrelated word pairs and made JOLs while their pupil size was recorded with an eye tracker. Subjects' pupils dilated more when studying related than unrelated word pairs suggesting that they actually engaged in more effortful processing when studying related than unrelated word pairs. This outcome was surprising and is inconsistent with the central assumption of fluency-based explanations for the effects of associative relatedness on JOLs which claim unrelated material receive more effortful processing than related material. Furthermore, there was no relationship between pupil size and JOLs which fails to support the hypothesis that fluency contributes to the effects of associative relatedness on JOLs.

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10:20-10:40 am (192)

Relationships Between Metacognitive Knowledge and Control: Behavioural and fMRI Evidence from Cognitive Offloading Paradigms. SAM J. GILBERT, *Institute of Cognitive Neuroscience* – Individuals frequently choose between accomplishing tasks using their unaided cognitive abilities or engaging in cognitive offloading (e.g., setting external reminders to help remember delayed intentions). Existing evidence shows that individuals decide whether or not to engage in cognitive offloading based (partially) on a metacognitive evaluation of their unaided abilities. This talk will describe recent work asking: 1) does the metacognitive influence on cognitive offloading extend to time-based as well as event-based prospective memory paradigms, 2) to what extent are metacognitive influences on cognitive offloading domain-general or task-specific, and 3) how do the neural correlates of metacognitive knowledge (i.e. judgements of confidence) relate to those associated with metacognitive control (i.e., offloading decisions)? Results demonstrate 1) a metacognitive influence on time-based as well as event-based prospective memory, 2) an influence of both domain-general and task-specific confidence on offloading, and 3) partial but not full overlap between neural correlates of metacognitive knowledge and control. These results can

inform the design of metacognitive interventions to optimise individuals' use of cognitive tools.

Email: Sam J. Gilbert, sam.gilbert@ucl.ac.uk

10:40-11:00 am (193)

Feeling of Rightness and Sustainability in Consumer Choice. VALERIE A. THOMPSON, DEREK BUECKERT, BRIANNA GROOT, EMILIE MOELLENBECK, IAN R. NEWMAN, and GIOVANNI QUARTARARO *University of Saskatchewan* – In this study, we adapted Thompson et al.'s (2011) two-response procedure to studying metareasoning processes in the context of consumer choice. One hundred fifty participants were presented with two versions of a consumer product, such as potato chips or toothpaste. Their preferred brand was always present; on half the trials, the second product had a sustainable label. They were asked to express an initial preference under time pressure, then rate their feeling of rightness (FOR) in that choice. They were then allowed to put the product in a hypothetical shopping basket or leave it on the shelf. Products that engendered a conflict between brand preference and sustainability lowered FOR; conversely, choices where preference and sustainability were congruent increased FOR. Strong FORs translated into purchasing decisions. These data represent an important real-world validation of Ackerman and Thompson's (2017) Meta-Reasoning theory.

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11:00-11:20 am (194)

Poor Awareness of Health Change Following Bariatric Surgery. MICHAEL B. WOLFE and TODD J. WILLIAMS, *Grand Valley State University*, ELIZABETH N. DEWEY and BRUCE M. WOLFE, *Oregon Health and Science University* – To measure health change, health practitioners often rely on patients to self-report their symptoms over time. Thus, it is assumed that patients are effective in assessing their current health and able to accurately recall their past health. Using data from the Longitudinal Assessment of Bariatric Surgery (LABS-2) we examined concordance between patients' perceptions of health change and actual self-reported physical health change for each of 5 years following bariatric surgery. Patients rated current health, and perceived change in physical health, using the Short-Form Health Survey (SF-36; N=2,027). Concordance between perceived and actual health change was generally low (< 43%) and varied from year to year among patients. Concordance status was also associated with weight loss following surgery. Overly optimistic perceptions predicted greater weight loss, and overly pessimistic perceptions predicted lower weight loss. These results suggest recollection of previously reported health is poor and may be biased by salient factors at the time of recollection.

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11:20-11:40 am (195)

Is There More to Metamemory? An Argument for Two Specialized Monitoring Abilities. IAN M. MCDONOUGH, *The University of Alabama*, TASNUVA ENAM, *North South University*, KYLE R. KRAEMER, *Birmingham Southern College*, DEBORAH





EAKIN, *Mississippi State University*, MINJUNG KIM, *The Ohio State University* – Metamemory is the process of monitoring and controlling one's beliefs, knowledge, and mental processes of memory. One fundamental question is whether the monitoring component of this theory, should be considered only one ability or an umbrella of more specialized abilities. In the current study, we aimed to understand the structure of metamemory monitoring by testing unitary versus specialized measurement models of metamemory. Monitoring accuracy and mean ratings from four common monitoring judgments across different stimulus presentation pairs were calculated to create latent factors for each judgment using structural equation modeling. Our results suggest that although each of the monitoring judgments was correlated with one another, monitoring may be comprised of two distinct abilities: one occurring during initial presentation and one occurring at retrieval. These results can help explain prior behavioral and brain dissociations between predictions at encoding and retrieval in terms of experimental and material manipulations. We caution against the conceptualization and use of metamemory monitoring as a unitary construct.

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11:40-12:00 pm (196)

Actively Open-Minded Thinking as Metacognition for Self and Others: A Review. JONATHAN BARON, *University of Pennsylvania* – Actively open-minded thinking (AOT) is a prescriptive model based on a normative model applied to all thinking. I shall review the theory behind actively open-minded thinking (AOT), and briefly discuss, with some new results but mostly results of others, some issues: 1. The two most common deviations from the normative model are myside bias (confirmation bias, bias toward conclusions already favored) and unwarranted high confidence; 2. beliefs about good thinking, their norms or standards, affect how people think and, importantly, how they evaluate the thinking of others, on whom they often rely for other beliefs and decisions. AOT beliefs are supported by social norms deriving in part from the Enlightenment, and these norms exist alongside of norms derived from older traditions, which often oppose AOT as a norm. The existence of dueling norms creates individual differences within nations; 3. AOT beliefs vary with the domain of thinking, but individual differences remain in each domain; 4. AOT is not the same as “reflective thinking,” but measures are correlated; and 5. people rely on properties of AOT to decide whom to trust when they “outsource” their thinking to others.

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Spatial Cognition and Memory Saturday, 10:00 AM-12:00 PM CDT

10:00-10:20 am (197)

Spatial Memories of New Environments Are Affected by Patterns of Free Exploration. IVA K. BRUNEC, *Temple University*, MELISSA NANTAIS and JENNIFER E. SUTTON, *University of Western Ontario*, RUSSELL A. EPSTEIN, *University of Pennsylvania*, NORA S. NEWCOMBE, *Temple University* – When we

navigate in a new city, we construct a map of our surroundings from sensory information. However, we know little about how moment-to-moment behavioral patterns during exploration of new environments structure cognitive maps. In the present experiments, we investigated whether differences in free exploration patterns predicted cognitive map quality. We analyzed participants' moment-to-moment exploration dynamics while they freely navigated in a virtual reality environment (Virtual Silcton) for 16 minutes (Experiment 1) or 25 minutes (Experiment 2). They were then asked to point between buildings in the environment and to draw or build an overhead map. To capture environmental structure, we used the space syntax measure of axial integration, which represents the relative proximity of each street segment to every other street segment. We found that participants who explored more in high-integration areas had better spatial memory. In both experiments, better spatial memory was predicted by displacement speed, but not by the overall coverage of the environment. These results suggest that exploration dynamics provide a window into mechanisms underlying successful memory formation.

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10:20-10:40 am (198)

Individual Differences in the Integration of Vertical Spaces. LUCIA A. CHEREP and JONATHAN W KELLY, *Iowa State University* – There is a spatial cognitive cost for remembering object locations in a multifloor environment. Specifically, when asked to indicate the location of an object that is between floors, accuracy tends to be lower compared to judgments about object locations within floors. Individual differences have been elucidated in pointing accuracy and spatial ability when integrating routes in a horizontal domain, but these individual differences remained unexplored in the vertical domain. Therefore, the current study used latent profile analysis to investigate group membership in a multifloor integration task. Distinct groups emerged which mimic the differences in the rate and accuracy of spatial knowledge during horizontal route integration. Importantly, groups also differed on measures of spatial cognitive ability and video game experience. This work contributes to the long line of individual differences in spatial cognition and provides further insight into how well people can remember locations in multifloor spaces.

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10:40-11:00 am (199)

Development and Evaluation of a Novel Room Size Perception Measure: Virtual Room Re-Creation. HOLLY C. GAGNON, JEANINE K. STEFANUCCI, and SARAH H. CREEM-REGEHR, *University of Utah* – Spaciousness ratings and verbal reports of dimensions are traditional measures of holistic and dimensional room size perception, respectively. But these measures can be influenced by factors such as emotion and cognitive bias. The current study developed a new measure of room size perception, termed room re-creation (RR), in which users adjust the dimensions of a comparison virtual room viewed through a head-mounted-display (HMD) to match a previously viewed room. Users estimated the size of virtual rooms using RR, spaciousness ratings, and verbal reports. The





results indicate that RR estimates were more accurate to the veridical dimensions and less variable than verbal reports. RR estimates also had a strong, positive correlation with spaciousness ratings. Thus, RR simultaneously captures dimensional and holistic perception of room size. The development of this novel RR task provides a foundation for studying room size perception in a more objective, quantitative way than in prior work.

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11:00-11:20 am (200)

The Influence of Mask-Wearing in Distance Perception.

KATELYN J. SINGER and DANIELE NARDI, *Ball State University* – This study centered on the role that psychological resources (fear and anxiety) play in distance perception. Utilizing a novel, virtual approach, participants were asked to judge the distance of a series of virtual characters in two experiments. The first experiment asked participants to judge distance when the characters were depicted as either wearing or not wearing a mask. Participants were also asked to make these judgments in a second experiment under conditions in which the virtual character being depicted was identified as either someone familiar (friend) or unfamiliar (stranger). Demographic questions and fear ratings also were collected. Results of the study indicated that mask-wearing does influence participant distance estimates. Participants underestimated the distance of virtual characters in both experiments when the character was depicted as not wearing a mask. Familiarity did not significantly influence distance perception. These findings extend previous research that supports the role of fear in changes in perception, such as making objects appear closer (Cole, Balcetis, & Dunning, 2013), bigger (Vasey et al., 2012), and to move faster (Witt & Sugovic, 2012) when participants are exposed to fear-inducing stimuli.

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11:20-11:40 am (201)

Roles of Explicit and Implicit Mental Representations in Imagined Walking.

NAOHIDE YAMAMOTO, BRENDAN M. JAMES, JENNIFER VAN PELT, and BENJAMIN LOWE, *Queensland University of Technology* – When imagining walking, its duration is often shorter, sometimes substantially, than the duration of corresponding real walking. To explain this phenomenon, we propose that both explicit and implicit representations of walking underlie the mental imagery of locomotion. The explicit representation causes the underestimation of walking duration because it is susceptible to shortening biases in time perception, whereas the implicit representation is less penetrable to them and represents action timing information accurately. These ideas were tested by having participants imagine walking while performing various concurrent tasks. These tasks were designed to interfere with explicit execution of imagined walking to varying degrees, thereby increasing the dominance of the implicit representation in setting the duration of imagined walking. The duration of real and imagined walking became identical when the tasks involved motor signals that either arose from ambulatory leg motion or demanded participants' attention for their production. These were the conditions in which the implicit

representation was expected to be most effectively activated, and thus the results are consistent with the dual-representation view.

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11:40-12:00 pm (202)

What Determines Memory for the Expanse of a View?

HELENE INTRAUB and ABRIELLE BLAUVELT, *University of Delaware* – Bainbridge and Baker (2020) proposed that boundary extension simply reflects one end of a spectrum of scene properties that ranges from eliciting extension (a more expansive view in memory) to eliciting contraction (a loss of actual expanse in memory). The existing literature suggests an alternative explanation of their brief-presentation studies. To test this, we presented the most extreme images from both ends of their spectrum in a traditional boundary extension task (n=200): small set size (12), long study time (15 s each). At test, the images were rated as: the same view, a little or a lot closer, or a little or a lot farther away. With scene properties unchanged, results now mirrored a typical boundary extension error pattern: extension for near views and no directional error for far views. No contraction. Scene properties are insufficient for explaining the representation of spatial expanse in memory. We address the activity of a least two underlying memory mechanisms (one anticipatory/constructive, the other reflecting memory averaging) and tension between them.

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Saturday, 12:00-1:30 pm (WS2)

Basic Experimental Studies Involving Humans (BESH) Session.

TODD HOROWITZ, *National Cancer Institute*, JEREMY M. WOLFE, *Brigham & Women's Hospital* – A few years back, the NIH definition of “clinical trial” was changed in a manner that reclassified much of our basic cognitive research into the clinical trial category. This could have had some quite dramatic consequences for our work. After considerable pushback, implementation of the new policy was delayed and a new category of clinical trial was created: “Basic Experimental Studies Involving Humans” (BESH). The BESH classification also has consequences, less dire, but very real. BESH implementation has also been delayed, but it is coming, and cognitive researchers need to understand the implications for their NIH funding. We will bring you up-to-date with the state of play at the time of the Psychonomics meeting.

Symposium V: The Reliability Paradox: Current Issues

Saturday, 1:30-3:30 PM CDT

1:30–1:35 pm

Introduction





1:35-2:00 pm (SYM22)

Learning from the Reliability Paradox: How Theoretically Informed Generative Models Can Improve Person-Level Inference. NATHANIEL HAINES, *The Ohio State University* – Theories of individual differences are foundational to social, behavioral, and brain sciences, yet they are often developed and tested using superficial summaries of data (e.g., mean response times) that are both (1) disconnected from our rich conceptual theories, and (2) contaminated with measurement error. Traditional statistical approaches lack the flexibility required to test increasingly complex theories of behavior. To resolve this theory-description gap, we present generative modeling approaches, which involve using theoretical knowledge to formally specify how behavior is generated within individuals, and in turn how generative mechanisms vary across individuals. We demonstrate the utility of generative models in the context of the “reliability paradox,” a phenomenon wherein highly replicable group effects fail to capture individual differences (e.g., low test-retest reliability). Simulations and empirical data from the implicit association test and Stroop, flanker, Posner, and delay discounting tasks show that generative models yield (1) more theoretically informative parameters and (2) higher test-retest estimates relative to traditional approaches, illustrating their potential for enhancing theory development.

2:00 – 2:20 pm (SYM23)

Is Measuring Inhibition Doomed to Fail? JEFFREY N. ROUDER, *University of California, Irvine*, JULIA M. HAAF, *University of Amsterdam* – Establishing correlations among common inhibition tasks such as Stroop or flanker tasks has been proven quite difficult despite many attempts. It remains unknown whether this difficulty occurs because inhibition is a disparate set of phenomena or whether the analytic techniques to uncover a unified inhibition phenomenon fail in real-world contexts with small effects. We explore the field-wide inability to assess whether inhibition is unified or disparate. We do so by showing that ordinary methods of correlating performance including those with latent variable models are doomed to fail because of trial noise. We then develop hierarchical models that account for variation across trials, variation across individuals, and covariation across individuals and tasks. These hierarchical models also fail to uncover correlations in typical designs for the same reasons. While we can characterize the degree of trial noise, we cannot recover correlations in typical designs with typically small effect, even in those that enroll hundreds of people. We think there are no magical models or statistical analyses for the problem—effects in Stroop or flanker are too small for individual-difference analysis.

2:20 – 2:40 pm (SYM24)

Using Hierarchical Generative Models to Improve Reliability in Computational Psychiatry. VANESSA BROWN, *University of Pittsburgh* – Generative models of cognitive processes may enable more precise measurement of how these processes are disrupted in psychopathology. However, psychometric investigations into generative models popular in computational psychiatry, such as reinforcement learning, have been inconsistent. Using data from

participants with elevated compulsivity (N=38) who completed a reinforcement learning task hypothesized to measure compulsivity-related learning disruptions (Daw two-step task) at two timepoints 1 week apart, we examined 1) whether acceptable reliability could be achieved, 2) what analysis methods led to the best reliability, and 3) whether methods that increased consistency within and across visits within-person (i.e., reliability) were also sensitive to between-person differences in performance. We found that measures from hierarchical Bayesian models, when used appropriately, led to good split-half and test-retest reliability while increasing power to detect individual differences. These methods generalized to other datasets with other reinforcement learning tasks and populations, suggesting that hierarchical generative models are a powerful tool for reliably and sensitively measuring clinically relevant behavior.

2:40 – 3:00 pm (SYM25)

When Is Conventional Intraclass Correlation Not Suited for Measuring Test-Retest Reliability? GANG CHEN, *National Institutes of Health* – Test-retest reliability (TRR) measures the consistency of an effect across time, providing a critical criterion for studies of individual differences. Evidence of poor intraclass correlation (ICC) is alarmingly mounting and has recently attracted a lot of attention: ICC estimates appear unacceptably low for neuroimaging and psychometric data, casting doubt on their usability in studies of individual differences. In the current investigation, we demonstrate the limitations of the conventional ICC and show that 1) conventional ICCs can substantially underestimate TRR, 2) a single ICC value is misleading due to its failure to capture the estimation uncertainty, 3) the ICC underestimation depends on the number of trials and cross-trial variability, and 4) subject sample size has surprisingly little impact on ICC. In addition, we adopt a hierarchical modeling framework that a) more accurately characterizes and accounts for crosstrial variability, b) dissolves the issue of TRR underestimation by ICC, and c) illustrates the crucial role of trial sample size in improving TRR precision. We explore the puzzling observation of large crosstrial variability relative to crosssubject variability and its implications for experimental designs.

3:00 – 3:20 pm

Panel Discussion. A panel discussion will begin with Craig Hedge and E.J. Wagenmakers commenting on the talks and topic, addressing such questions as (1) how generative models may change the way researchers approach individual differences research, (2) barriers to the widespread use of generative models, (3) what types of problems generative models can and cannot solve, and (4) future directions for the use of generative models throughout the social, behavioral, and brain sciences. The audience will then be invited to contribute to the discussion.

3:20 – 3:30 pm

Audience Discussion





Concepts and Categories

Saturday, 1:30-3:10 PM CDT

1:30-1:50 pm (208)

Decision Processes During Rule-Based and Information-Integration Category Learning in the Same Individuals. CASEY L ROARK, *University of Pittsburgh*, GIORGIO PAULON and ABHRA SARKAR, *The University of Texas at Austin*, BHARATH CHANDRASEKARAN, *University of Pittsburgh* – Categorization requires learning to map variable perceptual input onto discrete categories. Categories with different distributional structure have been proposed to be learned by distinct neural and cognitive mechanisms. It is unclear whether the decision processes underlying learning differ across categories with different structures. We examined decision processes during learning of rule-based and information-integration auditory categories in the same individuals. Using drift diffusion models that estimate parameters at the participant level, we examined the patterns of decision parameters (i.e., drift rate, thresholds) for both types of categories. We found that thresholds, but not drift rates, were strongly correlated across tasks. To understand how success in learning is reflected in decision processes, we compared parameters across groups that had different levels of success in learning (poor, medium, high, and very high performers). Very high performers in the information-integration task had the highest drift rates, but very high performers in the rule-based task had the lowest drift rates. These results demonstrate that distinct decision processes underlie successful learning for different types of category structures.

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1:50-2:10 pm (209)

Understanding Constraints on Semantic Discriminability for Perceptual Encoding Systems. KUSHIN MUKHERJEE, *University of Wisconsin-Madison*, BRIAN N. YIN, *University of California, Berkeley*, BRIANNE E. SHERMAN, *University of Wisconsin-Madison*, LAURENT LESSARD, *Northeastern University*, KAREN B. SCHLOSS, *University of Wisconsin-Madison* – In visual communication, observers interpret meaning from information visualizations by mapping visual features (e.g., color, shape) to concepts. This process is easier when concepts are encoded in specific, strongly associated colors (e.g., banana encoded in yellow). But, what if a concept does not have strong, specific associated colors? Do color-concept encoded mappings still influence interpretability? Previous work suggested the answer was no, but we provide a new theory, Semantic Discriminability Theory, and corresponding evidence suggesting that people's ability to infer meaning from colors is more robust than previously thought. Semantic Discriminability Theory defines constraints on creating semantically discriminable feature sets (e.g., color palettes) for a given set of concepts; capacity for semantic discriminability is constrained by the difference between feature-concept association distributions. Experiments 1-2 support this hypothesis for two-color and four-color palettes, respectively. Experiment 3 shows that interpretability for a given concept depends on semantic context, in a manner that is strongly predicted

by our model ($r=.93$). This theory can extend to other visual features and to perceptual features in other modalities.

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2:10-2:30 pm (210)

Temperament and the Relationship Between Mood and Category Learning. TIANSHU ZHU and JOHN MINDA, *Western University* – Transient affective states have been shown to affect cognition, including category learning, but less is known about the role of stable temperament traits and categorization. We examined affective temperament traits to see whether the tendency to experience negative and positive affect is predictive of category learning performance and strategy use. Working memory and attentional control were measured as covariates. Participants first completed the Adult Temperament Questionnaire (Evans & Rothbart, 2007) including two affective temperament factors and an attentional control factor. Then they completed a memory task followed by either a conjunctive rule-based (CR) or an information integration (II) category learning task. Results showed that people who tend to experience more positive affect and less negative affect achieved higher accuracy and were more likely to find the optimal strategy in II task compared to people who tend to experience more negative affect and less positive affect. However, no performance or strategy use difference was seen in the CR task across different temperament profiles. These results extend prior literature and provide additional insights on the effects of stable traits on category learning.

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2:30-2:50 pm (211)

What Does It Take to Love a Bug? BARBARA C. MALT and JESSECAE K. MARSH, *Lehigh University* – Domain knowledge is often considered a minor contributor to environmental attitudes, with factors such as political orientation, values, and social norms instead dominating. Yet this may be an overgeneralization; domains may differ in this regard. Declining insect populations are a critical conservation concern but not prominent in public discourse, potentially giving greater weight to knowledge. We examined American college students' insect knowledge including exemplars and ecosystem interactions, associated valences, and their links to political orientation and concern for insect conservation. Political orientation correlated with conservation concern, supporting a role for worldview even in this relatively nonpoliticized domain. Mean valences were negative. However, participants who were asked to retrieve ecosystem interactions before other tasks subsequently gave modestly higher property valence ratings and retrieved a pollinator first. These observations support evaluating whether improving insect knowledge, especially the critical causal roles they play in healthy ecosystems, can boost valence and increase conservation concern regardless of political orientation.

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2:50-3:10 pm (212)

Enhancing Knowledge Structures Without Instruction.

RUTH S. DAY and MOLLY APSEL, *Duke University* – It is relatively easy to determine what people know about a content domain. It is more difficult to determine the structure of that knowledge; are concepts just pieces of unrelated information or part of a coherent knowledge structure? We used sorting tasks to reveal knowledge structures—participants sorted items from a given content domain based on their perceived similarity. Some sorted items without providing any justification (a bottom-up task) while others labeled their piles as they worked (a top-down task). The results depended on the nature of the content domain—whether it was highly familiar (such as fruit or vehicles) or less familiar and more technical (such as COVID-19 or medication side effects). Also, the sheer act of sorting items increased the amount of structure in certain cases, suggesting that a simple sorting task can deepen knowledge without additional study or instruction.

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Statistics and Methodology
Saturday, 1:30-3:10 PM CDT

1:30-1:50 pm (213)

We Need You: The Essential Role of Psychology in a Mission to Mars and How You Can Contribute to Interplanetary Success.

RICHARD J. ADDANTE, *Florida Institute of Technology* – Psychology is poised to play a pivotal role in the long trip to Mars (& back), yet most psychologists are not aware of the need nor the funding opportunities for them to get involved, and current research is wrought with methodological limitations that need to be overcome. In Space, if there is lapse of cognition or teamwork dynamics, such failures amid years of isolation & confinement could be catastrophic. Space travel is well-documented for effects of ionizing radiation on astronaut brains, and there are common deficits reported for astronauts in spaceflight, such as illusions while landing the space shuttle and landing it far beyond approved safety specifications- after only a few weeks in space. Future trips to Mars will require years of exposure, and is an area that needs renewed interest from mainstream psychological scientists. The talk will present these issues from the only professional research psychologist to serve as a Principal Investigator & as crew on NASA's largest psychological research mission for long duration space travel, the Human Exploration Research Analog, and discuss methodological problems, findings, and funding opportunities to make needed contributions to this historic endeavor to Mars and back.

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2:50-3:10 pm (217)

SampleSizePlanner: A Tool to Estimate and Justify Sample Size for Two-Group Studies.

DON VAN RAVENZWAAIJ, *University of Groningen*, MARTON KOVACS, *Eötvös Loránd University (ELTE) Institute of Psychology*, RINK HOEKSTRA, *University of Groningen*, BALAZS ACZEL, *Eötvös Loránd University*

(*ELTE*) *Institute of Psychology* – Planning a study's sample size often requires researchers to identify a statistical technique and to make several choices during their calculations. Currently, there is a lack of clear guidelines for researchers to find and use the applicable procedure. In this talk, I introduce a web app and R package that offer nine different procedures to determine and justify the sample size for independent two-group study designs. The application highlights the most important decision points for each procedure and suggests example justifications for them. The resulting sample size report can serve as a template for preregistrations and manuscripts.

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2:10-2:30 pm (215)

Limitations in the Use of Regression Analysis to Investigate Unconscious Mental Processes.

SIMONE MALEJKA, *University of Cologne*, MIGUEL A. VADILLO, *Universidad Autónoma de Madrid*, ZOLTÁN DIENES, *University of Sussex*, DAVID R. SHANKS, *University College London* – Many researchers agree that people can adapt their behavior to regularities in an experimental task in the absence of awareness (e.g., repetition priming, contextual cueing). Evidence that learning was indeed unconscious can require accepting the null hypothesis that participants were unaware of any task regularities. As null-hypothesis significance testing cannot prove the absence of an effect, one can regress the learning measure on the awareness measure, so that a significant intercept would be understood as successful learning without awareness (Greenwald, Klinger, & Schuh, 1995). However, the relationship between predictor and criterion variable is frequently biased by their respective low reliabilities. Ignoring measurement error in the predictor will attenuate the regression slope and can in turn raise a true zero intercept above zero. Therefore, Klauer, Draine, and Greenwald (1998) suggested an errors-in-variables regression for predictors with rational zero points (such as d'). We show that their method still overestimates intercepts. As an alternative, we suggest using a generative Bayesian regression approach that accounts for unreliability and tests the intercept using the Bayes factor.

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2:30-2:50 pm (216)

Some Misconceptions about Statistical Tests of Hypotheses in Psychological Research.

RICHARD A. CHECHILE, *Tufts University* – This paper discusses a network of misconceptions about the relative-frequency approach for testing statistical hypotheses that are widespread in psychological research. Misunderstandings about p-values, confidence intervals, retrospective power, and meta-analysis exhibit a common tendency for scientists to interpret frequentist tools in a fashion that is incompatible with the theory upon which it is based. These misinterpretations can result in erroneous conclusions. The misconceptions also demonstrate that the frequentist approach is not providing scientists with what they are seeking from a statistical analysis. Frequency theory has further led researchers to test trivial point hypotheses that are a misuse of scientific resources. Finally, a case is made that the Bayesian approach to statistical inference and





hypothesis testing is a more suitable framework that is less likely to result in flawed inferences.

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1:50-2:10 pm (214)

Realistic and Useful Model Specification for Within-Subject ANOVA Designs. JEFFREY N. ROUDER, *University of California*, JULIA M. HAAF, *University of Amsterdam*, MARTIN SCHNUERCH, *University of Mannheim* – ANOVA—the workhorse of experimental psychology—seems well understood in that behavioral sciences have agreed-upon contrasts and reporting conventions. Yet, we argue this consensus hides considerable flaws in common ANOVA procedures, and these flaws become especially salient in the within-subject cases. The main thesis is that these flaws are in model specification. The specifications underlying common use are deficient from a substantive perspective, that is, they do not match reality in behavioral experiments. The problem is that consensus specifications include subject-by-treatment interactions even when treatment effects are absent. This setup corresponds to statements like “everyone has a true effect but exactly half are positive and exactly half are negative.” We provide specifications that avoid such statements, and show that these Bayes factor model comparisons among these specifications are already convenient in the BayesFactor package. Finally, we argue that model specification necessarily reflects substantive concerns, and, consequently, is ultimately the responsibility of substantive researchers rather than statisticians or methodologists.

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Human Learning and Instruction I Saturday, 1:30-3:10 PM CDT

1:30-1:50 pm (218)

Optimizing Study for Real-World Constraints Requires a Depth-Breadth Tradeoff. BRENDAN A. SCHUETZE and VERONICA X. YAN, *The University of Texas at Austin* – In practice, students are constrained by their available study time. Hence, students typically have to make a trade-off between depth and breadth. We test the impact of this trade-off in the study of GRE-synonym word pairs. Classic memory paradigms treat all items as equally important. We relaxed this assumption by splitting our stimuli set, with focal items being afforded more rounds of retrieval practice than nonfocal items. All words were studied once followed by one of three test-with-feedback repetition conditions: low (45 word pairs x 2 repetitions), medium (30 WP x 3 repetitions), and high (15 WP x 6 repetitions). All conditions had the same total number of trials (i.e., constant study time), but differed in the number of focal words (breadth) and repetitions (depth). Study condition had a significant effect on performance on a day-delayed test [$F(2, 306) = 4.20, p = .016$], with the medium repetition condition resulting in better performance compared to the low ($d = .21, p > .10, n.s.$) and high ($d = .39, p = .01$) repetition conditions. The optimized student should therefore

study a select subset of content and study that well. Implications for the importance of understanding student selectivity are discussed.

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1:50-2:10 pm (219)

Does Making Predictions Benefit Classification Learning in Upper Elementary School Children? DIETSJE JOLLES and MARLEEN VAN TETERING, *Leiden University* – Making predictions can facilitate learning in a variety of contexts. This has been found even in elementary school children (e.g., Brod, 2020). Here, we examined whether predictions are also beneficial for classification learning, focusing on a field that is relatively unfamiliar to students: modern art. Two groups of sixth-grade students (11-13 years old) learned to classify modern art movements by viewing example paintings. In the instruction condition ($N=94$), each painting was accompanied by the name and a description of the art movement. In the prediction condition ($N=98$), participants first had to predict to which art movement a painting belonged before seeing the correct name and description of the art movement. Both groups improved performance on a paper and pencil classification task. Yet, there was no significant difference between groups in the extent of improvement, nor were there any group differences in other measures of performance. Instead, we found that performance could be predicted by participants’ self-adopted strategies and executive functions.

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2:10-2:30 pm (220)

Active Control of Study Enhances Relational Learning Among Adolescents. DOUGLAS MARKANT, *University of North Carolina at Charlotte*, AZZURRA RUGGERI, *Max Planck Institute for Human Development* – Adolescence is an important period for the development of self-regulated learning, marked by improvements in metacognitive awareness and strategic control over study. While existing work has focused on how young learners make choices when studying sets of independent items (e.g., paired associates), few studies have addressed how active control during study impacts the formation of relational knowledge from interrelated materials. We examined how adolescents ($N=42$, ages 14-18) made study decisions when learning about a relational hierarchy. During study participants learned relations between adjacent items in the hierarchy (e.g., $A < B; B < C$). They were then tested on their ability to make transitive inferences about pairs that were not studied ($A ? C$). Active control during study led to improved inference accuracy compared to passive study. Moreover, relational learning was tied to how adolescents explored the hierarchy during study, such that individuals who “chained” overlapping relations in close succession made more accurate inferences at test. These results show that active control enhances relational learning among adolescents, but this advantage depends on how learners sequence their own study of interrelated materials.

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2:30-2:50 pm (221)

Does Spaced Testing Improve Memory and Comprehension of Textbook Chapters? OYKU UNER and HENRY L ROEDIGER, *Washington University in St. Louis* – Testing ourselves on what we learned and spacing our learning over time improves memory. Despite the mnemonic benefits of spaced testing, it is unclear whether its benefits extend to situations where students need to use their knowledge in novel ways. To address this issue, we asked college students to read from a textbook and review key concepts twice, either back-to-back or spaced across 2 days. To review concepts, students either took quizzes with feedback (short-answer in Experiment 1, multiple-choice in Experiment 2) or restudied their definitions. Two days after the last review, students took a short-answer test with definition questions as well as novel application questions. Although both quiz types improved performance on definition questions, only short-answer quizzes improved performance on application questions. Spaced review did not improve performance on either definition or application questions. The lack of a spacing effect in either rereading or testing in two experiments represents a puzzle for future research.

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2:50-3:10 pm (222)

Guessing as a Learning Intervention: A Meta-Analytic Review of the Prequestion Effect. KYLE J. ST. HILAIRE and JASON C.K. CHAN, *Iowa State University* – Asking students to guess the answers to test questions before learning the correct answers (i.e., prequestions) enhances learning; however, this benefit is usually specific to the prequestioned items and does not generalize to nonprequestioned items. The benefits of prequestions are robust, having replicated with prose and video materials, across different content types (including science, geography, and history), using multiple-choice and short answer prequestions, and in both laboratory and classroom contexts. Despite the breadth of the prequestion literature, the theoretical mechanisms underlying this learning benefit are still poorly understood. Here, we present a meta-analytic review of this literature. The goals of this meta-analytic review are to 1) conceptually summarize the literature, 2) establish the overall size of the specific prequestion effect and the general prequestion effect, 3) explore moderating effects that might inform theoretical mechanisms, and 4) identify gaps in the literature.

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Recognition Memory I Saturday, 1:30-3:10 PM CDT

1:30-1:50 pm (223)

It's How You Look at It: Differences in Visual Exploration Behaviors During Item and Relational Memory Tasks. HEATHER D. LUCAS, KARA E. HOBBS, and BRIANNA E. CAIRNEY, *Louisiana State University*, – Item and relational memory have distinct neural substrates, with the former more reliant on the hippocampus. Hippocampal activity also is modulated by eye

movements, raising the possibility that visual exploration differences between item and relational tasks can explain their distinct neural correlates. We compared study-phase eye movements across tasks that used identical stimuli, but differed by whether the goal was to memorize object identities (item memory) or object-location pairings (relational memory). We found a small but significant increase in the overall number of fixations made during spatial relative to object study. In addition, the spatiotemporal properties of eye movements differed markedly, with shorter fixation durations, fewer within-item gaze transitions, and more between-item transitions occurring during spatial relative to object study. A coarse-to-fine viewing strategy was evident during object study only. These findings suggest that the amount and type of eye movements deployed during intentional study depend on the nature of the memory task. Future work should examine the extent to which these viewing differences contribute to differences in the neural correlates of item and relational memory.

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1:50-2:10 pm (224)

Insights on the Specificity of Associative Episodic Memory. NATHANIEL R. GREENE and MOSHE NAVEH-BENJAMIN, *University of Missouri* – We discuss recent research from our lab assessing the qualitative nature of associative memory, which is central to episodic memory in general. As deficits in associative memory are a hallmark of the normal aging process, we begin by demonstrating that these ubiquitous deficits appear to scale with the amount of specificity about associations that needs to be retrieved. We also show that older adults are not metacognitively aware of their objective deficits in specific associative memory. We consider some mechanisms that may underlie these age-related deficits, including depleted attentional resources and slower processing speed, by simulating these effects in healthy younger adults. We show that divided attention at encoding in young adults has a more robust effect on the quality of associative memory than that associated with aging, whereas speeded presentation times in young adults produce quantitatively similar effects on the specificity of associative memory observed in older adulthood.

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2:10-2:30 pm (225)

From Association to Gist. CHARLES J. BRAINERD, MINYU CHANG, DANIEL M. BIALER and VALERIE F. REYNA, *Cornell University*, KUNINORI NAKAMURA, *Seijo University* – How do we cleanly separate the effects of associative and semantic relations on false memory, so that the two can be manipulated factorially? This problem has been extant for 6 decades, since the appearance of articles by Underwood, Anisfeld, Knapp, Grossman, and Eagle. Our solution was to create a pool of 120 lists with widely varied forward and backward associative strengths. Large subject samples then rated the lists' gist strength (how well the words' meanings hung together) on numerical scales. Internal consistency and external validity analyses established that gist strength ratings were highly reliable (Cronbach's $\alpha=.99$) and valid (cumulative validity $r=.87$). We then used the lists' gist-strength ratings to manipulate the strength of associative





and semantic relations independently of each other in false-memory experiments. The results showed that (a) gist strength had unconditional effects on false memory; (b) associative strength had smaller conditional effects, which only occurred with low gist strength; and (c) the two effects were controlled by different retrieval processes.

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2:30-2:50 pm (226)

Inhibition, Competition, and Context Models of Forgetting in Recognition Tests. RICHARD SHIFFRIN, *Indiana University*, ASHLEIGH M. MAXCEY and REBECCA A. CUTLER, *Vanderbilt University*, ROBERT NOSOFSKY, *Indiana University* – Causes of forgetting in recognition paradigms investigating Retrieval-Induced Forgetting (RIF) include inhibition (stored traces are reduced in strength due to later practice/testing of related items), competition (increasing trace familiarity adds ‘noise’ when trying to recognize related items), and context change (recognition harmed by context shifts between storage and test). This study controlled context, and used forced choice recognition testing to assess inhibition and competition. Participants studied a list of pictures composed of categories varying in size and in the repetition of some pictures part way through the presentation schedule. Forced-choice recognition tests were given between pictures early and late from the same category, and between pictures in similar presentation positions from different categories. Inhibition predicts decreased recognition for early items from repeated-picture categories compared to non-repeated-picture categories. Competition predicts effects of category size. The results support forgetting caused by competition and familiarity processes, rule out significant effects of inhibition, and by inference suggest that RIF effects seen in prior recognition studies were due to context change.

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2:50-3:10 pm (227)

Examining the Role of Perceptual and Conceptual Encoding Strategies in the Cross-Race Recognition Deficit. TOMAS A. PALMA, JOANA QUARENTA, and ANA S. SANTOS, *University of Lisbon*, BALBIR SINGH and JOSHUA CORRELL, *University of Colorado Boulder* – Faces provide perceptual and conceptual information. However, when it comes to studying face encoding strategies, the contribution of perceptual and conceptual information tends to be investigated independently. In the current research, we examined the role of perceptual and conceptual-based encoding strategies in the cross-race recognition deficit (CRD). The CRD describes the tendency for individuals to have less accurate memory for cross-race (CR) than for same-race faces (SR). In two studies, participants learned a set of SR and CR faces and rated them based on their perceptual appearance or inferred personality traits. Later, they completed a face recognition test. We varied the perceptual and conceptual questions asked in each study. In study 2, but not study 1, we found an interaction between face race and type of question, such that perceptual questions led to an elimination of the CRD. These findings will be discussed in light of current theories of the CRD.

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Attention and Visual Search I Saturday, 1:30-3:30 PM CDT

1:30-1:50 pm (228)

In Visual Search, Feature-Based Attention Is Not All Bottom-Up Priming. JEREMY M. WOLFE and SNEHA B. SURESH, *Brigham & Women's Hospital* – The target that you found on your last visual search will “prime” your next visual search. Suppose you are looking for a T among Ls and each item can be randomly red, green, or black. If you found a red T on the last trial, you will be faster to report the T on the next trial if that T is red than if it is green or black. Is this priming the explanation for all feature guidance in search? Maybe not. When set sizes are varied, priming does not alter the efficiency of search as measured by the slopes of the RT x set size function. The priming effect is a constant RT benefit across set sizes. Top-down guidance to a feature like “red” certainly exists. When Os search for consistently red Ts among the same red, green, and black Ls, slopes are markedly shallower suggesting that search has been guided to the red items. Priming by the features of the previous target may direct the first deployment of attention to those features or it may speed motor responses to the repeated target. It does not appear to guide attention to the primed features throughout the next search. This effect is not seen in many previous studies that either use simple pop-out tasks and/or lack a set size manipulation.

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1:50-2:10 pm (229)

Top-Down Control Cannot Eliminate the Effect of Selection History on Attentional Capture. DION T. HENARE, HANNA KADEL, and ANNA SCHUBÖ, *Philipps-Universität Marburg* – In everyday life, goals and intentions guide our immediate actions and determine our search priorities. Recent research has shown that after repeated experience of selecting and responding to a particular set of features, those features start to influence search performance even if they are not part of an individual’s current goals. In this experiment, we sought to understand how top-down goals interact with this selection history, and whether strong task set instantiation could eliminate capture produced by previous experience. We recorded EEG while two groups of participants performed a categorisation task that induced different selection histories, and a search task where those histories impacted search. Participants in this task were given un-speeded voluntary control over the upcoming trial to afford maximal opportunity for top-down preparation. ERP and behavioural results show that while the voluntary choice version task provides enhanced preparatory control compared to trial cuing, stimuli from a historically relevant feature dimension nevertheless capture participants’ attention. Therefore, selection history appears to drive attention deployment even when it conflicts with optimised top-down control.

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2:10-2:30 pm (230)

Withdrawn

2:30-2:50 pm (231)

Modeling Changes in the Effect of Target-Distractor Similarity on Complex Visual Search Performance as a Function of Experience. PATRICK H. COX, ARTIN YOUSEFI, STEPHEN MITROFF, and DWIGHT J. KRAVITZ, *The George Washington University* – Given the role of visual search—looking for targets among distractors—in many crucial real-world tasks (e.g., radiology), it is important to understand the factors that affect performance. Relatively little is known about search efficiency in complex environments, and, specifically, how it is determined by similarity relationships between specific target(s) and distractors. The visual system represents many different dimensions (color, location, category) that can be flexibly weighted according to current goals, so different similarity relationships may be emphasized in different contexts. Here we examined the impact of similarity in complex visual search using big data from the mobile app Airport Scanner, where players search simulated bags for diverse targets among a large heterogeneous set of distractors. The variability in stimuli and the volume of data (>3.8 billion trials, >15.5 million users), allowed for a data-driven exploration of the impact of similarity on search performance. Similarity metrics derived from image statistics, biologically-inspired models of vision, and empirical similarity ratings (MTurk) were used to model the effects of similarity across different features on search performance.

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2:50-3:10 pm (232)

The Effects of Task-Irrelevant Threatening Stimuli on Orienting- and Executive Attentional Processes Under Cognitive Load. ANDRAS N. ZSIDO, DIÁNA T. STECINA, and REBECCA CSEH, *University of Pécs*, MICHAEL C. HOUT, *New Mexico State University* – The processes underlying the rapid threat detection (and how they operate under cognitive load) are not well understood. We tested the impact of task-irrelevant threatening stimuli on the salience network and executive control of attention during low and high cognitive load situations. Participants were exposed to neutral or threatening pictures as task-irrelevant distractors in near (parafoveal) and far (peripheral) positions while searching for numbers in ascending order in a matrix array. We measured reaction times and recorded eye-movements. Our results showed that task-irrelevant distractors primarily influenced behavioral measures during high cognitive load. The distracting effect of threatening images slowed reaction times for finding the first number. However, this initial slowing was later offset by an increase in arousal caused by threatening stimuli, leading to overall shorter search times. Our eye-tracking measures showed that participants fixated on threatening pictures slower and for shorter durations compared to neutral images. Taken together, our results indicate a complex relationship between threats and attention that results not in a unitary bias but in a sequence of effects that unfold over time.

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3:10-3:30 pm (233)

Occipital Late Positivity in Visual Search Marks Target Access to Consciousness. MATTIA DORO and ROBERTO DELL'ACQUA, *University of Padova*, BRANDI LEE DRISDELLE, *Birkbeck, University of London*, SABRINA BRIGADOI, *University of Padova*, PIERRE JOLICOEUR, *University of Montreal* – A finding at odds with the view that detecting a singleton target “popping out” from a homogeneous array of distractors is accomplished pre-attentively is the presence of an N2pc, the hallmark of attention allocation to target information, in ERPs elicited on singleton-present search trials. In singleton search, N2pc has been shown to overlap temporally with the raising portion of a positive ERP component, named posterior processing positivity (PPP), that peaks at occipital sites. A recent proposal is that PPP reflects access to consciousness of the target singleton. Here, we tested the hypothesis that, if PPP reflects access to consciousness, it should be observed whenever a target is detected, independently of search mode. Participants searched for a multifeature target presented among distractors. On target-absent trials, the features' overlap of one distractor and the target's was varied systematically. The PPP amplitude reached its maximum on target-present trials, decreased progressively as the target-distractor feature overlap was decreased, and was nil when no target feature appeared in the search array. The results are discussed in relation to the debate about visual consciousness as a gradual or all-or-none phenomenon.

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Cognition and Technology Saturday, 3:30-5:30 PM CDT

3:30-3:50 pm (234)

Measuring Interpretability of Explainable Artificial Intelligence. ERIC TAYLOR, *University of Guelph*, NOLAN S. DEY, *University of Waterloo*, GRAHAM W. TAYLOR, *University of Guelph* – The complexity and inscrutability of algorithms powered by deep learning have instigated ethical concern and legislative action over how these machines make decisions, especially when the outcomes affect user well-being. It is currently impossible to fully describe the transformation of input to output to a human. Consequently, a subfield of machine learning research called explainable artificial intelligence (XAI) has emerged in an effort to produce satisfying explanations for deep neural network function. XAI methods are ingenious and indispensable but are not commonly validated with human user studies. We present results from three studies that borrow from common research methods in psychology. We show that we can standardize agreement in explanation interpretation, we can measure interpretability with the method of constant stimuli, and we can quantify explanation quality borrowing other methods from psychophysics. Having human-centered measures of explainability will be essential to a fair and safe adoption of this technology.

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3:50-4:10 pm (235)

Large-Scale Validation of Psychological Inoculation Against Misinformation Techniques. STEPHAN LEWANDOWSKY, *University of Bristol*, JON ROOZENBEEK and SANDER L. VAN DER LINDEN, *University of Cambridge*, BETH GOLDBERG, *Google LLC* – Misinformation on social media is a complex societal problem that has proven to be difficult to solve at scale. In response, we designed five short, easily scalable videos that work as psychological “inoculations” against misinformation techniques commonly encountered online: the use of emotional language, incoherence, false dichotomies, scapegoating and ad hominem attacks. In five preregistered studies quota-matched to the US population (N=5,416), we find that these videos improve people’s ability to recognize the use of misinformation techniques in social media content, their confidence in spotting these techniques, their ability to discern trustworthy from untrustworthy online content, and the quality of their sharing decisions. These effects remain robust across the political spectrum and for different levels of “bullshit receptivity” and analytical thinking.

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4:10-4:30 pm (236)

Perspectives on the Challenges and Potential Rewards of Addressing Real-World Complexity for the Translation of Fundamental Science to Application. KELVIN S. OIE, *U.S. Army Research Laboratory*, STEPHEN MITROFF, DWIGHT J. KRAVITZ, and PATRICK H. COX, *The George Washington University* – It goes without saying that human cognition and behavior is complex. Yet it is not easy to study such complexity in controlled laboratory environments, and hard work is necessary to incorporate natural complexity into the scientific study of human cognition. But, in an increasingly resource-constrained and competitive funding environment, research that can lead to technology applications that address problems of real-world complexity will often be prioritized. This presentation serves as a call for human-centered, fundamental research to move beyond traditional, highly reductive methods and to embrace the study of complexity in earnest. Perspectives will be shared from experiences in Army science and technology (S&T) research on the challenges of translating fundamental research to real-world technology applications, and the need for a shift towards complexity approaches to understanding human cognition and behavior—the results of which hold the potential for rewards, including more direct paths to and influence on application, and greater impact within the scientific community.

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4:30-4:50 pm (237)

The Role of Psycholinguistic Factors in Large-Scale Question Answering Systems. JOE AUSTERWEIL and KESONG CAO, *University of Wisconsin-Madison*, JOE BOCKHORST and GLENN FUNG, *American Family Insurance* – Over the last few decades, psychologists and machine learning researchers have been integrating their individual investigations on question answering (QA) as a means of developing a quantitative description and explanation of QA between humans, humans and their environments, and

also between humans and machines. Psychologists have found many biases regarding the answers humans would prefer, and some of which are straightforward to implement using formal models (e.g. word simplicity). These studies usually examine psycholinguistic factors in a controlled environment. Instead, we examine the role of these factors in general-purpose QA. We do so by analyzing whether these factors are implicitly encoded in a state-of-the-art general-purpose QA system (BERT-QA), and how incorporating these factors influences the performance of this system. This tests the real-world efficacy of psycholinguistic factors as well as the ability to improve machine learning QA systems by incorporating them.

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4:50-5:10 pm (238)

Assessing Human Safety Perception: Effects of Drone Control Design and Testing Techniques. RANXIAO FRANCES WANG, *University of Illinois Urbana-Champaign*, KIRK M. BALLEW, CHRISTOPHER WIDDOWSON, HYUNG-JIN YOON, CAMERON MERRILL, and NAIRA HOVAKIMYAN, *University of Illinois* – As autonomous drones become ubiquitous in densely populated urban areas, it is crucial that their flight trajectories do not induce stress in the humans they serve. To better understand how drones elicit human stress due to perceived danger, we simulated the experience of receiving packages delivered via drone under various conditions. Participants viewed a desktop computer or head-mounted display (HMD) that showed a first-person perspective of a virtual basketball court. On each trial, a virtual drone picked up a package at the other end of the court and flew toward the participant. The participants were instructed to press a button when they wanted the drone to stop and drop off the package. We collected behavioral (the distance between the drone and the participant’s virtual avatar when the button was pressed) and physiological (galvanic skin response) measures. The results showed that preferred stopping distance significantly increased as a function of drone speed, both when viewed through the HMD and through a desktop display. We will discuss the relationship between drone control designs and human safety perception, as well as the effects of testing techniques.

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5:10-5:30 pm (239)

Incorporating Signals from Facial Expressions in Novel Emojis Enhances Emotional Communication. ISABELLE BOUTET, JOELLE GUAY, JUSTIN A. CHAMBERLAND, and CHARLES A. COLLIN, *University of Ottawa* – Emojis are used in digital interactions to clarify the emotional tone of written messages. However, many existing facial emojis are not interpreted consistently across users, which can lead to miscommunication. We developed novel emojis that portray emotional cues used to identify and distinguish basic facial displays of emotions (i.e., action units [AUs]; Ekman, 1982). In one block, participants (N=65) were presented with novel emojis, existing emojis, and real face photographs one after another and asked to label the emotion(s) conveyed by each stimulus. Percentage of participants who endorsed emotion labels was calculated. In another block, participants rated the extent to which





each stimulus conveyed basic emotions. Accuracy, intensity, and confusion with other emotions were measured. Novel emojis generally produced interpretations of emotions that were more consistent, accurate, and intense compared to existing emojis and real faces. Incorporating facial emotional cues (AUs) in emojis was successful. Because most humans already have the expertise for decoding these emotional cues, our novel emojis have the potential to reduce miscommunication in digital interactions.

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Working Memory I Saturday, 3:50-5:30 PM CDT

3:50-4:10 pm (240)

Is There an Activity-Silent Working Memory? KLAUS OBERAUER, *University of Zurich*, ED AWH, *University of Chicago* – When people hold information in working memory (WM) and temporarily switch attention away from it, neural activity corresponding to that information often becomes undetectable but is recovered as soon as attention is redirected to the information. This observation has been regarded as support for the assumption of a neurally silent form of WM. Alternatively, however, not-attended information could be maintained in episodic long-term memory (eLTM) rather than in WM. We present four experiments testing between these possibilities, building on evidence that WM protects information from proactive interference (PI) between trials. If currently unattended information is held in WM, it should be immune to proactive interference (PI) across trials, whereas eLTM representations should suffer PI. Participants remembered arbitrary colors (Experiments 1-3) or locations (Experiment 4) of everyday objects. We found PI for set sizes larger than 4 (i.e., exceeding WM capacity) but not for smaller set sizes. This was the case also when participants engaged in a distractor task during the retention interval, which other studies have shown to silence the neural signatures of attended WM contents. These results support the hypothesis of a neurally silent WM.

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4:10-4:30 pm (241)

Visual Working Memory Performance with Just One Item Predicts Nearly All of the Variance in Performance with Five Items. TIMOTHY BRADY, *University of California, San Diego* – What limits working memory performance when there are many items to be held in mind? Many models of working memory capacity focus on factors that are present primarily at high set sizes (e.g., interference between items; upper bounds on number of items that can be held in mind; etc). These models assume that performance is effectively “at ceiling” when remembering just one item, and so little can be learned about working memory from such “subcapacity” trials. Here we take an individual differences approach and use the TCC model (Schurgin et al., 2020) and a specially designed 4-AFC task to measure visual working memory performance all the way up to d' values >6.0 at set size 1. In three studies (all $N > 100$), we find that performance at set size 1 explains 85-95% of the explainable

variance at set size 5. By contrast, a challenging mental rotation task explains $<40\%$ of the variance. We suggest this raises important challenges for models who focus primarily on explaining high set sizes when considering the source of working memory limits.

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4:30-4:50 pm (242)

Cue Distinctiveness Facilitates Performance in a Memory Matching Game. PAUL H. THIBODEAU and ZHUANGYU ZHANG, *Oberlin College* – Games can be useful tasks for studying cognitive phenomena. Here, we report two experiments using a simple online version of a memory matching game. In both, we manipulate the distinctiveness of the items and test for an effect on performance. In Experiment 1, participants played the game with items modeled on the Stroop task: (a) color words in consistent ink colors, (b) color words in a neutral ink color, or (c) color words in conflicting ink colors. In Experiment 2, participants played the game with items that were (a) maximally distinct in color and shape (12 shapes in 12 colors), (b) fully distinct in shape but only somewhat distinct in color (12 shapes in 4 colors), (c) fully distinct in shape but non-distinct in color (12 shapes in 1 color), or (d) nondistinct in shape and color (4 shapes in 4 colors). As expected, participants in both experiments won the game in the fewest moves when the items were the most distinct. The results confirm prior work highlighting the importance of cue distinctiveness in working memory and help to validate the game for empirical research.

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4:50-5:10 pm (243)

How Precise Is Verbal Working Memory? STEVE MAJERUS and MARION BOUFFIER, *University of Liège* – While the capacity-limits of verbal working memory (WM) are well established, we have little knowledge about the precision at which verbal memoranda are represented. By varying the degree of overlap between probes and memoranda in a WM probe recognition paradigm, we examined the level of precision at which memoranda are represented at phonological and acoustic levels. In Experiment 1, we showed high discrimination performance when probe and target words differed by at least two phonemes but performance became unreliable when there was a single phoneme difference. In Experiment 2, we observed close to chance-level discrimination when probe and target nonwords differed by subtle acoustic variations of the onset phoneme or by acoustically similar onset phonemes; discrimination performance was only reliable when the onset phonemes involved distant phonological contrasts. Experiment 3, a neuroimaging experiment, showed that neural discrimination of nonword memoranda became unreliable at encoding and maintenance when phonological overlap exceeded 75%. This study shows that verbal information is represented with phonological-level rather than acoustic-level precision and that resolution at the phonological level is furthermore limited.

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5:10-5:30 pm (244)

Semantic Associations Increase Memory for Items, Not Binding. BENJAMIN KOWIALIEWSKI and KLAUS OBERAUER, *University of Zurich* – Verbal working memory (WM) is strongly influenced by semantic similarity and association between items. Serial recall of lists of semantically related words is better than of unrelated words. In this study, we assessed the possibility that semantic associations support WM maintenance via increased item-context binding strength. We manipulated semantic relatedness in a serial order reconstruction task (Experiment 1), a mixed immediate serial recall and serial order reconstruction task (Experiment 2) and an item-spatial association task (Experiment 3). These three experiments led to a clear convergent pattern of results: semantic relatedness did not affect performance in any condition that required only memory for word-context bindings. Therefore, it did not increase item-context binding. Using a computational modeling approach, we restrict the plausible range of mechanisms underlying semantic associative effects. Specifically, we show that semantic associations could benefit WM via stronger availability in activated long-term memory or by efficiently using semantic information to restrict the set of candidates at a reintegration stage.

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Judgment and Decision Making II Saturday, 3:30-5:30 PM CDT

3:30-3:50 pm (245)

Context Effects on Risk Perception of Common Behaviors During the COVID-19 Pandemic. JONATHAN C. PETTIBONE, *Southern Illinois University Edwardsville*, DOUGLAS M. WEDELL and WILLIAM M. HAYES, *University of South Carolina* – During the COVID-19 pandemic, public health policies have described best practice behavioral guidelines along with information about their associated risks. Accurate risk assessment of these behaviors is an important component for adherence to and application of policy guidelines. We report two studies that examined how the contextual distribution of behaviors brought to mind at judgment affects judgments of riskiness and related judgments of appropriateness and likelihood to engage in specific behaviors. In Study 1 (n=187), we manipulated recent context by including contextual behaviors along with moderate target behaviors. Significant contrast effects were found such that exposure to high-risk behaviors led to judging moderate behaviors as less risky, more appropriate, and more likely to be engaged in. Study 2 (n=144) tested for effects of long-term context by having participants self-report their behavioral context and likewise showed contrast effects on ratings. Belief in the efficacy of public health measures was found to contribute to risk perception in both studies. These results demonstrate that both recent and long-term contexts are related to risk perception and may influence adherence to risk mitigating practices.

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3:50-4:10 pm (246)

Withdrawn

4:10-4:30 pm (247)

Perceived Penalties for Sharing Incorrect Information with Experts. JESSECAE K. MARSH, *Lehigh University*, SAMANTHA KLEINBERG, *Stevens Institute of Technology* – Shared decision-making, where experts and patients work together to make medical decisions, has been touted as the gold standard for decision making in health. However, little is known about how patients view this process of sharing their possibly incorrect beliefs with an expert to make a decision. We explored people's perceptions of others who disclosed incorrect information to a healthcare expert. We varied how centrally related the disclosed information was to management of the health condition, as well as its accuracy. Participants judged patients expressing inaccurate information that was central to the health condition more harshly than patients who were inaccurate about peripheral health information. Additionally, the more unreasonable incorrect statements seemed, the more harshly participants judged the patients, with conspiratorial statements receiving the most penalty. These findings replicated while manipulating patients' reported gender and race. In interacting with an expert, people inevitably will know less and possibly disclose incorrect information. Our findings highlight the challenges people may see in fully participating in decision making with experts. We discuss implications for real world decision-making.

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4:30-4:50 pm (248)

Confirmatory Silos: Evidence from COVID-19 Attitudes, Preferences, and Behaviors. SANDRA L. SCHNEIDER, AUSTIN L. KATZ, MARCUS CUMBERBATCH, BRITTNEE HAMP-TON, NAHID AFROZ, SUNG HEE PYO, and JORDAN MARTIN, *University of South Florida* – This presentation explores the tight interrelationship between preexisting outlook, news source preferences, and developing attitudes and behaviors concerning the novel coronavirus, COVID-19. We hypothesized that motivated reasoning processes drive the choice of news consumption, resulting in closed feedback loops, or cognitive silos, that shape attitudes and behaviors in biased ways. We describe two correlational studies of undergraduates demonstrating moderate to strong relationships between pre-existing attitudes, news source preferences, and resulting COVID-related views and behaviors concerning likely health impacts, expected consequences, and advisable government policies. These relationships were only weakly (if at all) predicted by measures of analytic versus holistic decision style, numeracy, or self-assessments of personal knowledge. These findings provide evidence of confirmatory silos in the context of COVID-19, wherein motivated reasoning supports selective exposure to information, reinforcing a single point of view and limiting awareness of the potential viability of alternative points of view.

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4:50-5:10 pm (249)

Mental Operation on Precise and Imprecise Probabilities.

MANDEEP K. DHAMI, *Middlesex University, London*, DAVID R. MANDEL, *Defence Research and Development Canada*, GEORGINA GRAY, *Middlesex University, London* – People often have to perform arithmetic operations on probabilities, which may be communicated verbally or numerically and with more or less precision. In two experiments, we examined how different probability formats affect the calculation of proportional increases and decreases of probability estimates (e.g., a 1/3 increase in a 75% chance), as well as decisions made on their basis. In Experiment 1 (N=130), estimates were more accurate when participants received precise numeric probabilities than verbal probabilities supplemented with numeric ranges (hybrid condition). Accuracy for numeric ranges alone fell between these two conditions. Greater accuracy predicted decisions to act. In Experiment 2 (N=122), we replaced the hybrid format with a numeric margin-of-error format. Accuracy for the precise numeric format was again greater than the imprecise formats. Again, greater accuracy predicted decisions to act. The results suggest that people are most adept at operating on probabilities that are expressed as precise (numeric) values. The findings have implications for domains such as intelligence analysis and climate science, where probabilistic estimates serve as inputs for further estimation.

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5:10-5:30 pm (250)

When Communicating Probabilities, Is Shared Understanding Best Achieved Using Words, Numbers, or Both?

DAVID R. MANDEL, *Defence Research and Development Canada*, DANIEL IRWIN, *Department of National Defence, Canada* – Organizations tasked with communicating expert judgments couched in uncertainty often use numerically bounded linguistic probability (NBLP) schemes to standardize the meaning of verbal probabilities. In such schemes, an ordinal scale of verbal probabilities is initially defined by corresponding numeric ranges, after which only the verbal probabilities are used to communicate probability in estimates. An experiment (N=1,202 recruited online) was conducted to ascertain whether agreement (i.e., correspondence between stipulated and inferred meaning) with such a scheme was better when probabilities were presented verbally, numerically, or in a combined “verbal+numeric” format in communicated estimates. Across three agreement measures, the numeric and combined formats outperformed the verbal format, yielded better discrimination between low and high probabilities, and yielded a smaller fifty-fifty blip. The combined format did not confer any observable advantage over the purely numeric format. The findings suggest that NBLP schemes are not an effective means of communicating information about probabilities to others and they call into question recent recommendations for use of the combined format for delivering such schemes.

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Recognition Memory II

Saturday, 3:50-5:30 PM CDT

3:50-4:10 pm (251)

Withdrawn

4:10-4:30 pm (252)

Limits on the Development of Automaticity in Probe Recognition Memory Search.

ROBERT NOSOFSKY, *Indiana University*, RUI CAO, *Boston University*, SAMUEL M. HARDING, *Syracuse University*, RICHARD SHIFFRIN, *Indiana University* – A key route to the development of automaticity is consistent practice. A classic paradigm for studying this process is short-term-memory (STM) probe recognition. Past work using this paradigm shows that consistent-mapping (CM) training (targets and foils never switch roles) leads to vastly improved performance compared to varied-mapping (VM) training. A theoretical account is that item-response learning operates automatically in CM, producing long-term-memory representations that bypass the limits of STM. However, past research has contrasted CM and VM in pure-list designs in which observers may adopt different strategies and criterion settings across conditions. Here we tested STM probe recognition using a mixed-list design with CM and VM items appearing in the same lists. The performance patterns were dramatically different than in pure-list designs, with little benefit for CM compared to VM targets. The results raise questions regarding the conditions under which CM leads to different memory representations than VM and challenges the generality of automatic item-response learning theories. We develop an exemplar-based random-walk model to account for CM and VM performance in both the pure- and mixed-list designs.

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4:30-4:50 pm (253)

ERPs Dissociate Episodic Memory Strength from Evidence Accumulation Dynamics for Memory-Based Decisions.

KEISUKE FUKUDA, *University of Toronto Mississauga*, MIN-SUK KANG, *Sungkyunkwan University*, CAITLIN J. TOZIOS, *University of Toronto*, MATTHEW KOLISNYK, *University of Toronto Mississauga*, GEOFFREY F. WOODMAN, *Vanderbilt University* – ERP correlates of recognition memory (i.e., FN400 and P600) have been utilized widely to test theories of episodic memory. However, since identifying episodic memory retrieval requires behavioral reports, dissociating the neural signals of episodic memory from decision-related signals has been difficult. Here, by composing a uniquely large EEG dataset (n = 134) to establish a fine-grained measurement of memory strength and decision confidence, we successfully delineated the memory strength signal from decision signals. Surprisingly, we found that classic ERP correlates of memory strengths exclusively reflected decision confidence instead of memory strength. Particularly, P600 amplitude traced the evidence accumulation process irrespective of the presence of episodic memory by increasing its amplitude until recognition judgment was made. Moreover, 88% of the variance in its peak amplitude was explained by recognition





confidence and speed, leaving no variance accounted for by memory strength. In addition, we found a novel lateral-parietal ERP correlate (LPP300) that selectively reflected the memory strength. Thus, our results demand a re-evaluation of memory theories that rely on the classic ERP correlates of recognition memory.

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4:50-5:10 pm (254)

Independent Storage of Real-World Object Features Is Visual Rather than Verbal in Nature. PLATON TIKHONENKO, *National Research University Higher School of Economics (HSE University)*, TIMOTHY BRADY, *University of California, San Diego*, IGOR UTOCHKIN, *National Research University Higher School of Economics (HSE University)* – Previous studies demonstrated that meaningful features of real-world objects are stored in visual long-term memory with a high degree of independence (e.g., a person can remember seeing a particular coffee mug without remembering whether it was full or empty; Brady et al., 2013; Utochkin & Brady, 2020). Theoretically, this independence may be not purely visual—it may be caused by verbal encoding of object features, since words are independent “pieces” of verbal object descriptions. To test this assumption, we manipulated the match or mismatch of information about the color and state of an object between pictures and verbal descriptions (Experiment 1) or between different exemplar pictures from the same basic object category (Experiment 2). The effect of verbal descriptions on feature recognition in visually presented objects was quite weak. By contrast, the effect of feature mismatch between two visual exemplars was very pronounced and feature-specific. For example, when two exemplars had different colors but same states, color recognition was at chance but state recognition was reasonably good, and so on. Our results suggest the visual nature of independent feature storage in long-term memory.

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5:10-5:30 pm (255)

Withdrawn

Cognitive and Motor Control of Performance I Saturday, 3:50-5:30 PM CDT

3:50-4:10 pm (256)

Multitasking Control-Demanding Behaviors: The Role of Shared Versus Distinct Pathways. EVA VAN DEN BUSSCHE and BART ABEN, *KU Leuven*, GETHIN HUGHES, *University of Essex* – Combining multiple tasks is becoming omnipresent in our digital age. However, we are notoriously poor at multitasking control-demanding behaviors. Crosstalk models postulate that multitasking performance will only be impaired when both tasks require shared pathways, but not when the tasks recruit at least partially distinct pathways. To assess these assumptions, we asked 143 young adults to complete dual tasks combining two cognitive tasks (i.e., cognitive-cognitive dual tasks) or combining a cognitive control and a motor control task (i.e., cognitive-motor dual task). Participants

showed clear switch costs when combining two cognitive tasks compared to performing only a single cognitive task. However, performing a task requiring high cognitive control was not additionally hampered by a concurrent high motor control demand compared to a low motor control demand. Similar results were obtained in a sample of 63 elementary school children. These findings support crosstalk models of multitasking behavior.

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4:10-4:30 pm (257)

Withdrawn

4:30-4:50 pm (258)

The Role of Subvocalization in Vocal Pitch Imitation. PETER Q. PFORDRESHER, *University at Buffalo, SUNY*, EMMA B. GREENSPON, *Monmouth University*, TIM A. PRUITT, *University at Buffalo, SUNY*, ANDREA R. HALPERN, *Bucknell University* – Adults vary in ability to match vocal pitch; many are very good, but approximately 30% have very poor-pitch singing and difficulty imitating spoken pitch intonation. Our recent research suggests that forming an auditory image of the target plays a critical role in pitch matching accuracy, with the image priming neural networks associated with vocal motor planning, which in turn are manifested in actual subvocal movements. We report three experiments that use surface electromyography to measure subvocal muscle movements during auditory imagery. The first experiment verified that auditory imagery led to vocal-specific muscle activity, and that less-accurate imitators exhibited stronger subvocal activity than more accurate imitators. The second experiment used a suppression paradigm to validate the necessity of subvocalization for poorer pitch-matchers. The third experiment suggested that subvocalization reflects auditory short-term memory demands, but not difficulty in manipulating an auditory image, and is not specific to motor preparation, by use of a recognition task. Overall, these results suggest that auditory imagery leads to peripheral subvocal activity, but the activity may not reflect the fine details of the image.

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4:50-5:10 pm (259)

Writing Braille: Enriching Our Understanding of Producing Language through Keystroke. SIMON FISCHER-BAUM and ROBERT ENGLEBRETSON, *Rice University*, CAY HOLBROOK, *The University of British Columbia* – While most theories of typing focus on serially selected keystrokes that correspond to individual letters, writing systems differ in how words are typed. In this presentation, we will present new research investigating the cognitive and linguistic processes involved in writing braille. Direct braille production involves a six-key keyboard, with keys corresponding to dots in the braille cell. Typing braille, therefore, requires simultaneous keystrokes to produce characters. Pressing the left index and right middle fingers will result in the braille character for E, though if the left middle finger was pressed at the same time, H would be produced instead. We will discuss how to incorporate simultaneous





keystroke production into theories of skilled typing and present preliminary analyses from a large sample of braille writing collected from blind and visually-impaired students participating in the annual Braille Challenge competition, to show how braille typing errors can reveal the underlying orthographic structures in braille writing system knowledge.

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5:10-5:30 pm (260)

Individual Differences in Cognitive Offloading: A Comparison of Intention Offloading, Pattern Copy, and Short-term Memory Capacity. HAUKE S. MEYERHOFF, *Stiftung Medien in der Bildung (SbR)*, GRINSCHGL SANDRA, *University of Graz*, FRANK PAPANMEIER, *University of Tübingen*, SAM J. GILBERT, *Institute of Cognitive Neuroscience* – One strategy to compensate for information overload in many everyday life tasks is cognitive offloading (i.e., the externalization of cognitive processes). There appears to be remarkable variance in offloading behavior between participants which poses the question whether there is a common factor influencing offloading behavior across different tasks. To pursue this question, we studied individual differences between two well-established offloading paradigms: the intention offloading task which tackles memory for intentions and the pattern copy task which tackles short-term memory load. Our study also included an unrelated task measuring short-term memory capacity. Each participant completed all tasks twice in order to obtain reliability scores. Despite high reliability scores, individual differences in offloading behavior were uncorrelated between the two offloading tasks. In both tasks, however, offloading behavior was correlated with short-term memory capacity. Our results therefore show that offloading behavior cannot simply be explained in terms of a single common factor. We discuss the implications of this finding for future research investigating the interrelations of offloading behavior across different tasks.

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Visual Perception I

Saturday, 3:30-5:30 PM CDT

3:30-3:50 pm (261)

The Push-Pull of Serial Dependence Effects: Every Response Is both an Attraction to the Prior Response and a Repulsion from the Prior Stimulus. PATRICK SADIL, ROSEMARY COWELL, and DAVID E. HUBER, *University of Massachusetts* – In the “serial dependence” effect, responses to visual stimuli appear biased toward the last trial’s stimulus. Fischer and Whitney (2014) proposed that this reflects a “continuity field” that promotes visual stability by biasing perception toward the recent past. However, different kinds of serial dependence exist, with some reflecting prior stimuli and others reflecting prior responses. To untangle the two kinds of dependencies, we used a statistical approach that relies on participants’ naturally occurring errors on a trial-by-trial basis, simultaneously considering the combined effects of the prior response and the prior stimulus. To validate the approach, we

collected data in an experiment designed to produce relatively large errors, such that on many trials the prior response and prior stimulus were dissociated. We applied the approach to our own data, and to data from previous serial dependence studies, including Fischer and Whitney’s. Whenever these two effects could be differentiated, we found that serial dependencies reflected an attraction to the prior response and repulsion from the prior stimulus. In no case did we find unequivocal evidence of an attraction to the prior stimulus.

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3:50-4:10 pm (262)

Semantic Activation Influences Object Detection: A New Approach Yields New Insights. MARY A. PETERSON and RACHEL M. SKOCYPEC, *The University of Arizona* – Research has shown that detection of degraded objects is improved by valid vs. invalid labels shown beforehand but mechanisms are unclear. We measured figure assignment (i.e., archetypal object detection) and compared to a control condition to elucidate mechanism. Masked test displays showed a portion of a familiar object on one side of a central border, shown for 90 or 100 ms; 100 ms allows more time for the familiar object to activate semantics. Observers reported whether they detected an object on the left or right side. Words denoting either the object’s basic-level (BL) category or that of an unrelated (UNR) object were shown long enough in advance to activate semantics. In different studies UNR words denoted objects in the same or a different superordinate category. In control conditions, words did not precede test displays. Object detection accuracy was higher than control following BL words but was unaffected by UNR words, implicating high-level object representations as the mechanism. RTs in the UNR condition revealed conflict between high-level representations activated by word and display. Conflict (larger for same- than diff-category UNR and for 100-ms than 90-ms displays) had to be resolved prior to object detection.

Email: Mary A. Peterson, mapeters@u.arizona.edu

4:10-4:30 pm (263)

Objects Distort the Perception of Space Beyond their Boundaries. TIMOTHY J. VICKERY and ANTON LEBED, *University of Delaware* – Two points on the surface of an object appear farther apart than two equivalently spaced points positioned on ground space. This phenomena has been termed “object-based warping,” because the apparent expansion of space is proportional to the evidence that the two points are surrounded by cues to grouping (Vickery & Chun, 2010). In a series of new experiments, we examined the extent to which this effect extends to the edges of an object and beyond. Subjects completed interleaved staircase procedures to determine the point of subjective equivalence of the spacing between two vertically aligned points on or near a rectangular object, compared to points not near an object. We found that when points are located near the object boundaries but still inside the object and aligned with the vertical axis, a compression rather than an expansion effect is observed. Points located beyond the edges (with the object in between) also appear closer together than they are (up to 15% closer). Expansion effects are observed for dots that are misaligned with the vertical axis





(along the edge) and even in adjacent space. Our findings suggest that objects profoundly distort perception of space, both within and beyond the boundaries of an object.

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4:30-4:50 pm (264)

Radial Bias Alters Object Orientation. MELISA MENCELOGLU, *Brown University*, KEN NAKAYAMA, *University of California, Berkeley*, JOO-HYUN SONG, *Brown University* – A bias for radial orientations has been demonstrated for low-level visual features using measures such as discrimination thresholds for line orientations (Westheimer, 2003) and contrast sensitivity for sine gratings (Sasaki et al., 2006). Here, we observed an object-based illusion that is likely related to this bias. Participants including three trained observers and 18 undergraduate students judged the orientation of a peripherally placed Landolt C presented in one of eight orientations and in one of eight locations along four meridians (vertical, horizontal, 45° and 135°) centered on the fixation point. Participants responded by clicking on a central ring to indicate the location of the gap in the Landolt C. The distributions of the errors (the angle between the position of the actual gap and perceived gap) across different orientations and locations indicated that the perceived gap was often aligned with the radial axis. As an example, the gap in a regular C would often be wrongly perceived as tilted 45 degrees corresponding to the oblique meridian where it was placed. This pattern of results extends the radial bias findings by providing a novel example of early visual biases altering object perception and recognition.

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4:50-5:10 pm (265)

Eliminating Representational Momentum: The Influence of Stimulus Context on Representational Momentum. SIMON MERZ, *University of Trier*, CHARLES SPENCE, *University of Oxford*, CHRISTIAN FRINGS, *University of Trier* – Representational momentum (RM) is a robust phenomenon in which the final location of an (implied) motion sequence is systematically overestimated in motion direction and has been observed in vision, audition, and lately, also in touch. Interestingly, tactile RM studies typically use a different experimental context than nontactile studies, that is, nonmotion stimuli (which don't imply any consistent motion) are intermixed with motion stimuli, whereas in visual experiments, mostly only motion stimuli are presented. Therefore, in this experimental series, we systematically investigated the influence of local (trial N-1) as well as global (proportion of motion and control trials within one experimental block) stimulus context on visual RM. The results indicate that global context has a strong influence on the RM phenomenon, whereas local context does not. That is, a motion sequence for which a robust RM phenomenon is observed when presented in isolation, results in decreased or even no overestimation when intermixed with non-motion stimuli. Important implications for theoretical frameworks hoping to explain the localization of moving stimuli are discussed.

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5:10-5:30 pm (266)

The Observer's Perspective Determines Which Cues Are Used When Interpreting Pointing Gestures. LISA-MARIE KRAUSE and OLIVER HERBORT, *Julius-Maximilians-University Würzburg* – Different strategies for pointing production and interpretation lead to misinterpretations of pointing gestures. Observers extrapolate the vector defined by the pointer's arm and index finger for interpretation whereas the pointer puts his index finger in the line between his eyes and the pointed-at target. Here, we elaborated on this by testing the hypothesis that observers use two different visual cues depending on their perspective. More specifically, the extrapolation of the arm direction when seeing the pointer from the side, but the pointer's index finger position in their own visual field when sharing a similar perspective. In three experiments, participants judged the pointed-at location from different perspectives in a virtual or real world environment. As expected, the perspective decisively influenced the perception of the pointing gesture. Observers rely the more on the pointer's finger position in their visual field and the less on the arm direction, the more their perspective overlaps with that of the pointer.

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Attention and Visual Search II Sunday, 8:00-10:00 AM CST

8:00-8:20 am (268)

Withdrawn

8:20-8:40 am (269)

Attention Is a Partially Observable Markov Decision Process (POMDP). JOSEPH MACINNES, *National Research University Higher School of Economics (HSE University)* – Visual search, eye movements, and attention have all been well described as Bayesian or optimal processes. In particular, Bayesian processes allow for the combination of prior beliefs with sensory information to allow informed updating to a posterior belief. The Partially Observable Markov Decision Process (POMDP), however, has a number of properties that make it exceptionally useful as tool and model of integrating various types of attentional information. First, it combines both prior belief and selection history as a Markov process to account for more than simply top down attention, and even gives us a way to answer the question of top-down "from where?" Second, it formulates attention in service to action and the goals of the system in addition to a more conceptual state. Finally, newer implementations of POMDPs allow us to consider spatial and hierarchical inputs into these models allowing a closer connection to spatial orienting as a source of evidence and input.

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8:40-9:00 am (270)

The Role of Spatio-Temporal Prediction in Agency-Driven Attentional Selection. JAMES R. BROCKMOLE, EMILY E. TIGHE, and ADAM C. VILANOVA-GOLDSTEIN, *University of Notre Dame* – The sense of agency that arises when our actions cause observable outcomes biases our attention toward those things which we control, even when our actions are task-irrelevant. We asked whether this agency-driven bias arises from the predictability agency affords. Participants first controlled the direction of one object’s movement through a display while other objects’ trajectories changed randomly. In the strong prediction condition, object speed was constant throughout the trial, enabling participants to predict where the circle was going to be at a future point in time. In the weak prediction condition, object speeds changed randomly during the trial. In a following search task, the controlled object became a target or a distractor. Targets were found more quickly if they were previously controlled, but this effect was diminished in the weak prediction condition. In a second experiment, speed changes were replaced by luminance changes which did not reduce agency biases, indicating that changes to non-spatial object properties do not similarly affect agency. We conclude that agency-driven biases arise from spatio-temporal prediction mechanisms.

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9:00-9:20 am (271)

Augmented Target Recognition: Quantifying the Costs and Benefits of Implementation. TRAFTON DREW, RYAN J. MURDOCK, JOSH BUTNER, SARAH H. CREEM-REGEHR, and JEANINE K. STEFANUCCI, *University of Utah* – The purpose of automatic target recognition (ATR) is to cue potential threats within an area, alerting users to danger. Although this may provide benefits in terms of detecting cued threats, little is known about the potential for issues concerning users’ situational awareness caused by this cueing. In this study, participants (N=117) were tasked with identifying and localizing armed characters (amongst unarmed characters) in scenes either within a control condition or using simulated ATR highlighting that varied by its false-positive and false-negative rates. Overall, d' showed no significant variation between ATR and control conditions. However, ATR decreased response times and miss rates; however, targets that were missed by ATR resulted in more errors. The scenes used in this study also contained clutter objects that participants were tested on at the end of the study. We found no significant difference between accuracy of memory for objects between ATR and control conditions suggesting situational awareness was unimpaired by ATR.

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9:20-9:40 am (272)

Visual Search Guidance Uses Coarser Template Information than Match Decisions. XINGER YU, *University of California, Davis* – Theories of attention postulate the existence of a target “template” in memory that contains task-relevant information when looking for an object. Using a visual search task for a target amongst linearly separable distractors, our recent work (Yu, Hanks & Geng,

2021) showed that template information differs in precision when guiding sensory selection and when making identity decisions. However, real-world search targets are rarely linearly separable from distractors, and it remains unclear whether guidance uses a “fuzzier” version of the template compared to target decisions under more typical conditions. Here, we probed this question by varying distractor similarity during visual search in four experiments and measured the likelihood of attentional capture and target misidentifications. We found that early attentional guidance is indeed less precise than that of subsequent match decisions under varying exposure durations and distractor set sizes. These results suggest that attentional guidance operates on a coarser code than decisions, perhaps because guidance is constrained by acuity in peripheral vision or the need to rapidly explore a wide region of space, while decisions are more precise to optimize binary decisions.

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9:40-10:00 am (273)

The Next-Day Effects of a Normal Night’s Drinking on Attention and Emotional Processing. LYDIA E. DEVENNEY, *Letterkenny Institute of Technology*, KIERAN B. COYLE and JORIS C. VERSTER, *Utrecht University* – Attention is made up of a series of multicomponent processes which have been underrepresented in hangover research. This study aims to gain a more comprehensive understanding of attentional processes by looking beyond the standard attention tasks employed in hangover research. Twenty five participants with a mean (SD) age of 27.64 (8.04) years old participated in a repeated measures naturalistic study. A within-participants design was applied comparing a hangover testing session with a control session. Participants in the hangover session reported consuming a mean of 12.78 (4.95) units the night before testing. Cognitive tests included the Emotional Stroop test, Eriksen’s flanker test, 5 Choice Serial Reaction Time task, and Attentional Blink. Next-day effects of a night’s drinking were found on Emotional Stroop, Eriksen’s flanker, 5 Choice Serial Reaction Time, Psychomotor Vigilance, and Attentional Blink tasks. This study highlights the complexity of the attentional systems and gives insight into areas of attention such as visual information processing and response inhibition. Moreover, the signal detection analysis provides novel insight into the decision-making mechanisms at play during a hangover.

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**Judgment and Decision Making II
Sunday, 8:00-10:00 AM CST**

8:00-8:20 am (274)

Breast Cancer Mammography Screening as a Topic of Discussion Boards: What Has Been the Impact of COVID-19? T.L. BRINK, *Crafton Hills College*, VICTORIA KARALUN, *Crafton Hills College*, AMBER O’BRIEN, *University of California, San Diego*, REEM SARSOOR, *University of California, Irvine*, BOBBI VALDEZ, *Crafton Hills College*, BIANCA MABIDA, *Crafton Hills College*, LEIDY ARANGO-BALLOID, *Crafton Hills College*





– Breast cancer is now the most common form of cancer in the world. Although mammography is regularly recommended for screening, many women regard it as painful and/or embarrassing. This study examined the impact of the COVID-19 pandemic and lockdown on Internet discussion board posts concerning “cancer” and “mammogram” by comparing the number of posts made during 10 months (March 2020 through December 2020) compared with the pre-COVID-19 period of the prior year (March 2019 through December 2019). Data revealed a 24% decrease in these discussion posts ($p < .0001$). Qualitative content analysis of the posts revealed some of the competing motives and concerns expressed. Both the Andersen and Eisenhower models of decision making are used to explain this healthcare behavior.

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8:20-8:40 am (275)

A Rational Account of the Repulsion Effect. RAHUL BHUI and YANG XIANG, *Massachusetts Institute of Technology* – The attraction effect occurs when the presence of an inferior option (the decoy) increases the attractiveness of the option that dominates it (the target). Despite its prominence in behavioral science, recent evidence points to the puzzling existence of the opposite phenomenon: a repulsion effect. In this paper, we formally develop and experimentally test a normative account of the repulsion effect. This theory is based on the idea that the underlying values of options are uncertain and must be inferred from the available information. A low-value decoy can signal that the target is likely of lower value as well when both are thought to be generated by a similar process. We formalize this logic using a hierarchical Bayesian cognitive model which makes predictions about how the strength of the repulsion effect should vary with properties of the decision problem. Our theory can account for several observed phenomena linked to the repulsion effect across value-based and perceptual decision making, and we find some support in new experiments. Our results shed light on the key drivers of context-dependent judgment across multiple domains and sharpen our understanding of when decoys can be detrimental.

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8:40-9:00 am (276)

Illusory Truth Effect Only Emerges for Materials that Have Pre-Existing References in Semantic Memory. MIRI BESKEN and GIZEM FILIZ, *Bilkent University* – People typically produce higher truth judgments for repeated than novel information, named the illusory truth effect. The current study tested whether the illusory truth effect can be obtained with materials for which people lack pre-existing semantic knowledge. In a set of experiments, participants were presented with pseudowords and their category information in an initial study phase. Then, participants judged the truthfulness of fictitious statements that were either congruent or incongruent with the category information of these pseudowords. Illusory truth effect did not emerge when participants had no corresponding semantic references in their memory for repeated pseudowords (Experiment 1). The addition of a retrieval practice task for associating pseudowords with their categories produced higher truth ratings for repeated than

novel pseudowords. Moreover, participants produced higher truth ratings for congruent than incongruent information (Experiment 2). These findings were replicated with a 1-week interval between the study and truth-rating phase (Experiment 3). These results align with the referential theory (Unkelbach & Rom, 2017) and imply a role for recollection on judging truthfulness rather than familiarity.

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9:00-9:20 am (277)

Withdrawn

9:20-9:40 am (278)

A Continuous Transition from Decision to Action: Evidence from Electromyographic Measures in Decision-Making Tasks. MICHELE SCALTRITTI and REMO JOB, *Università degli Studi di Trento*, SIMONE SULPIZIO, *Università degli Studi di Milano-Bicocca* – Models of decision-making envisage motor-response implementation as a discrete stage that serially follows higher-level decisional processes. We investigated this assumption within lexical and object decision tasks by recording electromyographic (EMG) signal associated to the muscle responsible of the manual responses (i.e., button presses). Single trial EMG traces were used to partition reaction times (RTs) into a pre-motor component (the time elapsing from stimulus onset until the onset of the EMG burst) and a motor-time (the interval between the onset of the EMG burst and the button-press). In the lexical decision task, responses were slower for pseudowords compared to real words. Importantly, the effect was reliable even with respect to the purely motor component of the RTs. Additionally, the amplitude of the EMG burst was larger for words compared to pseudowords. Preliminary results from the object decision task show a similar pattern. The modulation of peripheral measures of response implementation as a function of stimulus type suggests that part of the decision process is still ongoing during response execution, and questions the notion of a serial transition from decision onto action.

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9:40-10:00 am (279)

Save the Best for First: First Attribute Heuristic in Consumer Choice. JOSEPH TEAL and PETKO KUSEV, *The University of Huddersfield* – We propose a novel decision-making mechanism (the First Attribute Heuristic [FAH]), where people’s preferences are determined by binary comparison on the first contextually available attribute. Accordingly, we argue that human decision-makers prefer the option with the dominant value on the first contextually available attribute. In two experiments, we explore the influence of FAH and the attribute chosen by the participants as more important (e.g., brightness or warranty) on their willingness to pay (WTP) for TVs A and B. We found that only when the attribute chosen as more important is also the first contextually available attribute, participants paid more money for the TV with dominant value on that attribute (experiment one). Moreover, in experiment two, we introduced a new task, where the first contextually available attribute





is nonnumerical (ethics of the TV manufacturer: ethical or unethical manufacturer), task irrelevant (the decision attributes are brightness and warranty), and with decision consequences (endorsing an ethical or unethical manufacturer). Accordingly, the results revealed that only FAH influenced participants' WTP judgements for TVs.

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Human Learning and Instruction II Sunday, 8:00-10:00 AM CST

8:00-8:20 am (280)

Bridging Cognitive and Educational Psychology Perspectives on the Self-Regulation of Learning. CRISTINA D. ZEPEDA, YEO-EUN KIM, and ANDREW C. BUTLER, *Washington University in St. Louis* – Understanding how people self-regulate their learning experiences has been at the forefront of many empirical and theoretical advances in both cognitive and educational psychology. Yet, these two fields have traditionally investigated this multifaceted aspect of learning using different approaches, which has resulted in scientific knowledge that is siloed in separate literatures. Bridging this divide is critical to facilitating innovative new research and creating comprehensive theories to explain the self-regulation of learning. In this review, we discuss how cognitive and educational psychology perspectives on self-regulation can complement and inform each other. Specifically, we compare and contrast the theoretical and methodological approaches of these two fields, identify the potential contributing factors that led to the divide between the fields, and discuss future directions and implications for integration across these disciplinary perspectives.

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8:20-8:40 am (281)

Designing Effective Video Learning: A Classroom Study of Adjunct Questions and Feedback in Video Learning Modules. EMMA H. GELLER, *University of California, San Diego* – The transition to remote instruction during the COVID-19 pandemic has raised many questions about effective video lecture design. The literature on text instruction supports the use of adjunct questions to improve learning, but it is less clear whether these results generalize to video lessons. Further, few studies have examined the effect of video-based adjunct questions in authentic educational settings. In fall 2020, we tested three different adjunct question interventions in a 10-week, remote course with 350 students. Each week, students watched three 30-minute video modules, and for each module they were randomly assigned to one of several experimental conditions in which we manipulated adjunct question type (multiple choice, open response), placement (beginning, interspersed, end), or feedback (no feedback, accuracy only, detailed explanations, targeted explanations). Students completed a practice quiz after each module, as well as weekly graded quizzes and three exams. This allowed us to evaluate adjunct questions across a variety of lecture topics, assessment types, and retention intervals, using both within- and

between-subjects analyses of each intervention. We also examined the moderating effects of prior knowledge.

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8:40-9:00 am (282)

The Effect of Lecture Video Speed on Immediate and Delayed Comprehension. DILLON H. MURPHY, ALAN CASTEL, KARA M. HOOVER, KARINA AGADZHANYAN, and JESSE C. KUEHN, *University of California, Los Angeles* – With online learning becoming more common, students are spending much of their time watching asynchronous lectures. In the current study, participants watched lecture videos at different speeds and we tested participants' immediate and delayed (1 week) comprehension of the material. Results revealed minimal costs incurred by increasing video speed from 1x to 1.5x or 2x speed, but performance declined at 2.5x speed compared to normal speed. We also compared learning outcomes after watching videos once at normal speed or twice at 2x speed and there was only an advantage for the group watching twice at 2x speed when the two study sessions were spaced in time. Thus, increasing the playback speed of videos (up to 2x) may be an efficient and efficacious study strategy, especially if students use the time saved for additional studying or rewatching the videos, but learners should space this additional studying.

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9:00-9:20 am (283)

Crossmodal Perceptual Learning in Learning a Tonal Language. XIN WANG and LUAN LI, *Macquarie University* – Some evidence shows that visual input can facilitate learning novel sound-to-meaning mappings that are crucial to learning a second language. However, the mechanisms by which visual information influences auditory learning are still unclear. We investigate to what extent visual input (i.e., training in one domain) can lead to effective learning in another domain (i.e., tonal categories in speech). We trained speakers (n=233) who had little exposure to a tonal language with Mandarin tones in four learning conditions (between subject): Auditory Only (AO) in which only auditory tones were given as input; Animated Contour (AC) in which moving visual pitch contours indicating the dynamic changes of tones were given in addition to auditory tones; Static Contour (SC) in which static visual pitch contours were given in addition to auditory tones; and Incongruent Contour (Control) in which mismatched pitch contours were given in addition to auditory tones. The immediate posttests only showed the advantage of AC over AO in learning tonal categories. The delayed tests showed the advantage of AC over AO, as well as SC over AO. These results suggest that providing salient common properties cross modalities gives the most benefits in learning new speech categories.

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9:20-9:40 am (284)

Evidence that (In)Attention Is 'Contagious' in Virtual Classrooms. NOAH D. FORRIN and SIMRANDEEP KALSI, *McMaster University*, FARIA SANA, *Athabasca University*, COLIN






M. MACLEOD, *University of Waterloo*, JOSEPH A. KIM, *McMaster University* – In online classrooms, students can observe the (in)attentive states of classmates who have their webcams on. We tested the hypothesis that visible (in)attentive states can spread across students—attention contagion—via informational social influence. For example, students who observe attentive classmates infer that the course content is important and invest more attentional resources. McMaster University students ($n = 60$) enrolled in an introductory psychology course watched a lecture video on upcoming course content. Research confederates were visible on webcam and behaved either attentively or inattentively. We obtained significant ($ps < .05$) evidence of attention contagion across several measures. In classrooms with attentive (vs. inattentive) confederates, students were more attentive, more motivated to learn, performed better on a lecture quiz, and perceived the lecture content as more important (consistent with our informational social influence account). Our results elucidate attentional dynamics in virtual classrooms in which students are visible, informing the development of online teaching practices and interventions. Students and instructors should be aware that (in)attentiveness can be highly contagious online.

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9:40-10:00 am (285)

Making Memories that Matter: Considering Motivated and Strategic Memory Processes. CHRISTOPHER R. MADAN , *University of Nottingham* – From our everyday activities, only some information and experiences will be remembered months, years, or decades later. In some cases, these are personally important or emotional experiences, such as moving to a new city or a wedding. Emotional and rewarding experiences stay with us much longer than the mundane. In other instances, information is effortfully memorised and carefully studied over the span of a semester, for recall on a final exam, but hopefully also retained for years to come. Mnemonics based on acronyms or bizarre images can be combined with scheduling-based strategies such as spacing and interleaving. Even then, the use of external aids—notes, books, and the Internet—can diminish the necessity of remembering. Here I present a framework to characterise these memories as being remembered due to either motivated or strategic memory processes. Both processes are involved in distinct sets of behavioural studies but have been seldom discussed within the same context and with respect to the functional purpose of memory.

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Cognitive and Motor Control of Performance II
Sunday, 8:00-9:40 AM CST

8:00-8:20 am (286)

Withdrawn

8:20-8:40 am (287)

Using Bayesian Modeling to Investigate Whether Variable Foreperiod Effects Systematically Change over Time Within

an Experiment. TIANFANG HAN and ROBERT W. PROCTOR, *Purdue University* – Responses are faster when a warning signal (S1) precedes an imperative stimulus (S2) by a foreperiod (foreperiod effect). When the foreperiod is variable, both the current and the previous foreperiods modulate reaction time. Los et al. (2014) proposed that the temporal relation between S1 and S2 on each trial is stored in a distinct memory trace, which along with earlier formed memory traces, leads to the variable foreperiod effects on subsequent trials. We modeled the data from three experiments using a Bayesian method to investigate whether the variable foreperiod effects systematically changed over time. For all three experiments, the model that included both trial- and block-level variability performed better than those not including both levels. However, only in Experiment 1 where the foreperiods were relatively long (400 ms and 1400 ms), were the parameters related to the systematic change of variable foreperiod effects significantly distinct from zero. In Experiments 2 (50 ms and 200 ms) and 3 (50 ms vs. 400 ms), the evidence was unclear based on an HDI + ROPE decision rule. These results suggest different causes of the variable foreperiod effects between short and long foreperiod scenarios.

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8:40-9:00 am (288)

Withdrawn

9:00-9:20 am (289)

Individual Variation in Top-Down Effects Is Domain Specific. MEGHAN CLAYARDS, NICOLE AMIR, and ROSS OTTO, *McGill University* – In recognizing speech, listeners combine both bottom-up (acoustic) and top-down (lexical) information. When listeners hear sounds varying between ‘eh’ and ‘ih’ they choose ‘eh’ more often for a vest-vist continuum and ‘ih’ more often for a desh-dish continuum, showing a top-down bias (Ganong effect). Some listeners have larger top-down effects than others across different tasks (Ishida, Samuel & Arai 2014). We asked if larger top-down effects are domain general, driven by a more automatic cognitive control style. We tested 74 participants on an auditory Ganong task and a colour analog (yellow-orange with biased objects, e.g. banana, carrot) and a cognitive control task (Dot Pattern Expectancy [DPX], equivalent to AX-CPT). Mixed effects models found a robust top-down bias for both Ganong tasks. Random slopes by participant were used to estimate individual differences (IDs) in top-down bias. Correlations showed no evidence for a relationship between these IDs across the visual and auditory Ganong tasks ($r < 0.01$) or between the Ganong and any of the DPX ID measures (AY-BX RT, PBI RT, PBI accuracy all < 0.15). Together these findings indicate that individual differences in top-down bias in speech are not domain general.

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9:20-9:40 am (290)

Being Flexible about the Future: Monitoring the Outcomes of (Un)Successfully Stopped and Switched Actions. CHRISTINA U. PFEUFFER, *Albert-Ludwigs-Universität Freiburg*,



LYNN HUESTEGGE, *Julius-Maximilians-Universität Würzburg*, ANDREA KIESEL, *Albert-Ludwigs-Universität Freiburg* – Our actions often yield predictable outcomes in our environment. Based on prior learning experiences we do not only select appropriate actions to achieve desired effects, but also anticipatorily move our eyes towards the future locations of our actions' effects. These anticipatory saccades reflect a proactive monitoring (i.e., cognitive control) process which prepares a subsequent comparison of expectation and reality. Here, we assessed how proactive effect monitoring is flexibly adapted to changing effect expectations when participants have to stop/switch responses in accordance with a stop/switch signal. Participants were more likely to successfully stop/switch a manual action when they had not yet anticipatorily saccaded towards that action's future effect. Moreover, participants were more likely to stop saccades or switch their direction towards a to-be-adapted action's effect after a successful versus unsuccessful stop/switch of the manual action. These findings demonstrate a strong interdependence between manual action selection and proactive effect monitoring.

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Perception and Action

Sunday, 8:00-9:40 AM CST

8:00-8:20 am (291)

Spatial Localization Within Auditory Verbal Imagery. TIMOTHY L. HUBBARD, *Arizona State University & Grand Canyon University*, SUSAN E. RUPPEL, *University of South Carolina Upstate* – Whether auditory imagery of spoken messages was spontaneously localized to the left ear or the right ear was measured. Building on work of Prete and colleagues, participants imaged a person spoke into their ear or that they spoke into an imaged person's ear. Valence of the message and sex of the imaged person varied. Participants were more likely to exhibit a right ear preference (i.e., the message was more likely to be imaged at the right ear) for good news, and there was a trend for a left ear preference for bad news; this pattern occurred regardless of whether (a) the imaged person was stationary and spoke into one ear, (b) the imaged person approached the participant and then spoke into one ear, or (c) the participant approached the imaged person and then spoke into one ear. Control conditions involving the imaged sound of a flute (high pitch) and tuba (low pitch) were included and exhibited a right ear preference. Measures of auditory imagery vividness and clarity, handedness, and preferred telephone ear did not correlate with ear preferences. Implications for cerebral lateralization in processing language, emotion, and auditory frequency, and for the inner voice/inner ear distinction in auditory imagery, are considered.

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8:20-8:40 am (292)

Comparing Partial Overlap Costs in Two- and Four-Choice Tasks: Evidence for a Heuristic Decision Bias. RICHARD E. HAZELTINE, *University of Iowa*, IRING KOCH,

Rheinisch-Westfälische Technische Hochschule Aachen University, DANIEL H. WEISSMAN, *University of Michigan* – Responses are usually slower when some stimulus or response features repeat from the previous trial and others alternate compared to when all features repeat or alternate. An influential view of such partial overlap costs holds that stimulus and response features are bound together in an episode. When one of these features appears on the next trial, the entire episode is retrieved, and costs are observed if the retrieved and current episodes do not match. Another view is that performance is partly guided by a heuristic decision bias. Here, repeated stimulus features signal repeated responses, and changed stimulus features signal changed responses. To distinguish these hypotheses, we compared partial overlap costs in a two-choice task to those in a four-choice task. With four choices, repeated stimulus features still signal repeated responses, but changed stimulus features no longer signal unique alternative responses. Consistent with signaling, the benefit of repeated stimulus features when the response repeated was similar for two- and four-choice tasks, but the benefit for changed stimulus features when the response changed was much smaller for the four-choice task. Thus, signaling may contribute to partial overlap costs in choice RT tasks.

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8:40-9:00 am (293)

Sequential Effects in Action Control: Partial Repetition Costs Index a Mixture of Binding and Signaling. DANIEL H. WEISSMAN and LAUREN D. GRANT, *University of Michigan*, IRING KOCH, *Rheinisch-Westfälische Technische Hochschule Aachen University*, ELIOT HAZELTINE, *University of Iowa* – Participants respond more slowly in two-choice tasks when either a previous stimulus feature or the previous response repeats in partial repetition trials than when both features repeat or both features alternate in complete repetition trials or complete alternation trials, respectively. Current views of action control posit that such partial repetition costs index the time to update a prior "binding" between a stimulus feature and the response. However, they may instead reflect the violation of a response expectation that forms because a decision-making heuristic interprets stimulus feature repetitions and alternations as "signals" to repeat or alternate the previous response. To distinguish between these hypotheses, we employed a four-choice task. Here, a stimulus feature repetition would still signal a response repetition, but a stimulus feature alternation would no longer signal a specific response. We mostly observed complete repetition advantages in the absence of complete alternation advantages. Further, partial repetition costs were smaller in the four-choice task than in an otherwise matched two-choice task. These findings suggest that a "signaling" heuristic makes a sizable contribution to partial repetition costs.

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9:00-9:20 am (294)

Walking the Right Way: Bias to Pass Approaching Pedestrians on the Right Side Increases with Group Size. MICHAEL K. MCBEATH, A. KOOP BILLS, and MATTHEW D. LANGLEY,





Arizona State University – This study examines American walking behavior and the bias to pass oncoming pedestrians on the right side. Past research confirms about 2/3 of adult American pedestrians favor walking on the right side of a centrally located inanimate object, in contrast to British pedestrians. We tested two principal hypotheses: H1: American pedestrians exhibit a right-side walking bias when passing each other, and H2: The magnitude of the right-side passing bias increases and correlates with group size. We recorded several hundred pedestrian encounters varying in group size in local parks and malls, and confirmed both hypotheses. Pedestrians significantly favor walking on the right sides of each other, and the bias significantly increases with group size, up to groups of about 5 people, where it asymptotes near 100%. We suggest that the right-side pedestrian bias is a prototypical example of a socially trained natural regularity in which individual biases can add when people interact in groups. This bias-additivity principle may have wide ranging generalizability relevant for both the design of locomotive spaces and for group dynamics in other more general socio-relational domains such as political affiliation and prejudice. That’s right!

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9:20-9:40 am (295)

How Individual and Situational Aspects Shape Sense of Agency. KATHARINA A. SCHWARZ, ANNIKA L. KLAFFEHN, and FELICITAS V. MUTH, *Julius-Maximilians-Universität Würzburg*, NICOLE HAUKE-FORMAN, *Friedrich-Alexander-Universität Erlangen-Nürnberg*, ROLAND PFISTER, *Julius-Maximilians-Universität Würzburg* – The sense of agency (SoA; i.e., the sense of control over one’s own actions and their consequences in the environment) is a crucial mental state for human beings and their functioning in society. It accompanies voluntary actions, motivates future action taking and is directly linked to feelings of responsibility as well as to feelings of regret over undesired action outcomes. Various factors have been shown to, at least somewhat, affect SoA formation, such as the number of available action choices or the temporal and identity predictability of action outcomes. However, agents vary in their SoA expressions, and so far we know next to nothing about the impact of individual traits on SoA. In the present high-powered study, we therefore take a look at how situational factors of actual control affect SoA formation in agents, which individual traits of the agents contribute to differences in SoA to which degree, and how situational and individual factors interact to eventually result in specific instances of the SoA spectrum. These results thus give us insight into when and why SoA expressions differ in specific situations by specific agents.

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Language and Semantics
Sunday, 8:00-9:40 AM CST

8:00-8:20 am (296)

Creating a Crossreferenced Multilinguistic Dataset to Investigate Semantic Priming. ERIN M. BUCHANAN,

Harrisburg University, KELLY CUCCOLO, *Alma College*, SAVANNAH C. LEWIS, *Ashland University*, PSYCHOLOGICAL SCIENCE ACCELERATOR – The Internet has changed the scope of modern psycholinguistics with the availability of large text corpora and the ease of data collection for experimental studies. Despite the increased publication of normed stimuli sets, very few datasets provide information across multiple languages, and the combination of available data usually results in only a handful of stimuli with complete information. In this presentation, we will demonstrate how to leverage sizable online corpora and computational tools to create a dataset appropriate for semantic priming with similarity statistics. We will illustrate how to create datasets with stimuli in 50-plus languages by using modeling techniques, rather than simple translation from English to the target language. The stimuli set and toolkit will be freely accessible for researchers to design new studies or answer computational hypotheses. Last, we will discuss the current progress of the Semantic Priming Across Many Languages (SPAML) project: a team science study investigating semantic priming in partnership with the Psychological Science Accelerator.

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8:20-8:40 am (297)

Iconic Structure Mapping Between Semantic Features and Phonology in American Sign Language (ASL). ZED SEHYR, BRENNAN P. TERHUNE-COTTER, LUCINDA O’GRADY FARNADY, and KAREN EMMOREY, *San Diego State University* – Holistic measures of sign iconicity (ratings) obscure the fact that only certain semantic features are depicted in the phonological form. To quantify and characterize the semantic features that participate in iconic structure mappings, we capitalized on the semantic feature production norms from McRae et al. (2005) to assess whether these features were iconically depicted in 513 translation-equivalent signs. From a total of 8,433 semantic features, 1,134 (13.5%) were identified as being depicted in the sign form (e.g., for the concept “elephant,” the semantic feature “has a trunk” is depicted, but “has four legs” is not). The most prominent depicted feature types were: visual form and surface (45%), function (29%), and encyclopedic (11%). The number of depicted features positively correlated with iconicity ratings. Additionally, iconic mappings favored both features that distinguish concepts from others and frequently produced features. The study clarifies the gradience in holistic iconicity ratings and systematicity in form-meaning mappings.

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8:40-9:00 am (298)

Motor Imagery as a Mechanism of Sensorimotor Simulation in Language Processing. PENNY M. PEXMAN, *University of Calgary*, STEPHAN F. DAHM, *University of Miami Information Technology* – There is substantial evidence to support grounded theories of semantic representation, however the mechanisms of simulation in those theories are underspecified. We tested whether motor imagery shares mechanisms with sensorimotor simulations engaged during semantic processing. In two studies we examined individual differences in motor imagery ability and tested their relationships to



sensorimotor effects in semantic processing. We identified and replicated an interaction indicating that as accuracy scores increased on a hand position imagery questionnaire, individuals responded more slowly to words with less sensorimotor information (low body-object interaction [BOI] words). Further, we observed an interaction wherein individuals with faster responses to foot stimuli on a mental body rotation task were faster to respond to foot action words than to nonfoot action words. The results suggest that specific types of motor imagery are related to specific sensorimotor effects and support the possibility that motor imagery shares mechanisms with sensorimotor simulation during semantic processing.

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9:00-9:20 am (299)

Representation, Not Selection, Drives Facilitation and Interference in Word Production. GARY OPPENHEIM, *Bangor University*, TANIA DHALI WAL, ANNA V. FISHER, and NAZBANOU NOZARI, *Carnegie Mellon University* – Contrasts between taxonomic interference and thematic (or “associative”) facilitation (and sometimes interference) have served as a recent battleground for a debate over competitive lexical selection in word production. The thematic effects are less consistent than the taxonomic, perhaps due to a lack of control in experiment designs. In two behavioral experiments, we orthogonally manipulated taxonomic and thematic associations, using (1) WordNet-based measures of hierarchical relationships to quantify taxonomic similarity and (2) corpus-based estimates of lexical co-occurrence to quantify thematic association. With such control, a blocked cyclic picture naming task elicited strong taxonomic interference and weak thematic facilitation, while a comprehension analogue demonstrated that the pattern was specific to production. A series of computational simulations show that such facilitation naturally emerges under the assumption that thematic associations provide additional retrieval cues. This effect can coexist with semantic interference, explaining both interference and facilitation regardless of the selection mechanism.

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9:20-9:40 am (300)

Not All Literally True Sentences Are Processed Faster than Metaphors: Using Word-Embedding Models to Quantify Conceptual Difficulty. CHRIS WESTBURY and PARASTOO HARATI, *University of Alberta* – Harati, Westbury, and Kiaee (2021) updated Kintsch’s (2000) computational model of metaphor comprehension. The model quantifies the conceptual similarity between two words (such as x and y in a “x is a y” sentence) by using the shared neighbors in a word-embedding model to adjust the word-embedding vectors of the two words according to a particular semantic interpretation. For example, in the metaphor “A lawyer is a shark,” the model uses the shared neighbors to adjust the meaning of the vectors for “lawyer” and “shark” to fit the interpretation of that metaphor. We demonstrate that when the adjusted vectors of words x and y are less similar, literalness decisions about literally-true “x is a y” sentences are made more slowly and literalness decisions about “x is a y” metaphorical sentences are made more quickly. More specifically

we show that literalness decisions about literally true statements are (unusually) slower than decisions to otherwise-matched metaphors when there is a large difference in their adjusted vectors. Literally true statements almost always have a very similar adjusted vectors, compared to many metaphors, which explains why most literally true statements do show an RT advantage in literalness decision.

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Discourse Processes

Sunday, 10:00 AM-12:00 PM CST

10:00-10:20 am (301)

Withdrawn

10:20-10:40 am (302)

The Role of Uncertainty During Reference Making. DELPHINE DAHAN, *University of Pennsylvania* – To make a definite reference, a speaker chooses an expression that maximizes the probability that their addressee understands them. In unscripted conversations, this study claims, speakers can also signal their degree of confidence; evidence of uncertainty causes their addressee to display evidence of understanding for the speaker to evaluate. Each pair of participants received an identical set of cards displaying a geometric configuration (tangram). One participant, the director, verbally instructed their partner, the matcher, to reproduce a series of pre-determined tangram sequences using their own cards. Each pair was assigned to one of two sets, a hard set or an easier set. Analyses showed that directors produced more descriptions, and hedged them more often, on a tangram’s first instance than on subsequent instances, and on tangrams from the hard set than from the easier set. In turn, matchers volunteered descriptions, thereby displaying their understanding, more often on a tangram’s first instance than subsequently, and more for tangrams from the hard set than from the easy set. Thus, conversational partners expand collaborative effort proportionally to the degree of belief that they will succeed in establishing reference.

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10:40-11:00 am (303)

Interpreting Negotiation Words In and Out of Context. ALLISON NGUYEN and JEAN E. FOX TREE, *University of California, Santa Cruz* – Words commonly used to hedge, like “kinda” and “I don’t know,” fall on one end of a continuum of certainty, with words like “absolutely” and “obviously” on the other. We propose that these words of negotiation also vary on the amount they suggest correction. These words were given in and out of context. Words of negotiation can be distinguished by the amounts of certainty (telling), correction, and sureness that they convey. The words group similarly when they are standalone and when they are couched in sentences. The choice of words signals how open communicators are to negotiating with addressees, with some words leaving room for negotiation and others not at all.

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11:00-11:20 am (304)

Validation of Text Concepts in Question Constructions. MURRAY SINGER, JACKIE SPEAR, and ARIAH J. SPENCE, *University of Manitoba* – Readers monitor text consistency by both passive and strategic processes of validation. However, validation is sometimes flawed, such as when readers overlook text discrepancies embedded in sentence presuppositions. In our paradigm, subjects encounter one of two concepts (wrench/hammer) early in text, and later read a target sentence such as “His uncle knew that he fixed the chair with a wrench.” We have reported greater reading time for inconsistent than consistent targets (the “consistency effect”) for both presupposed and focused discrepancies in declarative constructions (His uncle knew that...), but not interrogative ones (His uncle asked whether...). In new experiments: (1) the consistency effect appeared for declaratives but not questions within the same experiment, corroborating the interrogative finding; (2) subjects exhibited knowledge of the critical concept at the point of the target, indicating that they OVERLOOKED discrepancies; and (3) the consistency effect was absent even for interrogative clauses that were not sentence complements. These results may reflect the nonresolutive status of interrogative verbs (Ginzburg, 1995): Their use indicates that the questioner is agnostic about the true state of affairs.

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11:20-11:40 am (305)

Differential Impact of Perceptual and Semantic Induction Tasks on Verbal Information Search within a Text. NICOLAS VIBERT, DANIEL DARLES, and CHRISTINE ROS, *Centre de Recherches sur la Cognition et l'Apprentissage (CeRCA) & Centre National de la Recherche Scientifique (CNRS) at Université de Poitiers* – This experiment tested whether performing a presearch task involving either the spelling or the meaning of words modified the way adults and 11-year-old children subsequently scanned a text to find a single-word answer to a question. Contrary to expectations, performing the semantic induction task rather than the perceptual one did not accelerate adults' or children's information search within the text. However, eye movement recordings revealed that the perceptual and semantic inductions tasks had differential impacts on the way the words of the text were processed by both adults and children. The induction tasks had a stronger impact on children's than on adults' eye movements. Indeed, compared to the perceptual induction task, the semantic task reduced the average duration of children's gazes, which suggests that the semantic induction task facilitated word processing. When the text included some question-relevant distracting information, the semantic induction task led in addition to a decrease of the number of gazes needed by children to find the answer. Fostering the semantic processing of words may help children find the answer to a question in a text when the text includes semantically relevant distracting information.

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11:40-12:00 pm (306)

Adults Have Trouble Answering Questions about Another Person's False and True Beliefs. DANIEL M. BERNSTEIN, *Kwantlen Polytechnic University*, DANIEL G. DERKSEN, *Simon Fraser University*, ANDRE ASSFALG, *Albert-Ludwigs-Universität Freiburg*, ANGELA GIESBRECHT, *Trinity Western University*, DEVINDER KHERA, *Kwantlen Polytechnic University* – In the sandbox task, a character, Sally, puts an object in a sandbox and leaves. While Sally is gone, the object is moved within the sandbox. Participants judge where Sally will look for the object when she returns (false belief trials) or judge where Sally put the object originally (memory trials). Bias is measured continuously as the distance away from the correct location toward the incorrect location. Adults' small but consistent bias in false belief trials exceeds their bias in memory trials. In true-belief trials, Sally watches the object move. As in false-belief trials, participants judge where Sally will look for the object. In this seemingly trivial task, children show more bias as their understanding of false beliefs improves. This true-belief bias declines with age in older childhood. Our results show that this true-belief bias persists into adulthood. In six experiments (N=440), we found a large and consistent true-belief bias in adults. These data support Rakoczy and colleagues' (2020) claim that the trivial nature of true-belief trials confuses older children and, by extension in our data, adults. Vignettes should be modified to better reflect mature perspective-taking abilities.

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Working Memory II

Sunday, 10:20 AM-12:00 PM CST

10:20-10:40 am (307)

Short-Term Memory for Patterns in Time and for Nonsense Sentences Predicts Learning of Foreign Words. ELISABET SERVICE, ERIN DEBORBA, MARIA DE LOS ANGELES LOPEZ RICOTE, and MELIHA HORZUM, *McMaster University* – Non-word repetition and digit span forwards have been associated with vocabulary acquisition in first and second language. These tasks are thought to depend on the phonological loop component of working memory. We investigated whether domain-general short-term memory (STM) for patterns in time supports verbal immediate recall performance. Participants tapped temporal sequences of short and long beeps and repeated nonsense sentences sounding like their native language or an unfamiliar language. They also memorized familiar-word/foreign-word pairs. Word learning was directly predicted by nonsense sentence repetition accuracy. Prediction from temporal pattern tapping was mediated by performance on the repetition measure. We propose that STM for temporal patterns is a component skill that supports the prosodic profile of phonological loop representations and indirectly STM for phoneme order and long-term language acquisition.

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10:40-11:00 am (308)

Lexico-Syntactic Statistics Affect Item and Order Memory in Immediate Serial Recall. STEVEN SCHWERING, CASSANDRA JACOBS, and MARYELLEN C. MACDONALD, *University of Wisconsin-Madison* – Some models of verbal working memory (VWM) argue that people track part-of-speech when remembering sentence-like lists. In natural language, verb biases impact language comprehension and production, including dative sentences like “The sad baker GAVE/*SLEPT the loud boy some bread.” If VWM is supported by language comprehension/production, verb biases should moderate recall of dative-like lists. Typical dative verbs (gave), typical nouns (seat), and typical intransitive verbs (slept) were matched in length, frequency, contextual diversity, and concreteness. Experiment 1: Participants better recalled dative-like lists with typical dative verbs (gave) vs. the same list with control nouns (seat) in verb position (sad-baker-GAVE/SEAT-loud-fish-paper). Experiment 2: Participants better recalled noun arguments of sentence-like lists with good dative verbs (gave) vs. the same list with intransitive verbs (slept). We demonstrate that people’s long-term knowledge of the lexico-syntactic patterns of word use affect VWM performance. Results support integration between item and order representations in VWM, as predicted by strongly emergent theories of VWM.

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11:00-11:20 am (309)

The Mutual Interplay Between Cognitive Offloading and Secondary Task Performance. SANDRA GRINSCHGL, *University of Graz*, FRANK PAPPENMEIER, *University of Tübingen*, HAUKE S. MEYERHOFF, *Stiftung Medien in der Bildung (SbR)* – Individuals offload (i.e., externalize) cognitive processes into technical tools, especially when the demands of a task are high. In return, cognitive offloading improves task performance. While previous research focused on single-task setups, we used a dual-task approach to investigate both mechanisms. In our preregistered study, all participants (N=172) performed the Pattern Copy Task—a highly demanding working memory task which allows for offloading at various degrees. We manipulated the temporal costs associated with offloading behavior. In addition, we manipulated the need to process a secondary task by asking half of the participants to perform a concurrent n-back task (the other half ignored it). Processing the unrelated secondary task as well as reducing the temporal costs of offloading increased offloading behavior. Further, increased offloading behavior in the condition with lower temporal costs came along with more accurate performance in the n-back task. Thus, our results suggest an interplay: Processing a secondary task increases the need for offloading while—at the same time—cognitive offloading releases internal resources that can be devoted to other, concurrent tasks for improving performance.

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11:20-11:40 am (310)

Impact of Memory Load on Processing Diminishes Rapidly During Retention in a Complex Span Paradigm. CANDICE C. MOREY and TANYA N. JOSEPH, *Cardiff University* – Complex working memory span tasks, in which simple decisions are imposed between presentations of memory items, regularly yield lower spans than simpler memory tasks. However, it is less clear how reconfiguring and maintaining various amounts of information affects decision speeds. We introduced preliminary “lead-in” decisions and post-encoding “lead-out” decisions to isolate potential influences of reconfiguration and maintenance on decision speeds. Compared with lead-in choice responses, the decision following the first memory item slowed substantially. As the list accumulated, decision responses slowed even more. But after presentation of the list was complete, decision responses sped rapidly: within a few seconds, decisions were at least as fast as when remembering one item. These patterns appeared consistently regardless of differences in list length (4, 5, 6, or 7 to-be-remembered items) and response mode (spoken or selection via mouse). This pattern of findings is inconsistent with the idea that merely holding information in mind conflicts with attention-demanding decision tasks. Instead, it is likely that reconfiguring memory items for responding is the source of conflict between memory and processing in complex span tasks.

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11:40-12:00 pm (311)

Individual Differences in Learning Monitoring Ability Are Not Related to Working Memory Capacity. ALESSANDRA SOUZA, *University of Porto*, JULIA KRASNOFF, *University of Zurich* – Learning monitoring is essential to efficiently adjust study behavior. To date, it is unknown whether it constitutes an ability that varies across individuals and whether it is constrained by a limited cognitive resource such as working memory capacity. Across two experiments (N=102 and N=132), participants completed several learning tasks—spanning verbal and visual domains—while providing judgments of learning (JOLs) after each study item (item JOL) and at the end of the learning phase (global JOLs). Participants also completed three working memory tasks. Confirmatory factor analysis showed that item and global JOLs formed two separate factors reflecting reliable individual differences in global and item-level monitoring accuracy. Although working memory capacity was associated with learning performance, it did not predict the accuracy of item JOLs. For global JOLs, negative correlations with working memory capacity were observed in some instances, reflecting the tendency for high-capacity people to underestimate their learning. In sum, learning monitoring is one facet of metacognition in which people reliably differ. This ability, however, does not seem constrained by immediate memory capacity limitations.

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False Memory

Sunday, 10:20 AM-12:00 PM CST

10:20-10:40 am (312)

Repetition Does Not Increase Belief in Bizarre, Health-Related Headlines. RAUNAK M. PILLAI and LISA K. FAZIO, *Vanderbilt University* – Repetition increases belief in a variety of true and false statements such as general trivia, political news headlines, and interpersonal rumors. In fact, current theories do not predict differences in the size of the effect across topics. In two studies, we find that this illusory truth effect does not occur for bizarre, health-related headlines (e.g., “Third cat tests positive for bubonic plague in Wyoming”), marking an unexplained limit to the effect. In Experiment 1, subjects received texts with true and false health headlines over 15 days, then rated the truth of each claim. Repetition did increase belief, but the increase was very small (one-fifth the effect size with trivia). In Experiment 2, subjects rated new and repeated claims on one of three topics (trivia, politics, health) in a single session. Repetition increased belief in trivia and political news, but not health claims, despite similar initial belief. We hypothesize that the health claims prompt deliberation (due to their bizarreness or self-relevance), reducing reliance on repetition-induced cues that typically affect truth judgments. A planned experiment will test this account by examining if the illusory truth effect reemerges under a time limit and working memory load.

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10:40-11:00 am (313)

Creating False Rewarding Memories: How It Biases Decision-Making. JIANQIN WANG, *Fudan University*, HENRY OTGAAR, *Maastricht University*, MARK L. HOWE, *City, University of London*, YICHUN LIU, *Fudan University* – When memories of past rewarding experiences are distorted, would relevant decision-making be impacted? Recent research has demonstrated the important role of episodic memory in reinforcement decision-making. However, very few have examined the role of false memory in decision-making. The current study combined the pictorial Deese-Roediger/McDermott (DRM) false memory paradigm with reward learning, where participants learned that items from some DRM lists gained reward (i.e., money) and items from other lists led to no reward. Later, participants’ memories and decision-making preferences were tested. With three experiments, we successfully “implanted” memory episodes of rewarding experiences that participants falsely remembered seeing a lure item bring them reward (Experiment 1). Such false memories led participants to prefer the lure items to win money in a follow-up decision-making task and the more false memories they had, the higher preferences for the lure items (Experiment 2). Finally, results were replicated with or without a memory test before the decision-making task, suggesting that the impact of false memory on decision-making was not cued by a memory test.

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11:00-11:20 am (314)

Assessing the Effect of Repeated Warnings on the Misinformation Effect in Mock Eyewitnesses. JESSICA M. KARANIAN and MADDISON MELLO, *Fairfield University*, MCKINZEY TORRANCE, ELIZABETH RACE, and AYANNA THOMAS ✉, *Tufts University* – Exposure to misinformation can distort future memory reports. In a recent study, we demonstrated that warning mock eyewitnesses about the threat of misinformation before (prewarning) or after (postwarning) exposure to it protected memory from misinformation; however, neither warning eliminated the misinformation effect. In the present study, we assess whether repeated warnings (i.e., prewarning and postwarning) would further protect memory from misinformation. Mock eyewitnesses watched a crime video, completed an interview about the crime, listened to a narrative of the crime with some misinformation, and then completed the interview again. Participants were randomly assigned to receive either no warning, prewarning, postwarning, or repeated warnings about the reliability of the narrative. Preliminary data from an online sample suggest that warnings (prewarning, postwarning, repeated warning) reduced the misinformation effect, relative to unwarned participants; however, there is no evidence to suggest that there is an additional benefit of the repeated warning.

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11:20-11:40 am (315)

Effects of Associative Inference on People’s Susceptibility to Misinformation. AIPING XIONG, SIAN LEE, HAESEUNG SEO, and DONGWON LEE, *The Pennsylvania State University* – Associative inference is an adaptive process that allows people to link together related information acquired to make novel connections. We report three online experiments investigating effects of associative inference on people’s susceptibility to fake news, and whether those effects are impacted by individuals’ cognitive ability and the misinformation presentation. In each experiment, we examined participants’ recognition and perceived accuracy of snippets of news in tweet format across two phases. In Phase 1, participants viewed real news only. In Phase 2, participants viewed both real and fake news. Critically, we varied whether fake news at Phase 2 was inferred from, associated with, or irrelevant to the corresponding real-news pairs at Phase 1. Participants were more susceptible to fake news with associative inference for both measures regardless of their cognitive ability level. When the associative-inference triad was presented as hashtags embedded in the tweets, the obtained effect was only evident for participants of high cognitive-ability level. Altogether, our results provide strong evidence for associative inference (i.e., constructive processes of memory) as a basis for people’s susceptibility to misinformation.

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11:40-12:00 pm (316)

Susceptibility to Different False Memory Tasks with Age.

ALEE L DEVITT, *University of Waikato*, JEFFERY L. FOSTER, *Western Sydney University* – As we get older, we become more vulnerable to a range of false memories. However, recent work suggests that there is no false memory trait; younger adults who are susceptible to one type of false memory are not necessarily susceptible to other types of memory errors. We know little about how the relationship between different false memories changes across the lifespan. In the current study, we examine the links between different types of false memories in an online sample of younger and older adults. To elicit false memories, we used three different tasks: a misinformation task, a memory conjunction task, and the DRM paradigm. Results showed no relationship between different types of false memories for younger adults, replicating prior findings. Older adults similarly exhibited no relationship between different types of false memories. These results demonstrate that we maintain individual differences in susceptibility to different types of false memories even as we age, and pave the way toward understanding and preventing memory distortions in older age.

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Visual Perception II Sunday, 10:00-11:40 AM CST

10:00-10:20 am (317)

Humanlike Color Categories Emerge Naturally in a Deep Neural Network.

SEBASTIAAN MATHÔT, *University of Groningen* – Visual working memory is biased by color categories, such that memories of reddish colors are biased towards prototypical red. A fundamental question is whether such category biases result purely from top-down feedback (e.g., from language or long-term memory) or whether they already emerge during the initial feedforward sweep of perception. To investigate this, I modified a deep feedforward convolutional neural network (VGG19), originally trained for image classification, and retrained it for a color-reproduction task. Remarkably, the model's responses were biased towards color-category prototypes, just as those of human participants on a similar task. (Categories were determined independently by human participants and never explicitly given to the model.) Analysis of the model's activation showed that in early layers, just as in human visual cortex, color categories clustered together in representational space. Strikingly, in deeper layers, color categories were “anti-clustered,” that is, they were spread out across representational space. Taken together, these results suggests that color categories can emerge purely from the statistics of visual input and can already shape the initial feedforward sweep of visual perception.

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10:20-10:40 am (318)

Seeing the Pattern of One's Own Ocular Dominance Columns in Primary Visual Cortex (Visual Cortical Area V1).

CHARLES Q. WU, *Perception and Cognition Research* – I first describe a procedure to see a weblike pattern in one's entoptic vision and then attempt to relate the phenomenon to its underlying neural substrate. Under high illumination (e.g., 10k lux), with closed eyes, one normally sees a reddish visual field. By alternately shadowing the two eyes, one will see a dynamic traveling-wave pattern: Some reddish patches (from the unshadowed eye) and some whitish-cyan patches (from the shadowed eye) “attacking” each other; after a few alternations, one will see a web-like pattern with white thin winding lines—a pattern illustrated by Purkinje as Figure 2 in his entoptic images. Since the above procedure involves competition between two colors (incurred from the two retinae) in the whole visual field, we can refer to it as the “whole-field binocular rivalry”. As the observed pattern is created by the two eyes' neural activities impacting each other, it must occur at a monocular level (where the two eyes' neural activities are independently maintained) within the visual system. Mapping onto a known feature of the thalamic recipient layer (L4) in V1—namely, its tangential layout of ocular dominance columns (ODCs)—I assert that the seen pattern directly corresponds to the ODC pattern there.

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10:40-11:00 am (319)

Adaptive Comparisons Enhance Perceptual Learning.

PHILIP J. KELLMAN, VICTORIA JACOBY, and CHRISTINE MASSEY, *University of California, Los Angeles* – Between-category comparisons have been shown to enhance perceptual learning in complex domains. We tested an adaptive approach to comparisons that used learner performance to target confusions in a face learning paradigm. In Experiment 1, one condition consisted of single face classification trials. In the other condition, an adaptively-triggered comparison (ATC) trial was generated whenever a participant repeatedly confused two face categories. Comparison trials involved discrimination of simultaneously presented exemplars from the two face categories. In Experiment 2, an ATC condition was compared to a condition using nonadaptive comparisons: participants received comparison trials containing randomly chosen faces intermixed with ordinary trials. All participants learned to accuracy and speed criteria, and completed an immediate and 1-week delayed posttest. Results of both experiments showed greater learning efficiency—posttest accuracy divided by number of trials invested—in ATC conditions. All conditions showed transfer to novel exemplars of learned face categories. These results indicate that using learner performance to determine the contents and timing of comparisons can enhance perceptual category learning.

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11:00-11:20 am (320)

Withdrawn

11:20-11:40 am (321)

Robust and Reliable Implicit Categorization of Food Information at the Individual Level through EEG Frequency Tagging. ZHICHENG LIN and XUEZHEN XIAO, *The Chinese University of Hong Kong, Shenzhen* – How food tastiness and healthfulness might be processed implicitly remains largely unknown. Moreover, a reliable measure of food information processing remains elusive. Here, 42 participants took part in an EEG fast period visual stimulation session, where task-irrelevant nonfood images appeared sequentially at 6 Hz, with every fifth image an odd-ball food image from one of four categories (i.e., crossing of healthfulness and tastiness). The task was to monitor changes of central letters either in color or in color and letter conjunction (i.e., low vs. high perceptual load). Control stimuli were created by diffeomorphic transformation. The identical EEG session was repeated three times weeks apart. We found that 1) the signal-to-noise ratio of food oddballs was much higher than control oddballs; 2) the effect manifested at the individual level for all participants and was highly reliable; 3) the effect was not modulated by perceptual load or food tastiness, but might be higher for low (vs. high) healthfulness pictures. These results demonstrated robust and reliable implicit categorization of food information at the individual level, with the effect not modulated by perceptual load or tastiness (but might be by healthfulness).

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Mental Structures and Processes Sunday, 10:00-11:40 AM CST

10:00-10:20 am (322)

What Is Intentional Binding Measuring? LAURA SAAD, PERNILLE HEMMER, and JULIEN MUSOLINO, *Rutgers University* – Intentional binding (IB) is standardly regarded as an implicit measure of the sense of agency. We evaluated two alternative explanations for results from a publicly available IB experiment (Weller et al., 2020): sequential dependencies and regression. Aggregate results across three experimental conditions revealed overestimation for two of the time intervals and underestimation for the third one, even after controlling for sequential dependencies. We then used summary statistics from the data as parameters in a simple Bayesian model of memory. Model simulations across each experimental condition reproduced the behavioral data for the two longer time intervals but slightly underestimated the overestimation at the shortest time interval. We ruled out IB since the hallmark is underestimation and propose a boundary effect as an explanation. In sum, the results from this dataset can be accounted for as manifestations of memory (i.e., regression to the mean) with no appeal to mechanisms related to agency.

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10:20-10:40 am (323)

Is the Mind a Network? Maps, Vehicles, and Skyhooks in Cognitive Network Science. YOED N. KENETT and YOED N. KENETT, *Technion – Israel Institute of Technology*, THOMAS T. HILLS, *University of Warwick* – Cognitive researchers often carve cognition up into structures and processes. Cognitive processes operate on structures, like vehicles driving over a map. Language alongside semantic and episodic memory are proposed to have structure, as are perceptual systems. Over these structures, processes operate to construct memory and solve problems by retrieving and manipulating information. Network science offers an approach to representing cognitive structures and has made tremendous inroads into understanding the nature of cognitive structure and process. But is the mind a network? If so, what kind? Here, we will review the main metaphors, assumptions, and pitfalls prevalent in cognitive network science, highlight the need for new metaphors that better capture the mind, and present open questions in studying the mind as a network. We will illustrate the usefulness of the mind as a network metaphor but also argue that it is an incomplete metaphor.

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10:40-11:00 am (324)

Recent Experiences Shift Concept Knowledge. ALEXA L. TOMPARY and SHARON L. THOMPSON-SCHILL, *University of Pennsylvania* – Decades of research has shown that recent experience dynamically influences conceptual processing, but the manner and extent of this influence remains underspecified. Our exploration of this question is guided by a framework which has long treated episodic memory retrieval as a reconstruction of different information sources but has not been adopted to query how concept knowledge might be similarly reconstructed. Here, we ask how recent experiences alter the boundaries and central tendencies of color concepts. Fifty participants viewed 400 dots that either ranged from red to orange or red to pink and judged whether each was red. Before and after this training phase, they used a color wheel to identify canonical colors like “typical red.” First, when the frequency of redder dots decreased midway through training, participants judged more orange and pink dots as red, replicating prior work. Second, responses for “typical red” changed after training: The red-pink group selected shades of red closer to pink, and the red-orange group selected shades closer to orange. This suggests that recent experiences both expand the boundary of red and shift its central tendency, providing evidence for concept knowledge as a reconstructive process.

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11:00-11:20 am (325)

Evidence for Shared Knowledge and Access Processes across Comprehension and Production: Literacy Enhances Spoken Word Comprehension and Word Production. FLORIAN HINTZ, MEREL C. WOLF, CAROLINE F. ROWLAND, and ANTJE A. MEYER, *Max Planck Institute for Psycholinguistics* – Extensive exposure to written text has vast consequences on one’s ability to use language. Recent research showed that the positive effects of enhanced literacy extended to spoken language comprehension.





Theories of language processing assume that comprehension and production “are facets of a unitary skill.” On such an account, the effects of literacy should transfer and also enhance language production skills. We tested this hypothesis by re-analyzing a large publicly available dataset. We used a latent-variable approach for operationalizing “literacy,” “spoken word comprehension,” “word production,” and “processing speed.” Literacy explained substantial portions of variance in spoken word comprehension and word production factors, even after accounting for processing speed and IQ. Experience with written text can thus enhance language use in the spoken domain, including word comprehension and word production. Our data support the notion that word comprehension and word production draw on shared linguistic knowledge and access processes.

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11:20-11:40 am (326)

Item-General Components of Counting Speed-Up. JAMIE CAMPBELL, YALIN CHEN, and BETH LANGER, *University of Saskatchewan* – Learning of alphabet-arithmetic (e.g., $B+4=F$) may be a proxy for learning processes of genuine addition ($2+4=6$). We tracked acquisition of alphabet-arithmetic during early learning across six practice blocks with 36 problems per block, replacing 12 old items with 12 new items in each of Blocks 3 and 5. Transfer of procedural learning expressed in RT speed-up suggests that item-general mechanisms facilitated initiation of a counting task set but did not facilitate item-general counting per se. Speed up for letter sequences common to multiple problems produces transfer of speed-up to items sharing these specific solution components (e.g., solving $B+4$ and $C+3$ both traverse $C-E-F$), but there was no evidence that speed-up involved an abstracted counting procedure that applied generally across problems.

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Reasoning and Problem Solving Sunday, 10:20 AM-12:00 PM CST

10:20-10:40 am (327)

Cognitive Underpinnings of Individual Differences in Complex Problem Solving. ALEXANDER P. BURGOYNE and RANDALL W. ENGLE, *Georgia Institute of Technology* – The ability to solve novel problems and adapt to changing environmental demands is critical to effectively navigate our dynamic world. And yet, the cognitive underpinnings of individual differences in problem solving remain poorly understood. Historically, the study of problem solving has been essentialized to pattern recognition, often taking the form of figural matrices or series completion items. The present work includes and extends these traditional paradigms by investigating individual differences in performance on the complex problem solving paradigm MicroDYN. In MicroDYN, participants must explore relations between inputs and outputs in a novel problem solving environment to 1) build an understanding of the causal relations between parameters in a complex system and 2) leverage this understanding to attain a desired goal state by manipulating the system’s

inputs. This large-scale study assesses the relative contribution of fluid intelligence, attention control, working memory capacity, and other abilities to complex problem solving.

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10:40-11:00 am (328)

Bullshit Receptivity Is Associated with Metacognitive Inaccuracy in Creative Problem Solving. TIM GEORGE, *Union College*, MARTA K. MIELICKI, *Kent State University* – People are often inaccurate in their predictions of performance on a variety of cognitive tasks. We tested whether receptivity to bullshit—the tendency to perceive meaningless statements as profound—would relate to the accuracy of metacognitive judgments on several problem-solving tasks. Individuals who were highly receptive to bullshit were less accurate in their predictions of performance on creative problem-solving tasks, but this effect was less pronounced for verbal analogy and recall tasks. Further, individuals with high BS receptivity were less able to discriminate between solvable and unsolvable problems when making metacognitive judgments. These findings support the possibility that the tendency to perceive semantic connections where none exist, as indicated by high bullshit receptivity, may lead to inaccurate predictions of performance on tasks that require noticing and utilizing distant semantic connections.

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11:00-11:20 am (329)

Neurodualism: People Assume that the Brain Affects the Mind More than the Mind Affects the Brain. JUSSI VALTONEN, *University of Helsinki*, WOO-KYOUNG AHN, *Yale University*, ANDREI CIMPIAN, *New York University* – People commonly think of the mind and the brain as distinct entities that interact, a view known as dualism. At the same time, the public widely acknowledges that science attributes mental phenomena to the workings of a material brain. How do people reconcile these conflicting perspectives? We propose that people integrate beliefs about the brain extrapolated from the wider culture into intuitive theories, but in forms that are compatible with dualism. The end result is a hybrid intuitive theory positing that the brain’s power over the mind is greater than that of the mind over the brain—an intuitive theory we term neurodualism. Five studies involving both thought experiments and naturalistic scenarios provided evidence of neurodualism among laypeople and, to some extent, practicing psychotherapists. For example, lay participants reported that “a change in a person’s brain” is accompanied by “a change in the person’s mind” more often than vice versa. Similarly, when asked to imagine that “future scientists were able to alter exactly 25% of a person’s brain,” participants reported larger changes in the person’s mind than in the opposite direction. The results provide insights into lay intuitive theories of the mind–brain relation.

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11:20-11:40 am (330)

Working Memory, Insight, and Representational Change.

SERGEI KOROVKIN, *Yaroslavl State University* – There is much data about the relationship between insight and working memory (WM; Ash & Wiley, 2006; Chuderski & Jastrzębski, 2017) and about the dynamics of their interaction (Lv, 2015; Korovkin et al., 2018) and solution stages that distinguish insight and non-insight problems. The most plausible stages are an impasse and representational change (RC). We investigated the contribution of WM loading (WML) to the RC. We assumed that high WML is required for the RC, but not for creative hypotheses production. We used three problem types: hypotheses production (no RC), simple RC, and complex RC. We suggested that a simple RC would require less WML than a complex RC. We loaded the WM with an additional task at the same time of problem solving. We measured the WML through the success of additional task: the higher the response time for the task, the more WM load. As a result: WML was the same throughout the hypotheses production; problems with simple and complex RC had an increase in response time at the end of problems (i.e., close to the answer). We interpret the result in favor of the need for WM for RC. We did not get differences between the end of simple and complex problems, which requires further study. Supported by RFBR 20-013-00801-a.

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11:40-12:00 pm (331)

Withdrawn



Poster Sessions

Session I: Friday, November 5, 12-1 PM CDT (posters 1001-1469)

Session II: Saturday, November 6, 12-1 PM CDT (posters 2001-2499)



Poster Session I

Friday

Poster authors will be present for Q&A between 12:00 and 1:00 PM CDT, with posters available for viewing for 3 months following the conference.

12:00-1:00 pm (1001)

Attentional Capture During Smooth Pursuit Eye Movements. MORITZ STOLTE and ULRICH ANSORGE, *University of Vienna* – Moving distractors alter smooth pursuit through vector averaging or local motion inhibition, while interference from stationary distractors is less understood and may depend on selection based on target-distractor similarity. We investigated distractor interference when tracking a horizontally moving target. In four experiments, distractor motion (up, down, static), onset location (behind, in front, at target location), duration (200ms, 500ms), and target-distractor color contingency (match, mismatch) varied. We found moving distractors reduced horizontal pursuit velocity during steady state tracking, especially when distractors onset behind the target. Static distractors additionally resulted in increased velocity for distractors in front of the target, especially for the longer distractor duration. Making distractor location task-relevant resulted in reduced velocity across all three distractor locations, which was preceded by a velocity increase when the distractor was in front of the target. Target-distractor color contingency had no effect on smooth pursuit. Together, results reveal deviations of smooth pursuit toward the distractor location even when distractors were stationary, task irrelevant and dissimilar to the target.

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12:00-1:00 pm (1002)

Costs and Benefits of Orienting to Subliminal Cues. SEEMA PRASAD and RAMESH H. MISHRA, *University of Hyderabad* – It has been long known that it is possible to orient our attention to subliminal information. But it is not known whether such orienting is mediated by cue-related facilitation, interference, or both. Using a novel methodology of creating a neutral condition, we examined the costs and benefits of subliminal attention in two experiments ($n=30$ each). On each trial, an abrupt onset peripheral cue appeared in one of four boxes, followed by a target letter (E or H). The task was to identify the letter. The target could appear at the cued location (valid) or in one of the other three locations (invalid). There were also no-cue trials. On all trials, a warning signal simultaneous with the cue onset was presented to equate the alerting component across cue conditions. Results showed faster responses on valid trials compared to no-cue trials (benefit, $p < 0.001$). No difference was seen between invalid and no-cue trials (cost, $p = 0.671$). The same results were seen in Experiment 2, when the participants were told not to attend to two of the boxes because the target would never appear there. These results suggest that subliminal peripheral cues that are not informative of the target location are ignored and do not capture attention.

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12:00-1:00 pm (1003)

Exploring the Conditions that Engage Auditory Suppression. HEATHER R. DALY and MARK PITT, *The Ohio State University* – Suppression has been proposed as a mechanism underlying selective attention. We previously found statistical learning-induced auditory suppression using a search task where one distractor sound occurred more (70%) than another (30%) across trials, and results showed reduced interference from the highly probable distractor. We assessed the strength and generalizability of this result by implementing the same distractor regularities in repetition detection and n-back tasks but did not find evidence of suppression. A key difference across these paradigms was the number of nontarget voices in the scene that must be ignored, prompting us to explore whether suppression is engaged primarily when additional distracting voices (sounds) must be filtered. As an inhibitory mechanism, suppression may only emerge when there is a need to attenuate multiple sources that interfere with perception of the target. We discuss results from an additional experiment where the number of nontarget voices was systematically increased to test this hypothesis. Together, these experiments elucidate how auditory suppression is only engaged in more complex listening situations where the listener needs to filter out multiple sounds in order to focus on the target.

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12:00-1:00 pm (1004)

Visual Saliency Maps Based on V1 Blob Cells. RACHEL F. HEATON, SIMONA L. BUETTI, ALEJANDRO LLERAS, and JOHN E. HUMMEL, *University of Illinois* – Saliency maps of images are useful for predicting the allocation of visual attention and eye movements. We present a new type of saliency map that identifies areas of visual interest based on continuous fields of color in the visual field (i.e., surfaces). Unlike most models of saliency, the resulting representations do not emphasize image contrast (e.g., edges or surface boundaries) but rather mark continuous surfaces as regions of interest. The operations that compute these saliency values are modeled on blob cells in visual area V1. We present simulations comparing the performance of the resulting saliency maps to competing models as an account of human eye movement data.

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12:00-1:00 pm (1005)

Absence of Value-Driven Attentional Capture at Task-Irrelevant Locations. XIAOJIN MA and RICHARD A. ABRAMS, *Washington University in St. Louis* – Attention tends to be attracted to visual features previously associated with reward. To date, all existing studies presented the value-associated stimulus at or near a potential target location, making it nevertheless meaningful to inspect. Our study examined whether the attentional priority of a value-associated stimulus depends on its location-wise task relevance. After value training we conducted a rapid serial visual presentation (RSVP) task in which a specified colored target appeared in the centrally presented stream and a distractor appeared in the periphery. At a peripheral location that could never contain the target, the value-associated color did not capture attention. In contrast, at the same eccentricity, a distractor





in a goal-matching color did capture attention. The results show that value-associated stimuli do not receive attentional priority at task-irrelevant locations, in contrast to other types of stimuli that capture attention.

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12:00-1:00 pm (1006)

Can Abrupt Onsets Be Suppressed Like Color Singletons?

OWEN J. ADAMS, *Binghamton University SUNY*, ERIC RUTH-RUFF, *University of New Mexico*, NICHOLAS GASPELIN, *Binghamton University SUNY* – There is now considerable evidence that color singletons can be suppressed to prevent visual distraction, while abrupt onsets cannot. However, previous studies have almost exclusively assessed onset capture and singleton suppression in separate paradigms. These paradigms also introduce numerous irrelevant onset features beyond abrupt appearance. To address this issue, the current study assessed oculomotor suppression of task-irrelevant onsets and singletons within one paradigm. Participants performed a visual search task for a target shape with onset and singleton distractors. First saccade destination was then used to assess whether onsets and singletons captured attention or were suppressed. An initial experiment demonstrated that onsets captured attention under conditions where color singletons were suppressed. However, when irrelevant factors like luminance and task relevance were more carefully controlled between stimuli, onset capture was nearly eliminated. We conclude that onsets can be suppressed to prevent capture under the same conditions that permit suppression of color singletons.

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12:00-1:00 pm (1007)

Attentional Capture Related to Attentional Focus. GRETA MANINI, FABIANO BOTTA, ELISA EM MARTÍN-ARÉVALO, and JUAN LUPIÁÑEZ CASTILLO, *University of Granada* – Across five experiments, we studied attentional capture by potentially relevant vs. irrelevant distractors to the main task (i.e., from inside vs. outside the attentional focus) as a function of task demands. Based on the opposite predictions by two main theories concerning attentional capture (reduced vs. larger distraction with higher perceptual load, respectively for Lavie’s perceptual load theory and Gaspelin and colleagues’ attentional dwelling hypothesis), we hypothesized that the observed pattern of results may depend on the distractor type used (relevant or irrelevant). In the same paradigm we manipulated both task demands (i.e., perceptual load) and distractor type. Results were highly consistent across experiments: interference from relevant distractors presented inside the attentional focus was consistently higher for high vs. low task demands, while there was no effect of irrelevant distractors presented outside the attentional focus. Our results suggest that the influence of task demands on attentional capture varies as a function of distractor type, providing specific insight into perceptual load and attentional dwelling hypotheses, and new considerations about attentional capture as a function of task demands.

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12:00-1:00 pm (1008)

Statistical Learning of Spatial Distractor Features: Does Target Template Specificity Modulate Expectation-Dependent Suppression?

AYLIN HANNE, JAN TÜNNERMANN, and ANNA SCHUBÖ, *Philipps-Universität Marburg* – When tasked with searching for a target, participants typically respond slower when a salient but task-irrelevant distractor is present compared to when it is absent. Recent work shows that this attentional capture effect is reduced when the spatial distribution of the distractor is biased, i.e. when it appears more often at a specific location than at other locations within the visual field. It is assumed that participants are able to derive spatial feature regularities of the distractor and use this information to suppress the highly probable location. Here, we tested how expectation-dependent suppression is modulated by target template specificity. In two online versions of the additional singleton search task, target template specificity was modulated by asking the participants to either search for a diamond (sharp template) or for a shape singleton (broad template). Results provide empirical support for feature-blind suppression of the high-probability location similar for both task variants. To further assess the role of target template specificity in expectation-dependent suppression, we discuss results from hierarchical Bayesian modeling approaches.

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12:00 – 1:00 pm (1009)

Does It Help to Expect Distraction? Attentional Capture Is Attenuated by High Distractor Frequency But Not by Predictability.

LOUISA BOGAERTS, DIRK VAN MOORSELAAR and JAN THEEUWES, *Vrije Universiteit Amsterdam* – Salient distractors such as color singletons typically capture attention. Recent studies have shown that probabilistic expectations of color singletons’ occurrence—even when their location and features are unpredictable—can eliminate attentional capture. Here we ask whether this effect, referred to as “second-order distractor suppression,” (1) could be merely a result of repetition priming and (2) is driven by the expectation of distractor occurrence. Experiment 1 introduces a novel approach for manipulating the frequency of distractor occurrence whilst controlling for intertrial priming by design. We observed no elimination but significant attenuation of capture in the condition with a higher distractor frequency. In Experiment 2, we investigated the effect of the predictability of distractor presence. Repeating regular distractor absent/present patterns did not result in attenuated capture. The results demonstrate that second-order distractor suppression is not merely a result of repetition priming. However, it is not a general response to expectations; this nonspecific type of suppression is almost instantly elicited by environments with a high likelihood of distractors, but not by distractor presence which can be anticipated.

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12:00-1:00 pm (1010)

The Reduction of Attentional Capture in the Presence of High-Probability Distractors Is Context Dependent.

JEFF MOHER, *Connecticut College*, ANDREW B LEBER, *Ohio State*





University, OLIVIA NARDONE, *Connecticut College* – Research has shown that individuals can implicitly learn the likelihood that a salient, irrelevant distractor will be present in a search array and use this information to blunt attentional capture. Here we question whether this learning depends on a low-level selection history account or a more abstract, context-dependent control account, by which the learning of distractor probability is tied to the present behavioral context. To test this, we used an incidental learning approach in which background scenes prior to the search array were paired with a high (80%) vs. low probability (20%) of distractor presence but did not predict distractor location. When the scene indicated a high probability of distractor presence, the magnitude of attentional capture was dramatically reduced on the subsequent trial. Participants showed little explicit awareness of the relationship between background and distractor probability, suggesting an implicit learning process. An ongoing follow-up study is investigating if these patterns reflect learned feature-based suppression of the distractor. Overall, these results indicate that implicit contextual learning can facilitate suppression of salient distractors appearing at unpredictable locations.

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12:00-1:00 pm (1011)

Gaze Cueing and Social Facilitation. TAKATO OYAMA, KENTA ISHIKAWA, and MATIA OKUBO, *Senshu University* – Human gaze direction triggers gaze cueing attention. Overall reaction time (RT) has been faster for the gaze cues than for other cues (e.g., abrupt onsets, directional arrows). We hypothesized that this difference in RT is attributed to social facilitation induced by the gaze cues: the existence of others raises the emotional arousal and accelerates the performance. To test this hypothesis, we used the gaze and arrow cues in a cueing paradigm and measured pupil dilation as an index of arousal. Pupil dilation negatively predicted overall RT. This result supports our hypothesis and suggests that the existence of others raises the emotional arousal and accelerates the performance in the gaze cueing paradigm.

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12:00-1:00 pm (1012)

Direct Comparison Reveals that the One-Target Emotional Attentional Blink Is Far Weaker than the Two-Target Attentional Blink. LINDSAY A. SANTACROCE, APURVA SWAMI, and BENJAMIN J. TAMBER-ROSENAU, *University of Houston* – The attentional blink (AB) shows the temporal limits of attention when the second of two targets in a rapid stream of filler items is difficult to recall if it is separated by a short lag from the first target. The emotional AB (EAB, also termed “emotion-induced blindness” [EIB]) shows that an AB-like effect also occurs when just one target is preceded by an emotional distractor that captures attention, almost as if the emotional item were a first target in the AB paradigm. While the AB and EAB are often viewed as similar, research has yet to directly compare these effects in interleaved trials using identical targets and fillers in the same participants. In two experiments with image stimuli, we randomly mixed AB and EAB trials. In

both experiments, we observed a strong AB but a surprisingly weak or nonexistent EAB. This held true when targets were defined by frame color (perceptual processing) or by image content (semantic processing). Two follow-up experiments showed similarly weak EAB effects without the addition of AB trials, suggesting that mixing with AB trials did not lead to strategic shifts that lessened the EAB. These results suggest that emotional capture in the EAB may not be as robust as previously thought.

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12:00-1:00 pm (1013)

Semantic Generalization of Value-Based Attentional Priority Is Category-Specific. ANDREW CLEMENT, LAURENT GRÉGOIRE, and BRIAN ANDERSON, *Texas A&M University* – A large body of evidence suggests that previously rewarded stimuli can capture attention. Recent evidence also suggests that observers can learn reward associations for a particular semantic category. However, it is unclear whether value-driven attentional biases can generalize to new exemplars of a rewarded category or semantically related categories. Here, we tested whether this was the case. In an initial training phase, participants searched for two categories of objects and were rewarded for correctly looking at members of one category. In a subsequent test phase, participants searched for two new categories of objects. A new exemplar of one of the trained categories or a member of a semantically related category could appear as a distractor in this phase. Compared to the unrewarded category, participants were more likely to initially fixate the distractor and fixated the distractor longer when it was a new exemplar of the rewarded category. However, similar effects were not observed for members of semantically related categories. Together, these findings suggest that while value-driven attentional biases can generalize to new exemplars of a rewarded category, these biases do not extend to semantically related categories.

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12:00-1:00 pm (1014)

The Role of Visual Working Memory Capacity in Attention Capture Among Video Game Players. CHRISTOPHER HAUCK and MEI-CHING LIEN, *Oregon State University* – Previous studies have shown that action video game players were less likely to be captured by salient distractors than nonplayers. Other studies have also found that individuals with high visual working memory capacity are less susceptible to capture by irrelevant distractors. We examined whether individual differences in visual working memory capacity modulates the attention capture among video game players. Participants completed a questionnaire reporting their video game playing experience, followed by a color change detection task assessing their visual working memory capacity. They then performed an attention capture task in which they determined the orientation of a bar within a shape singleton while ignoring a color singleton distractor that appeared in 50% of trials. Results showed that action video game players did not produce less capture effect than the non-action video game players. However, high visual working memory capacity individuals produced less capture effect than low






visual working memory capacity individuals. These results suggest that the ability to resist capture by irrelevant distractors may be better explained by individual differences in visual working memory capacity, not action video game experience.

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12:00-1:00 pm (1015)

Testing Memory Encoding Cost Theory: Evidence from Modulation of Expectation Violation on Spatial Cueing Effects. LUO CHEN, HUI CHEN , and MOWEI SHEN, *Zhejiang University* – Recently, Chen & Wyble (2018) proposed the memory encoding cost theory which uncovered two distinct mechanisms underlying the exogenous spatial cueing paradigm: attentional facilitation at cued location and nonspatiotopic attentional suppression resulted from memory encoding of cue information (e.g., location). These two mechanisms are separately reflected by the cueing effect (valid vs. invalid cue) and the cost effect (invalid vs. no cue). Here we investigated how expectation violation evoked by rare events modulated the spatial cueing effects. In three experiments, the critical manipulations were respectively the probability of cue presence, the probability of cue location, and whether the cue was accompanied by a rare sound. All experiments found a convergent evidence that expectation violation increased the cost effect, which meant that it enhances memory encoding of the cue. Besides, expectation violation enhanced the cueing effect in Experiment 3 but not in Experiments 1 and 2, revealing that it wasn't necessary to improve the attentional capture of the cue. These results indicate that expectation violation triggered by rare events may switch the information processing from highly selective mode to a more explorative mode.

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12:00-1:00 pm (1016)

Dynamics of Attention Capture by Information Retrieved from Long-Term Memory. DEBORAH HANNULA and JOSHUA HOELTER, *University of Wisconsin-Milwaukee* – Items retrieved from long-term memory (LTM) can capture attention when they are not search targets. Here, we examined the time-course of these capture effects following presentation of a memory cue and a corresponding recognition test. Participants studied scene-object pairs and then search displays were interleaved with encoded scenes and test displays. When scenes were presented, participants attempted to retrieve the associate for an upcoming recognition test. During search, participants were told to immediately fixate a colored target. A critical distractor was always present and sometimes it was the studied associate of the scene. Capture by the associate occurred most often immediately after the scene was presented but remained above baseline levels prior to the recognition test. Capture was also above baseline immediately after recognition but decreased quickly; similar effects were seen for novel distractors. Results may provide insights into dynamic representational states of information retrieved from LTM.

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12:00-1:00 pm (1017)

Value-Biased Competition in the Auditory System of the Brain. ANDY J. KIM, LAURENT GREGOIRE and BRIAN ANDERSON, *Texas A&M University* – Recently, behavioral studies of value-driven attention have demonstrated involuntary attentional capture by previously reward-associated sounds, emulating behavioral findings within the visual domain and suggesting a common mechanism of attentional capture by value across sensory modalities. In the present neuroimaging study, we examined the neural correlates of the modulatory role of learned value on the processing of auditory information. We replicate behavioral findings of both voluntary prioritization and involuntary attentional capture by previously reward-associated sounds. When task-relevant, the selective processing of high-value sounds is supported by reduced activation in the dorsal attention network of the visual system, implicating cross-modal processes of biased competition. When task-irrelevant, in contrast, high-value sounds evoke elevated activation in posterior parietal cortex and are represented with greater fidelity in the auditory cortex. Our findings reveal two distinct mechanisms of prioritizing reward-related auditory signals, with voluntary and involuntary modes of orienting that are differently manifested in biased competition.

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12:00-1:00 pm (1018)

Don't Look Back (at Me) in Anger: Emotion Expression Modulates the Direct Gaze Effect. ROBRECHT VAN DER WEL, *Rutgers University*, ROXANA PITTIG, *Julius-Maximilians-Universität Würzburg*, TIMOTHY N. WELSH, *University of Toronto*, ANNE BOECKLER-RAETTIG, *Leibniz Universität Hannover* – Gaze direction and emotion expression are salient facial features that facilitate social interactions. Previous studies addressed how gaze direction influences the evaluation and recognition of emotion expressions, but few have tested how emotion expression influences attentional processing of direct versus averted gaze faces. We tested if the prioritization of direct gaze (toward the observer) relative to averted gaze (away from the observer) is modulated by the emotion expression of the observed face. Participants identified targets presented on the forehead of one of four faces in a 2x2 design (gaze direction: direct/averted; motion: sudden/static). Emotion expressions of the faces (neutral, angry, fearful, happy, disgust) differed across participants. Direct gaze effects emerged for targets on direct gaze faces being faster than on averted faces. This direct gaze effect was enhanced in angry faces (approach oriented) and reduced in fearful faces (avoidance oriented). “Weaker” approach and avoidance-oriented expressions (happy and disgusted) did not modulate the direct gaze effect. These findings reveal how the context of facial emotion expressions influences attentional processing.

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12:00-1:00 pm (1019)

Estimating the Probability of Attentional Capture. TAYLOR J. RIGSBY and BRAD T. STILWELL, *Binghamton University SUNY*, ERIC RUTHRUFF, *University of New Mexico*,





NICHOLAS GASPELIN, *Binghamton University SUNY* – Current behavioral metrics of attentional capture indicate whether or not capture occurred. However, they do not provide a direct estimate of the probability that attentional capture occurred. The present study introduces a new method to estimate the probability of capture from mean response times. Participants performed a modified spatial cueing paradigm and demonstrated the typical contingent capture effect. Using a novel approach, we were able to estimate the proportion of trials in which attentional capture occurred. The results show the probability of a salient stimulus capturing attention is much lower than previously assumed. Even target-colored cues—which have traditionally produced the strongest capture effects—produced capture on only 30% of trials. This new metric provides an index of capture probability that can be meaningfully compared across different experimental contexts, which was not possible until now.

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12:00-1:00 pm (1020)

The Suppression of Multiple Colour Singletons. BRANDI LEE DRISDELLE and MARTIN EIMER, *Birkbeck, University of London* – Distractor inhibition is believed to contribute to target selection in visual search. Distractor suppression effects have been demonstrated behaviourally and with ERPs (Pd), but so far only for displays that contain a unique salient singleton distractor. It remains unknown whether suppression can be applied to multiple distractors in the same search display, either in parallel or sequentially. We tested this with displays that contained one highly salient and another less salient colour singleton distractor (S+ and S-). Lateralised activity was measured separately for S+ and S- in displays where one colour singleton appeared laterally, while the other singleton (and the target) appeared on the vertical midline. Both S+ and S- elicited a contralateral positivity, which emerged earlier for S+. We interpret this pattern as evidence for two separate Pds indicative of two successive distractor inhibition processes but consider alternative interpretations. An additional behavioural study demonstrated more efficient target selection when S+ and S- were both present than when only one of them was presented. These results provide new evidence for the existence of multiple distractor suppression processes in the same search display.

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12:00-1:00 pm (1021)

Inhibition, Binding, or Sensory Discrimination: What Does the Behavioral Anti-Saccade Task Measure? GIDON T. FRISCHKORN and KLAUS OBERAUER, *University of Zurich* – The behavioral anti-saccade task is a widely used measure of attention control. Yet, it is still debated which specific cognitive processes contribute most to performance in this task: 1) the inhibition of automatic saccades towards the cue preceding the target stimulus, 2) prediction of target location through bindings between cue and target-location, dependent on the block instruction (pro- vs. anti-saccades), and 3) sensory discrimination ability to detect the target letter before it is masked. We varied the requirements of inhibition and binding to investigate to what extent these processes are tapped by the

behavioral anti-saccade task. Specifically, we introduced additional cue conditions and manipulated the cue-target interval to evaluate the contribution of inhibition and binding ability to anti-saccade performance. Although experimental results indicate that participants use cue-target location bindings to predict the target location and inhibit automatic responses, correlations of performance across experimental conditions show that individual differences in anti-saccade performance predominantly measured sensory discrimination ability.

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12:00-1:00 pm (1022)

On the Time Course of Parallel Processing in Task Switching with Preview. JOVITA BRUENING and DIETRICH MANZEY, *Technische Universität Berlin* – Research on individual differences in multitasking has shown that individuals either prefer a more serial or more parallel mode of task processing, which can be identified in the task switching with preview (TSWP) paradigm. This variant of a task switching paradigm allows but does not oblige individuals to preview the stimulus of the next task switch in a predictable task switching procedure (AAABBB...). In two experiments, we explored precisely when individuals who prefer parallel processing use the preview to prepare the next switch. In a first experiment (n=45), we varied the onset and therewith the length of the preview within-subjects. The data suggested that for the preparation of the task switch, rather the position than the pure length of the preview is decisive. In the ongoing follow-up experiment (n=48), we presented the preview stimulus in discrete steps (and thus with the same length) along with the different stimuli of the ongoing task throughout the AAA or BBB sequence. First results of the second experiment suggest that the preview is primarily processed in the trial directly preceding the task switch. Implications for individual differences in cognitive flexibility will be discussed.

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12:00-1:00 pm (1023)

The Relative Influence of Different Sources of Distraction in Attention-Deficit/Hyperactivity Disorder. JAHLA OSBORNE, HAN ZHANG, PRITI SHAH, and JOHN JONIDES, *University of Michigan* – Adults with attention-deficit/hyperactivity disorder (ADHD) are typically distracted easily, yet not many studies have focused on whether there is a difference in susceptibility to particular types of distraction. In general, distraction can either manifest from an external or internal (e.g., mind-wandering, repetitive negative thinking) source. The current study aimed to discover if mind-wandering (MW) is predictive of ADHD, above and beyond external distraction (EXT) and repetitive negative thinking (RNT). We addressed this question by having participants complete several questionnaires to measure EXT, RNT, MW, and ADHD. Our data consisted of a clinical ADHD sample (N=60) and two large subclinical samples (N=569, N=651). The results show that MW, even when accounting for EXT and RNT, is consistently more predictive of diagnosed ADHD and ADHD symptomatology at the clinical and subclinical levels. These findings highlight the importance of MW in understanding distractibility within ADHD. Additionally, these





findings should ignite future research to examine if these results are consistent across ADHD subtypes as well.

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12:00-1:00 pm (1024)

Patience Is a Virtue: Individual Differences in Cue-Evoked Pupil Responses Under Temporal Certainty. AUDREY V. HOOD, KATHERINE M. HART, FRANK M. MARCHAK, and KEITH A. HUTCHISON, *Montana State University* – We investigated participants' ability to engage versus relax attentional control in anticipation of hard versus easy trials within a saccade task, creating a cue-evoked pupillary response (CEPR). Participants completed the automated operation span (OSPAN) task followed by a saccade task with a constant 5000ms delay and occasional thought probes. Lower working memory capacity (WMC) individuals showed pupil dilation throughout the fixation delay for both types of trials, whereas higher WMC individuals only showed dilation immediately before stimulus onset when expecting an antisaccade trial. Accuracy was predicted by WMC, smaller initial CEPR, larger late CEPR, and less CEPR variability, but not self-reported task-unrelated thoughts (TUTs). At the latent level, although the two measures were correlated, CEPR variability significantly predicted saccade accuracy whereas TUTs did not. These results demonstrate that higher WMC individuals may be more efficient at exerting control. Further, they indicate that physiological measures can provide a more valid index of attentional state than self-report measures.

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12:00-1:00 pm (1025)

Inspection Time, Attention Control, and Fluid Intelligence. JASON S. TSUKAHARA and RANDALL W. ENGLE, *Georgia Institute of Technology* – The inspection time task is considered as a relatively pure measure of processing speed and strongly correlates with intelligence. The inspection time task requires making a discrimination between the length of two lines (i.e., which line is longer) under time pressure. The question, then, is why a simple psychophysical task like inspection time strongly correlates with a higher-order ability like intelligence. One possibility is that performance on inspection time tasks is not only due to differences in processing speed but also the ability to control attention. In the current study, we tested this by manipulating the number of relevant and irrelevant lines to be discriminated. Our results showed that the pattern of performance across the conditions for fast vs. slow inspection time subjects is consistent with the interpretation that the inspection time task reflects both processing speed and attention control abilities. We also found that attention control fully explained the correlation between inspection time and fluid intelligence. Therefore, our findings suggest that the inspection time is not a pure measure of processing speed and that attention control is the reason why this task correlates strongly with intelligence.

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12:00-1:00 pm (1026)

Facilitatory and Inhibitory Mechanisms Underlying Spatial Attention in the Flanker Task. SANG HO LEE and MARK PITT, *The Ohio State University* – Using a flanker task in which flanker distance from the target was varied, Lee and Pitt (in press) found wide individual differences in the shape of flanker interference, ranging from monotonically decreasing patterns from the target location (broad attentional focus) to a reversed gradient pattern suggestive of highly focused attention. The current study explored the mechanisms modulating the shape of these attentional distributions using a cognitive model that included facilitatory and inhibitory mechanisms. Manipulations across two experiments sought to induce selectively the operation of both mechanisms along with corresponding changes in model parameters. The results suggest that facilitation and inhibition in spatial attention covary to some extent but have distinct influences on the distribution of attention.


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12:00-1:00 pm (1027)

A Construct Representation Approach to Validating Sustained Attention Measures. MATTHEW S. WELHAF, *University of North Carolina at Greensboro* – People differ in their ability to maintain optimal attentional focus and readiness to respond to goal-relevant stimuli. This sustained-attention ability is measured either by performance in computer tasks (e.g., reaction time [RT] variability) or by people's self-reports of task-unrelated thought (TUT); RT variability and TUT rates correlate strongly when RT measures come from attention-demanding tasks ($r_s \approx .50$), but correlations are weaker from tasks that don't heavily tax attention ($r_s \approx .20$; Kane et al., 2016; Unsworth, 2015). The current study experimentally manipulated task parameters in three commonly used sustained-attention tasks in an online sample ($N=1,514$) to test whether minimizing the need for sustained attention weakened, or eliminated, associations between performance and self-report sustained attention indicators. An internal meta-analysis across counterbalancing conditions suggested that our manipulations of sustained-attention demands did not meaningfully alter associations between TUT rates and RT variability. Implications for the construct validity of sustained-attention measures are discussed.

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12:00-1:00 pm (1028)

Individual Differences in Sustained Attention. ALEXIS TORRES , *Arizona State University*, MATTHEW K. ROBISON, *The University of Texas at Arlington*, GENE A. BREWER, *Arizona State University* – Vigilance is one's preparedness to detect specific, infrequent, and unpredictable events over extended periods. In vigilance tasks, there is a ubiquitous group-level pattern of performance deterioration with time on task (i.e., vigilance decrement). In the current study, we expand on recent findings that the vigilance decrement can be reliably measured at the individual differences level and estimated using linear mixed effects modeling. Further, we modeled vigilance decrements for each task nested within each participant using linear mixed effects modeling and then correlated these





within-person vigilance decrement estimates with participants' self-reports on the Big Five Inventory, the Short Grit Scale, and thought-probe prompts assessing task-unrelated thinking. Participants (N=451) completed three vigilance tasks to measure vigilance decrements: the psychomotor vigilance task, the Sustained Attention to Response Task, and the degraded vigilance task. We conclude that vigilance decrements are present at the individual level but individual differences in vigilance are not task general. Vigilance decrements did not correlate with measures of personality, but they did correlate with higher rates of task-unrelated thoughts.

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12:00-1:00 pm (1029)

Anxiety But Not Perceived Stress Affects Pre-Attentive Processing Measured by the MMN. JANE W. COUPERUS, OLIVIA M. CLARKE, ELIZABETH R. ROY, NICOLE JOH, NOA SADEH, and SONALI SIKDER, *Mount Holyoke College*, CINDY M. BUKACH, *University of Richmond*, CATHERINE L. REED, *Claremont McKenna College* – Detecting changes in relevant auditory stimuli is essential for goal-directed behavior. Previous research suggests those experiencing high levels of anxiety (Ge et al., 2010; Fucci et al., 2019) show increases in pre-attentive processing as measured by the mismatched negativity (MMN) during change detection tasks. In contrast when psychosocial stress is induced, the MMN is attenuated (Simoens et al., 2007). As anxiety and stress often co-occur, here we examine the MMN in relation to individual differences in anxiety and perceived stress. College-age participants (n=199, mean age=19.44 SD=1.36) completed the Beck Anxiety Inventory, Perceived Stress Scale and an auditory oddball task while event-related potentials were recorded. Multiple linear regression analysis of MMN amplitude ($R^2=.048$, $F(2, 202)=5.32$, $p=.006$) showed that individuals high in anxiety showed an increased MMN ($B=-.039$, $\beta=-.237$, $t=-2.68$, $p=.008$) but perceived stress was not significantly related to MMN amplitude ($B=.006$, $\beta=.029$, $t=0.395$, $p=.69$). This suggests that trait anxiety but not current perceived stress affects pre-attentive processing. This may be attributed to heightened arousal associated with anxiety.

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12:00-1:00 pm (1030)

Heart Rate Variability as a Correlate of Working Memory Capacity. AUDREY V. HOOD, BRANDON G. SCOTT, and KEITH A. HUTCHISON, *Montana State University* – Heart rate variability (HRV) refers to the changes in time between successive heartbeats and is thought to reflect the heart's ability to adapt and respond to varying circumstances by detecting and responding to unpredictable stimuli (Acharya et al., 2016). Although greater resting baseline vagally-mediated HRV has been shown to be associated with better cognitive task performance (Forte et al., 2019), no one has directly examined whether individuals higher in working memory capacity (WMC) have greater resting baseline HRV. Physiological measurements (heart rate and respiration) were collected with electrocardiograph (ECG) electrodes and BioNomadix receivers transmitting signals to a Biopac MP150 system. HRV was calculated

from the interbeat and interbreath intervals data. Participants first underwent a resting baseline period and then completed the shortened AOSPAN and SSPAN. HRV during a 5-minute resting baseline period significantly and positively correlated with WMC, indicating that individuals higher in WMC have greater resting baseline vagally-mediated HRV.

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12:00-1:00 pm (1031)

Shifting Across Languages: Conceptual Cues Do Not Shift Attention in One's Second Language. REBECCA K. LAWRENCE, *Griffith University*, ANDREW CLEMENT, *Texas A&M University*, ALISON L. CHASTEEN, and JAY PRATT, *The University of Toronto* – Concepts can guide spatial attention; seeing words like *God* and *happy* can shift attention upward, whereas words like *Devil* and *sad* can shift attention downward. However, most conceptual cueing studies have not considered the language status of their participants. The current study aimed to test whether stimuli presented in one's second language would result in similar attentional shifts to those observed in one's first language. Monolingual English speakers and multilingual Spanish-English speakers completed a conceptual cueing task which used English words associated with upward or downward spatial locations and a target detection task to measure attentional shifts. Overall, we observed typical conceptual cueing effects in our monolingual English sample with participants responding faster when the location of the target was compatible with the spatial association of the word. In contrast, no such effects were observed in our multilingual Spanish-English sample. Thus, conceptual cueing effects may not be invoked when using one's second language. This, in turn, suggests a role for language acquisition in embodied cognition.

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12:00-1:00 pm (1032)

The Visual Arrays Task: Lessons from Four Manipulations. CHRISTOPHER DRAHEIM and RANDALL W. ENGLE, *Georgia Institute of Technology* – Visual arrays is a change detection paradigm generally considered to be an indicator of visual working memory capacity. However, there is growing evidence that individual differences in some variants of this task are due more to attentional factors than memory. In the present study, we explored the role of attention in five visual arrays tasks with four manipulations: number of distractors, set size, spatial configuration of stimuli, and cue-to-stimulus interval. Preliminary data (N~120) show that while most manipulations impacted overall performance, only the presence of distractors significantly altered the nature of performance and predictive power of the task. Specifically, in the absence of distractors, visual arrays performance had weak correlations to other attention measures, whereas the selective (distractors present) versions had strong intercorrelations, stronger correlations to other attention tasks, and better predictive validity. This trend held regardless of set size, cue-to-stimulus interval, or spatial configuration of the stimuli. We conclude that visual arrays is a measure of attention that is robust





to a variety of manipulations, with the most important factor being whether distractors are included.

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12:00-1:00 pm (1033)

Variation in the Intensity and Consistency of Attention at Encoding: The Role of Conative Factors. ASHLEY L. MILLER and NASH UNSWORTH, *University of Oregon* – The amount of attention allocated to a task (intensity) and the consistency with which attention is maintained on task (consistency) are seemingly two related, yet distinct, aspects of attention important for successful learning. It remains unclear, however, what factors differentially influence these aspects of attention. The present study thus examined whether conative factors are important contributors to variation in intensity and consistency. In two studies, we assessed cognitive abilities (working memory and general episodic memory), conative factors (task-specific motivation and self-efficacy), and paired associates cued-recall—during which pupil diameter was simultaneously recorded to provide an index of intensity. Study 2 adopted the same procedure but also measured self-set goals and off-task thoughts (via thought probes during encoding) to index consistency. Broadly, results revealed that intensity and consistency were important predictors of associative learning ability, and variation in each facet of attention was influenced by both cognitive and conative factors. Theoretical mechanisms are discussed.

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12:00-1:00 pm (1034)

Core and Periphery Properties in the Language and Executive Functioning Structural Networks. CELIA P. LITOVSKY, THOMAS HINAULT, SUSAN M. COURTNEY, and BRENDA RAPP, *Johns Hopkins University* – The language and executive functioning (EF) networks are sometimes thought to operate within a functionally defined core-periphery organization, with language regions forming a highly interconnected, stable “core” and EF regions forming a flexible “periphery.” Here, we examined whether language and EF regions showed similar core-periphery properties structurally as they do functionally. We segmented the brains of each of 46 healthy adults into atlas-defined parcels and quantified the number of fiber streamlines (from diffusion-weighted tractography and measures of fractional anisotropy) passing between each parcel. Based on published meta-analyses, we then identified parcels belonging to the language and/or EF networks and quantified their core-periphery properties based on the specific graph theoretic metrics of clustering coefficient and participation coefficient. As expected, the language network exhibited greater structural coreness than the EF network, and the EF network exhibited greater structural peripherality than the language network. These results show, for the first time, that the core-periphery structure that has been observed functionally is also present in the brain’s structural connectivity.

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12:00-1:00 pm (1035)

Time Perception: How Do Environmental Factors Interact with Individual Differences to Influence Judgments of the Passage of Time? MATTHEW HOPKINS and IRENE REPPA, *Swansea University* – Time perception is essential to everyday functioning. Yet, accuracy when judging the passage of time can be determined by several factors, pertaining to the environment (e.g., music, rapidly repeated auditory or visual stimuli) and to the individual (e.g., neurological conditions, such as schizophrenia). Very little is currently known about how these factors may interact. Over 100 participants completed the short O-LIFE questionnaire which measures schizotypy—a set of personality traits related via physiological processes to schizophrenia. They then carried out a classic temporal bisection task, judging whether each of seven interval durations were short or long. Following this baseline task, participants completed the temporal bisection task again, but this time each interval was preceded by a 5-second click train. Although the click train manipulation led all participants to judge time intervals as longer compared to baseline, it was significantly less effective for participants scoring high in schizotypy. The results are discussed in the context of two dominant theories of time perception—scalar expectancy theory and attentional gate model and their predictions regarding the operation of an internal clock.

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12:00-1:00 pm (1036)

Eye Spy: Gaze Communication and Deception in a Hide-and-Seek Task. JACOB D. GERLOFS, NICOLA C. ANDERSON, and ALAN KINGSTONE, *The University of British Columbia* – Research on gaze and social attention has largely focused on the detection and following of gaze, rather than its two-way communicative component. The present study addresses this issue in two experiments. First, “hidiers” were eye-tracked while they selected hiding spots among a grid of boxes on a computer screen, displays being sometimes visually homogenous and sometimes not. Hidiers did or did not know that their gaze would be shown to “seekers,” who they may wish to communicate to or may wish to deceive. In a second experiment, seekers were asked to select the hidiers’ locations after viewing hidiers’ gaze behaviour, including the eye movements that hidiers had been (falsely) told would be concealed. Results indicate that seekers are most accurate when hidiers use their gaze to communicate their selected locations and least accurate when hidiers aim to deceive. These communication strategies varied based on the visual display. Our study demonstrates how the gaze of an individual both acquires and signals information and that individuals will spontaneously adjust the balance between these two functions based on the situation and environment. Results are discussed in relation to theory of mind, social cognition, and metacognition.

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12:00-1:00 pm (1037)

Benefit of Medical Improvisation Filled out with Transdisciplinary Simulation Training to Develop Empathic Communication Skills. JULIE DE WEVER, MATHIEU HAINSELIN, and MAXIME GIGNON, *University of Picardy Jules Verne* – Professionals from different disciplines can bring their expertise to develop the needed teaching of health relational skills. Medical improvisation permits experiential learning, based on specifically applied improvisational theater exercises. Simulation also brings real-life contexts and permits a transdisciplinary approach. Twenty-two health students have yet been trained to 16-hours sessions Medical Improvisation training and 60 to four simulation sessions at SimUsanté (health simulation facility). Theater students acted as patients, and facilitators from health, improv arts, and psychology departments debriefed. We explore the impact on empathic communication skills through three self-assessment scales. Preliminary results show students assessed their communication skills as better and more important to their profession after the medical improvisation training compared to before. They also perceived their empathy skills as better only after the medical improv training. This research suggests a pedagogical interest in improv training filled out with simulation sessions for health students' training on self-perceived empathic communication abilities.

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12:00-1:00 pm (1038)

Breadth Improves Transfer: Lessons from a Large-Scale, Online Cognitive-Training Dataset. ALLEN M. OSMAN, NICOLE F. NG, KELSEY R. KERLAN, PAUL JAFFE, and ROBERT J. SCHAFER, *Lumos Labs* – Does the breadth of cognitive training influence how well or widely it transfers to other activities in the lab, clinic, or real world? If so, what is the mechanism? To address these questions, we analyzed a large online observational dataset involving 149,000-plus individuals who each played between 1 and 64 different Lumosity games a total of 1 to 5,000 times. Breadth of gameplay was indexed by Shannon's measure of entropy (e.g., sixteen games played with equal frequency would equal four bits). Gameplay was preceded and followed by assessment on a battery of eight neuropsychological tests. Changes in performance on the test battery for each individual were examined as a function of the number and entropy of their intervening games. A positive relation was found between both factors, and the amount and breadth of improvement across tests. Implications for the design of cognitive training and mechanisms of transfer will be discussed.

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12:00-1:00 pm (1039)

Do Training Gains Last? Delayed Testing with a Focused Video Game. ASHLEIGH WELLS and RICHARD E. MAYER, *University of California, Santa Barbara*, JAN PLASS, *New York University*, BRUCE HOMER, *City University of New York* – This study examined whether previously established executive function training gains from playing a focused video game for 2 hours persist after a week delay. In an entirely virtual study, participants

completed pretest cognitive assessments, then either played CrushStations (n=9)—a game designed to train the executive function skill of updating—or a control word-search game not intending to train any cognitive skill (n=10) for 2 hours across four sessions. After a week delay, participants completed posttest assessments to measure their updating and inhibition skill. Preliminary results show that there are no significant differences between groups on n-back performance (updating; $F[1, 18]=3.91, p=.063, \eta^2p=.18$), Stroop task performance (inhibition; $F[1,18]=.67, p=.42, \eta^2p=.04$), or complex span performance (educationally relevant updating task; $F[1,17]=.02, p=.88, \eta^2p=.001$). Participants playing CrushStations reported significantly lower motivation ($p=.04$) than those playing the control game, liked it less ($p=.004$) than the control game, and were less willing to play CrushStations again ($p=.001$).

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12:00-1:00 pm (1040)

Reminding Guides the Use of Self-Regulated Reading Reflections. JIYU LI and JONATHAN G. TULLIS, *The University of Arizona* – Reminding, the process of retrieving earlier studied episodes, prompts us to use relevant prior knowledge in novel situations and guides a variety of cognitive skills, including classifying new items (Ross et al., 1990), solving problems (Reeves & Weisberg, 1994), and interpreting ambiguous events (Tullis et al., 2014). In the current study, we examined whether reminding influences how learners self-regulate reading through complex passages. We trained participants to write cognitive and metacognitive reflections, as developed in Nückles et al. (2020), under distinct contexts that differed in font, background color, topic, and screen position. Then, during the test phase, learners wrote their own reflections to novel passages. Test contexts influenced the kind of reflections learners wrote. More specifically, when test contexts matched metacognitive training contexts, learners' reflections included more metacognitive statements, but when test contexts matched cognitive training conditions, learners' reflections included more cognitive statements. Reminding can guide complex self-regulated learning processes, like reflections to complicated readings.

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12:00-1:00 pm (1041)

Perceiving the Risk: Effects of Framing and Visualization. AHU GOKCE, AYŞE DOĞAN, NOYEMI NK KALPAKYAN, and DIDEM TASKIRAN, *Kadir Has University* – Gain-framed messages emphasize the benefits that are more effective in preventing high-risk behaviours while loss-framed messages are more effective to promote behaviours that can detect future illnesses. Adding visual aids makes both loss- and gain-framed messages effective to convey the desired information. The current study investigates how framing and visualization modulate individuals' behavioural intentions, perceived risks, and attitudes towards COVID-19-related risk behaviours. Gain/loss-framed messages conveyed chances of getting infected by the virus when engaged in high/low-risk activities. Messages were presented with visual aids (e.g., bar, icon graphs) or in text format. High-risk, compared to low-risk, behaviours elicited an





increase in perceived risk and decreased intention to engage, thus more positive attitude to avoid. The chances of getting infected by engaging in high-risk behaviours were rated as significantly higher for loss-framed messages regardless of presence of the visual aid. Results suggest that loss-framed messages evoke higher risk perception even when visual aids are presented.

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12:00-1:00 pm (1042)

Do Monkeys See It, Too? Assessing Individual Differences in Dominance Perception and Categorization of Artificial and Real Human Faces. ASHLEY M. MEACHAM, MEGHAN J. SOSNOWSKI, SARAH F. BROSANAN, and HEATHER M. KLEIDER-OFFUTT, *Georgia State University* – The ability to assess relevant features of others is a critical and adaptive social skill when deciding how to interact with a stranger. However, unfamiliar faces also may be perceived differently as a result of the viewer’s sex, such that when viewing male faces, females may be attuned to signals of potential mating options while males may be cognizant of possible threats to their status. What is unknown is whether there is an evolutionary basis for humans’ sensitivity to facial dominance and if such dominance cues have been conserved throughout evolution. In the current study, we assessed whether tufted capuchin monkeys of both sexes could reliably generalize previously trained dominance categories to artificial and real male human faces that had been pre-rated for dominance by human raters. For artificial faces, males were significantly more likely than females to categorize faces as dominant. However, when presented with real human faces, males were significantly more likely than females to categorize pre-rated “dominant” faces as dominant. These findings provide support for the possible evolutionary relevance of dominance perception and that this perception may vary as a result of how each sex views a dominant individual.

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12:00-1:00 pm (1043)

The Effort Economy: Investigating the Relationship Between Effort Intensity and Effort Cost. DAVID BRAUN, *Lehigh University* – Exerting mental effort is experienced as costly and generally avoided if possible. It is largely assumed that the aversiveness of mental effort is a function of the intensity of mental effort being exerted. We examined this assumption by drawing on prospect theory’s notion of reference-dependent preference to ask whether the cost (or utility) of some amount of effort is derived by comparing actual effort output against the level of effort that is expected or usual. Participants were faced with repeated choices between a risky and a safe option, where the options varied in how many switches there would be in a run of cued task switching. Results revealed that, when outcomes were explicitly framed around a reference point, risk preferences were opposite of what is predicted by prospect theory—participants were risk averse for choices framed as losses (i.e., more effort than expected) and risk seeking for those framed as gains (i.e., less effort than expected). This effect was replicated using simple word problem stimuli with hypothetical outcomes. These results

suggest that the experience of effort is driven by more than simply the intensity of mental activity, but that people might judge effortful experiences relative to expectation.

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12:00-1:00 pm (1044)

Effects of Media Multitasking Using a Novel Multitasking Framework. JESUS J. LOPEZ and JOSEPH M. ORR, *Texas A&M University* – Media multitasking has been linked to decreased executive functioning. However, the tasks used to establish this finding do not approximate a real-world volitional multitasking environment. The current study used a novel experimental framework where multitasking was afforded by an occasional “popup” associated with a secondary task. We predicted that an individuals’ self-reported multitasking would relate to their 1.) distraction by the popups and 2.) tendency to choose to multitask. We instead found no association of media multitasking frequency on any task performance measures, in line with our previous marginal findings related to media multitasking and volitional multitasking. Using EEG, we found a prominent P300 event-related potential (ERP) component related to popup onset, but this component was not related to media multitasking index (MMI) score. However, when comparing stimulus-locked activity for the primary and popup trials, popups showed greater activity at early sensory components (75-125 ms). As most studies finding negative effects of media multitasking have relied on extreme groups, we suggest that normal levels of multitasking do not affect cognitive performance.

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12:00-1:00 pm (1045)

The Interplay of Multiple Psychological Processes Underlying the Attraction Effect. NEO POON, ASHLEY LUCKMAN, ANDREA ISONI, and TIMOTHY L. MULLETT, *Warwick Business School* – The attraction effect refers to the observation that an option can be promoted when an asymmetrically dominated decoy is added to the choice set (Huber et al., 1982). This work is the first to examine the attraction effect with multiple process-tracing methods, namely mouse-tracking and reason listing. Theoretically, the present work allows us to study how mental processes of both high (e.g., decision strategies) and low (e.g., attentional patterns) cognitive levels integrate to produce the attraction effect, as well as testing the assumptions of existing models. Methodologically, the novel data obtained in this experiment provides triangulation on process-tracing methods and improves validity of the analyses. After replicating the attraction effect, we first found that the quantity and position of reasons, as well as fixation patterns, could predict choice independently. We further found that reasoning partially mediated the effects of attentional processes on choice, while microlevel analyses showed that fixation could predict the types of reasons. These results demonstrated the intertwined roles of attentional processes and reasoning in multialternative choices, and they provided the first step towards a complex cognitive model.

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12:00-1:00 pm (1046)

Effects of Visual Cues and Decoys on Product Choice. LOUIS-ERIC MONGRAIN, *University of Toronto*, JULIA DONATIEN, *Towson University*, JAY PRATT, *University of Toronto*, BLAIRE J. WEIDLER, *Towson University*, MATTHEW D. HILCHEY, *University of Toronto* – One strategy to influence product choice is to add a decoy, a product inferior to the target product on all features, but superior to a competitor product on some features. The decoy shifts choice toward the target product. Another strategy uses visual cues to direct attention toward the target product, which also shifts choice toward the target. It is unclear which strategy is more effective and what occurs when strategies are combined. In two computer-based experiments, we instructed participants to indicate which of three coffee products they preferred, each differing in size and price. Each product set included a decoy intended to shift choice toward the target product. In Experiment 1, one random product in each set was made visually salient to cue attention. In Experiment 2, a central arrow was used to cue attention. Both experiments reveal robust decoy effects, with choice tending toward the target product. To a lesser extent, choice tends toward the cued product. Interactions between the two strategies are unreliable. The findings suggest that the strategies can combine additively to maximize the likelihood that a target product is chosen.

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12:00-1:00 pm (1047)

Interactive Attention to Amount and Time Information in Intertemporal Choice. LISHENG HE, *Shanghai University*, SUDEEP BHATIA, *University of Pennsylvania* – The study of attention dynamics in decision making has been increasingly important in uncovering the cognitive principles of choice behavior. Recently, empirical work on this topic has suggested that the two attributes involved in intertemporal choice (monetary amounts and time delays) have distinct and independent influences on the choice process and that these attributes are additively aggregated in an evidence accumulation process. In this paper, we outline theoretical problems with such an account and argue that the two attributes must interact in order to generate reasonable choice behavior. We re-examine eye-tracking datasets of intertemporal choice using a Markov model of attentional dynamics and find that high values of currently sampled information lead to more frequent transitions to the other attribute in the same option, which corresponds to interactive attention dynamics during decision making. Thus, for example, participants are more likely to sample the time delay of an option when the monetary amount is high (and vice versa). We conclude by examining how such an interactive attentional process can combine with an attention-based evidence accumulation process to generate the observed intertemporal choice behavior.

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12:00-1:00 pm (1048)

Age-Related Difference on Sunk-Cost Fallacy. HUANGQI JIANG, *Case Western Reserve University*, YALI HOU, *Beijing Normal University*, BROOKE N. MACNAMARA, *Case Western Reserve University* – Previous research has found that participants' age influences the sunk-cost effect and, more specifically, older adults are less likely than younger adults to fall prey to the sunk-cost fallacy. However, previous studies examining age-related differences have largely focused on sunk-cost fallacy frequency. Little is known about age-related differences of sunk-cost fallacy intensity—willingness to invest relative to the amount of sunk cost. In this study, we replicated previous findings demonstrating that older adults are less frequently subject to the sunk-cost fallacy compared with younger adults. However, when older adults did fall prey to the sunk-cost fallacy, it was more intense; relative to their younger counterparts, they were more willing to continue investing when there were larger sunk costs.

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12:00-1:00 pm (1049)

Testing the Effect of Choice Set in Categorization. SEAN P. CONWAY and ANDREW L. COHEN, *University of Massachusetts Amherst* – The attraction effect is a well-known decision-making phenomenon in which the addition of a dominated option to a binary choice set increases the probability of selecting the option that dominates it. The attraction effect has been documented in numerous kinds of choices, including both preferential and perceptual choice. However, the effect of choice set has not been studied in categorization. This project examines the effect of choice set on categorization behavior. This question is important because the attraction effect violates Luce's choice axiom, the choice rule assumed by the generalized context model (GCM), a highly influential model of categorization. Experiments 1 and 2 found evidence of the attraction effect in categorization, albeit evidence that was confounded with participants' category learning. In a within-subjects design, Experiment 3 failed to find significant evidence of the attraction effect. Both the GCM and a rule-based categorization model are used to explain differences across choice set conditions.

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12:00-1:00 pm (1050)

Dynamic Action Costs Influence Reward-Based Decisions. ERIC GRIEBSBACH, *Friedrich-Schiller-University Jena*, PHILIPP RASSBACH and OLIVER HERBORT, *Julius-Maximilians-University Würzburg*, ROUWEN CAÑAL-BRULAND, *Friedrich Schiller University* – Traditional models of decision-making (DM) often assume that DM is sequential in nature. By contrast, recent embodied theories of DM integrate dynamic action costs and argue in favor of a bidirectional relationship between the action dynamics and DM. To scrutinize the latter hypothesis, we examined whether dynamic action costs of gait behavior influence reward-based decisions. Participants approached and had to step into a central zone before deciding to walk to targets (displaying the rewards) positioned either to the left or right (Y-fork). Rewards and targets were displayed while





participants approached the central zone. Both the stance leg and the angular distance toward the lateral targets were manipulated. Results showed that both the stance leg and the magnitude of the directional change (manipulated via angular distance) influenced participants' choices. Participants generally chose targets that were easier to reach, even when this decision resulted in receiving less reward. Supporting embodied theories of DM, these findings indicate that choices integrate dynamically varying action costs with concurrent action (see also Griebach et al., 2021, *Scientific Reports*).

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12:00-1:00 pm (1051)

Is the Affect Gap in Risky Choice due to Affect or Numeric Outcomes? JORDAN MARTIN, MARCUS CUMBERBATCH, and SANDRA L. SCHNEIDER, *University of South Florida* – The affect gap involves a systematic difference in affect-poor and affect-rich risky choices, with greater reliance on probabilities and expected values (i.e., outcome expectations weighted by probabilities) in affect-poor choices (e.g., involving money) than affect-rich choices (e.g., involving medication side effects). However, prior affect-rich conditions did not involve numeric outcomes (e.g., “15% chance of fever”). Thus, numeric versus non-numeric outcomes may drive these differences in choice processes. We used numeric outcomes for both affect-poor (monetary values) and affect-rich (number of imagined experiences) conditions. We also considered two types of affect: affective context of the choice (affect-poor, affect-rich) and one's current emotional state. Both affect-poor and affect-rich groups tended to prefer lotteries consistent with expected value, suggesting the previously observed affect gap may be partially due to difficulties combining numeric probabilities and non-numeric outcomes. However, affect ratings were similar in both monetary and imagined experience conditions, suggesting concepts of affect-poor and affect-rich may not be distinct.

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12:00-1:00 pm (1052)

Toward a Reinforcement Learning Decision Diffusion Model of Choice Behavior in the Context of Incidental Discrete Emotion. KYLE LAFOLLETTE and ANNE E. KOTYNSKI, *Case Western Reserve University*, DAVID J. FRANK, *Texas A&M University–Commerce*, AMANDA R. MERNER, HUANGQI JIANG, and BROOKE N. MACNAMARA, *Case Western Reserve University*, KEVIN J. BURNS, *The MITRE Corporation*, HEATH A. DEMAREE, *Case Western Reserve University* – Emotion can bias processes of decision-making and actionable tendencies; however, little is known about how distinct discrete emotions influence the specific cognitive mechanisms that underlie these processes. Some theories suggest the valence and intensity of emotion are independently weighted mechanisms, giving rise to behavioral differences in choice selection and response time. To elucidate these weighting mechanisms, we propose the combined use of reinforcement learning and decision diffusion modeling to explain decision-making with the manipulation of discrete emotion. Here, we describe a two-alternative forced choice task during which either

task-irrelevant fearful, saddening, or neutrally affective stimuli interleaved probabilistic choices. We fit a computational model to participant data to estimate group and subject-level reinforcement learning and decision diffusion parameters. Bayesian equivalence tests showed that subjects in different affective stimuli conditions (i.e., fearful, sad, and neutral stimuli) differed in processes of evidence accumulation, nondecision time, learning-rate, and sensitivity to noise.

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12:00-1:00 pm (1053)

Conveying Uncertainty: How to Improve Real-time Earthquake Information Visualizations. SABRINA KARJACK and JADA BARNES, *Temple University*, MIKE BRUDZINSKI, *Miami University*, THOMAS F. SHIPLEY, *Temple University* – Data visualizations tend to be designed to be eye-catching, but they may contain a fair amount of uncertainty. Rather than prioritizing visual impact, it is important to convey such uncertainty to the public and promote trust in science (Hullman, 2019; Johnson, 2003; Johnson & Slovic, 1995). Early information about earthquakes is uncertain and heavily reliant on models where experts understand the uncertainty implicit in the visualizations. We evaluated the public's understanding of two USGS products (ShakeMap and PAGER) that are widely viewed immediately after an earthquake and seek to model location of damage and number of fatalities. Poor performance on interviews probing the products' visualizations led us to develop alternative versions that could convey uncertainty, drawn from prior work on visualizing uncertainty, by showing multiple potential outcomes. We assessed participant understanding of the new visualizations compared to the originals, revealing modest improvement with the new versions. This suggests additional work is needed in developing visualizations for educating the public about basic earthquake principles and the uncertainty contained in models.

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12:00-1:00 pm (1054)

The Role of Health Literacy in Making Decisions about Health Information on Social Media: A Mouse-Tracking Study. MARK LOWRY, NEHA TRIVEDI, MELISSA TREVINO, PATRICK BOYD, ANNE JULIAN, and FRANK M. PERNA, *National Cancer Institute* – Health misinformation is a problem on social media sites like Twitter. Health literacy is an important moderating factor for evaluating health information and misinformation. Health literacy evolves and is influenced by social media consumption, but it may also depend on the ability to process information and other underlying cognitive factors. In this study, we determined the health literacy (adequate or inadequate using the Newest Vital Sign questionnaire) for 178 adults. Participants' accuracy in determining whether 60 health claims were true (e.g., “Alcohol is a drug”) or false (e.g., “Alcohol is not a drug”) was assessed. Claims were presented as Tweets or as simple text statements on a computer screen. We also employed mouse tracking to measure reaction times and response uncertainty. The 60 statements were related to three domains of cancer risk behavior (i.e., smoking, alcohol, and HPV vaccines). The





results indicate that tweets affect adequate and inadequate health literacy scorers differently compared to statements: adequate scorers become more accurate and less confident, but inadequate scorers become less accurate and more confident. Additionally, processing happens incrementally rather than in discrete stages.

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12:00-1:00 pm (1055)

Improving Medical Image Decision Making by Similarity-Based Aggregation. EESHAN HASAN, *Vanderbilt University*, QUENTIN EICHBAUM, ADAM SEEGMILLER, and CHARLES W. STRATTON, *Vanderbilt University Medical Center*; and JENNIFER S. TRUEBLOOD, *Vanderbilt University* – Improving the accuracy of medical image interpretation is critical to improving the diagnosis of many diseases. Using both novices (undergraduates) and experts (medical professionals), we investigate methods for improving the accuracy of a single decision-maker by aggregating repeated decisions from an individual. Our participants made classification decisions (cancerous versus noncancerous) on a series of cell images. We examined algorithms that aggregated decisions based on image similarity, leveraging neural network models to determine similarity. For a given image, the algorithm aggregates the decisions on the most similar images and determines the final decision for the current image based on a threshold (e.g., the final decision is cancerous if more than half of the images are cancerous). We examine the performance of our aggregation method by varying the neural network model, the number of similar images, and the threshold. We show that aggregating responses on similar images improves the classification accuracy for novices and not experts, suggesting differences in the decision mechanisms of novices and experts.

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12:00-1:00 pm (1056)

Planning Hurts: Model-Based Reinforcement Learning Taxes the Central Executive. DAVIDE GHEZA and WOUTER KOOL, *Washington University in St. Louis* – It is often asserted that goal-directed planning requires cognitive control. Most evidence for this notion comes from studies showing that cognitive load lowers the propensity to plan towards goals. Here, we demonstrate the opposite. Using a sequential two-step decision-making task, we show that maintained reliance on goal-directed (model-based) control impairs performance on interspersed arithmetic problems. Specifically, we manipulated the relative effectiveness and difficulty of implementing model-based control by changing the rate at which participants ($n=86$) needed to update the task's action-outcome contingencies. Even though high-switch rate blocks increased the effectiveness of model-based control compared to habitual (model-free) control, they resulted in a shift toward the latter strategy, presumably because of the increased need to update the transition structure. Consistent with our hypothesis, we found that the degree to which people relied on model-based control in a block negatively impacted performance on the orthogonal mental calculation problems in the same block. These

results are the first to demonstrate that prolonged exertion of model-based planning taxes the central executive.

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12:00-1:00 pm (1466)

Effects of Expert Witness Testimony and Cross-Examination Strategies on Juror Decision-Making. KEELY BURNS and GARRETT BERMAN, *Roger Williams University*, MICHAEL TOGLIA, *Cornell University* – While researchers have examined effects of cross-examination type on testimony by experts and eyewitnesses, the impact of differential cross-examinations of lead detectives testifying about their procedures in eyewitness cases remain unstudied. Recent best practice recommendations for identification procedures affords defense attorneys the opportunity to rigorously cross-examine detectives, comparing procedures in the case with recommended practices (Wells et al., 2020). The current study examined effects of eyewitness expert testimony (present vs. absent) and cross-examination type (standard vs. rigorous) of the lead detective on juror decision-making in a sexual assault case. After reading a trial transcript, participants rated the defendant's guilt, perceptions of the witnesses (e.g., believability), and case strength. Results indicated that participants found the detective most credible when rigorously cross-examined and when expert testimony was present. Our research points to further examining effective methods of cross-examination and when to call experts to testify. This knowledge ultimately aids attorneys in mounting a strong defense.

12:00-1:00 pm (2495)

You Left No Good Luck Here for Me: Good Luck Is Perceived as a Limited Resource in Space. DÉBORAH MARCIANO, ODED WERTHEIMER, SACHA BOURGEOIS GIRONDE, and LEON DEOUELL, *University of California, Berkeley* – We recently hypothesized that good luck can be perceived as a limited resource (Marciano et al., 2019). Here we investigate whether luck is perceived as limited in space: do we move away from locations that have just been lucky? In an online spatial lottery game, subjects ($N=1200$) chose an envelope from a set of envelopes dispersed on a map. Each envelope contained a monetary prize (big/medium/small/null). Before they made their choice, subjects saw the choice and the outcome of another player (in fact a virtual player, VP). In the Good/Mild/Bad Luck condition, the VP received a big/medium/null prize. In the Control condition, the envelopes contained shapes and subjects received a bonus they found the same shape as the VP. Results: in all conditions, the subjects' choice was not random. The distance between the subject and the VP's choices was distributed bimodally, with a close distribution (a minority of subjects choosing an envelope around the VP's) and a far distribution (the vast majority moving away from the VP). Moreover, participants moved significantly farther away from the VP's choice in the Good Luck condition than in all other conditions, suggesting that subjects perceived good luck as a limited resource in space.

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12:00-1:00 pm (1057)

Incentivizing Performance Eliminates Attentional Control Decrements After 24 Hours of Sleep Deprivation. AMELIA KRACINOVICH, *Naval Information Warfare Center Pacific*, JOSEPH CUELLAR, *Naval Health Research Center*, MICHAEL H. WALKER, *Naval Information Warfare Center Pacific*, RACHEL MARKWALD, *Naval Health Research Center* – Recent findings suggest that the phenomenology of fatigue signals the costs associated with engaging in a task in the absence of offsetting reward. From this framing, we can hypothesize that motivational factors can override fatigue if available reward becomes larger than the perceived costs of engaging. Here, we tested whether incentivizing behavior could recover attentional performance after sleep deprivation. Participants went 24 hours without sleep while performing two attentional control tasks: the psychomotor vigilance (PVT), and anti-saccade tasks. The final PVT was incentivized by informing participants that their time-on-task would be inversely correlated to their performance; the final anti-saccade was not incentivized. Anti-saccade performance followed a cubic pattern, wherein performance remained stable until roughly 2000 hours, then declined until 0730 hours, and again plateaued. PVT performance followed a similar pattern; however, performance recovered back to baseline for the final PVT. These findings highlight a behavioral mitigation strategy that can combat fatigue decrements.

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12:00-1:00 pm (1058)

Cognitive and Physical Effort-Based Decision-Making: Comparing Effort Discounting in Choice Selection. LI XIN LIM and SEBASTIEN HELIE, *Purdue University*, MADISON FANSHER, *University of Michigan* – Studies have shown a reduced tendency to select high effort options to maximize reward in people with motivational disorders. However, there is still a large knowledge gap about effort-related decision-making in typical adults. Previous studies have used the Effort Expenditure for Reward Task (EEfRT) to show devaluation in motivation with physical effort in effort-based decision-making. To demonstrate the same result in cognitive effort, we proposed a new task based on the shell game (SG) as a cognitive effort-based decision-making paradigm. The task required target trailing by following the movement of the target. Participants performed both the EEfRT and SG tasks in a within-subject design. Using computational modelling, we show that effort-cost induced by the variability of task demands in the SG is similar to the existing EEfRT. The effort cost also appeared as a stable trait across individuals in the two tasks. As a result, we propose using computational models as an indirect measure of cognitive effort.

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12:00-1:00 pm (1059)

To the Moon! The Effects of Sudden Windfall on Value-Based Decision-Making. MING-RAY LIAO, ASTIN C. CORNWALL, BRIAN ANDERSON, and DARRELL WORTHY, *Texas A&M University* – Reward learning is critical for adaptive behavior and has been captured by models such as the delta rule and

decay rule. Some more fortunate souls have the privilege of benefiting from an unexpected windfall like a rise in stock or cryptocurrency values or winning the lottery, but how this affects choice preference is unclear. We adapted a binary-outcome choice task where participants selected between A (.65) vs. B (.35) on 100 trials, or C (.75) vs. D (.25) on 50 trials, during training (reward probability in parentheses), before experiencing novel combinations (e.g., AC) in a test phase without trial-by-trial feedback. Rewards were 2¢ in both phases. Half of participants then performed a choice task in which A(0) and Z(1) were paired where the reward for Z was much larger (\$1.50); such trials continued until participants chose Z four times. Finally, all participants repeated the test phase. We expected the AZ trials to devalue A, but we instead observed an overvaluation of A and devaluation of B in the final test phase. Our effect can be understood through stimulus sampling theory where all visual elements are associated with reward, and that the overvaluation of A caused a devaluation of B.

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12:00-1:00 pm (1060)

Preference for Control Is Consistent Across Outcome Magnitudes and Probabilities of Success. ERIC C. CHANTLAND and SUSAN M. RAVIZZA, *Michigan State University* – Control has been argued to be inherently rewarding, implying it is uncorrelated with outcomes. However, control is not always sought and can be undesirable if it is maladaptive to be in control. Control may simply be a means of obtaining an outcome. We investigated if control preference varies with reward outcome magnitude as well as if control preference is driven by inflated perceptions of success. We found that varying the reward outcomes did not alter control-seeking behavior, suggesting that control is preferred no matter the desirability of the goal. Additionally, even when altering probabilities of success, participants showed a clear preference for control which was not explained by an inflated perceived ability. This suggests that control is rewarding in itself and not preferred because it is a strategy.

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12:00-1:00 pm (1061)

Sensation Seeking, Size of Group, and Delay Predict Choices to Gather in Groups During the COVID-19 Pandemic. REBECCA B. WELDON, *SUNY Polytechnic Institute*, ELIZABETH LETSOU, *Williams College*, CHRISTINE AN, *The George Washington University*, PHILIP T. DUNWOODY, *Juniata College* – Humans tend to discount rewards occurring in the future and instead opt to receive a reward that brings immediate gratification. During the COVID-19 pandemic, people have been faced with temporal choices about social gatherings—whether to gather “now” versus delay the gathering until it is safer. In the present study, participants answered delay discounting questions (gathering now versus later) about gathering during the pandemic. We manipulated the type of gathering (e.g., family, friends), size of the group, and length of the delay until people could gather safely. We found that as the delay increased, participants were more likely to opt for the immediate gathering. Participants higher in sensation seeking were more





likely to choose the immediate gathering. As the number of people in the group increased, participants were more likely to opt for the delayed gathering. Findings will be discussed in the context of prior delay-discounting studies that examine monetary choices.

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12:00-1:00 pm (1062)

Will Lie for Money: The Impact of a Reward on Deceptive Response. SCOTT MEEK and JONATHAN CONRADY, *University of South Carolina Upstate*, MICHELLE C PHILLIPS-MEEK, *Limestone University* – The current study attempted to explore if the promise of a monetary reward and anonymity would create organic deceptive behavior in participants. Thirty-six participants engaged in a competitive assessment, believing that an opponent (confederate) is competing against them to achieve a faster completion time to win a \$10 reward. Subjects were randomly assigned to either an anonymous condition or a nonanonymous condition. Following the assessment, participants were initially shown to be slower than the opponent. They were then shown an error screen followed by the initial results screen being presented again, but with the relevant completion times switched. Participants were given the option to agree to a new, faster time (i.e., lie to win) or disagree (i.e., remain honest but lose the monetary reward). Response time (RT) was recorded during the decision-making process. A significant effect was found on choice of deception, in that monetary reward increased choice of deception across all conditions. Furthermore, RT was significantly longer for participants who told the truth. The current paradigm was successful in creating organic deceptive behavior; however, anonymity did not significantly impact deceptive behavior.

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12:00-1:00 pm (1063)

Withdrawn

12:00-1:00 pm (1064)

Directed Exploration Involves Deciding Not Just Whether, But Also When to Explore. JACK DOLGIN and WOUTER KOOL, *Washington University in St. Louis*, ROBERT WILSON, *The University of Arizona*, WOUTER KOOL, *Washington University in St. Louis* – Big or small, most decisions incorporate the tradeoff between exploration and exploitation—whether to take advantage of what we know to be good, or to take a chance on something new. Recent research suggests we make this choice via a combination of stochasticity and directedness, and that the directedness involves prioritizing lesser-seen options. Through a series of multiarmed bandit experiments, we extend this conceptualization of directed exploration to incorporate opportunistic choice in dynamic decision contexts. Participants chose between two bandits and, replicating prior work, explored undersampled bandits more when more future trials remained, because there was increased strategic value in learning about those choice options. Crucially, however, on each trial they chose one bandit by multiplying and the other bandit by adding two randomly selected digits. We found that people seized the context

to opportunistically explore, such that they were more likely to pass on the multiplication bandit for a hard problem when more subsequent trials remained. The results echo recent machine-learning work on “cross-learning” but in humans and suggest directed exploration reflects not just whether, but also when to explore.

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12:00-1:00 pm (1065)

The Effect of Motivation on Placekeeping Performance After One Night of Sleep Deprivation. ELLE M. WERNETTE, ERIK M. ALTMANN, and KIMBERLY M. FENN, *Michigan State University* – Sleep deprivation impairs some higher-order cognitive processes, such as procedural placekeeping, or the ability to execute a sequence of steps in order without repetitions or omissions. However, in this and other cases, it is unclear if this is due to impaired ability or impaired motivation to perform the task. To address this question, we conducted what to our knowledge is the first remote, online sleep deprivation study. Participants joined a Zoom meeting in the evening and completed the UNRAVEL placekeeping task. Then, we randomly assigned participants to the Rested or Deprivation condition. Rested participants left the meeting at 00:00 to sleep and returned at 08:30; Deprivation participants stayed awake in the meeting for the entire study. At 08:30, all participants completed UNRAVEL again. Some Deprivation participants had the opportunity to earn a monetary reward based on their morning performance (Motivated) and some did not (Nonmotivated). Preliminary results suggest Motivated participants performed better than Nonmotivated participants in the morning. If these results converge in the full data set, they would suggest motivational interventions can help mitigate the effects of sleep deprivation.

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12:00-1:00 pm (1066)

Eye Contact Induces Overevaluation of Expected Reward Value in Reinforcement Learning. MITSUHIKO ISHIKAWA and SHOJI ITAKURA, *Doshisha University* – Eye contact has been suggested to facilitate social learning. Recent studies have shown that physiological responses are enhanced during making eye contact, suggesting that eye contact may induce expectations of later rewarding events. Here, we examined how eye contact affects expected reward value using the reinforcement learning paradigm. Forty adults were recruited and underwent pupil size measures and performed a two-armed bandit task. After that, the two-armed bandit task was conducted with 70% and 30% of reward probabilities for each option. During the two-armed bandit task, a female showing direct gaze (DG) or closed eyes (CE) was presented from the start of each trial. Results showed that behavioural bias to choices with 70% reward probability was increased in DG condition than CE condition. In the DG condition, the behavioural probability of choices with 70% rewards was significantly higher than the expected reward value (70%). These results suggest that participants overevaluated the expected reward value in DG condition. Eye contact may enhance reward expectations and affect behavioural choices.

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12:00-1:00 pm (1067)

Withdrawn

12:00-1:00 pm (1068)

Reinforcement Learning In and Out of Context: The Effects of Attentional Focus. WILLIAM M. HAYES and DOUGLAS M. WEDELL, *University of South Carolina* – Reinforcement-learning (RL) agents learn action values in a context-dependent fashion. Here, we tested the effect of attentional focus on context dependence in RL. In the learning phase, participants chose between two (Experiment 1; $n=111$) or three (Experiment 2; $n=90$) options per trial and received complete feedback. Choice options were grouped in stable contexts so that only a small set of the possible combinations were encountered. One group of participants occasionally rated how they felt about options (Feelings condition) and another group reported how much they expected to win from options (Outcomes condition). A third group served as a Control condition. In a subsequent transfer test, participants chose between all pairs of options without feedback. There were no group differences in the learning phase, but transfer performance was highest in the Outcomes condition. Feelings depended heavily on context, whereas expected outcomes were more sensitive to global values. Transfer choices revealed irrational preferences resulting from a reliance on context-dependent values. The data were best explained by a hybrid RL model which assumes the encoding of both absolute and relative feedback.

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12:00-1:00 pm (1069)

Continued Influence of False Political Accusations After Correction. MICHAEL S. COHEN, VICTORIA HALEWICZ, THOMAS HOGEBOOM, and JOSEPH W. KABLE, *University of Pennsylvania* – Misinformation has persistent effects on causal inference and affective evaluations even after being corrected. In politics, accusations of scandal have negative effects on candidate evaluations even when proven false, benefitting unscrupulous politicians willing to spread misinformation about an opponent. The continued influence effect on political judgments has previously been demonstrated between participants with a small stimulus set, limiting the ability to draw inferences about cognitive and neural mechanisms. We developed a novel set of 36 hypothetical politicians, based on real candidates falsely accused of misconduct (e.g., sexual harassment, racism, embezzlement), with information presented as social media posts. We find a robust continued influence effect on global ratings measured immediately after presentation of the stimuli. We also find continued influence of corrected misinformation in later binary vote choices. Finally, memory (d' with log-linear correction) is better for accusations than for corrections or neutral control stimuli, implying that accusations form especially distinct memory representations. Future work will address how misinformation influences reward-related neural measures of candidate impressions.

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12:00-1:00 pm (1070)

Explicit and Implicit Devaluation Effects of Food-Specific Response Inhibition Training. LOUKIA TZAVELLA and CHRISTOPHER D CHAMBERS, *Cardiff University* – The devaluation of reward-associated cues in our environment is a promising avenue for interventions that target behaviours which may be incompatible with health-related goals. Over two preregistered experiments we investigated whether training individuals to inhibit motor responses towards energy-dense foods would be associated with reduced stimulus evaluations after training. This devaluation effect was examined using both explicit (ratings) and implicit measures (affective priming paradigm). Participants completed go/no-go training with stimuli that were consistently paired with either responding (go) or inhibiting a response (no-go). In Experiment 1 we observed small-to-medium devaluation effects for no-go foods compared to go and untrained items, both in terms of ratings and priming effects. In Experiment 2 we replicated these findings, except for the implicit devaluation of no-go foods relative to untrained items. The experiments also indicated that the priming effect for no-go foods was close to zero, which suggests that affective priming measures could help us elucidate the mechanisms of action behind training-induced devaluation effects (e.g., negative affect attached to inhibition-associated stimuli during training).

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12:00-1:00 pm (1071)

Stimulus Complexity Affects Learning-Rate Asymmetry in Experience-Based Risky Decision-Making. YI-HSIN SU, *Academia Sinica* – Experience-based risky decision-making involves updating the internal values of and decisions between risky options. Visual stimuli, serving as mimics of options in the laboratory, could have a wide variety of perceptual properties. It is unclear how perceptual properties of stimuli could affect decision-making processes. In the present study, we employed stimuli with different stimulus complexity, implemented by manipulating verbalizability and perimeter complexity, to the same risky decision-making task performed by groups of healthy human participants. Computational models of reinforcement learning were then applied to the choice data to estimate the positive and negative learning rates of each participant. We found that participants in the low stimulus complexity groups showed larger negative learning rates than the positive ones, which could be attributed to risk aversion. However, in the high stimulus complexity groups, the learning-rate asymmetry vanished. Taken together, our results reveal an observable effect of stimulus complexity on risky decision-making and suggest that increasing stimulus complexity may shift one's decision attitude from being risk-averse to risk-seeking.

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12:00-1:00 pm (1072)

Reward Accelerates the Preparation of Goal-Directed Actions. TYLER J. ADKINS and TARAZ G. LEE, *University of Michigan* – People's goals often conflict with their habits, leading people to perform worse than desired. Research shows people are





better at overcoming their habits and achieving their goals when they are motivated by the prospect of reward. However, it is not known whether expected reward leads to improved performance via the inhibition of habits, the facilitation of goals, or a mixture of both. We addressed this using forced-response conflict tasks and a probabilistic response preparation model that dissociates the preparation of habitual and goal-directed actions. Across three experiments, we find evidence that reward accelerates the preparation of goal-directed actions. In a context with conflict, reward differentially affects the preparation of habitual and goal-directed actions. In particular, we find that reward accelerates the preparation of goal-directed actions, while the preparation of habitual responses was slowed or unaffected by reward. However, outside of the context of conflict, reward globally accelerates the preparation of both habitual and goal-directed actions.

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12:00-1:00 pm (1073)

The Construction and Use of Cognitive Maps in Model-Based Control. ATA B. KARAGOZ, ZACHARIAH M. REAGH, and WOUTER KOOL, *Washington University in St. Louis* – When making decisions, people can use habit or they can expend effort to use internal models to plan toward goals. Recent work formalizes the distinction between these two systems using model-free and model-based reinforcement learning. This formalization has led to considerable progress in understanding how people use goal-directed control to plan their actions using cognitive maps. However, it remains largely unknown how they construct these representations of task structure. Here, we take a behavioral representational similarity approach to gain insight in this process. Participants (n=103) performed a two-stage decision-making task that dissociates between model-based and model-free choice. To get an implicit measure of their internal representations of task structure, participants judged the relatedness of pairs of novel abstract stimuli that represent the choice options both before and after the choice task. Participants whose relatedness ratings reflected the task's action-outcome contingencies exerted more model-based control during the two-stage task, suggesting they formed more accurate cognitive maps. Our results shed light on how learning, motivation, and decision making interact during cognitive map formation.

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12:00-1:00 pm (1074)

The Sin and the Sentence: Comparing Rule Implementation via the Cognitive Costs of Breaking COVID-19 and Everyday Rules. PHILIPP SCHMITT, KATHARINA SCHADE, and CHRISTINA U. PFEUFFER, *Albert-Ludwigs-Universität* – The human cognitive system retrieves and follows rules by default. Thus, rule-breaking comes with significant cognitive costs, leading, for instance, to prolonged initiation and movement times. Here, we tested the implementation of COVID-19 rules (January 2021, Germany) by comparing participants' rule-following and rule-breaking of COVID-19 (access with mask) and everyday (access prohibited) rules. Participants moved their mouse to one of two target areas

fast and accurately to gain rewards, deciding on each trial whether to cross or circumvent a rule-restricted area. For both rule types, rule-breaking was associated with increased initiation and movement times. However, increased initiation times and decreased movement times for COVID-19 compared to everyday rules were observed. Furthermore, COVID-19 rule breaks appeared to be more strongly affected by reward magnitude than everyday rule breaks. Thus, only recently implemented COVID-19 rules affect our behavior similarly to everyday rules but are nonetheless uniquely influenced by potential rewards.

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12:00-1:00 pm (1075)

The Role of Multimodal Processing in Understanding Comics. JOSEPH P. MAGLIANO and DANIEL FELLER, *Georgia State University*, LESTER C. LOSCHKY, *Kansas State University*, NEIL COHN, *Tilburg University* – The present study explores the relative roles of visual and linguistic modalities in the construction of mental models. An independent contribution hypothesis states that visual and linguistic modalities both independently contribute to the mental model. Conversely, the integrated impact hypothesis states that both sources of information are processed in a linguistic-like manner, are highly interactive, and ultimately contribute to a single representation. In all experiments, participants viewed comic strips, and the presence and order of the text and images in the comics were independently manipulated. All comics had a textless final panel with a character showing an affective release. Viewing times and judgments of coherence of the comics were recorded. Viewing times supported the integrated impact hypothesis, such that any disruption to the narrative was equally detrimental to the ease of processing. Conversely, the coherence judgments were more consistent with the independent contribution hypothesis.

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12:00-1:00 pm (1076)

Whom to Trust and What to Believe: Effects of Epistemic Cognition, Political Ideology, Information Sources, and Tentative Language. REESE BUTTERFUSS, *Arizona State University*, VICTORIA JOHNSON, *University of Minnesota* – Individuals encounter information about vaccines from different sources that vary in epistemic orientations. These factors may differentially influence belief in the information and trust in information sources. We examined how different information sources (i.e., conservative vs. liberal media vs. scientific sources) and hedged language (i.e., certain vs. hedged) interacted with individuals' epistemic beliefs and political ideologies to influence their belief in vaccine information and trust in sources. The findings revealed different patterns of belief and trust among liberals and conservatives. Specifically, liberals believed and trusted scientific sources more than partisan media, whereas conservatives believed and trusted conservative media as much as they did scientific sources. Additionally, individuals with a lower epistemic belief in justifying knowledge by personal opinion reported higher belief and trust in scientific sources, whereas individuals with higher justification by personal opinion believed and





trusted conservative media more. These findings suggest that complex interactions between partisanship, epistemic cognition, and source information in part determine belief and trust of vaccine-related claims.

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12:00-1:00 pm (1077)

OK, Boomer: Do Intergenerational Stereotypes Reduce Perceived Common Ground? MIJA VAN DER WEGE, RACHEL BLOCK, LAUREN CAROTHERS-LISKE, REBECCA FOX, MIRIAM FREEDMAN, NISHA RAO, and JORDAN M. NAVARRO, *Carleton College* – Perceptions of common ground can affect judgments of how effective communication is or will be. People rate ambiguous communication with friends or spouses as more likely to be successful than with strangers, even though actual understanding did not differ (Savitsky et al., 2012). This closeness-communication bias has been observed in communication in friends, minimal groups, and individuals who have only engaged in a brief text exchange (Van Der Wege et al., 2021). Prior research found no effects of group membership in different college communities on ratings of predicted and perceived conversation effectiveness. Intergenerational communication can be influenced by stereotypes about the age group and thus influence the predicted and perceived satisfaction of the conversation (Anderson et al., 2005). The current studies investigate whether members of different generations (i.e., baby boomers vs. generation Z) might rate communication effectiveness higher when listening to members of their own generation produce ambiguous statements.

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12:00-1:00 pm (1078)

Individual Differences Influence the Timing of Dispreferred Turns in Conversation. JULIA B. MERTENS, LILY FORMAN, and JAN P. DE RUITER, *Tufts University* – Conversationalists delay socially dispreferred turns, or verbalizations that do not emphasize social solidarity. However, we know little about individual differences in this delay. People with greater social power or who are less sensitive to social norms may initiate dispreferred turns earlier. We analyzed whether majority group affiliation and autism spectrum symptoms predicted shorter delays. We recruited 28 Asian and Caucasian undergraduates at Tufts University. Each of the 14 dyads participated in two conversations, in one quiet and one noisy environment. We identified all clarification requests (e.g., “What?”), as these indicate inattention or poor communication and are therefore dispreferred. Our outcome variable was the time between the previous turn and the clarification request. Predictor variables included gender, ethnicity, scores on the Autism Spectrum Quotient Short Form (AQ-S; Hoekstra et al. 2011), and control variables. Interlocutors requested clarification earlier when they scored higher on the AQ-S ($B = -86\text{ms}$, $95\%CI = -156\text{ms} - -16\text{ms}$), or were Caucasian ($B = -203\text{ms}$, $95\%CI = -432\text{ms} - 26\text{ms}$) or male ($B = -233\text{ms}$, $95\%CI = -453\text{ms} - -13\text{ms}$). Individual differences can influence when people initiate dispreferred turns.

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12:00-1:00 pm (1079)

Examining the Link Between the Cohesion of Individuals’ Language and Creativity. LAUREN E. FLYNN, *University of New Hampshire* – Trait creativity has been shown to be related to individuals’ performance on a number of linguistic tasks, such as think-alouds and written essays. However, little work has specifically examined how individual differences in creativity manifest in the characteristics of this discourse. The purpose of the current study was to examine relations between individual differences in divergent thinking skills and the structure (i.e., cohesion) of individuals’ language. Participants ($n=75$) completed two writing tasks: 1) a think-aloud designed to tap into their stream of consciousness and 2) a diary entry intended to measure a more structured writing style, devoid of outside source material. Participants then completed the Alternate Uses Task (AUT), which provided a measure of their divergent thinking skills. Results indicated that AUT scores were positively related to the cohesion of individuals’ think-alouds and diary entries, suggesting that individuals with higher divergent thinking skills generated writing that was more connected and on-topic. Overall, these results provide preliminary evidence that creativity benefits linguistic performance because it serves to improve the coherence and structure of individuals’ ideas.

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12:00-1:00 pm (1080)

The Context of Politeness Perception. ELISE L. DUFFAU and JEAN E. FOX TREE, *University of California, Santa Cruz* – We compared politeness perceptions across social and nonsocial tasks. In Experiment 1 we tested the perception of positive and negative politeness in a nonsocial task. Positively polite requests were perceived as more positively polite (working with and appreciating the hearer) than negatively polite (respecting the hearer’s freedom), while negatively polite requests were not distinctly perceived as either negatively or positively polite. In Experiment 2, we tested a social context. Here, negatively polite requests were seen as more negatively polite than positively polite, while the positively polite requests showed no distinction. We also found that the more complex a response the social request elicited, the greater distinction in the perception of positive and negative politeness. In Experiment 3, we tested more examples of positive and negative politeness in social and nonsocial contexts, and we found that the general politeness perception trends were consistent with Experiments 1 and 2.

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12:00-1:00 pm (1081)

How Modality Switching Affects Social Presence and Emotional Connection. VANESSA Y. OVIEDO and JEAN E. FOX TREE, *University of California, Santa Cruz* – Switching from one communicative modality to another, such as from talking to texting, has become increasingly common in interpersonal communication. Does the way people first interact affect how present and connected they feel with others? Participants first met via either an audio or a messaging modality, then switched to the other modality. Dyads who met first via messaging did not rate social presence and emotional





connection differently from those who met first via audio. However, the more socially present a person felt, the more willing they were to meet their partner again and become potential friends. Data also demonstrates that social presence and emotional connection are correlated.

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12:00-1:00 pm (1082)

Perspective-Taking in the Comprehension of Spatial Demonstratives. MICHAEL LONG and MICHAEL P. KASCHAK, *Florida State University* – Spatial demonstratives (SDs; e.g. “this” and “that”) can refer to objects in space while discriminating them from other objects. Works in language production suggest that choice between a proximal or distal SD is determined by whether a referent is within or beyond the speaker’s reach, or their peripersonal space. However, in collaboration, speakers show a preference for the comprehender’s space, suggesting perspective-taking in the production of SDs. Little is understood about the comprehension of SDs and the perspective taken by a comprehender. Comprehension has been found to be facilitated when proximal SDs refer to any space between the speaker and listener and distal SDs refer to objects outside that space. It remains unclear, however, if comprehension of SDs vary when discriminations must be made between items within the shared space. The current study aims to determine if comprehension of SDs depends on the relative location of a partner. A virtual confederate was positioned at a table with the participant that used SDs to refer to objects that subsequently appeared on the table. Reaction times in object identification revealed that comprehension of SDs involve taking the perspective of the speaker to locate a referent.

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12:00-1:00 pm (1083)

Withdrawn

12:00-1:00 pm (1084)

What Do You Remember? Divided Attention and Memory for Past Referents. MORGAN THORPE and ANU SUBRAMANIAN, *The University of Iowa* – It is well established that speakers have better memory of past referents compared to listeners because they may invest more cognitive effort into language planning than listeners. Less explored is whether this speaking benefit of memory can be extended even when attention is divided while speaking. In the current study, participants played the role of speaker or listener in a referential communication task. We manipulated participants’ attention using a dual-task (phonology taboo task). In the attention-divided group, participants were asked to describe target images without the use of certain sounds. In the control group, participants freely described target images. After the communication task, participants completed a memory test for the past referents. The results show that speakers produced fewer modifiers in the attention-divided group than in the control group in the communication task. In the memory test, participants remembered past referents better when speaking vs. listening for both groups, although the overall accuracy was lower in

the attention-divided group. The research replicates speaking benefits of memory in conversation and provides new insight into the role of cognitive resources in language production.

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12:00-1:00 pm (1085)

Processing of Irony in Text: A Systematic Review of Eye-Tracking Studies. HENRI OLKONIEMI, *University of Oulu*, JOHANNA K. KAAKINEN, *University of Turku* – Theoretical models of irony comprehension pose different hypotheses about the time-course of resolving ironic interpretation of an utterance, and they propose several context-, phrase- and reader-related factors that influence the ease or difficulty of processing irony. In recent years, these factors have been increasingly examined using eye tracking, which allows a detailed analysis of time-course of reading processes. In this paper, we present a meta-analysis of the eye-tracking studies in a standard case of irony and then present a systematic review of the factors that have been shown to influence the time-course of irony processing. The review will point to future directions in how eye tracking could best be applied to further develop the current theoretical views.

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12:00-1:00 pm (1086)

Malleability of Source Credibility Evaluations and Knowledge Revision. VICTORIA JOHNSON, *University of Minnesota*, REESE BUTTERFUSS, *Arizona State University* – Evaluations of source credibility are malleable. However, we have a limited understanding of how changes to a source’s credibility influence knowledge revision. In the current experiment, we examined how text structure (refutation vs. nonrefutation) and updates to source credibility (high-credibility vs. low-credibility vs. neutral/no change) influenced knowledge revision and credibility evaluations. The results indicate that when readers engaged with refutation texts, knowledge revision was stronger when information came from high-credibility sources and weaker from low-credibility sources. Additionally, readers rated high-credibility sources as more credible in the refutation condition than in the nonrefutation condition, but credibility ratings for low-credibility sources did not differ between text conditions. Taken together, these findings suggest that corrections from sources that are later revealed to be high-credibility facilitate both revision of prior knowledge and credibility evaluations. These findings shed light on the malleability of readers’ source representations and the conditions that influence this malleability.

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12:00-1:00 pm (1087)

The Impact of Modality, Coherence Breaks, and Individual Differences on Bridging Inferences. DANIEL FELLER, *Georgia State University*, JOHN HUTSON, *Educational Testing Service*, MI’KAYLA NEWELL, DIMITRI WING-PAUL, VIRGINIA TROEMEL, ELIZABETH TIGHE, KATHRYN MCCARTHY, and JOSEPH P. MAGLIANO, *Georgia State University* – This





study explored bridging inferences in the context of reading texts and viewing picture stories. Understanding narratives requires bridging inferences. Bridging establishes that explicitly conveyed events are causally related. In the context of coherence breaks, they involve inferring missing events that establish how the explicit events are connected. Participants thought aloud while reading and viewing stories. Target locations were selected that required bridging inferences such that an event needed to be explained in terms of the prior discourse context. The presence of the immediately prior event that provided the causal antecedent was manipulated. We also measured individual differences in vocabulary knowledge and picture vocabulary (i.e., accessing lexical items in response to pictures). Results indicated that participants were more likely to mention the causal antecedent in the picture versions than the text-based versions. Individual differences in vocabulary moderated the production of the bridging event, but only in the context of text.

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12:00-1:00 pm (1088)

With a Little Help from your Friends: Investigating the Influence of Common Ground on Memory for Conversation Using an Online Referential Communication Paradigm.

DANIEL R. NAULT, *Queen's University*, ROHIT N. VOLETI, *Arizona State University*, MATTHEW R. NICASTRO, and KEVIN G. MUNHALL, *Queen's University* – Common ground is an essential aspect of efficient conversation (Clark & Brennan, 1991). Interlocutors require some level of mutual knowledge to build their conversation without restating redundant information. Common ground formation also has been shown to relate to one's recognition memory for structured conversational content (McKinley et al., 2017). Here, we investigate multiple layers of common ground and their influence on memory for conversation in a series of studies using an online version of the referential communication task (RCT; Krauss & Weinheimer, 1966). Dyads formed common ground for images of basic object categories (Study 1) and human faces (Studies 2 and 3) while interacting over Zoom, and their recognition and recall memories were tested. Task-irrelevant and task-relevant common ground were varied, such that some pairs were friends or some stimuli were introduced in a thin-slicing task prior to the RCT. We use verbatim recall and natural language models of semantic similarity to measure recall performance. Friends are shown to form significantly better common ground for images than strangers. Results are discussed in relation to the impact of different levels of common ground on memory for conversation.

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12:00-1:00 pm (1089)

Withdrawn

12:00-1:00 pm (1090)

Development of Regret and Disappointment: Identification and Labeling. MARIANNE HABIB and CAROLINE BEAUVAIS, *Paris 8 University*, CORENTIN J. GOSLING, *Paris Nanterre*

University, SABINE GUERAUD, *Paris 8 University* – Emotional development relies on the development of emotional concepts and emotion labels. We examined third-fifth grade children's ability to label and identify regret and disappointment (i.e., choosing an emotional label or reporting an emotional intensity among a preestablished list of emotions). Sixty-one third-grade children, 63 fourth-grade children, 71 fifth-grade children, and 80 adults (18-30 years) read short stories (116 words on average) designed to elicit sadness, anger, shame, guilt, disappointment, and regret. We assessed emotion labeling by asking participants to label the emotions felt after each story, and we assessed emotional identification through the reporting of the intensity with which they felt listed emotions. Children identified disappointment at 8-9 years and regret at 10-11 years. However, regret and disappointment labeling remained rare at 10-11 years. Our results indicate that the identification of these emotions precedes their labeling and show a developmental increase in regret and disappointment recognition from third to fifth grade.

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12:00-1:00 pm (1091)

Dynamic Neural Mechanisms Associated with Metaphor Generation for Visual Stimuli.

ASUKA TERAI, *Future University Hakodate*, JUNICHI CHIKAZOE, TAKA AKI YOSHIMOTO, and NORIHIRO SADATO, *National Institute for Physiological Sciences*, KOJI JIMURA, *Keio University* – Humans create new meanings in response to external stimuli by forming internal representations and metaphor could be regarded as linguistic expression of the representation. The present study examined neural dynamics during the metaphor generation for visual stimuli. During fMRI scanning, human participants were presented a color or black-and-white ink-blot image that could be rotated by pushing a button. They were asked to freely describe the image and to make vocal responses in the scanner. The explanations generated were classified by two raters into literal or metaphorical explanations. In imaging analysis, fMRI signal was first extracted for each of the time windows before the response, allowing the analysis of temporal change in brain activity that preceded explanation generation. The interaction effect of response types (metaphorical > literal) and temporal change was observed in the left middle and superior frontal gyri and the bilateral middle temporal gyrus. These findings are related to neuroscientific evidence on semantic cognition. This work was supported by JSPS KAKENHI Grant Number 19K12121, JP16H06280 and the Cooperative Study Program (21-542) of National Institute for Physiological Sciences.

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12:00-1:00 pm (1092)

Comparing Syntax Processing in Different Language Learners: A Dialogue Sentence Production Study of L1 Child Speakers and L2 Adult Speakers.

SOPHIE M. HARDY, EMA USHIODA, and KATHERINE MESSENGER, *University of Warwick* – We investigated syntax processing in different language learners in order to develop a more unified understanding of language development. We recruited 60 participants per five speaker





groups that vary in age, language background, and proficiency (data collection to be completed in October 2021): L1 English adults, L1 English 3-4-year-olds, L1 English 7-9-year-olds, L2 English low-proficiency adults, L2 English high-proficiency adults. Participants completed a dialogue priming task in which they alternated describing pictures of transitive verb events with the experimenter. The experimenter described their prime picture according to a script (active vs. passive syntactic structure): we measured the likelihood of the participant repeating the prime syntax when describing their subsequent target picture. Preliminary group comparisons indicate that lexically independent priming increases with language proficiency, but that lexically dependent priming increases with age. This supports accounts in which different mechanisms contribute toward different priming effects during sentence production and suggests that these same mechanisms underlie language processing and learning across a diverse range of speakers.

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12:00-1:00 pm (1093)

Withdrawn

12:00-1:00 pm (1094)

Solving the Cyclic Naming Problem. CHANNING E. HAMBRIC and PADRAIG O'SEAGHDHA, *Lehigh University* – Semantic interference in cyclic picture naming could be due to controlled selection processes, to incremental learning, or to both. To test for incremental learning, we assessed transfer of interference (relative to condition specific baselines) across taxonomic and problem-solving testing phases. In the problem-solving condition, participants were tasked to discover the relation among thematically related items during cyclic naming. We examined transfer from taxonomic to problem solving phases (Experiment 1) and problem solving to taxonomic phases (Experiment 2) by migrating items across the phases. Interference during problem solving, especially when tested first, suggested that it can occur when the relation among items is unknown. Migrated items did show clear repetition benefits, but there was no evidence of cumulative interference across contexts in either direction. These findings suggest that semantic interference in cyclic naming does not yield net incremental learning.

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12:00-1:00 pm (1095)

Speech Production Is Affected by Manipulating Stress Mindset. JESSICA BAYNARD-MONTAGUE, LORI JAMES, and JASMIN PANIQUE, *University of Colorado Colorado Springs* – Stress mindset interventions can improve people's reactions to stressors (Crum et al., 2017; Jamieson et al., 2018). The current study examined if a manipulation designed to influence people's mindsets about stress can impact their speech production abilities. Specifically, the study tested the hypothesis that people who are primed to identify stress as positive (stress-is-enhancing group) would perform better on a difficult speech production task than those primed to identify stress as negative (stress-is-debilitating group). Independent groups

t-tests showed that people in the stress-is-enhancing group adopted a faster speech rate, but did not commit more speech errors, than those in the stress-is-debilitating group. In other words, individuals in the stress-is-enhancing group were better able to react to the difficult speech production task. Results confirm that teaching people to perceive their body's reaction to stressors as energy that benefits performance can improve language production.

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12:00-1:00 pm (1096)

Agreement Errors and Language Production Processes: Building a Taxonomy of Error Types from Spontaneous Speech Data. JOHN ALDERETE, *Simon Fraser University*, MELISSA BAESE-BERK, *University of Oregon* – This work examines agreement errors and proposes a taxonomy of error types that connects observed error patterns with explicit language production processes. Prior experimental research has modeled agreement errors as the mis-assignment of morpho-syntactic features in grammatical encoding. The current account builds on these models by investigating 700 agreement errors collected from spontaneous speech in English conversations. The open-ended nature of the study allows examination of both well-studied agreement patterns (number in subject-verb agreement and pronoun agreement) and other understudied constructions (determiner-noun agreement, auxiliary verb form, non-finite verbs, and pronominal case) and grammatical features (person and tense). Parallels between experimental and naturalistic findings provide validation of prior analyses that model errors in function assignment, inflection, and constituent assembly, while mismatches suggest new approaches to agreement gone awry.

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12:00-1:00 pm (1097)

Syllable Similarity in Mandarin Chinese Production. MO CHEN, *Lehigh University*, YU LU, *Rice University* – Languages vary in the first retrieved, proximate phonological units of production. For example, the well-known phoneme similarity effect is consistent with the primacy of phonemes in English. Here, we propose that the precedence of syllables in Chinese languages yields a distinct syllable similarity effect. Participants produced Mandarin disyllable word pairs that varied in the similarity of their first syllables, in a random order directed by arrow cues. This cued word-order procedure requires the words to be (re)generated from memory immediately before speaking. RT and error analyses provided evidence of increased difficulty in producing word pairs with similar initial syllables (e.g., 杀菌 (sha.jun)- 山庄 (shan.zhuang)). We argue that this effect is intrinsically syllabic and cannot be reduced to a phoneme level explanation. The syllable similarity effect bolsters the case for the primacy of syllables in Chinese language production.

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12:00-1:00 pm (1098)

Passing or Handing It Along: Replicating Transfer of Verb Bias Learning Between Semantically Related Verbs.





AMANDA C. KELLEY, and GARY S. DELL, *University of Illinois Urbana-Champaign* – Verb biases are tendencies for verbs (e.g., dative verbs such as “hand”) to appear in particular sentence structures (e.g., hand something to somebody) more frequently than in alternatives (e.g., hand somebody something). Verb biases are learned from experience, and previous work suggests that learning a new bias for a verb like “throw” transfers to semantically related verbs like “toss.” The current study replicates these results with a new set of verbs. As in previous work, participants learned new biases for particular verbs. For example, participants completed sentence stems using “hand,” which were designed to encourage production of a double object dative. Participants also learned new biases for transitive verbs like “chop,” which were biased toward active or passive structures. After this training, participants produced sentences that allowed them to choose the structure. These sentences could use trained verbs like “hand” or “chop,” or they could use untrained verbs like “pass” or “slice,” allowing for an assessment of training and generalization. We will present this data, as well as a connectionist model that learns to map between semantic representations of verbs and structural choices in an attempt to simulate the data.

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12:00-1:00 pm (1099)

Spanish Readers Signal Hierarchical Metric Structure in Spoken Productions of ‘El Gato Ensombreado,’ a Spanish Translation of Dr. Seuss’s ‘The Cat in the Hat’. MARA BREEN, SHEYLA GARCIA, LUPE ANTONIO LOPEZ, AHREN B. FITZROY, and GENEVIEVE FRANCK, *Mount Holyoke College* – Children’s books, especially those for early readers, often are written with predictable metric and rhyming structure. We investigate how 13 adult Spanish speakers produce this structure in “El Gato Ensombreado,” a Spanish translation of Dr. Seuss’s “The Cat in the Hat” (1957), written with a consistent endecasílabo (10-syllable) metric structure and a regular rhyme scheme. Using linear mixed-effects regression, we assessed how the metric and rhyme structure—in addition to the lexical, syntactic, and semantic structure of the text—account for variation in duration, intensity, and pitch variation on each syllable. Similar to English productions of “The Cat in the Hat,” Spanish readers consistently signal a hierarchical metric structure, where higher metric strength is cued by longer duration, increased intensity, and higher pitch. In addition, other aspects of linguistic structure, including lexical frequency, syntax, semantics, and text emphasis, are signaled through prosody. These results demonstrate that metric structure is signaled similarly across lexical-stress languages, and highlight the consistent cues to linguistic structure encoded in children’s literature.

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12:00-1:00 pm (1100)

Eliciting Authentic Prosodic Cues in Lab Speech. MICHELLE PERDOMO and DUANE WATSON, *Vanderbilt University* – Prosodic cues are useful for deciphering the meaning of spoken language. However, it is difficult to capture naturalistic speech in the lab that is likely to elicit authentic prosodic information. Previous

studies have found that speakers use increased duration and higher pitch (e.g., blue angel and GREEN angel) to contrast elements in a discourse. In this study, we developed a new elicitation method for collecting natural speech. We invited two participants to play a matching game using 24 tiles that were facedown. The object of the game was to match the images on the other side of the tiles by indicating to the researcher which tiles to turn over. The tiles had shapes of different colors on the visible side. This resulted in utterances in which participants either contrasted two colors (adjective-focus; blue square v. red square), two shapes (noun-focus; red star v. red square), or two completely different objects (new-focus; blue star v. red square). We find that speakers employ a combination of acoustic cues to denote contrast and that investigation of temporal prosodic information is critical for prosody research. We also discuss implications for perception of speech prosody.

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12:00-1:00 pm (1101)

Investigating Inverse Frequency Effects in Attention, Action, and Language. AMY LEBKUECHER and DANIEL J. WEISS, *The Pennsylvania State University* – Syntactic priming refers to the tendency to reproduce a recently produced or encountered syntactic structure. This phenomenon tends to be more robust for less frequent sentence structures, known as the inverse frequency effect, and suggests that implicit learning over long-term experience is an important component of priming. Similar implicit learning components also are featured in models of attention and action planning. To the best of our knowledge, however, no one has tested whether similar inverse frequency effects are manifest in these non-linguistic domains. We have begun to investigate this issue by presenting participants with analogous attention, motor, and language tasks that evaluate priming for high- and low-frequency response patterns. This study is part of a broader program of research that aims to better understand the similarities and differences between linguistic and nonlinguistic production biases.

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12:00-1:00 pm (1102)

Withdrawn

12:00-1:00 pm (1103)

What Is Intentional Binding Measuring?. LAURA SAAD, JULIEN MUSOLINO, and PERNILLE HEMMER, *Rutgers University* – Intentional binding (IB) is standardly regarded as an implicit measure of the sense of agency. We evaluated three alternative explanations for results from a publicly available IB experiment (Weller et al., 2020): sequential dependencies, memory, and boundary effects. Aggregate results revealed overestimation for two of the time intervals and underestimation for the third one, even after controlling for sequential dependencies. We then used summary statistics from the data as parameters in a simple Bayesian model of memory. Model simulations reproduced the behavioral data for the two longer time intervals but slightly underestimated the overestimation at the





shortest time interval. We ruled out IB since the hallmark is underestimation and propose a boundary effect as the explanation. In sum, the results from this dataset can be fully accounted for as manifestations of memory (i.e., regression to the mean) and a boundary effect with no appeal to mechanisms related to agency.

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12:00-1:00 pm (1104)

Memory-Guided Attention: Retrieval and Retention of Spatial Information of Expected Targets Embedded in Learned Soundscapes. MANDA FISCHER, MORRIS MOSCOVITCH, and CLAUDE ALAIN, *University of Toronto* – What is the relation between awareness, attention, and memory? Using EEG, we examined the neural correlates underlying expectation for a lateralized target. Participants heard 80 audio clips (half included a lateralized tone that varied in frequency) and classified the tone as high or low. A surprise test followed, in which participants responded to a lateralized tone now embedded in each audio clip. Target detection was faster for clips previously associated with the target location (memory-cue) compared to those that were not (neutral-cue). Neuro-electric activity revealed a difference in evoked response at the cue period between memory-cue and neutral-cue clips that correlated with reaction time benefits. When memory-cue trials were divided in terms of left and right, ERP lateralization was observed, suggesting that spatial information regarding target location was retained and used to guide behaviour. The results suggest that incidental memory-guided attention is possible when attention is guided toward the target at encoding. Differences in the evoked response may index the retrieval of the associate memory and the lateralization of the target, ultimately aiding real-time perception and target detection.

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12:00-1:00 pm (1105)

Aphantasia and the Use of Imagery-Based Associative Strategies. JEREMY THOMAS and JEREMY B. CAPLAN, *University of Alberta* – Interactive imagery, which is one of the most effective memory strategy instructions for remembering pairs of words, involves asking participants to form mental images during study. We examined whether individuals who report that they have no experience of mental imagery, known as aphantasics, also benefited similarly from interactive imagery instructions. Individuals who self-classified as aphantasic exhibited significantly better recall performance when asked to use interactive imagery and to the same degree as non-aphantasics ($BF < 0.3$). These results suggest that interactive imagery effects may not act primarily through the formation of visual imagery.

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12:00-1:00 pm (1106)

Similar Mechanisms Underly Execution-Based and Verbal Code-Based Stimulus-Classification But Not Stimulus-Action Associations. ANA-MARIA ROSCA, ANDREA KIESEL, and CHRISTINA U. PFEUFFER, *Albert-Ludwigs-Universität*

– Stimuli become associated with task-specific semantic classifications (stimulus-classification [S-C] association) as well as motor outputs (stimulus-action [S-A] association), facilitating subsequent fast and accurate responding for previously encountered stimuli (S-C/S-A priming effects). Both associations can be formed by both active response execution (execution-based) and by passively attending to verbal codes denoting class and action (verbal coded-based). In a large scale ($N=453$) linear mixed model re-analysis of prior studies, we correlated execution-based and verbal code-based slope parameters representing individual S-C/S-A priming effects. Although execution-based S-C priming effects were more pronounced than verbal code-based S-C priming effects, the slope parameters correlated, suggesting at least a partial overlap in the underlying mechanisms. Conversely, we found Bayesian evidence against a correlation of execution-based and verbal code-based S-A priming effects. We discuss pre-existing semantic networks as the source of joint variance/mechanisms in S-C retrieval and narrow down potential causes of verbal code-based S-A priming effects.

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12:00-1:00 pm (1107)

The Impact of Gesture on Source Memory. NAOKO TSUBOI and ASHLEY S. BANGERT, *The University of Texas at El Paso* – Prior research has shown that gestures improve problem-solving and forming associations during foreign language vocabulary learning. Gestures may lead to such benefits by lightening the load on working memory (working memory offloading) or enhancing encoded representations by adding additional information that may subsequently lead to an additional route for retrieval (bodily encoding hypothesis). However, it is unclear whether gesturing during encoding of information enhances memory for its source. In the current study, 48 participants completed spatial- and modality-source memory tasks in which they were asked to remember either the location on the screen or the modality in which words were presented under different encoding conditions: a) no gesture, b) irrelevant gesture, c) congruent gesture, or d) incongruent gesture. No gesture effects were observed, suggesting that gestures, regardless of type, failed to enhance spatial or modality source memory. However, there was better source discrimination for modality compared to spatial information. These results suggest that the benefits of gesture may be limited and do not extend to the formation of contextual associations needed to remember how or where information was presented.

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12:00-1:00 pm (1108)

High Frequency First Syllables Facilitate Name Learning. LORI JAMES, JENNA M. VENUTO, BIANCA A. HEADEN, and JASMIN PANIQUE, *University of Colorado Colorado Springs* – There is evidence that words containing high frequency (HF) first syllables are produced more easily than words with low frequency (LF) first syllables. Within node structure theory (NST), an interactive activation model that represents both memory and language processes, this syllabic frequency effect reflects increased accessibility of often-used phonology. We tested whether there is a downstream





benefit of this sublexical frequency in a name-face association learning task. Twenty-eight student participants (ages 18-35) learned names paired with previously unknown faces. Half of the names contained an HF first syllable and half contained a LF first syllable, and strict control of the frequency of the names' second syllables was maintained. We found a facilitative syllable frequency effect: participants learned more names containing HF first syllables than names containing LF first syllables. This finding comports with previous research showing that a word's syllabic frequency contributes to the ease with which that word is produced. More importantly, our project extends this benefit of increased phonological usage to name learning and supports predictions derived from NST.

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12:00-1:00 pm (1109)

Eye Movements as Indices of Relational Memory. LOGAN BEAL and KATELYN BOWERSOX, *Christopher Newport University* – Previous eye-tracking research argued that a paradigm that included object additions, deletions, and location changes indexed relational memory (Ryan et al, 2000). Data from Experiment 1 of the current study (N=31), which included object additions and deletions, suggests that preferential viewing of the critical region of the scene was only present for additions but not deletions. This suggests that memory effects were likely driven by item memory rather than relational memory. Experiment 2 (N=28) assessed relational memory using object location changes. Individuals fixated more on the object-related areas of interest (AOIs; regardless of whether the object was present and absent) when the location of the object within the scene was manipulated versus repeated. Experiment 3 (N=29) assessed relational memory by manipulating object-scene combinations. Individuals fixated more on the AOI that included the object when the object-scene combination was manipulated than when it was repeated. These findings suggest that eye movements can index relational memory; however, object additions and deletions likely reflect item memory rather than relational memory.

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12:00-1:00 pm (1110)

The Creation of the Fan Effect with Daily News Headlines. GRACE ZEMPEL, LI ZHOU, and KEITH M. GORA, *Bemidji State University* – This study investigates how the top headlines from the political pages from three major news outlets (CNN, Fox News, Reuters) create differing fan effects (Anderson, 1974). For 30 consecutive days during October and November 2021, researchers selected the first 10 article titles they found on the websites of CNN, Fox News, and Reuters political pages. For each day and news organization, the selected article titles were analyzed for fan sizes. The independent variable was the major news outlet and the dependent variable was the fan size. The major news outlets had significant differences in the size and complexity of fans that were presented across time. The daily selection of article titles was then used as to-be-remembered stimuli in a memory task. Using an adapted fan effect presentation and test format based off Radvansky et al. (1991), 90 participants were each randomly assigned one of these 90 memory lists.

The fan effect was observed across all the memory stimuli. It also was observed that days and news organizations with larger and more complicated fans led to more difficulty remembering headlines.

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12:00-1:00 pm (1111)

The Role of Maintenance and Elaborative Rehearsal in Associative Memory. PELIN TAN, *University of Waterloo*, WILIAM E. HOCKLEY, *Wilfrid Laurier University* – Forming and retrieving associations is essential to creating new memories. Previous research has demonstrated that manipulating maintenance rehearsal and elaborative rehearsal have different consequences for associative memory. In our current work, we further explored how different rehearsal processes influence the encoding of associative information. Using an item-method directed forgetting task, we varied item duration to manipulate maintenance rehearsal and cue duration to manipulate elaborative rehearsal. Participants studied two unrelated words at a time, each followed by a cue to either remember or forget the pair. For the pairs they were instructed to remember, participants were told to form an association between the words to help them remember those better for a future test. At a subsequent associative recognition test, participants showed better memory for to-be-remembered (TBR) than for to-be-forgotten (TBF) pairs. Memory for TBR items also increased as a function of increasing cue duration. Increasing cue duration did not have an affect on memory for TBF items. Results demonstrate that forming associations relies on an intentional, elaborative rehearsal process more than maintenance rehearsal.

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12:00-1:00 pm (1112)

Withdrawn

12:00-1:00 pm (1113)

The Influence of Multiple Inferencing Attempts on L2 Vocabulary Learning. STEVEN J. DESSEMBERGER and MITCHELL S. SOMMERS, *Washington University in St. Louis* – Lexical inferencing, the process of inferring the meaning of a word based on the surrounding lexical information, is thought to be one of the primary methods for acquiring foreign language (L2) vocabulary. According to the type of processing resource allocation model of L2 vocabulary learning, learning a new word requires processing multiple types of learning, including acquisition of a new form and mapping that new form onto existing semantic representations. Lexical inferencing is a task that emphasizes semantic processing but not form processing which suggests that it may not be an effective method for acquiring novel vocabulary word forms. The present study sought to examine the memory benefits of lexical inferencing compared to a read-only control when participants are exposed to the words in a variety of sentences (ranging from 1-5 sentences). Across three experiments, results indicate that memory retention for the meaning of vocabulary words increased in the lexical inferencing condition relative to the control, but counter to our predictions, memory for the L2 word





forms did not differ between the lexical inferencing condition and the control condition.

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12:00-1:00 pm (1114)

Does Depth of Processing Affect Temporal Contiguity?. ABIGAIL MUNDORF, MITCHELL G. UITVLUGT, and KARL HEALEY, *Michigan State University* – Memory tends to be better for items processed for meaning (deep processing) rather than perceptual features (shallow processing). This levels of processing (LOP) effect is well-replicated, but the mechanisms involved are not well understood. The temporal contiguity effect (TCE), the finding that recalling one event often triggers recall of another event experienced nearby in time, also predicts memory performance. However, it is unknown how LOP affects the TCE, and various theories make differing predictions. We compared recall and contiguity in an immediate free recall task where participants completed deep, shallow, or no processing tasks for each word. Recall and the TCE were greater in deep than shallow processing but were greatest for no-task lists. Our results support theories which assume temporal associations are automatically encoded and those which emphasize strategic control processes. Both perspectives should be considered in theory development and utilizing LOP to improve memory performance.

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12:00-1:00 pm (1115)

The Story of Me: The Relationship Between Narrative Skill and Autobiographical Reminiscing in Young Children. MADELEINE R. FRAZIER, SABRINA KARJACK, ELLIOTT G. JOHNSON, NORA S. NEWCOMBE, and INGRID R. OLSON, *Temple University* – Young children are enthusiastic storytellers, but their narratives can be incomplete. At the same time, young children's autobiographical memories are rapidly improving (Newcombe et al., in press). Whether narrative skill contributes to autobiographical reminiscing is unclear (Wang et al. 2013; Kleinknecht & Beike 2004). We assessed this connection by showing 4- to 6-year-old children clips of entertaining but silent unfamiliar cartoons (e.g., "Maus"). After viewing a cartoon once, participants were instructed to tell the story while it was replayed. Narrative complexity was evaluated based on temporal and causal elements, as well as goal-based story structure (Demir et al., 2014). Later, these children completed a second study where they reminisced about previous life events. Reminiscences were evaluated based on their production of new or repeated information, as opposed to placeholders and off-topic content (Cleveland & Reese, 2005). Results show that narrative complexity and elaborative skill correlated positively with age. Moreover, children who produced more complex narratives also produced more elaborative talk, suggesting the development of narrative skill may be important for autobiographical reminiscing.

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12:00-1:00 pm (1116)

Memory Qualities of Factual and Fictional Events in Immediate and Delayed Recall. PIERRE GANDER, *University of Gothenburg* – Although fictional information has been found to influence people's beliefs and real-world knowledge, the distinction between fact and fiction generally needs to be upheld in order for people to function in the world. When people recall previous events from memory, how are they able to differentiate between factual and fictional events? One way in which memories of fictional events could differ from factual events is in their experienced qualities. The present study adds to earlier research by including events of both positive and negative valence and a retention interval of five weeks. Participants read four stories, labelled fact or fiction, of varying emotional valence and narrative perspective, and rated memory qualities at three time points: clarity, color, visual details, sound/smell/taste/touch, complexity of the storyline, emotional valence, emotional intensity, bodily reactions, and cognitive empathy. Results show that experienced memory qualities are highly similar for factual and fictional events, with the exception that for negative events, fictional events seem to be remembered with higher clarity than factual events. This is explained by simulation theories of processing of fiction.

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12:00-1:00 pm (1117)

The Shared and Unique Neural Correlates of Personal Semantic, General Semantic, and Episodic Memory. ANNICK TANGUAY, *University of Ottawa*, DANIELA J PALOMBO, *The University of British Columbia*, BRITTANY LOVE and PATRICK DAVIDSON, *University of Ottawa*, LOUIS RENOULT, *University of East Anglia* – One of the most common distinctions in long-term memory is that between semantic (i.e., general knowledge of the world) and episodic (i.e., recollection of past events). However, emerging cognitive neuroscience data suggest a surprisingly large overlap in their neural correlates. Moreover, personal semantic memories (e.g., for personal facts and repeated events) have been studied little and do not easily fit into the standard semantic-episodic dichotomy. In this fMRI study, we recorded brain activity while 48 participants verified statements concerning general facts, personal facts, repeated events, and unique events. Using multivariate analysis, we found that a common network of regions dissociated the four types of memory from the control condition. Activity in key regions of this network (e.g., posterior medial and middle frontal regions) also dissociated the four memory types from one another; with a linear increase from general to personal facts, and from repeated to unique events. Our data are inconsistent with a strict separation of semantic and episodic memory, and suggest they may instead rely on a similar network of brain regions but with different weighting of elementary component processes (e.g., contextual details).

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12:00-1:00 pm (1118)

Accessibility of Semantic Self-Images and Psychosocial Well-Being During the COVID-19 pandemic: A Study in





Young and Older Adults. CLAUDIA PELAGATTI, *University of Florence*, CARLO CHIORRI, *University of Genoa*, SILVIA CASALE, LAURA FAVILLI, and MANILA VANNUCCI, *University of Florence* – Recent studies suggest a relationship between well-being and semantic autobiographical memories, with higher levels of well-being associated with more positive self-images. In the present study, during a period of moderate restrictions related to COVID-19, we further investigated this association in a sample of young and older adults, taking into account the different levels of accessibility of semantic self-images (i.e., order of generation of self-concept statements). A multinomial model run on the first self-image that came to mind revealed that higher levels of perceived stress were associated with a higher likelihood of negative self-images. Moreover, although the first self-image was more likely to be positive in both groups of participants, young adults reported less positive images than older adults in early generated self-images (second and third statements). Independently of the order of generation, higher levels of personal relevance of self-images and higher levels of life satisfaction were associated with a higher likelihood of positive than negative self-images, whereas higher levels of negative affect were associated with a higher likelihood of negative than positive self-images.

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12:00-1:00 pm (1119)

Episodic Future Thinking-Induced Forgetting: Exploring Memory Inhibitory Mechanism in Adaptive Memory. DOMINIKA Z. WOJCİK, ANTONIO M. DÍEZ-ÁLAMO, EMILIANO D. VILLORIA, ELENA FLORES GARCÍA, SILVIA S. EUGENIO, and ÁNGEL FERNÁNDEZ, *University of Salamanca* – Drawing from a Ditta & Storm 2016 study, we conducted two experiments in which we asked participants to engage in episodic future thinking (EFT) for specific, personal events related to previously retrieved autobiographical memories (AMs). Our Experiment 1 replicated their study by finding that thinking about future events causes forgetting of similar, competing events from AM. The novelty of Experiment 2 was to examine the hypothesis that AMs induced with cue words related to avoiding death or danger would be less susceptible to forgetting due to their importance for survival. Although we again replicated the original findings, we did not find support for our adaptive-memory hypothesis. While these results could reflect a failure to evoke processes related to survival with the specific verbal materials that were used, further research along these lines could potentially lead to develop extensions and revisions of the adaptive memory framework.

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12:00-1:00 pm (1120)

The Influence of Accurate Person Memory on Subsequent Social Decisions. ALLISON M. SKLENAR, PRANJAL P KADWE, ANDREA N. FRANKENSTEIN, PAULINE URBAN LEVY, and ERIC D. LESHIKAR, *University of Illinois Chicago* – Research has consistently found that correctly remembering positive/negative impressions of others affects subsequent decisions to

approach or avoid social targets, suggesting an important role of memory in such decisions. The current study extended this work to show that memory for various episodic details (e.g., impressions, behaviors) associated with targets has a strong influence on subsequent approach/avoidance decisions. Participants formed impressions of social targets represented by a name and a trait-implicating behavior. We then measured memory for the impression and behavior associated with each target. Later, participants decided whether to approach or avoid each target. Results showed that accurate (but not inaccurate) memory for both impressions and behaviors had a strong effect on subsequent social decisions, further implicating the important role that memory plays in social decisions.

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12:00-1:00 pm (1121)

What Happened Next? Event Boundary Perception and Long-Term Memory Recall in Older and Younger Adults. EMILY E. DAVIS, OAKLEY K. FRECHETTE, and KAREN L. CAMPBELL, *Brock University* – The perception of event boundaries helps segment on-going experience into discrete units that are stored in long-term memory (LTM). Research with young adults using narratives shows that associations within events are stronger than those that cross event boundaries (Ezzyat & Davachi, 2011). Recently, we showed that young and older adults exhibit this memory effect for movies (Davis et al., in press). Here, we extend this result to written narratives. Old and young adults read three stories that contained adverbs indicating a temporal shift in the storyline (i.e., “A while later”) meant to elicit the perception of a boundary. Participants were cued with sentences and asked to recall the sentence that directly followed. The sentence cues either preceded the temporal shift (preboundary), were the boundary sentences, or were within-event control sentences. Both groups showed lower cued recall for the preboundary cues than all other cue types ($p < .001$) suggesting that associations are stronger within an event than across an event boundary, even for older adults. Our results replicate past research and suggest that the way events are perceived and stored in LTM does not differ with age.

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12:00-1:00 pm (1122)

Computational Text Analysis of Recurrent Memories: Using Machine Learning to Characterize Memory Content and Their Links to Mental Health. RYAN C. YEUNG, MAREK STASTNA, and MYRA A. FERNANDES, *University of Waterloo* – Researchers debate whether recurrent involuntary autobiographical memories (IAMs; personal memories retrieved unintentionally and repetitively) are pathological or ordinary. While some argue that these memories contribute to clinical disorders, recurrent IAMs are commonly experienced in everyday life. Few studies have considered characterizing the content of recurrent IAMs. In our study, we asked if content could distinguish between maladaptive recurrent IAMs that predict mental health status and benign ones. Over 2 years, 9,157 undergraduates completed surveys about recurrent IAMs, 3,624 of whom wrote text descriptions of their memory. We





identified coherent topics (e.g., friendships, car accidents) in these descriptions using structural topic models, a method of unsupervised machine learning. Further, symptoms of mental health issues (e.g., depression, anxiety, posttraumatic stress) uniquely predicted the use of certain topics in recurrent IAMs (e.g., stressful events, interpersonal conflict) but not others (e.g., negative emotion, recreation). Our work shows that topics in recurrent IAMs—and their links to mental health—are identifiable, distinguishable, and quantifiable.

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12:00-1:00 pm (1123)

Episodic Simulation of Positive Events Leads to a More Immersive, Vivid Experience than for Negative Events.

JEREMY K. MILLER, *Willamette University*, KATE MORRIS, *North Carolina State University* – Research has shown that when people mentally simulate positive events in their past or future, they tend to do so with more detail than when they simulate negative events. This tendency to undersimulate negative events may lead to consequences for downstream decision-making based on these simulations; for example, people who do not simulate the negative consequences of an action may be more inclined to take risks (Noël et al., 2017). Across three experiments, we assessed students' ability to mentally simulate past and future events and asked them to rate their phenomenological experience of these events. We also measured variables associated with the propensity to engage in risky behavior. Our results confirm past work demonstrating that positive simulations are rated as more detailed and immersive than negative simulations. However, we found mixed evidence regarding whether the clarity and immersiveness of mental simulation was associated with subsequent risky decision-making.

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12:00-1:00 pm (1124)

The Effect of COVID-19 Pandemic on Event Dating. ÖYKÜ EKINCI and NORMAN R. BROWN, *University of Alberta* – The COVID-19 pandemic has undoubtedly produced a considerable change in people's lives. The present study examined the role of the COVID-19 pandemic on the organization of autobiographical memories by focusing on the information people use when dating personal event memories. Specifically, in response to neutral cue words, first-year undergraduates recalled autobiographical memories from September 2019 to December 2020. They then thought aloud as they estimated the date of each recalled event. These dating protocols were coded for the presences of temporal landmarks and period information (COVID-19, personal/generic, high school, university). We found that COVID-19 was used as a temporal landmark in more than 15% of the memories, regardless of their relation to the pandemic, although, as expected, memories with COVID-19 reference accumulated around the outset of the pandemic. Additionally, more than a third of the memories were judged to be pandemic-related. In line with transition theory (Brown, 2016, 2021), these findings suggest that the onset of the pandemic severed as a collective transition,

marking the beginning of a COVID period in autobiographical memory.

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12:00-1:00 pm (1125)

Chinese and American Subjects Think About the Collective Past and Future Differently. ADAM L. PUTNAM and WUYIZHE DENG, *Furman University*, THOMAS TALHELM, *University of Chicago* – Our prior research has demonstrated that US subjects are positively biased toward their personal future and negativity biased toward their country's future, whereas no such bias exists for Chinese subjects. One explanation for this discrepancy is that subjects may have a similar bias about the past (e.g., US subjects remember their personal lives positively and their country's history negatively), and this bias about the past informs how they think about the future. To test this explanation, we had US and Chinese subjects generate as many events as possible that they were excited and worried about regarding the past and future for both their personal life and their country. Both the US and Chinese samples replicated the emotional dissociation between the personal and collective seen in our prior work; critically, subjects displayed the same bias when thinking about the past. This outcome suggests that subjects may be partially drawing on past experiences to imagine the future and that they draw on different experiences for their personal and collective lives.

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12:00-1:00 pm (1126)

Examining the Effects of Normative Social Influence on Attentiveness in an Online Classroom. SIMRANDEEP KALSI, *McMaster University*, FARIA SANA, *Athabasca University*, JOSEPH A. KIM, *McMaster University*, COLIN M. MACLEOD, *University of Waterloo* – Prior research suggests that attention contagion—the spread of (in)attentive states between members of a group—occurs within in-person classrooms. Our objective was to examine whether attention contagion also occurs during live online lectures. In an online classroom, participants (undergraduate students) watched a prerecorded lecture along with confederates who modeled either attentive or inattentive behaviours. Participants and confederates had their webcams on during the lecture. Overall, we found consistent evidence of attention contagion. Additionally, we assessed the extent to which publicness (e.g., the extent to which a participant felt like others were watching them) affected participants' attentiveness. Feelings of publicness were related to less phone use during the lecture and were more likely to arise when participants perceived the confederates as being highly motivated. Altogether, instructors should encourage their students to turn their webcams on (when possible) to promote adherence to the norms of attentive behaviour in the classroom.

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12:00-1:00 pm (1127)

Combining Generative Learning Strategies in Online Learning. ALYSSA P. LAWSON and RICHARD E. MAYER, *University of California, Santa Barbara* – Generative learning strategies are activities that learners engage in during learning intended to promote understanding through priming appropriate cognitive processing, such as selecting relevant information, organizing it into a coherent model, and integrating it with prior knowledge (Fiorella & Mayer, 2015, 2016; Wittrock, 1974). There is also some evidence to suggest that the benefits of these types of strategies can be additive (Ponce et al., 2018). These studies investigate the effects of prompting one or two generative learning strategies in an online lesson on an immediate or delayed test. Students viewed a lesson on greenhouse gases in four short animations. Between each animation, students were asked to engage in no activity, summarize the material in words, draw a corresponding illustration, or do both activities. Participants were tested either immediately (Experiment 1) or after a week (Experiment 2). In Experiment 1, summarizing led to significantly better posttest scores compared to the control group, but no other group was different from the control. Data collection for Experiment 2 is ongoing. The results suggest that summarizing can benefit learning in an online lesson, but drawing may require more training and support.

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12:00-1:00 pm (1128)

Comparing Effectiveness of Exploratory Learning Activities: Generating Multiple Strategies vs. Inventing One Strategy. LIANDA VELIC, OLIVIA C. KAISER, and MARCI DECARO, *University of Louisville* – Exploratory learning before instruction typically benefits conceptual understanding compared to the instruction-then-practice method traditionally used in schools. However, the exploration activities used vary widely across studies, potentially impacting students' learning approaches and outcomes. We directly compared an instruct-then-practice method against two exploration activities that differed only in their instructions. Psychology statistics students (N=173) were taught the procedure and concepts of standard deviation in one of three conditions. Students in the instruct-first condition received a lesson before attempting the activity. Students in the invent condition explored the activity before the lesson and were asked to invent one method to calculate consistency. Students in the strategy generation condition also explored before the lesson but were asked to come up with many different ways of measuring consistency as possible. The strategy generation condition significantly improved students' conceptual understanding and ability to solve a transfer problem. Quantity of solution attempts mediated this effect, suggesting that by generating multiple solutions, students learned the concept more deeply.

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12:00-1:00 pm (1129)

Flatten What Curve? Helping People Make Sense of COVID-19 Graphs when Public Health Messaging Fails. MADISON FANSHER, POORTATA LALWANI, TYLER J. ADKINS,

MADISON CARLSON, and MADELYN QUIRK, *University of Michigan*, AYSECAN BODUROGLU, *Bogazici University*, RICHARD L. LEWIS, *University of Michigan*, JOHN JONIDES and PRITI SHAH, *University of Michigan* – At the height of the COVID-19 pandemic in the United States, citizens relied on media coverage of the event to make well-informed decisions. The media's primary method of communicating information about the virus was with graphical presentation, but what are the consequences of such messaging when graph literacy is generally low among the public? Prior work has shown that people fail to understand the meaning of "flatten the curve," and that Americans are poor at understanding the relationship between daily and cumulative case curves. We created an instructional online video intervention explaining the meaning of flattening the cumulative case curve and how to interpret COVID-19 graphs. We show in a randomized control experiment with 772 MTurkers that understanding of the relationship between daily and cumulative functions improves with intervention and that increased understanding improves attitudes toward social distancing behaviors. The effect of intervention was present immediately after the intervention, 1-2 weeks later, and 6-7 weeks later, with the intervention allowing participants to understand the relationship between change and accumulation functions in both near- and far-transfer contexts.

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12:00-1:00 pm (1130)

Learning with Electronic Devices: The Effect of Taking Tablet-Based and Longhand Notes on Academic Performance. YUXIN LIU, *University of Michigan*, KRISHNA V. GOMATAM, ABIGAIL I. GOLDSCHMIDT, and CELESTE PILEGARD, *University of California, San Diego* – Electronic devices, already widely used in academic environments, have become unavoidable with the shift to remote learning. We investigated the differences in learning outcomes between longhand note taking and tablet-based note taking (i.e., with iPad and Apple Pencil). Previous studies suggest that any differences in learning when taking notes with laptops compared to longhand were explained by differences in note-taking strategy associated with each medium. New technologies can also engender extraneous cognitive processing that interferes with learning. However, the mechanical similarity between conditions and high fidelity of the tablet pen may minimize any processing differences. College students (N=101) were randomly assigned to either take longhand notes or tablet-based notes while watching a video on economic inequality. After a distraction task, they completed a 10-item exam. We found no significant differences in exam scores between the longhand and tablet conditions: $t(99)=-0.785$, $p=.434$, $BF_{10}=0.276$. Our results provide initial evidence that any differences in the process of taking notes by hand or on a tablet may be too small to affect learning.

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12:00-1:00 pm (1131)

All the Learning in Half the Time? The Effect of Watching Sped-Up Lectures on Recall. OSCAR D. RAMIREZ-PEREZ and JULIA S. SOARES, *Mississippi State University*, ANNIE S. DITTA,





University of California, Riverside – The COVID-19 pandemic has increased demand for educational media that can be delivered to students without compromising health and safety. The past year has seen a dramatic increase in online learning, with many instructors designing new online classes with video-recorded lectures for students to watch asynchronously. Many video-posting platforms include functionality to increase playback speed and many students seem to take advantage of this feature when watching lecture videos, but is this an efficient way to consume information? We conducted an experiment in which participants watched an educational video at either normal speed or double speed. Consistent with prior work (e.g., Wilson et al., 2018) participants correctly answered fewer cued recall test questions about material they watched at double speed compared to normal speed. Follow-up experiments are planned to examine how this effect may interact with students' preferred study strategies.

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12:00-1:00 pm (1132)

Memes and Math Instruction: How Do Memes Affect Students' Learning and Motivation? MONICA VAN and SEAN TROTT, *University of California, San Diego* – Many studies show that including seductive details—interesting but educationally irrelevant content—into a lesson can derail student learning (Harp & Mayer, 1998; Sundararajan & Adesope, 2020), leading many to recommend eliminating this type of content from learning material. However, not all studies show negative effects, and there is debate in the literature as to the extent of this negative impact, as well as the circumstances under which these effects occur (e.g., Eitel & Kühl, 2019). Further, far less work has focused on how seductive details impact student interest and motivation. In this study, we investigate the role that humorous memes might play in learning calculus, their impact on student interest and motivation, and if these outcomes are differentially affected by meme type (i.e., memes whose humor depends on lesson-relevant concepts vs. memes that relate to the general emotions involved in learning math). We found no detectable effect of including memes at the beginning of a lesson on either learning or cognitive load. However, we did find a significant effect of meme type on student intrigue: students who saw the lesson-relevant meme reported higher levels of intrigue about the lesson to come.

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12:00-1:00 pm (1133)

Supporting Comprehension by Improving Access to the Textbase. TRICIA A. GUERRERO and JENNIFER WILEY, *University of Illinois Chicago* – Comprehension tests generally use inference-based questions to assess understanding from text. Some of the most challenging inference-based questions involve hypothetical contexts in which the reader must apply concepts to a new situation they were not exposed to in the text, or manipulate or integrate a new element into their preexisting mental model for the phenomena described in the text. The current study examined how improving access to the textbase may improve this ability to engage in hypothetical reasoning and ultimately improve comprehension. Manipulations

designed to improve access to the elements of the textbase needed to answer hypothetical reasoning questions were found to help readers engage in more complex and comprehensive reasoning, suggesting that comprehension deficits can be due to a weak textbase representation and not necessarily deficient reasoning skills.

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12:00-1:00 pm (1134)

Evaluating the Encoding Variability Account of the Spacing Effect in Memory. JACOB NAMIAS, *The University of Southern Mississippi* – Two experiments were conducted to test the encoding variability account of the spacing effect in free recall and recognition. Homograph targets were studied that were repeated consecutively (massed) or over a lag of four intervening items (spaced). Targets were presented alongside a constant repeated cue that was either unrelated (wrench-FALL), related (stumble-FALL), or presented alongside a variable cue that was taken from the same semantic category (stumble-FALL; trip-FALL), a different semantic category (stumble-FALL; autumn-FALL), or a different unrelated cue (wrench-FALL; umbrella-FALL). Spacing effects were found in both recall and recognition, and pair types produced similar patterns across massed and spaced conditions. Recall and recognition were greatest under variable conditions when cues were from the same or different semantic categories and lowest when constant cues were repeated and unrelated. Results provide partial support for an encoding variability mechanism: Target memory benefitted from semantically variable cues but was not improved further when variability was highest in the different semantic category cue condition.

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12:00-1:00 pm (1135)

Value-Directed Learning: Schematic Reward Structure Supports Value Prediction. KATIE M. SILAJ and ALAN CASTEL, *University of California, Los Angeles* – When learning, it is often necessary to organize key concepts into categories to identify important themes within content. In value-directed remembering tasks, words paired with point values communicate item importance for a recall test. In the present study, we examined whether knowing how many points words were worth could support students in identifying a schematic structure across lists and whether they could apply their knowledge on a final test. Participants studied a series of words each paired with a value based on category membership, creating a schematic reward structure (with some categories worth more than others). A control group studied the same words without values. On the final transfer-of-learning test, participants were presented with new words belonging to the same categories as the ones they previously studied and were asked to predict how many points each item was worth. Results from two experiments showed that participants who studied the words paired with values learned the schematic reward structure of the lists significantly better than the control group. Thus, values may support students in learning to make connections between related concepts.

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12:00-1:00 pm (1136)

Mobile-Based Language Learning in Adults: What Promotes Learning Performance the Best? SIMON GORIN, NICOLE SKIERESZ, SANDY C. MARCA, THOMAS P. REBER, and NICOLAS ROTHEN, *UniDistance Suisse* – Technological developments in information and communication technologies offer almost permanent access to learning software. From the perspective of memory research, learning software offers a unique opportunity to gather data on learning and memory in a natural setting to an unprecedented level of detail than ever before. Hence, we used this advantage to explore predictors and factors contributing to optimal learning with a mobile vocabulary learning application. To this end, French- and German-speaking adults learned Finnish words for 2 weeks with a dedicated mobile application which enabled the manipulation of different learning principles (e.g., spacing, presentation modality, feedback type, rate of retrieval trials, language learning direction). Before using the application, participants were tested for working memory, sustained attention, vocabulary size, nonverbal intelligence, rhythm processing, and Finnish knowledge. The results are discussed in line with the literature on learning principles and cognitive predictors of vocabulary learning.

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12:00-1:00 pm (1137)

Using Nondeclarative Learning Techniques to Help College Students Understand Important Topics in Introductory Statistics. ERIN N. GRAHAM, *Gustavus Adolphus College*, MAREN GREVE, DANIEL P. BYRNES, and CHRISTOPHER A. WAS, *Kent State University* – It has long been theorized that cognitive exercises which recruit declarative memory place a heavy burden on an individual's working memory resources. This relationship between declarative memory and working memory has important implications for education, as it puts students with limited working memory resources at a disadvantage in educational contexts which rely on direct instruction. Recent research suggests that some nondeclarative techniques, namely errorless learning and cue fading, can be successfully employed to help students with limited working memory resources learn important topics in mathematics like polynomial factoring or number-line estimation. The present study sought to extend this work by comparing the relative efficacy of declarative and nondeclarative interventions intended to help college students understand the relationships between measures of central tendency and the shape of a distribution. Our findings provide some support for the application of nondeclarative learning techniques to topics in introductory statistics and mathematics education more broadly.

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12:00-1:00 pm (1138)

Withdrawn

12:00-1:00 pm (1139)

Effects of Temporary Grade Withholding on Academic Performance. CAROLINA E. KUEPPER-TETZEL, *University of*

Glasgow, PAUL L. GARDNER, *University of St Andrews* – Although feedback engagement is important for learning, students often do not engage with provided feedback to inform future assignments. One factor for low feedback uptake is the easy access to grades. Thus, systematically delaying the grade release in favour of providing feedback first—temporary grade withholding—may increase students' engagement with feedback. We tested the hypothesis that temporary grade withholding would have positive effects on future academic performance and feedback engagement in authentic psychology university settings. For Experiment 1, second-year students were randomly assigned to grade-before-feedback or feedback-before-grade conditions for their report in semester 1, and performance was measured on their report in semester 2. In Experiment 2, a third-year student cohort (t) was provided with feedback on their report before grades were released in semester 1 and compared to the previous third-year cohort (t-1) where individual feedback and grades were released simultaneously. Using this multimethodological approach, we reveal positive effects of temporary grade withholding on students' academic performance and feedback engagement in authentic higher education settings. Practical implications are discussed.

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12:00-1:00 pm (1140)

Does Adaptive Mastery Improve Flashcard-Based Learning? LISA D. BLALOCK and MORGAN D. KELLEY, *University of West Florida* – While most students use flashcards to study, they often make suboptimal decisions on when to drop or add items to a deck. Using objective criteria to adaptively determine when to add or drop an item from study based on performance may help improve learning outcomes in flashcard-based tasks. In this study, participants learned to identify butterfly species under different adaptive mastery conditions: a no add/drop group (all items remain in the deck throughout study), a mastery drop group (start with all items, then drop after an item is mastered), and a mastery add group (start with three items, add items once mastered). All participants completed a pretest, then studied butterflies in a flashcardlike task. After training, participants took post- and transfer tests. One week later all groups completed delayed post- and transfer tests as well as a symmetry span task and a visual working memory change detection task. Adding items to study showed significantly better retention than dropping items from study in both the immediate and delayed tests, but mastery add was not significantly different from the no add/drop group. These results suggest dropping items from study, a common study practice, is problematic for learning.

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12:00-1:00 pm (1141)

In the (K)now: Dissociating the Role of Episodic Bindings Versus Insight-Based Contingency Awareness for Over-shadowing Effects in Learning. MRUDULA ARUNKUMA, and CARINA G. GIESEN, *Friedrich Schiller University Jena* – Over-shadowing is a popular phenomenon in the classical conditioning literature related to learning. Previous studies in humans show





mixed results where preference of one salient cue over a nonsalient cue is present when participants are instructed to learn but absent in incidental learning (Schmidt & DeHouwer, 2010). Our study aims to explore overshadowing in contingency learning and if it can be attributed to episodic bindings or stems from insight of contingencies. In our task, salient or nonsalient distractors are equally predictive for responses. When participants were hinted at the contingencies, they learnt the associations better with salient distractors, reflecting overshadowing. However, this effect is evident only in those participants who detected the contingency. When insight was not provided during the experiment, overshadowing effects were weaker in reaction time but stronger in errors, indicating that awareness plays a crucial role in contributing to overshadowing phenomena. This (dis)association presented in our study between knowledge of what to learn and effects of transient episodic bindings in overshadowing provides a platform to study the underpinnings of learning mechanisms on a deeper level.

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12:00-1:00 pm (1142)

Test Anxiety and Study Habits. ASHLEY WAGNER, *University of Maryland* – This study evaluated the relationship between college students' study habits and strategies and their test anxiety. Previous research has suggested that instruction of better study habits may be a protective mechanism for test anxiety (Yusefzadeh et al., 2019). Prior research exploring the relationship between test anxiety and study habits has found mixed results. We used the Test Anxiety Inventory (Spielberger et al., 1980) to measure overall test anxiety and Hartwig & Dunlosky's study habits survey (2012) to identify the study habits and specific study strategies that participants reported using. The only relation with overall study habits was that students with higher test anxiety were more likely to report cramming for their exams. Although study habits were generally unrelated to test anxiety, there were many differences in the specific study strategies students reported using. Students with higher test anxiety reported using a wider variety of individual study strategies. Specifically, they were more likely to report using flashcards, making diagrams, and recopying their notes. We also explored the impact of transitioning to online learning on study habits and test anxiety due to the COVID-19 pandemic.

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12:00-1:00 pm (1143)

Do Students Know to Choose Practicing Recall Over Rereading? A Play in Three Acts. GIULIA R. MCDONALD and DEBORAH EAKIN, *Mississippi State University* – Karpicke et al., (2009) asked students about their study strategies and reported that students did not report or choose practicing recall over rereading. We report findings from an updated survey that asked students to report their frequency of use and effectiveness of listed study strategies using their class notes. ACT 1: Most students reported using rereading of their class notes (66%) and rated it as effective (84%). However, they also reported using practicing recall (64%) and rated it as effective (84%). ACT 2: We forced a choice between rereading and practicing

recall in a question about preparing for an exam; one group answered for themselves, another recommended the strategy to a friend. Most students chose practicing recall over rereading both for themselves and for others. ACT 3: Another group of students wrote in a study strategy to use in an open-ended question; most wrote rereading as their recommended strategy.

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12:00-1:00 pm (1144)

Are Online Lecture Breaks Beneficial for Attention and Learning? KITTY M. GUO and NOAH D. FORRIN, *McMaster University*, FARIA SANA, *Athabasca University*, JOSEPH A. KIM, *McMaster University* – We examined the effect of break length and frequency on attention and learning during a prerecorded lecture video. Based on the condition that the participants (n=360; recruited on Prolific) were randomly assigned to, they either took no breaks, one 6-minute break halfway through, one 2-minute break halfway through, or three 2-minute breaks equally distributed throughout the lecture. Attention probes and a postlecture quiz were used to measure attentiveness and learning, respectively. There were nonsignificant differences in attention and immediate learning between the no-break groups and the break groups, and between the three break groups. Interestingly, there were significant positive correlations between more favourable attitudes towards break(s) and higher attentiveness and quiz performance. This study suggests that the attitude towards lecture break(s) is an important moderator of the effect of lecture break(s) on attention and learning. Future studies should investigate what individual factors may result in some individuals having better attitudes towards lecture break(s) than others and, consequently, benefiting more from lecture break(s).

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12:00-1:00 pm (1145)

Instructional Visuals Affect Students' Judgments of Drawing When Learning from Science Text. ALLISON J. JAEGER, *St. John's University*, LOGAN FIORELLA, *University of Georgia* – This study explored how instructional visuals affect monitoring accuracy for different types of judgments of learning (JOLs). Prior work has focused on judgments of test performance or explanation ability, but in science, the ability to draw concepts may be a unique indicator of understanding. We investigated judgments of drawing and its relationship to students' actual level of understanding. We hypothesized that students may exhibit lower monitoring accuracy if visuals inflate the sense that they would be able to create the visuals on their own. Participants read texts on human organ systems that were either paired with conceptual diagrams or not. For each text, participants made three JOLs (test, explanation, and drawing performance) and completed a comprehension test. Results indicated the text-and-visual group and text-only group did not differ on test performance or in relative metcomprehension accuracy for their test or explanation judgments. However, the text-and-visual group showed worse relative accuracy for drawing judgments than the text-only group. This suggest students may rely on cues from the visuals when






making drawing judgments, but these cues may not be diagnostic of their understanding.

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12:00-1:00 pm (1146)

Visual Working Memory Drives Unconscious Processing in a Coarse (But Not Fine) Manner. YINGTAO FU , WENCHEN YAN, and MOWEI SHEN, *Zhejiang University* – Previous studies reveal that visual working memory (VWM) prioritizes access to visual awareness for unconscious information matching VWM content, reflecting an interaction between VWM and conscious awareness. This study explored the hierarchical character of this interaction by testing on which information processing level (coarse vs. fine) could it occur. Three experiments were conducted by combining a VWM task with a b-CFS task. Experiment 1 adopted the Landolt stimuli consisting of both coarse (color) and fine information (small gap), and found that VWM promoted unconscious processing only for the coarse feature. Experiment 2 extended this finding by adopting the same dimension stimuli (simple vs. complex shape). Using the global-local stimuli, Experiment 3 investigated whether the constraint for the interaction with fine information was due to VWM or unconsciousness processing, and found that the interaction could not occur as long as the fine information needed to be processed in either side (VWM or unconscious processing). In summary, these results suggest that VWM drives unconscious processing in a coarse (but not fine) manner, which arises from the constraint of information processing both for VWM and unconsciousness.

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12:00-1:00 pm (1147)

Examining the Role of Attention During Feature Binding in Visuospatial Working Memory. DAVID T. GOLDENHAUS-MANNING, NICHOLAS R. COOPER, and VANESSA LOAIZA, *University of Essex* – An enduring debate regards the role of attention in feature binding in visuospatial working memory. Here, we consider the nature of the features, i.e., whether they are intrinsic (integrated within the object, such as its color and shape) or extrinsic (not part of the object, such as its spatial location). An array of colored shapes in different locations is followed by a brief retention interval and recall, wherein one feature of the probed object prompts recall of one of the other features (e.g., a shape probe at the center of the screen prompts recall of color). Experiment 1 was designed to determine whether disrupting central versus peripheral attention during the retention interval increases binding errors for extrinsic and intrinsic features, respectively, indicating that extrinsic and intrinsic feature binding are dissociable in the types of attention they require. Experiment 2 determines whether directing attention via extrinsic retro-cues reduces binding errors relative to a no-cue baseline, whereas intrinsic retro-cues may have little impact, suggesting that the benefits of directed attention are specific to extrinsic feature binding. Thus, these experiments will clarify how attention impacts different types of feature binding.


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12:00-1:00 pm (1148)

Comparison of Visual Working Memory Crowding Across Upper and Lower Visual Hemifields Suggests Distinct Attention Mechanisms for Working Memory Representation and Selection. HARUN YÖRÜK and BENJAMIN J. TAMBER-ROSENAU *University of Houston* – Visual crowding is often taken as a measure of the spatial resolution of selective attention. Consistent with other measures of attentional resolution, visual crowding studies reveal greater resolution in the lower (vs. upper) visual hemifield. We recently showed that visual perception and visuospatial working memory (VWM) share representational mechanisms by demonstrating that both visual and VWM crowding are subject to a hallmark of early visual cortex representation—anisotropy between radial and tangential crowding. Here, we investigated whether the lower/upper asymmetry is also present in VWM, i.e., whether perception and VWM share selective attention mechanisms as well as representational bases. This is important because it is widely accepted that working memory entails attention, but there is a diversity of attention mechanisms, and it is unclear if the attention needed for working memory representation is the same attention as that needed to individuate items in a crowded representation. Reanalysis of our previous VWM crowding data revealed moderate evidence ($BF_{01} > 4$) against an upper/lower asymmetry in VWM, suggesting that distinct attentional mechanisms may support VWM representation and item selection/individuation.

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12:00-1:00 pm (1149)

Do Cultural Differences and Prior Knowledge Influence Feature Binding in Working Memory? HIU WAH CHEUNG , NICOLAS GEERAERT, and VANESSA LOAIZA, *University of Essex* – There is extensive evidence showing Easterners may process information more holistically than Westerners. Such cultural differences may be useful to understand the fundamental processes of feature binding in visual working memory (WM). Accordingly, we recruited Western and Eastern participants to complete a visual WM task wherein to-be-remembered colors are integrated within (i.e., intrinsic binding) or as backgrounds (i.e., extrinsic binding) of to-be-remembered shapes (Experiments 1 and 2). Experiment 2 further investigates the role of prior knowledge in long-term memory to facilitate binding in WM. During retrieval, participants must decide whether the probe was presented (a target) or not (a lure: a recombination of the presented features or a new color/shape). Advancing on prior work, hierarchical Bayesian multinomial processing tree models will be fit to the data to estimate parameters representing binding and item memory. We expect that Easterners will show greater extrinsic binding memory than Westerners (Experiment 1), such that Easterners may more automatically integrate extrinsic features that are further facilitated by prior knowledge in long-term memory in Westerners (Experiment 2).

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12:00-1:00 pm (1150)

Individual Differences in Visual Working Memory Capacity Predict Source Memory, But Not Learning Rate. CHONG ZHAO and EDWARD VOGEL, *University of Chicago* – Prior work has shown that working memory capacity predicts source memory accuracy, which requires participants to report the original position of each picture in one of four quadrants. Other work has shown that source memory accuracy improves with repetitions of the item sequence. Here we sought to replicate the relationship between memory capacity and source memory, while also testing whether it predicts the learning rate for source memory. Subjects performed a location source memory task in which they were presented a sequence of 30 objects shown in one of four quadrants and then were tested on each item's position. We then repeated the procedure with the same object sequences, such that each subject was shown and tested on the same sequence 5 times. We replicated the prior finding of a relationship between memory capacity and overall source memory accuracy. We also found a source memory learning effect, with large increases in source accuracy with each repetition. Yet, while each individual's learning rate was reliable across repetitions, it was unrelated to memory capacity. These results suggest that while many facets of memory performance are predicted by memory capacity, others such as learning rate may be distinct.

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12:00-1:00 pm (1151)

Examining the Effects of Semantic Relatedness on the Sequential Encoding Benefit in Visual Working Memory. RYAN E. O'DONNELL and BRADLEY P. WYBLE, *The Pennsylvania State University*, ANDREW CLEMENT, *Texas A&M University* – A growing body of evidence suggests that semantically related object pairs are better remembered than unrelated pairs. Recent evidence also suggests that memory for individual objects is improved when they are presented sequentially compared to simultaneously. This prompts us to consider how sequential encoding benefits translate to cases where the memoranda are semantically related. Participants studied three object pairs that were all semantically related (e.g., key and lock) or unrelated (e.g., key and mug) before being probed with a single item recognition test. All six objects were presented simultaneously, in paired sequential order (e.g., key, then lock, then mug), or in disrupted sequential order (e.g., key, then mug, then lock). When objects were presented simultaneously, semantically related object pairs were better remembered. A similar effect of semantic relatedness was observed when objects were presented in paired sequential order, but this effect disappeared when objects were presented in disrupted sequential order. These results suggest that semantic relationships serve as powerful cues to chunk objects in memory, but it is difficult to build such chunks without temporal grouping cues.

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12:00-1:00 pm (1152)

Location Encoding in Visual Working Memory (VWM) Is Not Completely Automatic. JOYCE TAM and BRADLEY P.

WYBLE, *The Pennsylvania State University* – Location is thought to hold a privileged role in VWM as the master index, but it is unclear whether this entails its complete encoding. We compared the extent of automaticity in location and orientation encoding by manipulating their task relevance unexpectedly. Separate groups of participants were asked to report the color of a stimulus for 25 trials. The task changed unexpectedly on the 26th trial, with half of participants receiving a probe for location and the other half a probe for orientation. This surprise trial was followed by 25 control trials that probed both color and the new feature. We found surprise trial memory to be significantly worse than the first control trial for both location and orientation, but more so for orientation. Color memory worsened after the surprise trial in both experiments. Our data shows that location encoding had greater automaticity than orientation as its memory was less affected by task relevance, but it was not completely automatic either, as intentional encoding still led to an improvement and required additional resources. Thus, incidentally encoded location is only coarse grained, constraining the spatial precision of space-based indexing systems.

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12:00-1:00 pm (1153)

Prior Knowledge of Color-Object Associations Does Not Improve Visual Working Memory. NUNO SOBRINHO and ALESSANDRA SOUZA, *University of Porto* – Elaboration is an intentional process that uses prior knowledge to help memory retention. Elaboration consistently benefits long-term memory. For working memory, elaboration does not help recall of verbal stimuli. Here, we tested if elaboration boosts retention of colors in visual working memory. We used prior knowledge about object-color associations to facilitate elaboration. Participants studied four colored words (Experiment 1) or four colored objects (Experiments 1 and 2) and reproduced their colors on a continuous color wheel. The stimuli (e.g., banana) were presented in their congruent (e.g., yellow) or incongruent color (colors opposite to yellow on the wheel). In Experiment 1, colors of images were reproduced with less error than of words. Congruency, however, had no impact on recall and it did not interact with stimulus format. In Experiment 2, we provided people with more time to elaborate (4500 ms instead of 1500 ms) in Session 1 and with a direct instruction to elaborate (Session 2). Longer time improved performance, but congruency still had no impact in either session. Variability in individual's object-color associations could not explain the lack of benefit. Prior color-object knowledge didn't enrich color memory.

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12:00-1:00 pm (1154)

To Be or Not to Be Relevant: Comparing the Long-Term Effects of Cue-Based and Reward-Based Prioritization in WM. STEPHANIE JEANNERET, *University of Geneva*, LEA M. BARTSCH, *University of Zurich*, EVIE VERGAUWE, *University of Geneva* – Working memory (WM) and attention have largely been studied together, notably for the role of attention in WM maintenance. Priority-based allocation of attentional resources has shown





robust effects in WM. However, the consequences of WM prioritization in long-term memory (LTM) are less clear. Here, our goal was to test the LTM effects of cue-based versus reward-based prioritization in WM. In a first experiment, participants were presented with four items and were then indicated to prioritize certain items in WM by a retro-cue or reward pattern. The effect of prioritization on WM performance and on performance in a surprise LTM test was compared between both types of prioritization. Although there was a benefit of prioritization by the retro-cue in WM and LTM, our reward manipulation did not show convincing evidence of a benefit in WM or LTM. Thus, in a second experiment, we sought to assess whether the weak impact of the reward-based prioritization could be remediated with a more explicit and meaningful manipulation, and hence allow for a better evaluation of its implications in LTM.


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12:00-1:00 pm (1155)

Testing Working Memory Boosts Long-Term Learning of Visual Arrays. PHILIPP MUSFELD, *University of Zurich*, ALESSANDRA SOUZA, *University of Porto*, KLAUS OBERAUER, *University of Zurich* – One of the best-known demonstrations of long-term learning through repeated exposure is the Hebb repetition effect: immediate recall of a memory list repeated amidst nonrepeated lists improves steadily with repetitions. However, previous studies failed to observe this effect for visuospatial arrays. Souza and Oberauer (2020) showed that Hebb learning was consistently observed when all items of a visuospatial array were tested (full-test) but not if only one item was tested (single-test). This suggests that testing memory over the short-term favors long-term learning. Alternatively, it is possible that single-tests prevented the application of what was learned. In three preregistered experiments (total $N=701$), we ruled out this alternative explanation: changing the type of memory test midway through the experiment from single- to full-tests did not reveal hidden learning, and changing it from full- to single-tests did not conceal learning. Mixing full- and single-tests for nonrepeated arrays, however, eventually produced Hebb learning even in the single-test condition. In sum, immediate full-array testing promotes visual long-term learning by changing encoding strategies while retrieval consolidates this information in memory.

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12:00-1:00 pm (1156)

Sensory Recruitment in Visual Short-Term Memory: A Systematic Review and Meta-Analysis of Sensory Visual Cortex Interference Using Transcranial Magnetic Stimulation. PHIVOS PHYLACTOU  and ARTEMIS TRAIKAPI, *Cyprus University of Technology*, MARIETTA PAPADATOU-PASTOU, *National and Kapodistrian University of Athens*, NIKOS KONSTANTINOU, *Cyprus University of Technology* – Sensory visual areas are involved in encoding information in visual short-term memory (VSTM), yet it remains unclear if sensory visual cortex is a necessary component of the brain network for maintenance of information in VSTM. Here, we aimed to systematically review studies that have investigated the role of the sensory visual

cortex in VSTM using transcranial magnetic stimulation (TMS) and to quantitatively explore these effects using meta-analyses. Fourteen studies were identified and reviewed. Eight studies provided sufficient data for meta-analysis. Two meta-analyses were conducted, one regarding the VSTM encoding phase (17 effect sizes), and one regarding the VSTM maintenance phase (15 effect sizes). Our results indicate that the sensory visual cortex is similarly involved in both the encoding and maintenance VSTM phase. We suggest that in some cases where evidence did not show significant TMS effects, this is due to low memory or perceptual task demands. Overall, these findings support the idea that sensory visual areas are part of the brain network responsible for successfully maintaining information in VSTM.

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12:00-1:00 pm (1157)

Visual Working Memory Training Effects on the Quantity and Quality of Representations. SHUANGKE JIANG , MYLES JONES, and CLAUDIA C. VON BASTIAN, *University of Sheffield* – Past research has primarily examined overall performance in training tasks without distinguishing between the quantity and quality of representations in visual working memory (VWM). An increase in the quantity of VWM representations reflect expanded VWM capacity, which may lead to broad transfer. In contrast, an increase that is limited to the quality of VWM representations rather reflects enhanced efficiency, which likely leads to a more narrow transfer. Here, we assessed training-induced changes in quantity and quality of VWM representations using continuous-reproduction tasks. In this preregistered pretest/posttest study, 96 young healthy adults were randomly assigned to an experimental group and an active control group completing four training sessions. We observed that only the quality but not the quantity of VWM representations in the trained task significantly increased in the experimental group relative to the control group. However, these improvements did not generalise to untrained tasks. Our findings suggest that training gains are not driven by enhanced capacity. Moreover, gains in the quality of VWM representations might reflect more general task-specific abilities (e.g., better orientation discrimination).

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12:00-1:00 pm (1158)

Orientation and Color Are Remembered Using Fundamentally Different Types of Representation in Working Memory. TIMOTHY J. RICKER, *University of South Dakota*, EVIE VERGAUWE, *University of Geneva* – Models of delayed estimation in visual working memory show that individuals maintain both fine-detail and categorical representations of memory items. Models exploring the use of fine-detail and categorical representations have focused on color as the relevant feature of the stimulus. Here we ask whether the same use of categorical information generalizes to other stimulus features. Across four experiments testing delayed estimation of stimulus orientation we find that categorical information is used differently than in the delayed estimation of color. Color is estimated from memory using only one type of information in each response,






either fine-detailed or categorical information, but not both. Orientation is estimated from memory using a combination of the fine-detail and categorical information in each response. Considering this fundamental difference in mental representation across stimulus types, we next explore whether model fits indicate item limits or continuous-resource limits as the defining factor determining orientation capacity in working memory. The richness of the dataset also allows us to characterize the effect of encoding time, serial position, and output interference on memory representations of orientation.

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12:00-1:00 pm (1159)

The Influence of Distractor Expectancies on Visual Working Memory Interference Across and Within Feature Dimensions. RYAN S. WILLIAMS, JAY PRATT , and SUSANNE FERBER, *University of Toronto* – Actively maintained target representations are optimally tuned to the expected similarity of distractors, but does this hold for passively maintained representations? We examined this using a visual working memory interference paradigm where a stream of distractors was presented during a delayed estimation task. In Experiment 1, distractors were chosen from a dimension that was either the same as (e.g., orientation) or different from (e.g., shape) a memorized feature, with one distractor-type occurring thrice as frequently as the other (i.e., mostly same or mostly different). We observed same-dimension recall distortions, which were attenuated when such interference was expected. In Experiment 2, all distractors matched the memorized dimension and were chosen from either a 180° range centered on (proximal) or opposite (distal) the target value. Again, one distractor-type was more prevalent than the other (i.e., mostly proximal or mostly distal). Proximal distractors impaired recall precision more than distal distractors, which was not mitigated by distractor expectancies. We speculate that the anticipation of same-dimension distractors suppresses sensory activity that might otherwise be used to finetune mnemonic representations.

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12:00-1:00 pm (1160)

Chunks Are Not “Content-Free”: Hierarchical Representations Preserve Perceptual Detail Within Chunks. MICHAEL G. ALLEN and ISABELLA C. DESTEFANO, *University of California, San Diego* – Chunks allow us to use long-term knowledge to efficiently represent the world in working memory. Most views of chunking assume that when we use chunks, this results in the loss of perceptual details, since it is presumed the contents of chunks are decoded from long-term memory rather than reflecting the exact details of the item that was presented. However, in two experiments, we find that in situations where participants make use of chunks to improve visual working memory, access to instance-specific perceptual detail (that cannot be retrieved from long-term memory) increased rather than decreased. Participants successfully remembered the luminance of colored objects, with luminance changing on every trial but memory being supported by consistent color hue-object pairings, and remembered trial-specific fonts of letters encoded

as words. This supports an alternative view: that chunks facilitate the encoding and retention into memory of perceptual details as part of structured, hierarchical memories, rather than serving as mere “content-free” pointers. It also provides a strong contrast to accounts in which working memory capacity is assumed to be exhaustively described by the number of chunks remembered.

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12:00-1:00 pm (1161)

The Perceptual Advantage of Music Experts: Evidence from an Online Music Reading Task. KINNERA MATURI and HEATHER SHERIDAN, *University at Albany, SUNY* – Within their domain, experts display remarkable perceptual advantages relative to nonexperts. In an online experiment, we contrasted the performance of music experts (N=61) and nonmusicians (N=63) during a same-different judgment task that required participants to decide if two rapidly presented bars of music were the same or different. During this task, we contrasted a “Legal-Beamed” condition (i.e., 5-6 notes beamed and in a legal order) with a “Random-Unbeamed” condition (i.e., 5-6 notes unbeamed in a random order). Experts were more accurate than nonmusicians during this task. Also, both of the groups showed higher performance in the “Legal-Beamed” condition, which suggests that our manipulation was tapping low-level perceptual mechanisms (e.g., perceptual grouping mechanisms) that do not depend on music reading experience. We discuss the implications of our results for chunking and template theories of expertise (e.g., Chase & Simon, 1973; Gobet & Simon, 1996, 2000).

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12:00-1:00 pm (1162)

Withdrawn

12:00-1:00 pm (1163)

Influence of Three-Dimensional Stimulus Feature Changes on Memory Accuracy in a Retro-Cued Change/No-Change Paradigm. RALPH HALE and ERIN CONWAY, *University of North Georgia* – Fragile memories (FM), with a higher capacity and slower degradation than working memory (WM), are retrievable after an attention shift but are erased when a new similar scene occupies the same physical space. We probed storage capabilities of the FM system using three-dimensional appearing cubes. Stimulus arrays consisted of four cubes surrounding fixation, with individual cubes varying by orientation (e.g., up, down) and rotation (e.g., 0°, 45°). Each trial began with fixation, followed by a study array. Fixation then shifted away from center, followed by an interference array consisting of solid color polygons. Participants summed color polygon representations, thereby interfering with WM storage of the study array. Group 1 was retro-cued to a location of potential study array change; Group 2 was not cued. Then a test array was presented. Change/no-change responses were recorded, followed by the number of polygon colors. Participants performed above chance for no-change trials. For trials with orientation changes, accuracy was below chance and the retro-cue was facilitatory, but rotation changes





were above chance with an inhibitory retro-cue. This exploration is the first to study the FM system using changes in three-dimensional features.

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12:00-1:00 pm (1164)

Understanding Visual Imagery Through a Generative Deep Learning Model. SHEKOOFEH HEDAYATI and BRADLEY P. WYBLE, *The Pennsylvania State University* – Visual imagery presumably draws on long term memory (LTM), such that mental images can be scenes that we already have encountered in life, or combinations of visual knowledge. To study how the mind generates mental images based on visual knowledge, we used a generative working memory model called MLR (i.e., Memory for Latent Representations; Hedayati, O'Donnell, & Wyble 2021). This biologically plausible model generates colored-shapes (i.e., colored hand-written digits) by combining information from compact shape and color latent representations that are analogous to representations in visual cortex. Our simulations showed that the model is able to combine information from different cues to generate new images as a form of combinatorial imagery. For example, by cueing with a specific shape and a particular hue, it can generate a new stimulus with that same shape and hue. Furthermore, by attaching label networks to the shape and color maps, the model is able to use symbolic cues to generate combinations of familiar shapes and colors by reconstructing LTM traces. This model exemplifies how generative neural models can inform our understanding of visual imagery.

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12:00-1:00 pm (1165)

Relationship Between Visual Working Memory and Physical Recreational Activity in College Students. KEITH M. GORA, TRAVIS RICKS, DAVID PERRAULT, and BROOKE MIMMACK, *Bemidji State University* – Current study examined the effects on visual working memory (VWM) between vigorous- and moderate-intensity recreational activities. Forty-five college students (age $M=19.87$, $SD=1.7$) participated in this study. A change detection task was used to measure their VWM performance, and recreational activities were measured by Global Physical Activity Questionnaire (GPAQ). Students who had more than 75 minutes of vigorous-intensity recreational activities weekly were classified as vigorously active. Their response times ($n=24$, $mean=633.37$, $SD=97.80$) were significantly faster than that of inactive students ($n=21$, $mean=699.92$, $SD=75.18$), $t(43)=2.52$, $p<.05$. Moreover, the vigorously active group did not sacrifice their accuracy to have faster response since their VWM capacities were not different from each other, $t(43)=0.49$, $p=.62$. No significant difference was found between the moderately active and inactive group either in VWM capacity, $t(43)=0.13$, $p=.99$, or response time, $t(43)=0.35$, $p=.73$. In conclusion, compared with moderate-intensity recreational activities, vigorous-intensity recreational active is associated with improved visual working memory performance.

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12:00-1:00 pm (1166)

Assessing the Generalizability of Visuospatial Bootstrapping to Different Stimulus Types. MITCHELL M. METZGER, PETER R. MALLIK, AGATHA LOUCKS, NATALIE A. CLINGER, and LACEY RASMUS, *Ashland University* – Working memory (WM) bootstrapping involves an initiation of the episodic buffer by linking visuospatial and verbal WM with long-term memory (Darling et al., 2017). This bootstrapping has supported Baddeley's (2000) WM model by providing support for the episodic buffer. Assessments of visuospatial bootstrapping have assessed a typical keypad (TKP) stimulus in comparison to single display, novel keypad, as well as a full numeric array (Darling et al., 2017). The TPK has consistently scored highest relative to other conditions, providing support for visuospatial bootstrapping (Darling & Havelka, 2009). This experiment examined whether bootstrapping would be observed with a different display. Thus, 63 participants completed three working memory recall tasks across three stimulus types (TKP, Clock Face, and Single Digit). The Clock Face has similar properties to the TKP condition (both well-known and have 12 spatial locations) making it a viable option for visuospatial bootstrapping. Data show the bootstrapping effect generalized to the Clock Face display. Using a 3 (Stimulus Type) x 4 (Load) repeated-measures ANOVA, the Clock Face condition and the TKP condition scored higher than the single digit presentation for the WM recall tasks.

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12:00-1:00 pm (1167)

Working Memory Performance: Is Subjective Measurement a Better Predictor than Cognitive Load? MEGAN M. MCCRAY, *University of South Dakota*, KELLY COTTON, *City University of New York*, TIMOTHY J. RICKER, *University of South Dakota* – Many people believe they can complete multiple cognitive tasks at once. Research shows we engage in the rapid switching of attention between tasks. Current models of working memory performance during multitasking incorporate this assumption, specifying that individuals cannot concurrently engage in both memory maintenance and a second processing task at the same time. These models argue that switching from memory maintenance to nonmaintenance processing leads to forgetting. The balance between forgetting and maintenance, called the cognitive load, is operationalized as the time spent attending to the processing task divided by the total time available to complete the task. The existing literature shows that cognitive load determines working memory capacity. Recent research suggests a potential limitation to this relationship between cognitive load and memory performance. In the present work, we ask participants to complete a working memory dual-task and analyze the relation between NASA Task Loader Index (TLX) workload ratings, cognitive load, and response accuracy to determine if subjective workload better captures working memory performance than objective cognitive load.

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12:00-1:00 pm (1168)

Do Different Ways to Direct Attention Within Working Memory Have Different Consequences on the Vulnerability of the Information Involved? EVIE VERGAUWE, CARO HAUTEKIET, and NAOMI LANGEROCK, *University of Geneva* – The focus of attention holds mnemonic representations in a privileged state of heightened accessibility in working memory, resulting in better memory performance for items that receive focused attention during retention. In line with this notion, representations held in the focus of attention are often observed to be robust and protected from degradation caused by either perceptual interference or decay. Recent findings indicate, however, that representations held in the focus of attention are particularly vulnerable to degradation, and thus, appear to be particularly fragile rather than robust. A major difference between these sets of studies is how and when information is brought into the focus of attention. In this study, we directly compare the vulnerability of information in the focus of attention across these different conditions within a single paradigm, and we show how the vulnerability of information in the focus of attention is modulated.

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12:00-1:00 pm (1169)

Does the Nature of Interference Affect Working Memory Representations Differently Over Time? NAOMI LANGEROCK and EVIE VERGAUWE, *University of Geneva* – The goal of the present study was to test whether the nature of working memory representations changes over time. Based on previous studies, we hypothesized that a sensory-based representation initially is maintained in working memory and that this sensory-based representation shifts over time toward (or is complemented with) a more central, amodal representation. To test this, we manipulated the nature of distraction presented at different points in time during retention. Participants had to remember series of images. After list presentation, either a visual distractor task (perceptual interference) was presented for 6 seconds, followed by an auditory distractor task (central interference) for 6 seconds, or vice versa. We expected recall performance to be lower when perceptual interference was presented right after list presentation than when perceptual interference was presented later, as the perceptual task should interfere more with sensory-based representations than with amodal representations. The results of our study did not confirm this pattern, as there was no difference in recall performance between these conditions.

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12:00-1:00 pm (1170)

Individual Differences in Working Memory Ability and the Benefit of Retrieval Practice. AMANDA L. FORDYCE, THOMAS S. REDICK, and JEFFREY D. KARPICKE, *Purdue University* – Previous research on the association between individual differences in working memory and the benefit of retrieval practice has yielded mixed results. Various studies have shown no effect of working memory, while others observed either more or less retrieval practice benefit for individuals lower in working memory. Previous studies have shown variation in the learning task utilized, with the

most common task being a paired-associates task, though alternatives were used more often for studies that demonstrated a differential benefit of retrieval practice. Additionally, there has been variation in the cognitive ability range of the sample as well as the scoring method for working memory span tasks. The current study addressed how these variations influence the presence and strength of the relationship between working memory and retrieval practice. To address this, we utilized a general knowledge learning task modeled off a previous study that had shown a retrieval practice benefit for individuals with lower working memory. Additionally, separate analyses were conducted utilizing partial and absolute scoring methods for operation span to address inconsistencies in previous research.

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12:00-1:00 pm (1171)

Re-Examining Long-Range Temporal Dependence in Experience Sampling Reports of Mind Wandering. ANTHONY P. ZANESCO, DENKOVA EKATERINA, and AMISHI P. JHA, *University of Miami* – Emerging research suggests that time series sequences of experience sampling reports of mind wandering exhibit consequential temporal dynamics, including scaling behavior in their fluctuations across increasing time scales. This Hurst scaling behavior implies long-range temporal correlations, in which episodes occurring far in the past exert influence on the occurrence of mind wandering over increasingly large temporal intervals. Yet, short-range correlated processes can also exhibit scaling behavior, making it critical that apparent long-range temporal correlations are evaluated with respect to short-range correlated null hypotheses. To evaluate whether Hurst scaling reflects genuine long-range temporal autodependence, we compare autodependence in mind wandering time series to those derived from short-range correlated Markov models and sequences temporally permuted to remove any autocorrelations. We find that patterns of autodependence were more consistent with short-range correlated processes than with genuine long-range autocorrelations. This suggests that sequences of mind wandering reports have autodependence that decays to that of a short-range correlated process.

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12:00-1:00 pm (1172)

Response Activation and Activation-Transmission in Response-Based Backward Crosstalk: Analyses and Simulations with an Extended Diffusion Model. VALENTIN KOOB, *University of Bremen*, ROLF ULRICH, *University of Tübingen*, MARKUS JANCZYK, *University of Bremen* – In dual-tasks with two speeded responses, Task 2 response information can influence Task 1 processing and propagate back into Task 2. However, little is known about (a) the time-course of this Task 2 response activation and (b) possible transmission/propagation mechanisms. We addressed both issues by testing 10 drift-diffusion models with five datasets. To this end, we first examined if response activation is linearly increasing or pulslike. The pulslike model turned out superior, but the response activation dynamics described a monotonically increasing function that peaked late during Task 1 processing. By





extending the pulseline model with an additional diffusion process, we then examined whether and how the Task 2 response information could affect subsequent Task 2 processing. None of the assumed models proved to be entirely satisfactory; however, additional simulations suggest that Task 2 activation-transmission does not occur in every trial. Rather, only a model in which Task 2 started with a trace of the previous Task 1 response (i.e., irrespective of the Task 2 response activation) turned out to be the most promising account.

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12:00-1:00 pm (1173)

The (Circadian) Rhythm of the Night: Placekeeping Performance Across a Night of Sleep Deprivation. ERIN E. SAWYER, BRIDGETTE N. WEISS, JOSUE FRANCO, ERIK M. ALTMANN, and KIMBERLY M. FENN, *Michigan State University* – Circadian rhythms have pervasive effects on physiology and behavior. Across a night of sleep deprivation, performance on lower-level attention tasks steadily declines, with the worst performance occurring near the circadian nadir. After this, performance improves, despite increasing need for sleep. Less is known about circadian effects on higher-level cognitive tasks. Previously, we found that sleep deprivation impaired placekeeping performance (i.e., the ability to follow a series of steps in order without repetitions or omissions, despite interruptions). Here, we tested circadian variation of placekeeping performance during a night of sleep deprivation. Participants performed a placekeeping task (UNRAVEL) and a measure of vigilant attention (PVT) remotely each hour from 23:00 to 10:45 while monitored on Zoom. Preliminary results show that performance on both tasks declined from 23:00 to 09:00, indicated by increased errors on UNRAVEL and increased lapses on the PVT, followed by slight improvement through the end of the measurement period. This research may inform strategies for individuals who must perform complicated or high stakes procedural tasks during the night while sleep deprived, such as medical professionals.

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12:00-1:00 pm (1174)

Comparing Wellbeing in College Students Pre- and Post-Onset of COVID in the Context of Conducting an ENHANCE Intervention. ALANA ROSA and CAITLYN THELEN, *Radford University*, PEI-CHUN TSAI, *University College London*, JOE SIRGY, *Virginia Polytechnic Institute and State* – The Enduring Happiness and Continued Self-Enhancement (ENHANCE) project is a wellness intervention program developed by the late Ed Diener and his team that teaches individuals how to boost their subjective well-being (SWB) through daily exercises (Kushlev et al., 2017). The ENHANCE intervention has been found to increase SWB and lower symptoms of depression in participants (Heintzelman et al., 2019; Tsai et al., 2020). With the onset of the pandemic, many have experienced negative changes. Researchers examining these changes have found that people are experiencing higher rates of stress, depression, and anxiety in the postpandemic world (Huckins, 2020; Li et al., 2020; Sibley et al., 2020). A modified version of Diener's ENHANCE intervention was conducted on

the Radford University campus during the spring (prepandemic) and fall of 2020 and spring of 2021. Measures of well-being and negative affect were administered before the intervention began each semester. The current presentation compares the pretest data. It is hypothesized that those who took the pretest measures prepandemic will evidence higher baseline SWB, as well as lower symptoms of anxiety and depression when compared to those who took the pretest during the pandemic.

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12:00-1:00 pm (1175)

Mechanisms for Postrest Motor Performance Gains. MOHAN GUPTA and TIMOTHY C. RICKARD, *University of California, San Diego* – The prevailing hypothesis for observed postrest motor skill performance gains is that they are due to consolidation. In the present study, we present evidence of an alternate mechanism. Six groups of participants (N=240) performed a finger tapping task involving either massed or spaced practice and with one of three break conditions between training trials: 1, 10, or 30 seconds. The results showed that the smaller the ratio of break time to task time, the larger the postrest gain. This suggests that postrest gains are due to release from reactive inhibition and muscle recovery. The consolidation hypothesis is unable to explain these results. We discuss implications for motor learning and sleep research.

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12:00-1:00 pm (1176)

Identifying Common and Distinct Factors of Inhibitory Control and Impulsivity. KAMRYN MATTINGLY, *University of California, Riverside*, ANJA PAHOR, *University of California, Irvine*, AUDREY CARRILLO and RADHIKA S. AMIN, *University of California, Riverside*, ANDREW S. RIVERA, *California State University, San Bernardino*, EUNICE GHIL, *University of California, Irvine*, NANCY TSAI, *Massachusetts Institute of Technology*, JASON REIMER, *California State University, San Bernardino*, SUSANNE JAEGGI, *University of California, Irvine*, AARON SEITZ, *University of California, Riverside* – While impulsivity and inhibitory control (IC) are colloquially used interchangeably, they are measured differently and used in different contexts. IC is often defined as the ability to withhold or interrupt an action or decision. Many cognitive tasks aim to measure various components of IC, but disagreement remains in which tasks best capture specific IC constructs. Impulsivity is often defined as behavior that is done with haste and does not consider long-term consequences. While conceptually similar, IC is traditionally measured using performance-based cognitive tasks and impulsivity is typically assessed using self-report surveys. To better understand the relations between these measures we recruited 317 participants that completed self-report surveys of impulsivity and cognitive IC tasks. Impulsivity measures included the BIS/BAS Scale, SUPPS-P Scale and the SWAN Scale. IC tasks included Flanker, AXCP, Antisaccade, Stroop, TOVA, Cancellation, Dogs & Monkeys, and Category Switch. We will present performance distributions of each assessment and analyses of how IC and impulsivity factors overlap and diverge. These data can promote





more efficient test batteries to measure these constructs in basic research and clinical settings.

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12:00-1:00 pm (1177)

The Simon Effect Asymmetry for Left- and Right-Handers/ Footers. QI ZHONG, *Purdue University*, JING CHEN, *Old Dominion University*, ROBERT W. PROCTOR, *Purdue University* – In two-choice reaction tasks, responses are faster and more accurate when stimulus and response locations correspond than when they do not. This phenomenon is called the Simon effect for tasks in which the spatial dimension of the stimulus is task-irrelevant. Recent studies have found a Simon effect asymmetry for right-handed participants, with the effect being larger for the stimulus located on the right-hand side rather than the left-hand side. A similar asymmetry was found for pedal-press responses with the left and right feet, favoring the right responses for right-footed persons. Prior studies have mostly focused on right-handed and right-footed participants, but the findings have been attributed to hand dominance, implying that the asymmetries should reverse for left-handed and left-footed persons. The present study examined the Simon effect asymmetry for both hand and foot responses for left-handers/footers and right-handers/footers. Our results showed the expected reversal of the Simon effect asymmetry for the left-handers/footers when responding with the hands but an advantage for the right foot when responding with the feet that did not differ from that of right-handers.

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12:00-1:00 pm (1178)

The Preparation-Driven Subsequent Task-Switching Cost Affecting Task Implementation Is Abolished on No-Go Trials. LAURA PROSSER, *University of Aberdeen*, MOTONORI YAMAGUCHI, *University of Essex*, RACHEL SWAINSON, *University of Aberdeen* – A task-switching cost tends to follow cue-only trials (where only a task cue enabling task preparation is shown) but tends not to follow nogo trials (where a no-go signal is shown after task preparation, instructing that the task should not be performed). An interpretation of these findings is that during a no-go trial, the conditions for a subsequent task-switching cost are first established by preparation and then abolished by the no-go signal. We tested this idea by directly comparing the task-switching costs following no-go trials and cue-only trials, using a double-registration paradigm to separate the costs affecting task implementation (at target responses) from any costs affecting task preparation (at cue responses). We found a task-switching cost in target responses following cue-only trials but not following no-go trials. The task-switching cost in target responses was larger on trials that followed completed trials (where the task was actually performed) than on trials that followed cue-only trials. These results indicate that a task-switching cost affecting task implementation is established by preparation and is increased when the task is actually performed but is abolished when performance is disallowed.

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12:00-1:00 pm (1179)

Autocorrection of Typing Errors Reduces the Likelihood to Learn from Mistakes. JOSH K. KHOO, CLAUDIA DANIELMEIER, and JAN DERRFUSS, *University of Nottingham* – Adjusting our behaviour after errors and learning from mistakes is crucial for our future performance. Here, we focused on typing errors and investigated whether autocorrections of our errors are helpful or detrimental for our future typing performance. We presented four conditions: words typed correctly were either presented as they were entered by participants or had errors inserted, and words typed incorrectly were either presented as typed or had errors corrected. Crucially, words associated with errors (and a matched number of correct trials) were repeated, either immediately or after a delay. Replicating Logan and Crump (2010, *Science*), we found posterror slowing in the keystroke following typos, independent of whether the incorrect letter was displayed on the screen (uncorrected errors) or not (corrected errors). However, uncorrected and corrected errors were dissociable when the subsequent trial involved a repetition of the incorrectly typed word. Participants were significantly less likely to type the repeated word correctly if the errors were corrected. These results suggest that while posterror slowing on subsequent letters occurs independently of visual feedback, visual feedback does matter for posterror adaptations.

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12:00-1:00 pm (1180)

Testing Construct Validity via Criterion-Based Machine Learning: Neural Networks Accurately Reflect the Proactive Monitoring of Future Effects. FLORIAN GOURET, JOSEPH KRUMMENACHER, ANDREA KIESEL, and CHRISTINA U PFEUFFER, *Albert-Ludwigs-Universität Freiburg* – When actions predictably cause the same effects, effect anticipations yield anticipatory saccades toward future effect positions—a proactive effect monitoring (i.e., cognitive control) process preparing the comparison of expected and actual effect. High proportions of such anticipatory (relative to all) saccades (saccade-effect congruency [SEC] score) reflect effective individual effect monitoring. From two experiments, we selected a SEC-criterion-based participant subset (> 95%) to train a neural network predicting whether, at a given trial, a participant would perform an anticipatory saccade toward the future effect or not (training). We then applied this neural network to all participants (testing) as well as to a third experiment (transfer). Individual participants' model prediction accuracy (kappa, .05-.84) increased with their SEC scores (50-99%) both for the testing ($r=.38$) and transfer ($r=.81$) data sets. Thus, we demonstrate that criterion-based data selection enables testing whether a neural network accurately reflects the intended psychological construct.

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12:00-1:00 pm (1181)

A Confound-Free Evaluation of Congruency Sequence Effects: Implementing Cognitive Control Within the Diffusion Model Framework. MARKUS JANCZYK, *University of Bremen*, IAN MACKENZIE, ROLF ULRICH, and HARTMUT





LEUTHOLD, *University of Tübingen*, VALENTIN KOOB, *University of Bremen* – In conflict tasks, like the Stroop, Simon, or flanker tasks, the congruency effect is often reduced after an incongruent compared to a congruent trial: the congruency sequence effect (CSE). Despite extensive research, three issues are still unsettled. First, the origin of the CSE: Does it reflect conflict-driven adaptation in control sets or (confounding) factors, such as feature integration? Second, the adaptation mechanism: Does the CSE reflect increased processing of task-relevant features, suppression of task-irrelevant features, or both? Third, the temporal dynamics: Does adaptation in processing occur within a trial already, or does it occur between two successive trials? To evaluate each of these issues, we took a mathematical approach by implementing a pure mechanism of conflict-driven adaptation within the established diffusion model for conflict tasks (DMC). Based on simulations, we argue that the task-irrelevant feature is suppressed after experiencing conflict, and adaptation in control settings occurs between two trials. Importantly, since the mathematical approach predicted the typical CSE pattern, the present results demonstrate that CSEs even emerge in the absence of potential confounds.

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12:00-1:00 pm (1182)

Compositional Representation of Action Demands in Dual Tasks with Low Dimensional Overlap. LYNN HUESTEGGE, *Julius-Maximilians-Universität Würzburg*, TILO STROBACH, *MSH Medical School Hamburg* – We asked how behavioral (dual-action) demands in dual tasks are mentally represented. Three accounts were empirically tested. According to a compositional (Structuralist) account, component tasks remain structurally intact when combined with another task. A holistic (Gestalt) account posits that dual-action requirements in dual tasks are represented holistically and entirely distinct from its components. Finally, a contextual change account assumes that a change in context (e.g., from single- to dual-action requirements) might generally impede response retrieval, similar to repeating a response when the task context switches. We assessed trial-by-trial effects in a single-/dual-task switch paradigm (combining an auditory-vocal and a visual-manual task) involving sessions across several days. Comparisons of performance between complete switch trials (e.g., between the two different single tasks) and partial repetition trials (e.g., from dual to single task) revealed partial repetition benefits for both tasks and in both single- and dual-task performance. We conclude that dual-action requirements here are mentally represented in a compositional fashion, probably due to low between-task dimensional overlap.

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12:00-1:00 pm (1183)

Interference Control and Response Inhibition in Gifted and Nongifted Adults. KIRSTEN A. VERHAEGEN, BERT REYNVOET, and EVA VAN DEN BUSSCHE, *KU Leuven* – Inhibition is a cognitive control function that can be further divided in two separate but related subprocesses, namely interference control and response inhibition. Previous studies suggested that gifted adults outperform

non-gifted adults in cognitive control. However, it remains unclear whether this is true for inhibition and its subcomponents in particular. In this study, we observed that gifted individuals were significantly more accurate on a response inhibition task (i.e., go/no-go task) than nongifted participants, without reaction time differences. However, although gifted adults responded faster on interference control tasks (i.e., numerical flanker and Stroop tasks), there were no significant differences in interference control. Our study supports the notion that interference control and response inhibition are separate processes and suggests that gifted adults specifically outperform nongifted adults with regards to response inhibition.

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12:00-1:00 pm (1184)

Dissociating Stimulus-Response Compatibility and Modality Compatibility in Task Switching. ERIK FRIEDGEN, IRING KOCH, and DENISE N. STEPHAN, *Rheinisch-Westfälische Technische Hochschule (RWTH) Aachen University* – Modality compatibility (MC) describes similarity of stimulus modality and of the anticipated response effect. Task switching with incompatible modality mappings elicits larger costs than with compatible modality mappings. Yet, it is unclear if the influence of modality compatibility occurs before or after task selection, response selection, or affects both processes. We investigated potential interactions of MC and stimulus-response (S-R) compatibility—the latter being assumed to affect response selection—using a Simon paradigm (stimulus location irrelevant) and a spatial-discrimination paradigm (stimulus location relevant) with visual and auditory stimuli and manual and vocal responses. Results showed independent effects of S-R and modality compatibility in both paradigms. Bayes factors suggested moderate but consistent evidence for the absence of an interaction. Independent effects suggest MC effects arise before or after response selection, possibly both. We propose response initiation is associated with anticipatory activation of modality-specific effects, facilitating the correct response with modality-compatible mappings or reactivate, at task-selection level, the incorrect task with incompatible mappings.

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12:00-1:00 pm (1185)

Inhibition-Based Dual-Action Benefits: The Role of Predictability. TIM RAETTIG and LYNN HUESTEGGE, *Julius-Maximilians-Universität Würzburg* – Performing two actions at the same time usually results in performance costs. However, recent studies have also reported dual-action benefits: performing only one of two possible actions may necessitate the inhibition of the initially activated, but unwarranted second action, leading to single-action costs. Presumably, two preconditions determine the occurrence of such inhibition-based dual-action benefits: Firstly, there has to be dimensional overlap across action requirements. Secondly, the task situation should entail unpredictability regarding the particular responses and response types from trial to trial, meaning that all response alternatives have to be kept active in working memory. In the current set of dual-action experiments, we tested the latter hypothesis by comparing 1) a pseudo-randomized mode of trial presentation





to 2) intermixed, but fixed sequences of trial types and 3) a completely blocked presentation. As expected, dual-action benefits were strongly present in 1, but significantly reduced in 2, and absent in 3. This pattern of results is compatible with newer theories of multiple action control which assume that differential inhibitory costs in single-action trials are the root cause of dual-action benefits.

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12:00-1:00 pm (1186)

An EEG Analysis of Illusions of Authorship in Skilled Typists. CIGIR KALFAOGLU, *Eastern Mediterranean University* – Hierarchical control theory of skilled typing (HCT) proposes that implicit error detection (indexed by posterror slowing) can dissociate from subjective error awareness. When feedback from the fingers contradicts feedback from the eyes, implicit error detection and explicit error detection are more influenced by somatosensory and visual feedback, respectively; this method has been used to create illusions of authorship in typists (Logan & Crump, 2010). A similar distinction between implicit and explicit error detection exists in the EEG literature (ERN for implicit and Pe for explicit error detection). We used the methodology of Logan and Crump (2010) to test predictions of HCT and hypothesis about the relationships between ERN, Pe, and error detection using EEG and behavioral data collected from 25 skilled typists. We replicated Logan and Crump's behavioral results and found that Pe is more likely to reflect a result of (rather than being a contributor to) the neural processes involved in conscious error detection and that ERN is also associated with subjective error awareness.

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12:00-1:00 pm (1187)

Error Cancellation. ROLAND PFISTER, *Julius-Maximilians-Universität Würzburg*, MARCO STEINHAUSER, *Catholic University of Eichstätt-Ingolst*, KATHARINA A. SCHWARZ, WILFRIED KUNDE, and ANNA FOERSTER, *Julius-Maximilians-Universität Würzburg* – Errors trigger swift responses of performance monitoring mechanisms. Electrophysiological evidence for such performance monitoring shows a first peak around 100 ms after error commission, which has commonly been interpreted as reflecting error detection. Here we studied the duration of correct and erroneous keypress responses and observed that by this time, many erroneous responses have already ended whereas correct responses are still carried out. This even held true when controlling for cognitive and biomechanical differences between errors and correct responses (e.g., response times). We propose that these findings reflect immediate, active error cancellation, suggesting that the human cognitive system autocorrects errors instantaneously.

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12:00-1:00 pm (1188)

Large-Scale Modeling of Human Cognitive and Physical Performance Outcomes: Current Progress and a Plea for Data! TAD T. BRUNYÉ, *U.S. Army Combat Capabilities Development*

Command (DEVCOM) Soldier Center, KENNY YAU, KANA OKANO, GRACE ELLIOTT, and SARA OLENICH, *Tufts University Center for Applied Brain and Cognitive Sciences (CABCS)*, ERIC L. MILLER, *Tufts University* – Computational models of human behavior tend to focus on few predictors and highly specified outcomes in the domains of perception, attention, and memory. We developed a computational modeling framework with the goal of broadly and coarsely predicting cognitive and physical performance as a function of real-world contextual demands such as restricted sleep, stress, dehydration, physical exertion, and thermal load. Model construction leveraged diverse raw data sources, including over 1 million data points to estimate marginal probability density functions for each of six independent and dependent variables of interest using parametric modeling and maximum likelihood estimation. The joint distributions among variables were optimized using an adaptive lasso approach based on the strength and directionality of conditional relationships (effect sizes) derived from meta-analyses of over 15,000 original research reports. Preliminary model outcomes demonstrate the potential to predict several aspects of performance including cognitive control, gross motor, language, memory, perceptuomotor control, and reaction time. Continuing work includes model expansion with extant data (our plea!), additional predictors and outcomes, and validation.

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12:00-1:00 pm (1189)

Asymmetrical Reaction Time (RT) Disparity Among Congruent, Neutral, and Incongruent Trials in Conflict Tasks. PARKER R. SMITH and ROLF ULRICH, *University of Tübingen* – While the relation between congruent and incongruent conditions in conflict tasks has been the primary focus of cognitive control studies, the neutral condition is often set as a baseline between the two conditions. However, recent investigations have suggested that average neutral reaction times (RT) are not placed evenly between the two opposing conditions. The present study sought to establish whether there is a systematic asymmetry in RT differences between conditions in conflict tasks (Stroop, flanker, and Simon tasks). We first conducted a meta-analysis that recorded the average RTs of conflict tasks with neutral conditions to explore this. Upon finding an asymmetry that showed a larger disparity between average neutral and incongruent RTs, we tested the prior mentioned conflict tasks with two different sets of stimuli to establish the effect's robustness. The results suggest that the noted asymmetry exists and may depend on stimuli and/or response mapping. The asymmetry primarily appears in a manner opposite of what models such as the diffusion model of conflict (DMC) predict. Due to this, we endeavor to extend DMC to better account for the phenomenon.

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12:00-1:00 pm (1190)

Implicit Learning in Absence of Explicit Learning in a Visuomotor Adaptation Task. TEJAS SAVALIA, *University of Massachusetts Amherst*, DAVID E HUBER, *University of Massachusetts*, ROSEMARY COWELL, *University of Massachusetts* – In





the study of motor learning, it is commonly accepted that learning reflects both explicit learning, which rapidly adapts to novel visuomotor mappings (e.g., aim left to move up), and implicit learning (e.g., learning by doing), which is slow to learn and slow to unlearn. In this study we asked whether the implicit system can operate in the absence of explicit learning using a center-out reaching task. The novel mapping was a 90-degree rotation between the onscreen feedback when moving a stylus on a tablet and the actual motion direction. We tested four between-subject groups created by crossing two factors: gradual vs. immediate onset of a novel visuomotor mapping, crossed with feedback emphasizing speed vs. accuracy. After practice, the onset of this mapping occurred either abruptly or progressively in steps of 10 degrees of additional rotation with each block. After 10 blocks, the rotation was abruptly removed for all groups to assess unlearning. Unlearning was slowest for subjects in the gradual-speed group. We applied different models to the trial-by-trial accuracy data of each subject, finding that a simpler single-state model (i.e., implicit learning alone) provided a better account of data from the gradual-speed group.

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12:00-1:00 pm (1191)

Bracing Yourself Not to Look—Preparatory Processes and Inhibition in Multiple Action Control. JENS KUERTEN, JULIAN GUTZEIT, and LYNN HUESTEGGE, *Julius-Maximilians-Universität Würzburg* – Previous research on multiple action control has, under special conditions, demonstrated benefits of executing two actions at the same time compared to only one in isolation. Such dual-action benefits were due to costly inhibition of prepotent responses in single-action trials. The current study addresses the influence of preparatory processes on these inhibitory control demands. Participants responded to a peripheral visual stimulus with either an eye movement (saccade), a manual button press, or both. We manipulated saccade automaticity by varying the presentation time of the fixation cross prior to stimulus onset. To manipulate preparedness for inhibitory control demands response requirements either varied randomly within a block (mixed blocks, less prepared) or remained constant throughout a block (pure blocks, more prepared). The results revealed dual-action benefits in terms of elevated error rates in single- (vs. dual-) action trials. This effect was more pronounced for saccades with greater automaticity. Crucially, we observed considerable dual-action benefits in both mixed and pure blocks. This indicates substantial inhibitory control difficulties even when providing the potential to prepare for saccade inhibition.

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12:00-1:00 pm (1192)

‘We Can Work It Out’: Precrystallization Emerges in a Sequential Joint Action Task. APRIL KARLINSKY, *California State University, San Bernardino*, MATTHEW RAY, *University of Toronto* – Studies of sequential joint actions (one co-actor performs the first step of a task before the second co-actor finishes the task) have revealed that the person who initiates the task plans their movement to facilitate their partner’s action. Such studies have typically

involved binary motor tasks wherein individuals only select between a response that benefited themselves or their partner. Present experiments examined response selection in a joint action task in which the first person can flexibly distribute the task requirements. Partners performed a sequential joint action wherein the initiator passed a cube to the finisher. The cube had to be oriented so that a 3D shape fixed to its side could be inserted into a target. It was found that the initiator rotated the cube to facilitate the finisher’s task. Initiators completed more of the cube rotations when they had experience with the finisher’s task (Experiment 1; $n=20$), when their task was more difficult than the co-actor’s due to time constraints (Experiment 2; $n=15$), and when they had visual information about the finisher’s action requirements (Experiment 3; $n=30$). These findings suggest that people leverage shared task representations to facilitate a partner’s achievement of a shared goal.

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12:00-1:00 pm (1193)

The Observation of Grip Frequency and Duration as a Function of Sitting Skill. ERIKA GARCIA MORA, THAYNE BUKOWSKI, AREND VAN GEMMERT, and EMILY C. MARCINOWSKI, *Louisiana State University* – Current research has observed infant sitters who balance arms-free explore objects at higher frequencies than infant prop sitters (Marcinowski et al., 2019). The purpose of this study was to longitudinally examine the quality of exploration with objects among prop and arms-free sitters by analyzing the grip and touch frequency and duration with objects placed in their environment. Recruited at sitting emergence, 32 infants were assessed across three longitudinal visits. Grasping behavior of both hands was evaluated from a 30-second video recording of infants being presented with 1.5-inch cubic blocks. Grip configuration was coded at a minimum when a thumb plus finger was used (Newell et al., 1989). We used longitudinal multilevel modeling to assess the impact of sitting type on grasping behavior. On average, the number of touches changed quadratically ($p<0.01$), while frequency of grasps changed linearly ($p=0.02$). Prop-sitters initially increased their right-handed grasps more quickly than arms-free sitters ($p<0.05$). No sitting group differences were detected for left-hand grasps or touches across the visits ($ps>0.12$). These findings likely indicate the emergence of arms-free sitting changes the expression of manual biases for grasping.

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12:00-1:00 pm (1194)

Impaired Associative Learning But Intact Short-Term Memory in Old Pigeons. MARY FLAIM and AARON BLAISDELL, *University of California, Los Angeles* – Normal aging has been found to be accompanied by cognitive deficits in humans, nonhuman primates, and rodents. Specific deficits have been found in tasks that require holding information over a short delay and in paired-associate learning. Both tasks rely on the prefrontal cortex (PFC), indicating that this region is particularly vulnerable to age-related declines. Pigeons have an equivalent region to the PFC in mammals, the nidopallium caudolaterale (NCL), but it is not known if pigeons






show similar declines in performance on these tasks with age. We administered a short-term memory task, the delayed match to sample (DMTS), and an associative learning task, the symbolic match to sample (SMTS), to 15 pigeons ranging in age from 6 months to 18 years old. In the DMTS task, subjects were first shown a sample stimulus, and then were presented with comparisons after a delay, with selection of the matching comparison being rewarded. In the SMTS, a set of eight pictures was used to create four pairs to be memorized. Performance on the SMTS task declined with age, while age had no effect on performance for the DMTS task. Thus, pigeons show only partial replication of age effects on executive function typical of mammals.

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12:00-1:00 pm (1195)

The Generalizability of Symbol Learning by Rhesus Macaques. ANDRES SANCHEZ , BROOKE N. JACKSON, MARKIE ADAMCZYK, MAISY D. BOWDEN, BARBARA A CHURCH, and J. DAVID SMITH, *Georgia State University* – Humans use language to guide their behavior and report their mental states. Symbolic representation even allows us to process abstract relations (Smith & Church, 2021). We have found that macaques can take instruction from symbols to guide their color/shape matching but, unlike children, they do not generalize to novel colors/shapes (Bowden et al., 2019). Here we examined whether macaques could use symbols to declare the dimensional basis of the matches, and whether greater learning variability would produce generalization. Monkeys completed six tasks of increasing complexity with six colors and six shapes. In the first phase of each trial, monkeys matched stimuli by color or shape. In a second phase, they chose a symbol denoting the type of match. In their final task, monkeys were probed with novel items. They correctly used symbols to declare their match types, and they generalized to novel colors and shapes. Monkeys can learn abstract symbols.

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12:00-1:00 pm (1196)

Evidence of Mental Enumeration of Sequentially Presented Object Stimuli in Rats. TOHRU TANIUCHI and YUKA KURACHI, *Kanazawa University* – We trained rats to respond to a “third” stimulus among six same objects arranged in a row. The objects were put on one of ten goal wells filled with sand in a rectangular open field. Food rewards were given at the bottom of a correct well (under the third object). Since the assignment of objects to the wells was changed trial to trial (third to seventh well could be the correct goal), rats could identify the correct stimulus based on neither location of specific goal box nor distance from start point. Additionally, inaccessible food rewards put in wire mesh tea strainers were set in the incorrect wells to control possible odor cues. Rats learned the numerical discrimination task reliably. In the next phase, partitions with openings were inserted between the goal wells and thus rats could encounter the object stimuli only sequentially. Although rats’ performances were deteriorated initially, they recovered rapidly and reached reliable levels. When different types of objects were introduced to the

task, rats kept their good performance. These results suggest that rats can mentally enumerate the number of object stimuli in an abstract manner.

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12:00-1:00 pm (1197)

Reasoning Through Exclusion and with Auditory or Visual Cues in Cotton-Top Tamarins. JULIE J. NEIWORTH, ANA KNIGHTEN, and CHRISTOPHER H. LEPPINK-SHANDS, *Carleton College* – A two-cup forced choice task involving inferential reasoning was used to test exclusion (if not A, then B) and inclusion (if A, then A) in adult cotton-top tamarins. A second task using four cups tested whether tamarins demonstrate application of reasoning through a second choice when their first choice demonstrated exclusion. In both cases, tamarins demonstrate an ability to infer the location of a treat and could accomplish this cognition with visual cues. Some also were able to use auditory cues to discern the location. Inclusion, or showing the presence of a treat, produced more accurate performance than through exclusion or absence cues in which it was demonstrated visually or through auditory cues the location of the absence of the treat. A discussion of the strength and prevalence of logical reasoning in nonhuman primates not closely related to humans follows.

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12:00-1:00 pm (1198)

Testing a Modified Law of Effect with Pavlovian-Instrumental Transfer. HENRI P. DE GUZMAN, ISABEL ENRIQUEZ, BARBARA KNOWLTON, and AARON BLAISDELL, *University of California, Los Angeles* – Edward Thorndike’s law of effect (LOE) is a popular framework used to characterize stimulus-response (S-R) processes such as habits, yet it fails to account for many observations, such as increased behavioral variability during extinction. Recently, a modified law of effect (MLOE) was postulated to account for these observations. To test the MLOE, a Pavlovian-instrumental transfer (PIT) procedure was administered to 16 female rats. During Pavlovian conditioning, rats were presented with a continuously reinforced cue (CRF; 100% probability) and a partially reinforced cue (PRF; 25% probability) on separate trials. Then rats learned to press a lever for the same food reward that had been paired with the conditioned stimuli (CS). A final PIT test presented each CS during extinction of instrumental lever pressing. Because these cues had never been present during instrumental training, the MLOE predicts no difference in lever press variability elicited by the Pavlovian cues. We found instead that variability of lever press duration was lower during the CRF cue than the PRF cue, which supports the law of expect (LOX), that is, as outcome expectancy decreases, behavioral variability increases.

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12:00-1:00 pm (1199)

Oddity Discrimination of Category in Honeybees. NICHOLAS P. SCHALLY and PATRICIA A. COUVILLON, *University*





of *Hawai'i at Mānoa* – Muszynski and Couvillon (2020) found that category difference facilitated trial-unique oddity learning in honeybees. The present experiment is a further exploration of category difference in oddity problems. Bees were trained in a three-stimulus oddity problem, and choice of the odd stimulus was rewarded. Two categories of stimuli were used: circles of a single color (solid) and circles composed of two differently colored semicircles (split). The colors used were green (G), orange (O), yellow (Y), and blue (B). The training was trial-unique such that each trial had a new set of stimuli. On half the trials a solid was odd, and on the rest a split was odd. The two trial types were intermixed over 18 trials. For Group 1 the nonodd stimuli were identical (e.g., O-/O-/YB+, BG-/Y+/BG-). For Group 2, the nonodd stimuli were not identical (e.g., O-/B-/YB+, BG-/Y+/BO-). The expectation was that Group 1 bees would find the problem easier; they could choose the odd stimulus on the basis of color, category, or both. Group 2 bees could choose the odd stimulus only on the basis of category. Both groups solved the problem, with no difference in either rate or asymptote. The results indicate that oddity learning is quite robust in honeybees.

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12:00-1:00 pm (1200)

Withdrawn

12:00-1:00 pm (1470)

Simple Questions on Simple Associations: Regularity Extraction in Nonhuman Primates. JEREMY YEATON, *University of California, Irvine*, LAURE TOSATTO, JOEL FAGOT, JONATHAN GRAINGER, and ARNAUD REY, *Centre National de Recherche Scientifique (CNRS) & Aix-Marseille University* – Statistical learning (SL) refers to the ability to extract regularities from the environment through exposure. In many SL experiments, participants must extract regularities in a stream of stimuli which is free from random elements. This feature is not ecological as our environment is noisy and recent studies have been interested in extraction of regularities in noise. Yet, how the position of the regularity in the stream of noise might impact SL remains unclear. We conducted two experiments using a serial response time (RT) task with 20 Guinea baboons. We focused on simple two-element AB regularities in a noisy sequence. We manipulated the position of AB within the sequence, such that it could be either fixed (beginning, middle, or end for all trials; Exp. 1) or variable (Exp. 2). The slope of RTs from A to B was taken for each condition as a measurement of learning rate (LR). While all conditions differed significantly from a no-regularity baseline, we found strong evidence that LR did not differ between the conditions. These results indicate that SL is not impacted by the position of the regularity in noise, even when that position is variable, and provides new evidence on the dynamics of regularity extraction in noise.

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12:00-1:00 pm (1471)

Simultaneous Learning of Unidirectional and Bidirectional Associations in Primates. THOMAS CHARTIER and JOEL FAGOT, *Centre National de Recherche Scientifique (CNRS) & Aix-Marseille University* – When taught an A-B stimulus sequence, humans tend to infer that B-A is also valid, thus abstracting from order and focusing on links between stimuli. Such inference fosters language learning, since word-referent associations are typically bidirectional. Surprisingly, it is still unclear whether nonhuman animals can do that. If not, this could represent an obstacle to language. In pigeons, monkeys, rats, and chimpanzees trained with visual stimuli in matching-to-sample protocols, evidence for bidirectionality inferred from a strictly unidirectional training was mostly absent. But procedural biases and insufficient subject numbers may have impeded successful demonstration. Using an automated behavioral platform, we tested 20 Guinea baboons (*Papio papio*) with a revised procedure. For the first time, we found clear evidence for spontaneously inferred bidirectionality. Interestingly, unidirectional A-B associations, rather than inferred B-A associations, were the primary determinant of baboons' behavior. We conclude that from unidirectional training, baboons have formed both uni- and bidirectional associations. The difference between humans and non-humans may reside in opposite preferential access to two coexisting types of associations, rather than in learning one of two mutually exclusive types of associations. Associations learned by monkeys could be richer than previously appreciated.

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12:00-1:00 pm (1201)

Lever Pressing as a Measure of Intrinsic Motivation in Rats. SARA BOND, MARISA MELO, JORDAN NERZ, TANNER RAAB, and KENNETH LEISING, *Texas Christian University* – In contrast to extrinsically motivated behavior, intrinsically motivated behavior does not result in an apparent reward but is rewarding in itself. The overjustification hypothesis states that after engaging in behavior as a means to an extrinsic reward, there is a decrease in intrinsic motivation to engage in the behavior. Two studies evaluated the overjustification effect in rats with lever pressing as a measure of intrinsic motivation. For both experiments, lever pressing was measured in Phase 1 in the absence of an observable reward. In Phase 2, one group continued to lever press without reward (Control), while the other group received a sucrose pellet (Extrinsic) for each lever press. Phase 3 was the same as Phase 1. In Experiment 1, lever pressing did not result in any nominal events in Phase 1 and 3. Lever pressing in Group Extrinsic did not increase following Phase 2, and a floor effect occurred in Phase 3. In Experiment 2, lever presses in all groups and phases were followed by a brief light. The extrinsic group pressed more at the start of Phase 3 and stabilized at a higher rate than the control group. The results indicate many factors, such as conditioned reinforcement, may influence the overjustification effect.

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12:00-1:00 pm (1202)

Burgers Over Broccoli: Enhanced Visuospatial Memory for High-Calorie Foods. SHAWN T. SCHWARTZ, *Stanford University*, ALEXANDER L. SIEGEL, *University of California, Los Angeles* – The ability to selectively encode and retrieve important information in memory is a hallmark of human cognition. Prior work has shown a natural ability to selectively attend to and prioritize important information and its relative value, despite the cognitively demanding nature of associative binding. Optimal foraging strategies are one fitness-relevant context for successful visuospatial encoding and retrieval of important information (for survival and reproduction). It is known that an inherent food-location memory bias towards high-calorie foods exists for humans using multi-sensory (vision, taste, smell) encoding; however, it is unknown if this automatic, high-calorie food bias also occurs when gustatory and olfactory senses are not employed. We investigated whether an automatic bias towards calorie-dense foods emerged in a unisensory (vision) visual-spatial memory paradigm. We found that locations of high-calorie foods were better remembered than low-calorie foods and nonfood stimuli across two samples, including when attention was divided at encoding. Participants' BMI was associated with better memory for high-calorie foods in a sample of participants with a mean normal BMI, but not with a mean overweight BMI.

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12:00-1:00 pm (1203)

Stimulus-Response Binding and Retrieval Is Independent of Affective Consequences: Implications for Theories of Learning and Behaviour Automatization. JUHI PARMAR, JUHI PARMAR, and KLAUS ROTHERMUND, *Friedrich-Schiller University, Jena* – In four experiments, we investigated the modulatory role of performance-dependent and performance-independent affective consequences on stimulus-response binding and retrieval (SRBR). SRBR was assessed within a colour categorisation task in a sequential prime-probe design, with an orthogonal variation of response relation (colour repetition vs change) by distractor relation (word repetition vs change). SRBR is measured by an interaction of the two factors, with distractor repetition producing facilitation due to a retrieval of the correct response in response repetition sequences, but producing interference if the response changes from prime to probe. Positive, neutral, or negative events indicating monetary consequences were interspersed between primes and probes. Consistently across all four experiments (total $n=338$), we did not find any evidence for an affective modulation of SRBR, indicating that these effects are fully automatic and independent of affective consequences. Results are discussed with regard to their implications for theories of learning and habit formation.

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12:00-1:00 pm (1204)

Reward Motivated Directed Forgetting and Depression in an Online Sample. DIANE CHAO, *Southern Methodist University*, SARA N. GALLANT, *University of Southern California Leonard Davis School of Gerontology*, HOLLY J. BOWEN, *Southern*

Methodist University – Forgetting is an important mechanism that may protect against the development of memory-related disorders like PTSD and depression. While directed forgetting has often been examined in healthy samples, few studies have examined this ability in depressed samples. Depressive symptoms are often related to executive dysfunction, poor inhibitory control, working memory deficits, rumination, low approach motivation, and deficits in reward processing. Using a directed forgetting paradigm, we tested whether reward motivation differentially affected intentional forgetting in depressed and nondepressed young adults. Participants were shown a sequence of words with instructions to remember or forget to earn no, high (\$.75), or low (\$.01) reward. While the depressed group remembered fewer words overall, both healthy controls and depressed participants exhibited a directed forgetting effect and depressed participants did not perform differently than the healthy controls when reward was present. Reward motivation enhanced processing of high rewards in a more automatic rather than strategic, controlled way, thus making it more difficult to forget.

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12:00-1:00 pm (1205)

The Effects of Curiosity on Memory for Misinformation. MARY C. WHATLEY and ALAN CASTEL, *University of California, Los Angeles* – Curiosity motivates us to learn and seek new information. Prior research shows that curiosity to learn information is related to the likelihood of remembering that information later. Curiosity has even been associated with greater memory for irrelevant details, suggesting that curiosity may strengthen memory for an episode more broadly. However, it is unknown whether curiosity can improve memory for source information. The current study examined the influence of curiosity on later item memory and source memory for true and false information (i.e., misinformation). Participants were presented with trivia questions and rated their curiosity to learn the answer. For each question, participants were shown a true or a false answer and were told whether each answer was true or false. After a week, participants' memory for both the answers and the true or false label (i.e., source) were tested. The results showed that higher curiosity was related to better recall for the answer but was not associated with better source memory. However, curiosity was associated with higher confidence in source memory judgments. Thus, curiosity may not reduce the risk of misinformation but may lead to false confidence in source memory.

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12:00-1:00 pm (1206)

Incidental Interleaving: Is Intention to Learn a Prerequisite for the Interleaving Effect? KATHERINE CARIÑO, *University of California, Los Angeles*, STEVEN C. PAN, *National University of Singapore*, ELIZABETH L. BJORK, *University of California, Los Angeles* – A study schedule that entails interleaving exemplars from different categories benefits category learning compared to a schedule wherein exemplars from individual categories are presented in succession (i.e., blocked). Prior research on this interleaving effect asked participants to study with the intention to learn





categories in preparation for a test. The current study investigated whether the interleaving effect still occurs when participants are not intending to study nor are anticipating a test. Over the course of two experiments we compared the efficacy of interleaved and blocked study schedules in intentional versus incidental learning conditions for the learning of naturalistic visual stimuli. In Experiment 1, learners in the incidental condition were told to rate their liking of each category exemplar and in Experiment 2 they were told to identify extraneous visual information. An interleaving effect was consistently observed in the intentional learning condition, but there was a smaller interleaving effect (Experiment 1) or no interleaving effect at all (Experiment 2) in the incidental conditions. Thus, intention to learn can influence the cognitive processes that underlie the interleaving effect.

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12:00-1:00 pm (1207)

Predicting Trial-and-Error Learning from the Feedback-Related Negativity. SUCHETA CHAKRAVARTY and JEREMY B. CAPLAN, *University of Alberta* – The feedback-related negativity (FRN), an event-related potential (ERP) signal elicited during feedback processing in trial-and-error learning tasks, is thought to index discrepancies between expected and observed outcomes or reward-prediction errors (RPE), and thereby drive learning. Going beyond traditional ERP effects analyzed for trial-averaged data, we investigated if FRN amplitude predicted subsequent responses for individual trials. Participants learned, through repetitions (cycles), the response-rules for a set of 48 words, divided equally in high- and low-value words. Considering the cycle with the most learned responses (relative to its previous cycle), FRN amplitude predicted subsequent responses modestly but only for previously correct trials. Thus, contrasting with RPEs, which support response adjustments following errors, FRN amplitude supported the maintenance of correct or learned responses across successive cycles. This also calls for a reconsideration of the ways in which reinforcement learning theory can inform our understanding of human trial-and-error learning.

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12:00-1:00 pm (1208)

Probing the Effects of Valence and Arousal on Source Memory Accuracy: A Meta-analytic Review. DIANA R. PEREIRA, ANA CAROLINA TEIXEIRA-SANTOS, and ADRIANA SAM-PAIO, *University of Minho*, ANA P. PINHEIRO, *Universidade de Lisboa* – Source memory (SM) (i.e., the ability to remember and decide about the origins of an event) is affected by emotion in different ways. We examined the effects of valence and arousal on SM accuracy using a meta-analytic approach, also including the investigation of factors that might moderate the magnitude and direction of those effects. PRISMA guidelines were followed and 48 studies including 80 experiments (N=2,809 participants) were incorporated so far in the systematic review. Considering stimuli with different valence characteristics (negative vs. neutral; positive vs. neutral; negative vs. positive), no reliable effect of emotion on SM was observed (d_{unb} between -0.11 and -0.01). The analyses focusing on stimulus

arousal revealed that SM was improved for high and medium arousal (vs. low arousal; d_{unb} = 0.27; d_{unb} = 0.49, respectively), with no difference between high and medium arousal stimuli (d_{unb} = -0.12). Notably, the type of features and of SM tasks emerged as consistent moderators. Even though this review reproduces the methodological heterogeneity typically found in SM research, it also highlights some of the factors that may account for the discrepant findings and that may be further pursued in future studies.

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12:00-1:00 pm (1209)

Fractionating the Reward-Memory Literature. NICK SIMONSEN and CHRISTOPHER R MADAN ✪, *University of Nottingham* – The topic of reward effects on memory has been rapidly increasing and is often viewed as a coherent literature. However, there are critical differences in the methodology underlying sets of studies, likely with different underlying memory mechanisms. Here we propose that two distinct procedures comprise the overall reward-memory literature: instructed and feedback. Instructed studies tell participants of item-value associations during encoding with rewards earned during memory retrieval. In contrast, feedback studies ask participants to make responses during encoding, with rewards provided as feedback; memory retrieval itself is unrewarded. Some feedback studies require participants to make responses related to the to-be-remembered items, while others require participants to respond to an initial prompt before presenting an unrelated stimulus. While both procedures involve feedback, the first set of studies involves item-related feedback, and the second set has item-unrelated feedback. Despite this characterization not encompassing all studies in the reward-memory literature, our fractionation provides a framework for studying and differentiating between different behavioural results and memory mechanisms.

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12:00-1:00 pm (1210)

Anticipation of Threat Influences Free Recall Dynamics and Consolidation. BRANDON S. KATERMAN and ELIZABETH HORWATH, *Temple University* – Threat is known to enhance item memory but disrupt associative binding. However, open questions remain as to how threat influences free recall dynamics. To better understand how threat influences free recall dynamics, we presented participants (N=17) with word lists that were encoded either under high, low, or no threat. The high- and low-threat categories were associated with a differing adverse sound penalty on the following test day. Following encoding and a short distractor task, we asked participants to recall as many items that they could remember during an immediate and delayed test. Results indicated better memory for items encoded under threat (p=0.01) and also lower forgetting rates between delayed and immediate test (p=0.03), highlighting a putative role for consolidation. Future work will apply clustering analyses inspired by the temporal context model on this data to better understand threat's influence on temporal organization of memory.

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12:00-1:00 pm (1211)

Are Alerting Effects Modulated by Alert Frequency? HAI-LEY A. ARREOLA and DARRYL W. SCHNEIDER, *Purdue University* – People respond faster to a stimulus when it is preceded by an alerting cue than when it is not. However, it is unclear whether and how this alerting effect is modulated by the frequency with which alerting cues are experienced, in part because there are opposing predictions from basic and applied research. We conducted two experiments to examine whether alerting effects become smaller or larger as alert frequency is increased. In both experiments, participants made a spatially compatible keypress response to the direction of an arrow stimulus on each trial. The arrow was preceded by an alerting cue (a square) on either 25% or 75% of trials (Experiment 1) or on either 12.5% or 87.5% of trials (Experiment 2), with alert frequency manipulated between participants. Alerting effects were significantly modulated by alert frequency, but the data pattern was mixed (e.g., in Experiment 1, increased alert frequency was associated with a larger alerting effect on response times but a smaller alerting effect on error rates). Implications of the findings for understanding phasic and tonic alertness are discussed.

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12:00-1:00 pm (1212)

Independent Contributions of Rhythmic Expectancy and Endogenous Spatial Attention. POM CHARRAS and MARIA-GRAZIA CAPIZZI, *Université Paul-Valéry Montpellier* – Given the wealth of information available in our environment, humans have to prioritize some elements among others to achieve adaptive behavior and maximize survival. While the cognitive mechanisms underlying selective spatial attention have been widely investigated, less research has focused on temporal expectancy. To appropriately interact with the environment—like when catching a ball—information timing is extremely relevant. In the present study, we investigated how rhythmic expectancy and endogenous spatial attention combine to optimize target detection in a Posner-like paradigm. Targets were always preceded by a rhythm which consisted of the a/synchronous flickering of the two placeholders. In addition, the fixation cross turned either green or red to predict target location in 75% of the trials. Our results clearly suggest that rhythmic expectations and endogenous spatial orienting provide independent and additive contributions to target detection.

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12:00-1:00 pm (1213)

No Quantitative Differences Between Gaze and Arrow Cueing: A Meta-Analytic Answer to the Debate. JEANETTE A. CHACÓN CANDIA, RAFAEL ROMÁN-CABALLERO, and JUAN LUPIÁÑEZ CASTILLO, *University of Granada*, MARIA CASA-GRANDE, *Sapienza Università di Roma*, ANDREA MAROTTA, *Universidad de Granada* – Numerous studies have shown that directional stimuli such as gaze and arrows induce reflexive shifts of attention towards the cued locations, even when they do not predict above chance the location of target information. Nevertheless, there is still debate about the existence of quantitative differences between

the cueing effects triggered by social and nonsocial cues. In the present comprehensive meta-analysis, we identified 37 studies (including 144 outcomes) that allowed comparing the impact of both cues. Crucially for the debate, the orienting effect observed with gaze cues did not differ from that observed with arrows: both around $g \approx 0.40$; 10 ms of difference. In addition, the longer the cue-target interval and the older the participants, the smaller the outcome. Task type was also influential. Finally, the effect was observed to decrease over the years because of a marked publication bias during the first decade of this research topic and the higher prevalence of detection tasks, with which larger differences have been found.

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12:00-1:00 pm (1214)

Bypassing the Central Bottleneck with Easy Tasks: Beyond Ideomotor Compatibility. MORGAN LYPHOUT-SPITZ and FRANÇOIS MAQUESTIAUX, *Université Bourgogne Franche-Comté*, ERIC RUTHRUFF, *University of New Mexico* – It has been recently demonstrated that ideomotor-compatible (IM) tasks can operate entirely automatically, thereby bypassing the central bottleneck that constrains dual-task performance. Is this ability to perform central operations in parallel specific to IM tasks or common to many types of easy tasks? We addressed this question by testing the automaticity of non-IM but easy tasks that rely on high semantic compatibility between stimulus and response (e.g., hear “high,” say “low”). In two PRP experiments, this semantic task was presented as Task 2 along with an arbitrary Task 1. We found negligible dual-task costs, high percentages of response reversals, and high overlap between the observed distributions of interresponse intervals and predictions from bottleneck bypassing. These converging indicators of bypassing can be explained by neither IM compatibility nor task speed. We propose that the key enabling factor for bottleneck bypassing is the ease with which stimulus-response mappings can be loaded into working memory.

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12:00-1:00 pm (1215)

Withdrawn

12:00-1:00 pm (1216)

Selective Attention for Looming Sounds. PAUL A. SKARRATT, TOM PENEY, and DAVID R. SMITH, *University of Hull* – In visual search, objects elicit a greater attentional response when looming toward the observer, compared to receding away or remaining static. An auditory analogue to this visual looming advantage also exists: sounds that rapidly increase in amplitude elicit a range of behavioural and psychophysiological responses that suggest prioritization within the information processing system. The present study comprised three experiments that examined whether auditory prioritization can occur at the attentional level. We adapted a Posner-type task to accommodate looming, receding, and static sounds as precues. Results showed that looming cues elicited significantly







larger facilitation effects across a wide range of stimulus onset asynchronies and were also more resistant to manipulations designed to degrade and ambiguate them. These findings demonstrate that looming motion has attentional primacy in both auditory and visual modalities.

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12:00-1:00 pm (1217)

Is the Attentional SNARC Effect Truly Attentional? Using Temporal Order Judgments to Differentiate Attention from Response. BRETT COCHRANE , DIANA B. GALARRAGA, and JAY PRATT , *University of Toronto* – The spatial-numerical association of response codes (SNARC) effect reflects the phenomenon that low digits are responded to faster with the left hand and high digits with the right. Recently, a particular variant of the SNARC effect known as the attentional SNARC (which reflects that attention can be shifted in a similar manner) has had notable replicability issues. However, a potentially useful method for measuring it was revealed by Casarotti et al. (2007) using a temporal order judgement (TOJ) task. Accordingly, the present study evaluated whether Casarotti et al.'s results were replicable by presenting a low (1) or high (9) digit prior to a TOJ task where participants had to indicate which of two peripherally presented targets appeared first (Experiment 1) or second (Experiment 2). In Experiment 1, it was revealed that the findings of Casarotti et al.'s were indeed observable upon replication. In Experiment 2, when attention and response dimensions were put in opposition, the SNARC effect corresponded to the side of response rather than attention. Taken together, the present study confirms the robustness of attentional SNARC in TOJ tasks, but that it is not likely due to shifts in attention.

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12:00-1:00 pm (1218)

Binding of Task-Irrelevant Contextual Features in Task Switching. ELENA BENINI, ANDREA M. PHILIPP, and IRING KOCH, *Rheinisch-Westfälische Technische Hochschule (RWTH) Aachen University*, SUSANNE MAYR, *University of Passau*, CHRISTIAN FRINGS, *Trier University* – Research employing sequential paradigms produced convincing evidence suggesting stimulus- and distractor-response binding. We investigated binding of a task-irrelevant context with tasks and responses in cued task-switching. Previous studies found response-repetition benefits in task repetitions, but response-repetition costs in task switches. In this study, we predicted that repeating a context feature in a trial retrieved the features of the previous trial. Therefore, performance should improve when all the retrieved features match with the features of the current trial but worsens when retrieved and current features conflict. Two experiments (N=124; N=96) both revealed a three-way interaction of repetition (vs. switch) of context, response, and task, indicating that repeating the context improved performance when the task and the response repeated. Furthermore, Experiment 1 showed that a repeating context only retrieved the bound features when it appeared synchronously with the cue. In Experiment 2, we found that retrieval took place only when the context was a feature of the cue but not

when it was a feature of the target. We discuss implications for theoretical accounts of binding and retrieval in action control.

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12:00-1:00 pm (1219)

The Contribution of Meaning to the Detection of Task Conflict. RONEN HERSHMAN, YULIA LEVIN, JOSEPH TZELGOV, and AVISHAI HENIK, *Ben-Gurion University of the Negev* – The colour-word Stroop task produces both information conflict (detection of the ink colour vs word meaning) and task conflict (respond to the ink colour vs read the word). In this study, we measured both reaction time and pupil dilation, and the neutral stimuli in our study were nonreadable letter strings as well as meaningless nonreadable stimuli (i.e., coloured patches and abstract character strings). Our results showed slowest responses in the incongruent trials and fastest responses in the congruent trials. However, no differences were found between the investigated neutrals. In contrast, pupil dilation was largest in the incongruent trials and smallest in the neutral trials. Moreover, the more the neutral stimuli were meaningless, the less the pupil dilation that was observed. Our results suggest that nonword meaningless stimuli reduced task conflict (compared with all the investigated conditions). Neutral equivalence should be taken into consideration in Stroop and Stroop-like tasks.

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12:00-1:00 pm (1220)

Better Prediction of Cognitive Abilities with Increased Control Demands? CODY A. MASHBURN and RANDALL W. ENGLE, *Georgia Institute of Technology* – Many reflexive behaviors and homeostatic functions can be brought under voluntary control. The present work explores the consequences of inducing such control for the relationship between these “automatic” functions and cognitive ability constructs. It does so in the context of a prosaccade task, in which participants initiate eye movements toward a cue appearing in the left or right periphery of a central fixation to identify a target. Performance on prosaccade tasks is typically driven by the orienting reflex, in which attention is captured by the appearance of the peripheral cue. We tested both a typical prosaccade task and a prosaccade task performed with an adaptive procedure intended to induce errors and increase cognitive demand; correct target identifications resulted in less time to identify the target, whereas incorrect target identifications resulted in more time. We examine both behavioral and oculometric data for patterns of convergence and discrimination with measures of working memory capacity, fluid intelligence, attention control, and perceptual speed. We found stronger relationships with cognitive ability measures and the adaptive version of the prosaccade than the non-adaptive version.

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12:00-1:00 pm (1221)

Implicit Planning through Statistical Learning. WOUTER KOOL, ERIC GRUBER, and JACK DOLGIN, *Washington University in St. Louis* – Even though goal-directed planning is crucial for





adaptive behavior, its cognitive costs prime us to rely on information-processing strategies that are automatic or habitual. Such strategies are often described as relying on trial-and-error or heuristics. Here, we provide evidence for a more sophisticated form of automatic information processing, which relies on statistical learning of the task structure in order to implement implicit anticipatory planning. On each trial of a novel task, participants respond to a stimulus according to one of four different rules. Unknown to them, the structure of the task allowed for prediction of which rule would occur after each switch (every 3-5 trials). We find that the congruency effect of the expected rule, but not the other rules, increases in anticipation of the switch. This anticipatory task-set activation occurs even for participants who are unaware of the rule transition structure. In addition, we show that a predictive recurrent neural network mirrors human behavior. Taken together, these results indicate that the brain can use implicitly learned statistical associations to prepare for upcoming tasks, engaging in a form of goal-directed planning with minimal control demands.

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12:00-1:00 pm (1222)

Now You See It, Now Not So Much: What Determines the Use of Adaptive Control in Interference Tasks? GIACOMO SPINELLI and STEPHEN LUPKER, *University of Western Ontario* – In interference tasks such as the Stroop task, a larger congruency effect often emerges in a list containing mainly congruent stimuli (e.g., the word RED in the color red) vs. a list containing mainly incongruent stimuli (e.g., the word BLUE in red). This proportion congruent (PC) effect is traditionally thought to reflect the implementation of heightened adaptive control over conflict when having to deal with stimuli that are frequently incongruent. In experiments requiring arbitrary responses (e.g., keypresses to colors), however, the PC effect is typically small and/or nonsignificant. In a series of Stroop and Simon experiments, we explored and evaluated potential explanations for this difference. The data suggest that the key factor may not be whether the links between the relevant stimulus component (e.g., the ink color) and responses are arbitrary but whether the links between the irrelevant stimulus component (e.g., the word) and responses are arbitrary. That is, adaptive control appears to be most necessary when the irrelevant stimulus component naturally produces a response tendency that conflicts with the response that the relevant stimulus component requires.

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12:00-1:00 pm (1223)

Eliminating the Attentional White Bear: Top-Down Processes Override Attention to Expected Distractors. MAKAYLA CHEN, *University of Canterbury*, KYLE R. CAVE, *University of Massachusetts Amherst* – The attentional white bear (AWB) effect refers to the faster responses to a stimulus at expected distractor locations than at empty locations. It is driven top-down by expectations of upcoming stimuli (Tsal & Makovski, 2006). We investigate the factors that influence this effect. Participants responded to an occasional probe dot during the retention interval of

a visual memory task. The retention interval contained either distractors or no stimuli. Thus the probe dot appeared either when distractors were expected or not expected. We manipulated the number of items held in memory, the change between the memory and distractor displays, and the order of the distractor and no-distractor conditions across participants. All three factors affected the AWB. We propose that the AWB is jointly influenced by three factors: the persistence of a learned attentional set, the visual system's inherent sensitivity to change, and top-down control, which is evoked to prevent distractor interference in demanding tasks.

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12:00-1:00 pm (1224)

The Effects of Cue Validity and Distractor Salience on Top-Down Inhibitory Control of Spatial Locations. HSUAN-FU CHAO, SHIH-CHING HUANG, and FEI-SHAN HSIAO, *Chung Yuan Christian University* – Top-down inhibitory control refers to the mechanism that people can reduce the interference from the distracting information by voluntarily suppressing the distractor-related representations. This control mechanism can be investigated by an active inhibition task, in which a pre-cue for the distractor of the upcoming target and distractor display was pre-cued in advance and the participants are instructed to use the pre-cue to suppress the distractors. In the present study, we used the active inhibition task to investigate whether active inhibition of distractor locations requires participants' intention to use the pre-cue by manipulating the validity of the distractor pre-cue. In addition, we investigated whether the maintenance of active inhibition is contingent on the presence of the competing distractors by manipulating the salience of the distractors. The preliminary results suggested that active inhibition of distractors locations was contingent on people's intention to suppress the distractor-related representations and was maintained when there were competing distractors.

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12:00-1:00 pm (1225)

Auditory Distractions and the Cross-Modal Stroop Effect: The Influence of Cognitive Control. VINCENT A. MEDINA, DANIELLE A. LUTFI-PROCTOR, and EMILY M. ELLIOTT, *Louisiana State University* – Two mechanisms of auditory distraction have been proposed. In cases of attention capture, irrelevant sounds cause involuntary disengagement from a main task. However, in interference-by-process, the obligatory processing of irrelevant sound shares processing requirements with the main task and is therefore disruptive. One paradigm where the chief mechanism of auditory distraction is unclear is cross-modal Stroop; participants name the color of a visual item while hearing an auditory distractor that is also a color word. There is a cross-modal Stroop effect (i.e., speed and accuracy drop) during incongruent trials when the color of the visual item and auditory distractor are mismatched. In two experiments, we examined the role of attention capture in cross-modal Stroop through warning cues and task difficulty. These experimental manipulations were shown to influence auditory distractions independently in prior research. While warnings did not affect the





size of the cross-modal Stroop effect, high task difficulty decreased the size of the effect. Increasing focal attention to the main visual task by increasing difficulty decreased auditory interference. These findings are broadly consistent with an attention capture explanation.


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12:00-1:00 pm (1226)

Alertness Biases Attention Toward Salient Stimuli: Evidence from the Flanker Task and a Hybrid Flanker-Search Task. VERENA C. SEIBOLD, *University of Tuebingen* – Alertness increases congruency effects in response conflict tasks even though it leads to overall faster reaction time. This paradoxical effect has been recently explained in terms of an enhanced attentional bias for salient stimuli. In three experiments, I investigated the scope of this “salience account”: Experiments 1A and 1B served as an independent test in the context of the flanker task. To this end, I varied both alertness and the relative salience of target and flankers. In Experiment 2, I further investigated the nature of the alertness-salience interaction. In a hybrid flanker-search task, a target of varying location was flanked by either a response-related (congruent or incongruent) distractor or a neutral but salient distractor. Experiments 1A and 1B showed that alertness both increased and decreased congruency effects depending on whether the flankers were more salient than the target or vice versa. Experiment 2 showed that alertness did not only increase the impact of response-related distractors on search efficiency, but also the impact of the salient distractor. In sum, these results support the salience account and suggest a potential role for spatial attention in the alertness-salience interaction.

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12:00-1:00 pm (1227)

Revealing Object-Based Attentional Control in a Moving Object Paradigm. JACKSON S. COLVETT , *Washington University in St. Louis*, BLAIRE J. WEIDLER, *Towson University*, JULIE M. BUGG, *Washington University in St. Louis* – While object-based attention (Egly, Driver, & Rafal, 1994) is well established, no prior research has demonstrated that participants associate attentional control states with objects (i.e., object-based attentional control). We developed a novel paradigm where participants responded to flanker images that appeared in either a blue or a purple semicircle. One object was mostly compatible (MC) and the other was mostly incompatible (MI). After each response, the objects rotated clockwise. Because all flanker locations appeared in either the MC or MI object, all locations were 50% congruent. We found a difference in congruency effects between trials on the MC and MI object, indicating object-based attentional control. However, the effect only emerged when the bias for the inducer locations was strengthened, participants kept a running count of how many trials appeared in one of the objects, and the objects rotated between each trial. Finding evidence for object-based attentional control in the absence of location confounds is an important step for research on context-specific control. However, several manipulations were needed to observe this effect, leaving implications for context-specific designs.

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12:00-1:00 pm (1228)

Eye Gaze Versus Head Orientation: The Role of Social Cues as a Target in a Spatial Stroop Task. YOSHIHIKO TANAKA and MATIA OKUBO, *Senshu University* – Eye-gaze targets produce a reversed Stroop effect in a spatial Stroop task while arrow targets produce a spatial Stroop effect, suggesting the unique mechanism of attention for eye gaze in social cognition. We investigated the interaction between eye-gaze and other social cues, such as head orientation, using the spatial Stroop task. Participants judged the direction of the gaze target looking to the left and right while ignoring its location. When head orientation was provided to the target, reaction times were faster in congruent trials than incongruent trials (spatial Stroop effect). On the other hand, when the head orientation was removed, the spatial Stroop effect was eliminated (nonsignificant reversed Stroop effect). These results suggest that (1) the global configuration of head information facilitated the spatial judgments, overriding the local information of the eye region and, (2) social information is not processed solely but mutually interacted and integrated with other social cues.

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12:00-1:00 pm (1229)

Exploring Individual-Difference Factors in Distractor Devaluation and No-Go Devaluation Effects: Emotional Reactivity and Working Memory Capacity. BROOKE E. PARDY and ELIZABETH M. CLANCY, *University of Guelph* – Ignoring or withholding a behavioural response from a stimulus causes it to become affectively devalued. Leading accounts suggest this results from an aversive reaction elicited when inhibition is applied to prevent interference from distracting or otherwise-inappropriate stimulus/response representations. Accordingly, the lingering change in stimulus value in these “distractor devaluation” and “no-go devaluation” effects occurs because the aversive response becomes associated in memory with the perceptual details of the inhibited stimulus. Here we ask whether individual differences in emotional reactivity and working-memory capacity may therefore explain why there are large differences in the magnitude of these stimulus-devaluation effects. A self-report measure of emotional reactivity was not predictive of the magnitude of distractor devaluation following visual search trials or no-go devaluation following go/no-go trials. In contrast, working-memory capacity was predictive of stimulus-devaluation magnitude. Our results underscore the usefulness of individual-difference approaches for testing theories regarding the affective consequences of cognitive control.

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12:00-1:00 pm (1230)

Utilizing Computational Modeling to Determine the Individual Cognitive Processes Behind Attentional Bias. COLTON HUNTER and GRANT S. SHIELDS, *University of Arkansas* – Attentional biases toward or away from emotionally evocative stimuli have been well documented and are clinically relevant in various disorders, but their cognitive bases are relatively unclear. Computational modeling can be used to understand the cognitive processes






that contribute to attentional biases. In particular, the diffusion model for conflict tasks (DMC)—an established model that differentiates automatic and controlled attentional processes, decision-making processes, and motor processes—may be a useful tool for identifying specific cognitive mechanisms that contribute to emotional attentional bias. However, to date, no study has utilized the DMC to understand attentional bias. We address this gap in the present study by fitting the DMC to data from an emotional dot-probe task containing neutral, happy, and angry faces. Data analysis is ongoing. The results of this study will advance our understanding of the cognitive processes that contribute to attentional bias toward or away from emotional faces, which may further our understanding of disorders, such as anxiety, that are characterized by attentional bias

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12:00-1:00 pm (1231)

Interrupted Reading with Similar and Dissimilar Tasks.

GIA M. MACIAS  and DARRYL W. SCHNEIDER, *Purdue University* – Interruption of a primary task often elicits a cost when the task is resumed. One variable that might modulate interruption costs is the similarity between the primary and interrupting tasks. However, task similarity has not been clearly defined in the literature, and past manipulations of task similarity were sometimes confounded with task switching. The current research addressed this confound with five experiments in which the primary task of reading passages was either uninterrupted or interrupted by similar or dissimilar odd-ball tasks. The similar task always included word stimuli, whereas the dissimilar task included numbers, nonwords, or hybrid stimuli. Interruption costs were obtained for reading times, but they were rarely modulated by the similarity of the interrupting task. The results suggest that when task similarity is not confounded with task switching, it might have little or no effect on resuming interrupted tasks.

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12:00-1:00 pm (1232)

Does Aversiveness Enhance Metacognition: Some Evidence for Gender Differences. MOON SUN KANG and YU-CHIN CHIU, *Purdue University* – Humans exhibit metacognition whereby cognitive control can be adjusted by integrating past experiences in the same temporal context proactively or in the same stimulus context reactively. We demonstrated that proactive and reactive metacognition are indexed by listwise switch probability (LWSP) and item-specific switch probability (ISSP) effect, respectively. Yet, what triggers metacognition remains unclear. Here we examined a hypothesis if aversiveness (i.e., induced by negatively-valenced stimuli) enhances metacognition in our metacognition task switching paradigm. Experiment 1 showed that when stimulus valence was held constant within a participant but varied between participants, it modulated the ISSP effect but not the LWSP effect. More specifically, the ISSP effect was only observed among female participants in a sustained, negatively-valenced context. Experiment 2 showed that the ISSP was not modulated by valence when stimulus valence was varied between stimuli but the overall context was held neutral within participant. These together suggest that aversiveness as conveyed through stimulus

valence might not serve as an additional signal to enhance metacognition with the exception of females in a sustained, negative valence.

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12:00-1:00 pm (1233)

The Effects of Aerobic Fitness on Inhibitory Control and Information Processing Efficiency in Young Adults. HAO-LUN FU, *National Cheng Kung University*, SHIH-CHUN KAO, *Purdue University*, CHUN-HAO WANG, *National Cheng Kung University* – Previous studies have demonstrated high aerobic fitness is beneficial for inhibitory control. However, the fitness-related effects on the conflict control and response inhibition remains unclear. Here, we employed event-related potentials and systems factorial technology to study the effect of aerobic fitness on the inhibition control revealed by multi-signal processing. Forty-four young adults were divided into the high and low fitness groups and performed a redundant-target task. Results revealed lower false alarm rate, larger amplitude of N2d, and shorter latency of P3d for the single-minus-redundant condition in the high fitness group. Furthermore, larger resilience capacity, a measure of multisignal processing efficiency in the presence of distractors, in the high fitness group was observed for the faster responses but not for the slower responses. The results provide new insights on the role of aerobic fitness in enhancing cognitive functioning and its neural correlates.

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12:00-1:00 pm (1234)

Withdrawn

12:00-1:00 pm (1235)

Errors in Task Switching: Investigating Error Aftereffects in a N-2 Repetition Cost Paradigm. LUCA MORETTI and IRING KOCH, *Rheinisch-Westfälische Technische Hochschule (RWTH) Aachen University*, MARCO STEINHAUSER, *Catholic University of Eichstätt-Ingolst*, and STEFANIE SCHUCH, *Rheinisch-Westfälische Technische Hochschule (RWTH) Aachen University* – Since the beginning of task-switching research, associative learning has been thought to contribute to the costs of switching. In three studies, we investigated the possibility that one form of associative learning, task-set strengthening, takes place upon response execution in an automatic fashion, irrespective of accuracy. Under this framework, committing a task-confusion error, namely executing the irrelevant task B, instead of the required task A, would result in carry-over activation of task B in the following trial. As a consequence, task B instead of task A would cause interference, and would thus need to be inhibited. We therefore predicted that committing an error in trial N-2 would reduce N-2 repetition cost in trial N, with N-2 repetition cost constituting a well-accepted measure of task-set inhibition. Using a three-task-switching paradigm, we did indeed find abolished N-2 repetition cost following an error in trial N-2. Most interestingly, this was true only when response speed in trial N-1 was relatively low. We interpret this pattern of results as indicating that automatic





task-set strengthening can be counteracted by a slowly-acting cognitive control mechanism triggered by error commission.

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12:00-1:00 pm (1236)

Genetic Associations Between Executive Functions and Intelligence: A Combined Twin and Adoption Study. DANIEL E. GUSTAVSON, *Vanderbilt University Medical Center*, CHANDRA A. REYNOLDS, *University of California, Riverside*, ROBIN P. CORLEY, SALLY J. WADSWORTH, JOHN K. HEWITT, and NAOMI P. FRIEDMAN, *University of Colorado Boulder* – Much debate has concerned the separability of executive functions (EFs) and intelligence, with evidence that the two are genetically indistinguishable in childhood but distinct in older adolescents and adults. The current study leveraged data from twin and adoption studies to examine EF's genetic structure in adulthood ($M=32.54$ years, $SD=4.72$) and its overlap with intelligence. A total of 1,024 individuals completed six EF tasks and the Wechsler Adult Intelligence Scale®, Third Edition (WAIS-III) as part of the Colorado Adoption/Twin Study of Lifespan Behavioral Development and Cognitive Aging (CATSLife). Results replicated the unity/diversity model that distinguishes general EF abilities (common EF) from abilities specific to working memory updating (updating-specific) and task-set shifting (shifting-specific). Heritability was high for common EF ($h^2=.91$), updating-specific ($h^2=1.0$), shifting-specific ($h^2=.69$), and intelligence ($h^2=.78$). Intelligence was phenotypically and genetically correlated with common EF ($r=.49$, $r_g=.49$) and updating-specific ($r=.63$, $r_g=.71$). Leveraging the combined twin and adoptive design allowed us to estimate both additive and nonadditive genetic effects underlying these associations. These findings highlight the commonality and separability of EFs and intelligence.

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12:00-1:00 pm (1237)

Drift Rate Improves the Psychometric Modeling of Executive Functions. MARC YANGÜEZ ESCALERA, BENOIT BEDIU, JULIEN CHANAL, and DAPHNE Y. BAVELIER, *University of Geneva* – The study of executive functions (EF) relies heavily on latent variable models, yet their reliability has been called into question (Karr et al, 2018; Draheim et al., 2020). Here we show that the choice of behavioral indicators matters and propose a novel indicator, drift-rate, as a promising way to achieve better reliability. Children 8-12 years old ($n=182$) completed nine cognitive tasks tapping inhibition, working memory and cognitive flexibility. Bootstrapping and confirmatory factor analysis (CFA) were conducted to test five indicator-based models: reaction-time, reaction-time difference, accuracy, inverse efficiency, and drift rate. Model reliability demands both high model convergence and model fit. Accuracy and drift-rate indicator-based models showed the highest rate of model convergence (84% and 81%, respectively). Notably, drift-rate indicator-based models were the only ones to show proper model acceptance (75%), whereas all other indicator-based models showed a poor fit to the data (<30%). Thus, drift rate appears as a promising

behavioral indicator when modeling EF. The theoretical foundations of why this may be the case will be discussed.

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12:00-1:00 pm (1238)

Crossmodal Response Precueing. DENISE N. STEPHAN and IRING KOCH, *Rheinisch-Westfälische Technische Hochschule (RWTH) Aachen University* – In the response precueing paradigm, a cue indicates the relevant subset of relevant responses and allows one to prepare for those. Classic response precueing studies used visuo-spatial targets combined with manual responses. Hitherto, possible crossmodal influences were neglected. We developed a novel crossmodal response precueing paradigm combining visual and auditory bimodal precues with visual or auditory unimodal targets and tested it in two successive experiments ($N=66$). An additional manipulation, the cue target interval, in one experiment confirmed that the cues were used for preparation. While our data hints toward an advantage for visual over auditory targets, it overall indicates a general advantage for auditory cues irrespective of target modality. This interaction might be caused by the higher alerting quality of auditory cues, requiring active attention to process visual targets as effectively. Interestingly, the established advantage of hand over finger cues diminish with our nonspatial cues. This may be due to the fact that the spatial features responsible for cue-pattern advantages did not overlap. However, this is an assumption needing further research.

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12:00-1:00 pm (1239)

Learning Symbols to Declare Matching Relationships. BROOKE N. JACKSON, ANDRES SANCHEZ, MARKIE ADAMCZYK, J. DAVID SMITH, and BARBARA A. CHURCH, *Georgia State University* – Relational tasks, like same/different, are difficult for animals and young children (Smith et al., 2019). The current study examined whether participants could learn abstract visual symbols to declare matching relations, and the age at which this ability develops and generalizes. Participants completed a series of tasks that taught symbols for color (O) and shape (X) matching relations. The tasks gradually increased in difficulty and eventually tested full understanding of the symbols, including the ability to generalize to novel colors and shapes. Both adults' and children's performance declined when the color and shape trials intermixed for the first time. However, only adults and 8-year-olds were able to recover from this drop, as well as generalize the symbols to both novel shapes and colors. Younger children had more difficulty and could only generalize to new colors. Future testing will determine whether learning these visual symbols can aid monkeys' performances in relational tasks.

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12:00-1:00 pm (1240)

Learning New Categories for Natural Objects. WANLING ZOU and SUDEEP BHATIA, *University of Pennsylvania* – People learn new categories on a daily basis, and the study of category learning is a major topic of research in cognitive science. However,





most prior work has focused on how people learn categories over abstracted, artificial (and usually perceptual) representations. Little is known about how new categories are learnt for natural objects, for which people have extensive prior knowledge. We examine this question in three preregistered studies involving the learning of new categories for everyday foods. Our models use word vectors derived from large-scale natural language data to proxy mental representations for foods, and apply classical models of categorization over these vectorized representations to predict participant categorization judgments. This approach achieves high predictive accuracy rates and can be used to identify the real-world settings in which category learning is impaired. In doing so, it shows how existing theories of categorization can be used to predict and improve everyday cognition and behavior.

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12:00-1:00 pm (1241)

Toward a Clarified Definition of Autonomy. ANAÏS DETHOOR and MATHIEU HAINSELIN, *Centre de Recherche en Psychologie (CRP)—Cognition, Psychisme et Organisations (CPO) UR UPJV 7273* – Autonomy is a complex notion, studied in several disciplines, but there is no consensus on its definition. This lack of consensus in the literature has implications for the development of autonomy assessment tools. The aim of this communication was to propose a multidimensional vision of autonomy by presenting the different approaches and evaluation tools available. In the literature, we found five dimensions of autonomy: psychological, functional, social, professional, and digital. While psychological autonomy and functional autonomy are widely studied, social autonomy and professional autonomy are beginning to be integrated into evaluation tools, but there is no definition, as is true with the digital dimension. Here, we propose an integrative definition for autonomy and prospective to assess it. In general, the assessment of autonomy is based on only one dimension of autonomy. However, the scales evaluating autonomy are not integrative enough and lack psychometric quality or realism. Consequently, it seems necessary to develop a valid tool that is accessible to clinicians and integrates all the dimensions of autonomy. This tool will provide a better understanding of the patient's functioning and propose more appropriate care.

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12:00-1:00 pm (1242)

Temporal Concepts and Event Sequences: A Parallel Development from Preschool Age to Early Adolescence. VASILIKI KARADIMA, *Panteion University*, ASIMINA RALLI, *National and Kapodistrian University of Athens*, ARGIRO VATAKIS, *Panteion University* – Understanding time concepts in childhood is challenging, as the development of a mental timeline and its verbalization is in progress during the preschool and school years. Although much work has been done on deictic time or absolute duration, no studies have yet to investigate temporal concept understanding during elementary school years. We thus compared the performance of three groups of children (Group 1: 5–6, 2: 8–9, and 3: 11–12 years of age) in a picture-pointing task as a function of temporal category (e.g.,

future-past, duration, seasons, hours of the day). A pictorial sequencing task was also conducted for two to four items. We found Group 1 to be less accurate than Groups 2 and 3 in all temporal categories except those involving durational concepts. Moreover, the observed differences were correlated with children's sequencing performance, which improved as a function of age. Thus, the understanding of different temporal concept categories remains immature at least until the age of 6, particularly for long duration concepts, and improves until the age of 12; this is strongly linked with the development of event sequencing.

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12:00-1:00 pm (1243)

Improving Analogical Learning and Reasoning Through Visuospatial Training. DANIEL CORRAL, *Syracuse University*, HEATHER BURTE, *Texas A&M University* – We report two studies that investigate the relationship between visuospatial and analogical reasoning. In both studies, subjects completed spatial and analogical reasoning assessments. In Study 2, after completing these assessments, subjects were assigned to one of three training groups: (a) visualization training (learning to visualize the elements in scenarios), (b) spatial training (learning to recognize the spatial relationships in scenarios), and (c) analogy training (learning to recognize the analogous elements between scenarios). After training, subjects in Study 2 completed a posttest that assessed analogical reasoning. In both studies, we found that subjects who performed better on the spatial reasoning assessments also performed better on the analogical reasoning assessments. Additionally, in Study 2, subjects who received spatial training showed greater performance gains in analogical reasoning (from the first assessment to the posttest) than subjects who received visualization training. These results suggest that the relationship between visuospatial and analogical reasoning may be driven by subjects' ability to reason about spatial relationships among elements rather than by their ability to visualize those elements.

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12:00-1:00 pm (1244)

Investigating Category Learning in an Online Platform: The Relationship between Analytic and Holistic Thinking Styles. ANA C. RUIZ PARDO, NEHA S. KHEMANI, MAYA GHAI, ZARAH Z. GHULAMHUSSAIN, CHELSEA MCKENZIE, and JOHN PAUL MINDA, *Western University* – We explored the universality of category learning by using an online platform to test typical category learning behaviour. The goal of this project was to investigate whether typical category learning in a previously explored population can be seen using an online platform rather than an in-person/lab method. Participants learned one of the six classification tasks first described by Shepard et al. (1961) which tested the reliance on single feature rules, disjunctive rules, and family resemblance, and they completed a measure of their thinking style (analytic vs. holistic). We hypothesized that categories that can be learned using a single strategy would be learned more easily by those with an analytic thinking style, whereas concepts that can be acquired in





more than one way will show a preference for holistic thinking style. We found that participants with a preference for holistic cognition learned family resemblance concepts more easily than participants with a preference for analytic cognition. This project provides valuable insights to the category learning literature by demonstrating how an online platform can provide a new gateway to better and more representative data.

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12:00-1:00 pm (1246)

Features, Flexibility, and Fakes: How Modifiers Change Concepts. ABBY R. CLEMENTS and SHARON L. THOMPSON-SCHILL, *University of Pennsylvania* – An important question surrounding concepts is whether they have “cores” that define them, separate from superficial features that they may also probabilistically have. One problem with answering this is that all concepts could have different cores, making it impossible to identify consistent core features. To address this problem, we used the adjective “fake,” which modifies all concepts equivalently even if their cores are distinctive, such that modified concepts resemble the original concept in some way but are, by definition, not true examples. Subjects ($n=26$) rated sentences of the form “[Modifier] [concept] has [feature],” to see how different categories of modifiers, including “fake,” would affect a concept’s internal (potentially core) vs. external (superficial) features. While other modifiers increased uncertainty for all features, “fake” differentially negated internal features. Results suggest that while concept boundaries can be stretched quite far, internal features determine category membership, supporting the idea that concepts have cores. They also indicate modifiers like “fake” provide a previously unexplored avenue for determining where conceptual boundaries are and what features are most central to particular concepts.

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12:00-1:00 pm (1247)

Transfer of Category Learning to Impoverished Contexts. PETER WHITEHEAD, AMANDA ZAMARY, and ELIZABETH J. MARSH, *Duke University* – Learning often happens in ideal conditions but must be applied in less-than-ideal conditions—such as when a learner studies illustrated examples of rocks in a book but then must identify them in a muddy field. Here we examine whether the benefits of interleaving (versus blocking) study schedules supports the transfer of category learning in new, impoverished contexts. Specifically, keeping the study conditions constant, we evaluated learners’ ability to classify new exemplars in the same neutral context versus in impoverished contexts in which certain stimulus features are occluded. Over two experiments, we demonstrate that performance in new, impoverished contexts during test is greater for participants who received an interleaved (vs. blocked) study schedule, both for novel and studied exemplars. We show that this benefit extends to both a short (3 minute) or long (48 hours) test delay. Together, these results extend the growing literature investigating how changes in context during category learning or test impacts performance, and

provide support for the use of interleaving to promote the far transfer of category knowledge to impoverished contexts.

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12:00-1:00 pm (1248)

Interleaving Is Better when Trying to Memorize, But Blocking Is Better when Trying to Find a Rule. JEXYA A. NEPANGUE, KIMBERLY R. ABRAHAM, and RACHEL L. KARLIN, *California State University, East Bay* – Interleaving (i.e., mixing up items from different topics) is often better than blocking (i.e., grouping items by topic) for learning, but the optimal sequence for learning can depend on other factors. In the present research, we examined whether the optimal sequence depends on participants’ strategies (e.g., memorizing vs. rule-abstraction). In two experiments, participants learned English-like letter-strings from four different categories in either a blocked or interleaved sequence. Participants then had to classify new items on a transfer test and self-report their strategy (memorization vs rule-abstraction) on both a Likert-scale and with an open-ended response (with the instructions for these strategy questions differing slightly between the two experiments). The transfer items were designed to differentiate between similarity and rule-based representations. Based on participants’ numerical strategy ratings, both experiments showed that when participants tried to find a rule, blocking was better than interleaving for finding the rule, but when participants memorized, interleaving was better than blocking for classifying on the basis of similarity. We believe that these results have implications for learning in educational contexts.

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12:00-1:00 pm (1249)

Withdrawn

12:00-1:00 pm (1250)

Effect of Incidental Color on Judgments and Memory. SAMUEL W. BENNETT and BRYCE LUND, *Towson University*, EMILY R. COHEN-SHIKORA, *Washington University in St. Louis*, BLAIRE J. WEIDLER, *Towson University* – Past research has shown that incidental color exposure influences implicit preference, such that items associated with white are preferred over those associated with black. The present study sought to determine whether incidental colors influence perceived pleasantness and recognition memory. Participants saw positive and negative words on black or white backgrounds and either counted the number of vowels or rated their pleasantness (in Experiment 1, or unpleasantness in Experiment 2). After a distractor task, they performed a recognition task. Pleasantness ratings from the encoding task were higher for words on white backgrounds in Experiment 1. However, that effect did not replicate in Experiment 2 (both experiments showed the expected effect of word valence). In both experiments, the only effect in recognition was the standard levels of processing effect, with more deeply encoded words (pleasant/unpleasant task) remembered better than shallowly encoded words (vowel counting). These results add to the body of literature surrounding levels of processing and





suggest incidental color may alter pleasantness perception, though more research is still needed to fully understand its mechanisms and effects on memory.

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12:00-1:00 pm (1251)

Category Variability Effect and Single Category Based Strategy in Categorization. LEE-XIENG YANG, *National Chengchi University* – Category variability effect refers to the middle item between two categories of different variabilities being more similar to the low-variability category but tending to be classified as the high-variability category, challenging the exemplar model. This study instead hypothesized that this effect can result from participants' selectively relying on only the exemplars of the low-variability category for categorization. In Experiment 1, before the training and after the transfer phase of the categorization task, a recognition task was conducted to deepen the processing for the exemplars of the low-variability category, high-variability category, or both, with the intention to direct the participants to rely on the exemplars of specific categories for categorization. The results showed that the strongest category variability effect occurred when only the low-variability category was focused on in the recognition task, supporting our hypothesis. Experiment 2 with the same design further provided evidence that this single category based strategy could be applied to learning a normal categorization task with two categories of the same variability. All data in this study were well accounted for by an exemplar model, the similarity-dissimilarity generalized context model (SD-GCM).

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12:00-1:00 pm (1252)

Retrieval Practice During Category Learning Impacts Students' Study Order Choices. ADDISON L. BABINEAU and SARAH "UMA" TAUBER, *Texas Christian University* – Retrieval practice can benefit category learning (Jacoby et al., 2013); and we explored the possibility that retrieval practice also impacts students' study order decisions. Regarding study order decisions, students typically prefer to block their study more so than to interleave their study (e.g., Tauber et al. 2013). However, according to the performance monitoring hypothesis, these study choices should be influenced by information gained during learning. To investigate this possibility, in multiple experiments, participants classified categories of rocks (e.g., sedimentary) by completing study or test trials, and they made study order choices by selecting what to study on the subsequent trial. Students who completed test trials selected to interleave the majority of practice trials, whereas students who completed study trials selected to block the majority of practice trials. These findings have significant implications for category learning as well as for self-regulated learning.

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12:00-1:00 pm (1253)

How Do Judgments of Learning Facilitate Inductive Learning? The Roles of Retrieval and Category Salience. MORGAN D. SHUMAKER, *Texas Christian University*, NINA L. HOUSTON, CATHERINE D. MIDDLEBROOKS, and KATHLEEN M. ARNOLD, *Radford University* – Students are often required to learn broad concepts rather than minute details. One way to do this is by inductive learning—studying individual examples of a concept and abstracting an overarching rule (Kornell & Bjork, 2008). However, students may not know how to learn this way, making this a difficult task. Experience with prior inductive learning may aid subsequent learning, especially when attention is drawn to the overarching category via metacognitive judgments. Specifically, making judgments of learning (JOLs)—judging the likelihood of remembering information in the future—on previously studied categories may facilitate subsequent inductive learning of new categories (Lee & Ha, 2019). However, this effect has only been demonstrated when JOLs provided a covert retrieval opportunity and encouraged relational processing via category salience. The current study attempts to parse the roles of retrieval and category salience in the effect of JOLs on facilitating subsequent inductive learning.

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12:00-1:00 pm (1254)

When you Recognize a Dog, You Also Know It's an Animal: Evidence from Rapid Object Categorization Using Anaglyphs. ROBERTO G. DE ALMEIDA and CAITLYN ANTAL, *Concordia University* – We investigated the nature of object recognition using a picture-word congruency task with brief exposures (50-200 ms), while participants wore anaglyph glasses. Anaglyphs allowed us to investigate the role of early posterior visual projections during object and word recognition, by projecting words to the left hemisphere and pictures to the right hemisphere, using either ipsilateral or contralateral pathways. Pictures and target words were presented simultaneously with a 10 ms difference accounting for their recognition times: objects were presented for 50 or 190 ms, while words were presented for 60 or 200 ms. For each picture, one of four word probes was presented for congruency decision: the basic level category label of the picture (dog), a high-prototypical (bark), low-prototypical (fur), or superordinate feature (animal). Preliminary results suggest that, at presentation times, object names and superordinate features yield shorter response times and greater accuracy than high- and low-prototypical features. Results suggest that concept tokening relies on nondecompositional processes, whereby conceptual features are processed only after conceptual access.

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12:00-1:00 pm (1255)

Affective Implications of Expending Cognitive Effort. REBEKA C ALMASI, *The George Washington University*, JINI TAE, *Gwangju Institute of Science and Technology (GIST)*, MYEONG-HO SOHN, *The George Washington University* – Cognitive conflict arises when distractors provide information incongruent with a task-relevant target; ignoring them is effortful, reflected by slower





reaction. The literature shows both positive and negative affective outcomes of expending effort. Short-term priming studies show negative valence for conflict identification (response to both target and distractor) but positive valence for conflict resolution (responding and successfully ignoring the distractor). However, long-term association studies show that stimuli used in high-effort conflict resolution conditions are later recognized as positive faster than negative, indicating positive valence. The present study explores whether this effect emerges when the association is based on conflict identification. During the association phase, participants identified congruency of gender Stroop stimuli. In the transfer phase, participants identified emotion of the actors. Results showed that the actors associated with frequent conflict detection were more easily recognized as positive than negative. This implies that exerting effort, not only conflict resolution, induces positive valence.

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12:00-1:00 pm (1256)

Life Stress and Mind Wandering: The Role of Event Recency and Level of Processing. AMANDA HOLTZMAN, *Nova Southeastern University*, ELIZABETH L. GRIFFITH, and ADRIEL BOALS, *University of North Texas* – Mind wandering mediates the impact of prior life stress on working memory task performance (Banks & Boals, 2016). Prior life stress may not impact working memory if mind wandering does not occur during the task (Goller, Banks, & Meier, 2020). Negatively valenced mind wandering may be important in this relationship due to their impact on task performance (Banks, Welhaf, Hood, Boals, & Tartar, 2016). The current study examined the relationship between negatively valenced mind wandering and several dimensions of a prior life stressor, including recency of the event, level of closure, and level of processing. The results demonstrated that ratings of recent negative life events (e.g., within 6 months) that were processed in a concrete style, but not negative life events overall, predicted rates of negatively valenced mind wandering after controlling for working memory capacity and tendency to suppress thoughts. These results suggest that not all prior life stress predicts mind wandering.

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12:00-1:00 pm (1257)

The Deficiency of Attentional Processing for Social Stimuli in Social Anxiety. KENTA ISHIKAWA, TAKATO OYAMA, and MATIA OKUBO, *Senshu University* – The present study investigated the effect of social anxiety on attentional processing of social and nonsocial stimuli. Considering the characteristics of social anxiety, we expect that the level of social anxiety predicts the deficiency of attentional processing for social stimuli (i.e., gaze), but not for nonsocial stimuli (i.e., word). Ninety-two participants performed a spatial Stroop task in which an eye-gaze or a word target was presented. Participants were asked to indicate the direction of the target (indicating left or right), irrespective of the location of the target (left or right). Social anxiety scores negatively predicted a reversed spatial Stroop effect for the eye-gaze target while social anxiety scores were positively predicted a classic spatial Stroop effect for the word

target. These results suggest that the deficiency of attention processing of social stimuli was selective for social stimuli among socially anxious people.

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12:00-1:00 pm (1258)

Controlling Social Media Content: Non-Agency over Content Selection Reduces Envy and Social Comparison. ALICE RICKERT, *University of St. Gallen*, ANA-MARIA ROSCA, RAHEL GEPPERT, FLORIAN GOURET, LISA KIRSCHNER, and CHRISTINA U. PFEUFFER, *Albert-Ludwigs-Universität Freiburg* – Social media pervade daily life. Positive aspects of virtual communication are contrasted by negative emotional responses to the construed social media selves of others. In two experiments, we manipulated whether participants themselves or a computer selected social media content (vacation pictures) from an overview for closer viewing. Picture ratings revealed that participants experienced more benign/malicious envy and negative social comparison when they themselves had agency over content selection. Participants' self-reported satisfaction with life and self-esteem further influenced these relationships. Furthermore, participants rated self-chosen pictures more positively than computer-selected pictures. Crucially, our linear mixed models accounted for picture variance. Thus, even though participants' own choices may have reflected their picture preferences better than the computer selection, this can only account for our findings to a limited degree. We conclude that algorithmic content selection based on user-defined criteria may reduce experienced agency and thus envy and social comparison in social media.

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12:00-1:00 pm (1259)

Stimuli with a Positive Valence Can Facilitate Cognitive Control. JINI TAE, *Gwangju Institute of Science and Technology (GIST)*, REBECCA B. WELDON, *SUNY Polytechnic Institute*, REBEKA C. ALMASI and CHRISTINE AN, *The George Washington University*, YOONHYOUNG LEE, *Yeungnam University*, MYEONG-HO SOHN, *The George Washington University* – The current study investigated whether stimulus-associated emotion would have an impact on cognitive control. During the association phase of two experiments reported here, participants identified actors' emotion as either positive or negative; half of the actors exhibited positive emotion (MP) for most of the trials, while the other half exhibited mostly negative emotion (MN). In the transfer phase of Experiment 1, these same actors were presented with neutral emotion during a gender Stroop task, while in Experiment 2 they performed a task-switching paradigm identifying either age or gender based on a picture frame cue. The results of the two experiments showed that the Stroop effect and task switching cost were smaller for MP stimuli than for the MN stimuli. These results suggest that positive emotion can facilitate cognitive control, reducing distractor-induced interference.

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12:00-1:00 pm (1260)

The Anger-Inferiority Effect Is Most Pronounced with Female Faces. DEAN PURCELL, *Oakland University*, ALAN L. STEWART, *Stevens Institute of Technology* – In an affect congruency task (ACT) observers judge if the expression (happy or angry) of two successive presented faces display the same affect. The ACT produces longer response times and reduced accuracy for an angry expression (Purcell & Stewart, 2016). This disadvantage for angry faces is referred to as the anger-inferiority effect (AIE). We suggested that the AIE occurs because the emotion produced in the observer retards processing of an angry face. We noted that the AIE is larger for female faces than for male faces. In the present experiment we determine if the source of those differences results from poor performance with an angry face or if, instead, it is the relatively better performance with a happy face. For both male and female observers, regression analyses for angry and happy male and female faces showed that the AIE was most strongly predicted by angry female faces.

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12:00-1:00 pm (1261)

Tunnel Vision: A Novel Investigation of the Effect of Depression on Field of View. LISA A. BOLSHIN, *Fielding Graduate University*, NASREEN KHATRI, and JENNIFER RYAN, *Rotman Research Institute, Baycrest* – We investigated the cognitive and emotional functioning of previously depressed (remitted) individuals under a negative mood induction and compared them to currently depressed participants. Females aged 39-85 were grouped into never-depressed, depressed, and remitted categories. An eye-tracking procedure was used to explore how participants looked at a series of scenes (emotional or neutral) and recognized them after a delay. Using a 2 x 3 x 2 mixed model ANOVA, results indicated that remitted individuals possessed a narrow field of view, especially when under a negative mood induction. They also displayed greater visual exploration (attention) to negatively valenced information. Remitted individuals focused on a narrower (and more negative) aspect of the environment, which appeared to impair their ability to efficiently encode information. This perceptual and cognitive tunnel vision, which persisted in remitted individuals, may increase the risk for future depressive relapse.

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12:00-1:00 pm (1262)

Dementia Empathy Scale: A Validation Study. CIELO M. PRISCHAK, DANIEL EATON, VICTORIA A. KAZMERSKI, and OMAR ASHOUR, *The Pennsylvania State University, Erie* – Given the increasing number of service workers caring for individuals diagnosed with dementia, it is important to understand and measure the knowledge and empathy caregivers have for those with dementia. The purpose of this study was to measure participants' knowledge and empathy of dementia while testing the validity of a newly developed Dementia Empathy Scale (DES). Ninety participants were recruited through the subject pool to participate in the validation study. The results from this validation study showed that the

DES is moderately correlated to the Brief Interpersonal Reactivity Index (IRI) overall and specifically to the subscale for empathic concern. The DES also moderately correlated with the Toronto Empathy Questionnaire. It was not reliably correlated with knowledge of dementia. A pilot implementation study was conducted on 37 nursing and engineering students. Nursing students were significantly more empathic than engineering students before and after participating in the Dementia Live® simulation. Together the data demonstrate that the Dementia Empathy Scale shows promise as a measure for those training and researching dementia care workers.

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12:00-1:00 pm (1263)

Withdrawn

12:00-1:00 pm (1264)

The Impact of COVID-19 Pandemic Confinement on Loneliness, Anxiety, and Perceptual-Motor Performance. SHOGO SUGIYAMA, ELISA M. GALLEGO HIROYASU, and YUKO YOTSUMOTO, *The University of Tokyo* – Due to the COVID-19 pandemic, confinement has been implemented in countries around the world. An international collaborative study, Time Social Distancing (TSD), investigated the effects of confinement on time perception and psychological states. The present study focuses on how confinement affects Japanese people's feelings of loneliness, anxiety, and perceptual-motor performances and the effects of age on them. We obtained longitudinal data through three sessions. The first session was conducted during the first confinement. The second and third sessions were conducted 10 days and 4 months after the first session, respectively. Latency curve models showed a gradual increase in loneliness and a decrease in anxiety, and baselines of both variables decreased with age. Furthermore, autoregressive crosslagged models suggested that changes in loneliness may precede changes in anxiety. According to the longitudinal variability of loneliness and anxiety, we will further discuss what impact these psychological states have on time perception.

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12:00-1:00 pm (1265)

Emotional and Semantic Similarity Between Facial Expressions in Static and Dynamic Faces. LAURA MANNO, *University of East Anglia*, GUOMEI ZHOU, *Sun Yat-sen University*, STEPHANIE ROSSIT, ANDREW BAYLISS, and MINTAO ZHAO, *University of East Anglia* – Recent findings challenge the idea that human emotions are innate, discrete, and universal across cultures. Nonetheless, the dominant use of the emotion categorization task may not reveal the multidimensional representation of facial emotion. Here, we asked Asian and European participants to perform an emotion- or a semantic-profiling task before rating the similarity between facial emotions, using both static and dynamic faces. We found that the perceptual similarity between facial expressions can be predicted by the profiling responses to individual facial expressions and by stimulus similarity. Results of the profiling task (i.e.,





rating how much a facial expression depicts a set of emotion categories or semantic concepts) revealed that the same facial configuration conveys information about multiple categories of facial emotion. European and Asian participants showed a similar pattern of response in term of perceptual similarity, but they differed remarkably in terms of how they perceive the emotional and semantic information from the same face. These results support a multidimension representation of facial emotion and demonstrate that the perception of facial emotion is not as universal as previously assumed.

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12:00-1:00 pm (1266)

Tulsa Race Massacre: Affective and Cognitive Influences on Judgments of Blame and Punishment. JUSTIN DURHAM and SCOTT GRONLUND, *The University of Oklahoma* – Moral judgments and beliefs impact causal judgments regarding whether someone intentionally brought about harmful consequences. However, how affective and cognitive factors interact has not been systematically examined (Malle et al., 2014). We were interested in how affective valence (emotional quality) and prior knowledge of an event influence moral judgments. In particular, the goal was to examine how the affective label impacted attributions of blame and punishment. In our study, participants read a factual essay describing either the Tulsa Race Massacre, Riot, or Event; then made various moral judgments about Black and White Tulsans and Tulsa police. We found that valence and prior knowledge had a combined influence on blame judgments for Black Tulsans—students without prior knowledge attributed more blame to Black Tulsans compared to students with prior knowledge, but only in the Massacre condition. In general, students without prior knowledge attributed less blame and punishment to White Tulsans and greater blame and punishment to Black Tulsans compared to students with prior knowledge. My results suggest that labels influence how people understand and make judgments about this historical event.

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12:00-1:00 pm (1267)

Hopeful Misinformation in a Time of Uncertainty. ALEXANDRIA R. STONE, MATTHEW L. STANLEY, and ELIZABETH J. MARSH, *Duke University* – Misinformation surrounding COVID-19 has spread rapidly and widely, posing a significant threat to public health. Here we examined whether some types of misinformation are more believable than others, to the extent that they offer people hope in uncertain times. An initial group of subjects rated a series of COVID-19 misinformation statements for whether it made them feel hopeful (if true). From these preliminary data, we then selected two sets of statements rated as more or less hopeful; the two sets did not differ in word length or reading ease. In two additional studies, people rated their belief in each statement. In both studies, people rated the more hopeful misinformation (e.g., COVID-19 cures and prevention methods) as truer than less hopeful misinformation (e.g., transmission vectors). These findings are consistent with a motivated reasoning account of misinformation acceptance.

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12:00-1:00 pm (1268)

Withdrawn

12:00-1:00 pm (1269)

Bias Towards Trusting Others Is Associated with Insular Activity Before Distrusting Them. ATSUNOBU SUZUKI, *The University of Tokyo*, MIKA UENO, *Doshisha University*, KENTA ISHIKAWA, AKIHIRO KOBAYASHI, and MATIA OKUBO, *Senshu University*, TOSHIHARU NAKAI, *Osaka University* – People differ in their propensity to trust others. To examine neuro-cognitive processes related to individual differences in such trusting tendency, we reanalyzed the data of our previous experiment using functional magnetic resonance imaging (fMRI), which had participants intuitively classify unfamiliar people as cooperative (trustworthy) or selfish (untrustworthy) individuals based on their faces. Participants' trusting tendencies (biases) were assessed as their criteria for "cooperative" responses derived from signal detection theory. Results showed that the left insular activity before making "selfish" responses was positively correlated with trust bias (i.e., lax criteria for "cooperative" responses). Previous studies indicate that the decision to distrust others generates guilt feelings in trustors and that guilt is associated with the insular activity. Our results thus suggest that anticipatory guilt arising from the thought of distrusting others may be related to lenient standards in judging others' trustworthiness.

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12:00-1:00 pm (1270)

The Roles of Emergent Lexicality and Orthographic Regularity in Classification of Two-Letter Strings. ALBERT F. SMITH, *Cleveland State University* – To further investigate whether two-letter words may be perceived as configurations, participants completed binary classification tasks (discrimination, filtering, condensation) with the four two-letter stimuli in sets constructed by crossing two vowels with two positions relative to a consonant. Four stimulus sets varied in whether lexicality was an emergent property (e.g., It, Ti, Ot, To vs. Ek, Ke, Uk, Ku) and whether items were orthographically regular (e.g., It, Ti, Ot, To vs. iT, tI, oT, tO). Filtering (e.g., It, Ti vs. Ot, To) may be carried out with information about one stimulus attribute (i.e., vowel identity or vowel position); condensation (e.g., It, To vs. Ti, Ot) requires information about multiple attributes. Each of 14 participants performed the classification tasks with one stimulus set. For all sets, there was a response time disadvantage for condensation relative to filtering. However, the average condensation disadvantage for stimulus sets with lexicality as an emergent property was significantly smaller than for those in which it was not. Although the condensation disadvantage was larger for orthographically irregular than orthographically regular stimulus sets, this effect was not statistically significant.

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12:00-1:00 pm (1271)

Withdrawn

12:00-1:00 pm (1272)

Masked and Unmasked Priming Effect in Second Language Learners. MAR SUAREZ, *Universidad de Salamanca* – This work examined associative priming in second language learners under masked and unmasked conditions. Four hundred undergraduate students whose first language (L1) is Spanish and who have learned English as a second language (L2) participated in a lexical decision task. In this task, prime-target relationship (related vs. unrelated pairs) was manipulated as a within-subject factor, and language (L1 vs. L2) and prime condition (masked vs. unmasked) were manipulated as between-subject factors. Specifically, participants were presented with 160 prime-target pairs (80 word-word pairs and 80 word-nonword pairs) in L1 or L2, and either under a masked (prime duration of 50 ms) or an unmasked (prime duration of 150 ms) condition. Results showed that reaction times were greater when participants responded to L2 targets than to L1 targets. That is, L1 words were recognized more quickly than L2 words. Furthermore, associative priming effects were found in both the L1 and the L2 but only in the unmasked condition. These data suggest that spreading activation not only occurred in the L1 but also in the L2, even in L2 learners. Nonetheless, the masking procedure did not produce the priming effect regardless of the language.

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12:00-1:00 pm (1273)

Development of Statistical Learning Across Modalities, Domains, and Languages. JINGLEI C REN and MIN WANG, *University of Maryland College Park* – Statistical learning (SL) is our ability to detect implicit regularities in the environment. SL is present from infancy and is robustly observed across modalities. This study aims to examine native Chinese-speaking fourth-, sixth-, and eighth-graders' development of statistical learning in nonlinguistic stimuli, in their native language, and in their second language (English). Each child completed two SL tasks in the nonlinguistic domain: visual and auditory, and four tasks in the linguistic domain: English visual and auditory; Chinese visual and auditory. Preliminary results (N=40 eighth-graders; N=18 sixth-graders; N=15 fourth-graders) showed that sixth- and eighth-graders performed significantly above chance level across all tasks, while fourth graders did not show above-chance performance on nonlinguistic and English auditory tasks. There was a significant interaction between grade and domain, domain and modality, and modality and language. These preliminary results revealed a developmental trend of school-aged children's ability to extract statistical regularities in their native and second languages across modalities and domains. Furthermore, modality, domain and language interact with each other and jointly contribute to statistical learning.

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12:00-1:00 pm (1274)

Do Emphasis Cues Enhance Young Children's Ability to Associate Novel Objects with Learned Names? SARAH HUGHES BERHEIM, CAILEE M. NELSON, and JASON SCOFIELD, *The University of Alabama* – Children use word learning strategies to disambiguate between known and unknown objects when they occur in pairs. To date, little research has investigated how emphasis cues, such as beat gesture and contrastive pitch accenting, influence word learning strategies that allow children to associate novel names with unknown objects. Thus, this study investigated how the presence of beat gesture and contrastive pitch accenting influenced the ability of children (n=28, aged 4-6 years) to match novel words with objects. Preliminary results indicated no main effects of beat gesture or contrastive pitch accenting on object identification accuracy. Additionally, the interaction between the two factors failed to reach significance, although a future analysis is planned that would control for the possible influence of age. Thus, preliminary results indicate that the presence of beat gesture, contrastive pitch accenting, and the combination of both does not aid children's ability to pair novel objects with learned names.

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12:00-1:00 pm (1275)

Does Hand Proximity Affect Letter Identification? GIOR-DANA GROSSI, *SUNY New Paltz*, ANNIE OLMSTEAD, *The Pennsylvania State University*, LUCINDA JUDSON, EMILIA LISIECKI, and DANIELLE LUKASZEWSKI, *SUNY New Paltz* – Adam et al. (2012) found that letters were identified more accurately when presented near, compared to away from, the hands. We attempted to replicate these findings in two experiments. In the first one, letter strings (words, pseudowords, nonwords) were presented very briefly (duration was titrated for each participant) and then masked; participants had to decide which of two letters was presented in a given position. In the second experiment, participants viewed unpronounceable strings of consonants on a computer screen. The letters were presented in groups of three with different durations (33, 50, 67, or 83 ms). Participants had to verbally report the three letters. In both experiments, stimuli were presented under two different hand conditions: proximal and distal. The predicted effects of stimulus duration, letter position, and stimulus type were all statistically significant and robust; however, we were not able to replicate the hand proximity effect in either experiment.

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12:00-1:00 pm (1276)

The Development of Word Reading Skills and Categorical Spatial Relation Processing. AYAKO H SANHEYOSHI, NAOKO INADA, SAKI FUJITA, HIMIKO KURAYA, NAOKI HARA, and RISA HIRAMATSU, *Teikyo University* – We investigated whether the two types of spatial relationship processing (categorical and coordinate) support the development of word reading skills in Japanese children. Eighty-nine children (3-8 years old) performed the spatial relation processing task, in which they should memorize the categorical and coordinate spatial relations of the animals, and the reading





aloud task, in which Japanese hiragana letters, words, and their left-right flipped images were presented on the display one by one. The result suggested that younger children who had difficulty with the categorical relation processing read the stimulus more slowly than older children who could recognize categorical spatial information correctly. However, only younger children could read left-right flipped letters and words faster or the same as the original ones. These results suggested that children would learn the figure of each part of the letters individually at first and then learn the categorical spatial relationships of these parts.


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12:00-1:00 pm (1277)

Modelling Writing-to-Dictation in Chinese. DUSTIN K LAU, *The Hong Kong Polytechnic University* – The dual route framework suggested that the conversion of phonological codes into orthographic codes in the writing process can be achieved via the lexical and non-lexical routes. The current study investigated the cognitive mechanisms involved in the lexical route by examining the factors that predicted the response times (RTs) of Chinese writing-to-dictation. Twenty-six participants (age 22-24 years) were recruited. They were tested individually in a quiet room using a writing-to-dictation on 400 randomly ordered traditional Chinese phonetic compound characters. Results of linear mixed effect modelling showed that character frequency (CF), interactions between CF and semantic transparency of semantic radicals, imageability (IMG), homophone density, and phonetic regularity significantly predicted writing-to-dictation RT. Overall, the results indicated a relatively more important lexical-semantic component and a less important nonsemantic component in Chinese writing. It also supported the significance of semantic radicals in the lexical-semantic processing in Chinese writing.

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12:00-1:00 pm (1278)

Unveiling the Boost in the Sandwich Priming Technique. MARIA FERNÁNDEZ-LÓPEZ , *University of València*, PABLO GOMEZ, *California State University*, COLIN DAVIS, *University of Bristol*, ANA MARCET and MANUEL PEREA, *University of València* – The masked priming technique (e.g., #####-house-HOUSE) is the gold-standard tool to examine the initial moments of word processing. Lupker and Davis (2009) showed that adding a preprime identical to the target produced greater priming effects (sandwich technique: #####-HOUSE-house-HOUSE). While there is consensus that the sandwich technique magnifies the size of priming effects relative to the standard procedure, the mechanisms underlying this boost are not well understood (i.e., does it reflect quantitative or qualitative changes?). To fully characterize the sandwich technique, we compared the sandwich and standard technique by examining the RTs and their distributional features (delta plots; conditional-accuracy functions), comparing identity vs. unrelated primes. Results showed that the locus of the boost in the sandwich technique was twofold: faster responses in the identity condition (via a shift in the RT distributions) and slower responses in the unrelated condition.

We discuss the theoretical and methodological implications of these findings.

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12:00-1:00 pm (1279)

Trust your Senses: The Effects of Subjectively Normed Polysemy on Lexical Processing. VICTORIA A TKACIKOVA, *University of Pittsburgh*, CAITLIN RICE, *Amazon Alexa*, BLAIR ARMSTRONG, *University of Toronto Scarborough*, NATASHA TOKOWICZ, *University of Pittsburgh* – Language is ambiguous, and the degree of ambiguity influences how we identify, categorize, and process words. Words that denote a single sense, like “pumpkin,” are activated slower than words with multiple related senses, like “box.” To examine lexical processing, Rice et al. (2019) investigated the interactions of polysemy with previously-established predictors of lexical decision latencies and found that the number of senses (NOS) interacted with word features such as context availability and orthographic neighborhood. To do so, the authors extracted NOS from a lexical database (WordNet). However, using nonhuman norms to operationalize NOS may incorrectly estimate how many senses people know. Using subjectively normed NOS, a reanalysis of the original study showed that, when compared using Bayesian information criterion (BIC), subjective NOS was a better model fit than WordNet NOS ($\Delta\text{BIC}=7$; a “strong” effect, based on standards in Kass & Raftery, 1995). Word frequency and context availability still significantly interacted, but orthographic neighborhood predictors did not. Considered along with other recently published results, our findings suggest that subjectively normed NOS are better able to predict lexical processing.

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12:00-1:00 pm (1280)

Sound Symbolic Potential of Russian Aural-Motor Imitatives: Evidence from Eye-tracking. TUOMO HÄIKIÖ, *University of Turku*, OKSANA O. KANERVA, *University of Helsinki* – This study explored semantic recognition of Russian aural-motor imitatives (i.e., words that depict sounds and index action connected to these sounds) by naïve listeners, namely native Finnish speakers with no knowledge of Russian language. In Experiment 1, participants generated associations elicited by the stimulus words. Cluster analysis suggested the presence of facilitating, counteracting, mixed, and undefined cues linked to sound symbolism that were involved in connecting the words with their referents. In Experiment 2, an eye-tracking experiment using visual world paradigm was employed to closely examine the process of mapping the stimulus words to the correct semantic domain. Participants looked at the experimental display containing the target picture, visual and semantic competitors to the target, and an unrelated control distractor while they heard the target word. It was shown that the participants recognized the target pictures above the chance level for all four clusters established in Experiment 1. However, the recognition rate was higher for the facilitating





and mixed clusters. The results suggest that naïve listeners can elicit and recognize correct semantics of unknown aural-motor imitatives.

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12:00-1:00 pm (1281)

Modeling the Transposed Radical Effect in Chinese Character Recognition. ZIAN CHI and STEPHEN LUPKER, *University of Western Ontario* – In previous experiments, we found a transposed radical (TR) priming effect in masked priming experiments in Chinese. In an attempt to model these effects, three computational models (M1, M2, and M3) were built and trained with similar training algorithms. As orthographic inputs, radical position information in the character set was coded in two ways, one more highly constraining than the other. M1 was trained with the highly constraining input. M2 and M3 were trained with less constraining input. Additionally, to make position information less reliable than identity information, the reliability of radical position information fed into M3 was reduced in magnitude. The results showed that M1 didn't simulate a TR effect, while M2 and M3 did, with the predicted effect sizes being similar. The results suggest: (1) A position-sensitive assumption concerning radical position representation is unable to generate TR effects of the sort we observed; (2) TR effects cannot be entirely attributed to the property of our visual system that position information can be fuzzy; (3) Certain orthographic properties (e.g., orthographic density) of a language likely impose constraints on the flexibility of component position coding.

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12:00-1:00 pm (1282)

A Developmental Perspective on Morphological Processing in the Flanker Task. CHRISTOPHE CAUCHI, *Université Lumière Lyon 2*, IAN J. GRAINGER, *Aix-Marseille University*, BERNARD LÉTÉ, *Université Lumière Lyon 2*, ELISABETH BEYERSMANN, *Macquarie University* – This work explored the development of effects of morphological target-flanker relatedness in two groups of primary school children and in a group of adult participants. We examined effects of transparent morphological relatedness in two conditions: one where the target was the stem and flankers were derivations (e.g., farmer farm farmer), and the other where the flankers were stems and the target was the derived form (e.g., farm farmer farm). Morphological flanker effects were compared with repetition effects with the same set of stimuli (e.g., farm farm farm; farmer farmer farmer), and effects of related flankers were contrasted with the appropriate unrelated flankers. Results revealed no significant effect of morphological relatedness in the two groups of children, and a significant effect in the adult group, but only for suffixed targets and stem flankers. Repetition effects for stem targets were found across all groups, but only in the older children and adults for derived targets. These results show that morphological processing takes several years to develop, and that morphological complexity (stem vs. derived) and/or word length is a limiting factor for repetition effects in the flanker task with young children.

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12:00-1:00 pm (1283)

The Hierarchical Organization of Written Language Comprehension. BRICE B. BROSSETTE and BERNARD LÉTÉ, *Université Lumière Lyon 2*, IAN J. GRAINGER and STÉPHANE DUFAU, *Aix-Marseille University* – We investigated the hierarchical organization of three core processes involved in written language comprehension: (1) letter processing, (2) lexical processing, and (3) syntactic processing. Because of the hypothesized hierarchical organization, syntactic processing should be influenced by lexical processing which in turn should be influenced by letter-level processing. To test this hypothesis, skilled readers performed three different binary-decision tasks: alphabetic (AD), lexical (LD), and grammatical (GD). AD, LD, and GD were respectively used as a marker of efficiency for letter, lexical, and syntactic processing. Results showed that the relation between two hierarchically adjacent processes (AD/LD and LD/GD) is stronger than for non-adjacent process (AD/LD). Moreover, better performance in both the alphabetic and lexical decision tasks led to better performance in grammatical decision making. These results provide support for a hierarchically organized architecture of written language comprehension involving parallel, cascaded processing operating between letters and words and also between words and sentences.

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12:00-1:00 pm (1284)

Does 'Jugde' Activate 'Judge' When Reading Braille? Towards a Universal Model of Letter Position Coding. ANA BACIERO, *Universidad Nebrija*, MANUEL PEREA, *University of València*, JON A. DUNABEITIA, *Universidad Nebrija*, PABLO GOMEZ, *California State University* – Letter position coding in word recognition has been widely investigated in the visual modality, but not as much in the tactile modality (braille), leading to an incomplete understanding of the degree to which the process is modality-dependent. Unlike sighted readers, braille readers do not show a transposed-letter confusability effect with non-adjacent transpositions (e.g., "labotarory" behaves as "labodanory"). However, it is still unknown whether such effects can be found for adjacent transpositions. Indeed, in the auditory modality, transposed-phoneme confusability effects occur with adjacent phonemes, but not with non-adjacent phonemes. Here, we examined whether pseudowords created by transposing two adjacent letters of a word (e.g., laboartory) are more confusable with their base word (laboratory) than pseudowords created by replacing those letters (laboestory) in braille, using a lexical decision task. Results showed that transposed-letter pseudowords produced more errors and slower responses than the orthographic controls. Thus, the sensory modality that receives the information shapes serial order processing.

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12:00-1:00 pm (1285)

Exploring the Role of the Morphemic Boundary in the Morphological Decomposition of Compounds. ALEXANDER TAIKH, CHRISTINA L. GAGNÉ, and THOMAS L SPALDING, *University of Alberta* – Across four experiments, we examined





whether the letters at morphemic boundary play a special role in activating constituents of compound words. In Experiment 1, masked compound primes with a letter transposition (vs. replacement) facilitated the lexical decision responses of their compound targets (e.g., chickenpox) when the letter manipulation was at the boundary (e.g., chickepnox vs. chickevdox) but not inside of the first constituent (e.g., chicikpnox vs. chtekenpox). In Experiments 2 and 3, replacing letters at the boundary (vs. inside of the first constituent) of a compound masked prime interfered with recognizing the target compound, but that transposing letters did not. The results of Experiments 1-3 suggest that replacing letters at the boundary, but not inside of the first constituent, interferes with processing of the compound, suggesting that the boundary letters play a key role in morphological decomposition. In Experiment 4 we replicate the findings of Experiment 1 with first constituent targets, suggesting that replacing letters at the boundary influences the activation of the constituents inside the compound prime.

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12:00-1:00 pm (1286)

Are There Task-Specific Effects in Morphological Processing? Examining Semantic Transparency Effects in Semantic Categorization and Lexical Decision. QIAN WEN CHEE and MELVIN J. YAP, *National University of Singapore* – Is the early morphological decomposition of complex words based purely on orthographic structure (form-then-meaning accounts) or is it influenced by the semantic properties of the stem (form-with-meaning accounts)? The empirical findings remain mixed. Furthermore, semantic transparency effects in morphological processing have been examined almost exclusively with lexical decision. Consequently, the extent to which findings reflect the specific demands of the lexical decision task remains unclear. The present study extends previous work by testing if the processing dynamics of early morphological processing are moderated by task requirements. Using the masked morphological priming paradigm, this hypothesis was tested by examining semantic transparency effects for a common set of words across semantic categorization and lexical decision. In both tasks, priming was stronger for transparent (e.g., painter-PAINT) than opaque (e.g., corner-CORN) prime-target pairs. These findings are most consistent with form-with-meaning accounts and further underscore the importance of examining the interplay between task-general and task-specific mechanisms.

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12:00-1:00 pm (1287)

A Megastudy of Speeded Naming Performance for 8,427 Traditional Chinese Two-Character Compound Words in Hong Kong Cantonese Speakers. CHI-SHING TSE and YUEN-LAI CHAN, *The Chinese University of Hong Kong*, MELVIN J YAP, *National University of Singapore*, HIU LAM CHLOE CHOW, *The Chinese University of Hong Kong* – We report part of the database of speeded naming reaction times (RTs) and accuracy rates for 8,427 (out of totally 25,000-plus) traditional Chinese two-character compound words being developed in an ongoing megastudy. Each

word was responded to by about 33 participants. Item-level multiple regression analyses were performed by entering first/second characters' initial phoneme characteristics, orthographic variables (e.g., number of strokes and character/word frequency), phonological variables (e.g., homophonic density), and semantic variables (e.g., semantic transparency) in the models to test the extent to which they uniquely predicted naming performance. Results showed that (a) log Google word frequency accounted for more variance than log subtitle word frequency, (b) performance was better predicted by first-character than second-character lexical variables, and (c) orthographic variables accounted for more variance than phonological and semantic variables. These findings will be compared with those obtained from lexical decision task in the Chinese Lexicon Project (Tse et al., 2017).

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12:00-1:00 pm (1288)

Letter Co-Occurrence Statistics Affects Individual Letter Identification. MARA DE ROSA and DAVIDE CREPALDI, *Scuola Internazionale Superiore di Studi Avanzati (SISSA)* – Reading involves an interaction of linguistic and perceptual processes, in which top-down, lexical knowledge aids letter perception. Does such facilitation interact with letter co-occurrence regularities? Skilled readers were briefly exposed to strings of five consonants; critically, letters in position 2 and 4 were embedded in either high (e.g., L in GLVTZ) or low (e.g., L in NLRTZ) transitional probability (TP) triplets. When presented with two strings differing by the critical letter (GLVTZ vs. GRVTZ), participants correctly identified the right option more often in high-TP than in low-TP triplets. The effect disappears entirely when the task requires identifying single letters (Reicher-Wheeler task) and only survives for position 2 in a same-different task with response time constraints. This shows that letter identification is affected by letter co-occurrence statistics, but only when the task emphasizes string rather than letter processing, and coherently with a rapid deployment of spatial attention towards the beginning of letter strings. The genuine orthographic nature of these effects is also corroborated by a lack of facilitation with strings of non-alphabetic characters that share low-level visual features with letters.

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12:00-1:00 pm (1289)

Word-Meaning Priming Extends Beyond Homonyms. ADAM J. CURTIS, GARETH GASKELL, and MATTHEW MAK, *University of York*, SHUANG CHEN, *Zhejiang Normal University*, JENNIFER M. RODD, *University College London* – When a homonym (e.g., bark) is encountered in a context that biases its interpretation towards a less frequent meaning, subsequent interpretations of the word are more likely to favor that subordinate meaning. Such word-meaning priming effects appear to be maintained via sleep-related consolidation, suggesting that declarative memory systems may play a role in comprehension, providing an enduring contextually bound memory trace for the ambiguous word. By such an account, word-meaning priming should be observed for all words, not just






homonyms. In two experiments, we exposed participants to nonhomonyms (e.g., coal) in sentences that biased interpretation toward a specific aspect of the word's meaning (e.g., mining vs. fire). After 10-20 mins, the words were used in relatedness judgement and associate production tasks to assess whether sentence context enhanced access to the primed aspect of the word's meaning. Results showed that word-meaning priming can be observed for nonhomonymic words and that the effect is distinct from general semantic priming. We interpret the results with regard to a contextual binding account in which declarative memory systems maintain specific interpretations of sentences to facilitate comprehension.

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12:00-1:00 pm (1290)

Malay Lexicon Project 2: Morphology in Malay Word Recognition. MIRRAH MAZIYAH MOHAMED , *University of Western Ontario*, MELVIN J. YAP and QIAN WEN CHEE, *National University of Singapore*, DEBRA JARED, *University of Western Ontario* – Although morphological processing has been extensively studied in English visual word recognition, other languages have received less attention. Here we examined Malay, an Austronesian language that is agglutinative (i.e., each word contains many morphemes). We augmented the Malay Lexicon Project (a database containing lexical information for 9,592 words) by parsing each word into morphemes and computing morphological properties for those morphemes; such a resource will help facilitate research on morphological processing in Malay. We validated this database by collecting lexical decision data for Malay words that had one prefix and one suffix, and examined the impact of each morphological variable on RT. Morphemic length (i.e., root, prefix, and suffix) significantly predicted RT above and beyond word length. Root family size also significantly predicted RT. Finally, we conducted comparable analyses in Malay and English. More affix variables predicted RT in English than in Malay, but their effects appear small and unreliable. We hope that this work encourages further research in Malay and other understudied languages so that a universal theory of morphological processing can be developed.

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12:00-1:00 pm (1291)

The Contribution of Semantics to the Sentence Superiority Effect. STEPHANIE MASSOL, *Université Lumière Lyon 2*, JONATHAN MIRAULT and JONATHAN GRAINGER, *Aix-Marseille University & Centre National de Recherche Scientifique (CNRS) Laboratoire de Psychologie et Neurocognition (CNRS)* – In an online experiment, we examined the extent to which the sentence superiority effect can be modulated by semantic content. The central hypothesis guiding this study is that the sentence superiority effect is primarily a syntactic effect. We therefore predicted little or no modulation of the effect by semantics. The influence of semantic content was measured by comparing the sentence superiority effect obtained with semantically regular sentences (e.g., the man can run) and semantically anomalous but syntactically correct sentences (e.g., the eye was tall), with effects being measured against ungrammatical

scrambled versions of the same words in both cases. We found a significant impact of semantics, with a greater sentence superiority effect being obtained with semantically regular sentences. We conclude that sentence-level semantic information can constrain word identities under parallel word processing, albeit with less impact than that exerted by syntax.

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12:00-1:00 pm (1292)

Is There an Emotion Word Processing Advantage in Lexical Decision and Reading Aloud? CATHERINE MASON, LINDSEY NICKELS, and SOLÈNE HAMEAU, *Macquarie University* – Words used to describe emotions have been suggested to be distinct from other abstract concepts in terms of how they are learnt, stored, and accessed. Competing accounts attribute this to emotion words' unusually high ratings on semantic features typically associated with concrete words (imageability, context availability) or to emotion-based semantic features (valence, arousal). However, previous research has not applied a consistent definition of "emotion words" (e.g., included words with emotional associations). Our research aimed to determine whether words that label emotions i) show differences in processing speed to non-emotion abstract words; and ii) the extent to which any differences are accounted for by the four factors hypothesized to underpin this effect. One hundred twelve native English speakers performed visual lexical decision and reading aloud of 52 emotion and 52 non-emotion abstract words. Results will be presented from linear mixed effects models analyses showing whether word category predicted response latency and whether these effects were influenced by imageability, context availability, valence, and/or arousal.

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12:00-1:00 pm (1293)

Individual Differences in Phonological Similarity Effects: Insights from the Auditory English Lexicon Project. CHIN YI WONG, WINSTON D. GOH, and MELVIN J. YAP, *National University of Singapore* – Robust phonological similarity effects have been observed across many experimental paradigms in spoken word recognition. However, the extent to which individual proficiency moderates these effects has not been well-studied in this domain. Given the rich literature on proficiency effects in the visual modality and the advent of auditory megastudies, the present study explored these effects in a parallel fashion via analyses of archival data from the Auditory English Lexicon Project, which contains auditory lexical decision data for 10,170 words and 10,170 nonwords from 438 participants. Individual proficiency was operationalized via two measures: vocabulary knowledge and spelling ability. The results suggested that variation in these two measures modulated word recognition performance in the same manner, with more proficient participants showing larger effects of phonological neighbourhood density (i.e., slower responses for words with many neighbors) but smaller effects of a principal component that included phonological Levenshtein distance (i.e., slower responses for less phonologically distinct words). Possible mechanisms for these contradictory results





are discussed along with implications for the spoken word recognition domain.

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12:00-1:00 pm (1294)

The Competition–Compensation Account of Morphological Deficits in Children with Developmental Language Disorder. ZARA HARMON, *University of Maryland*, LIBBY BARAK and PATRICK SHAFTO, *Rutgers University*, JAN EDWARDS and NAOMI H. FELDMAN, *University of Maryland, College Park* – Children with developmental language disorder (DLD) regularly use the base form of verbs (e.g., dance) instead of inflected forms (e.g., danced). We propose an account of this behavior in which children with DLD have difficulty processing novel inflected verbs in their input. This leads the inflected form to face stronger competition from alternatives. Competition is resolved through a compensatory behavior that involves the production of a more accessible alternative with high semantic overlap with the inflected form: the base form. We test our account computationally by training a nonparametric Bayesian model that infers the productivity of the inflectional suffix (e.g., -ed) from data. We systematically vary the number of novel types of inflected verbs in the input to simulate the input as processed by typically developing children and children with DLD. We find that models with a reduced number of novel inflected types in their input yielded lower production probabilities for the target suffix. Modeling results are consistent with our hypothesis, suggesting that children’s inconsistent use of inflectional suffixes could stem from making inferences about the productivity of a suffix based on data with fewer novel types.

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12:00-1:00 pm (1295)

Morphemes as Letter Chunks: Evidence for Affix Identification With and Without Semantics. JAROSLAW R LELONKIEWICZ, MARIA KTORI, and DAVIDE CREPALDI, *Scuola Internazionale Superiore di Studi Avanzati (SISSA)* – Across five experiments, we investigated the role of semantics in the learning of novel morphemes. In Experiments 1-4, we tested if affix identification occurs in the absence of semantic information. Readers were exposed to nonsensical strings built of either familiar letters or abstract shapes. Each string contained a random sequence that was either followed or preceded by an affix-like chunk of frequently co-occurring characters. Consistently across all these different conditions, string processing resembled that of real, morphologically complex words; readers were sensitive to the presence and position of affixes within strings. In Experiment 5, we manipulated access to semantics. In one group, strings comprising a given affix were preceded by pictures representing a particular semantic category, thus allowing a mapping between this category and the affix; in another group, strings were preceded by white-noise squares. Both groups developed sensitivity to the chunks’ presence and position, but these effects were stronger in the group that had semantic access. Our data

demonstrate that access to higher-order linguistic information is beneficial, but not necessary for affix identification.

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12:00-1:00 pm (1296)

Seeing What Counts: Attentional Factors in an Estimation Task. AMY L. BOGGAN, HEATHER J. CLARK, and KAYLI A. SAMPLE, *Young Harris College* – For phobic individuals, fear-related stimuli can impact performance on cognitive tasks (Okon-Singer et al., 2011). The current study examined the effect of stimulus type on numerosity judgments. Sixty-three nonclinical participants (M age 40.1; range 19-84) completed the study online. For each trial, participants compared two sets of one item type and indicated by keypress which grouping contained more items. Compared sets ranged from 20-29 items with all comparisons approaching the just noticeable difference (JND), and the same patterns were repeated across stimulus type. While participants reported lower confidence about their performance with living stimuli (e.g., spiders, caterpillars, snakes) compared to nonliving stimuli (e.g., dots, puzzle pieces), $p < .001$, they completed the estimation task equally accurately and quickly regardless of stimulus type. Further, we identified no performance difference among 14 arachnophobic individuals (based on posttask SPQ-12, Zsido et al., 2018), suggesting that phobic stimuli do not impact cognitive resources for numerosity judgments.

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12:00-1:00 pm (1297)

Cultural Factors Weaken But Do Not Reverse Left-to-Right Spatial Biases in Numerosity Processing: Data from Readers of Arabic and English. DOMINIQUE LOPIC-COLO and CHARLES B. CHANG, *Boston University* – Directional response biases due to a conceptual link between space and number, such as a left-to-right (LR) bias for increasing numerical magnitude, are known as SNARC (Spatial-Numerical Association of Response Codes). We examined how SNARC for numerosities would be influenced by script direction, task (choose “smaller” vs. “larger”), and ambient visual environment in four populations exemplifying opposite reading-writing cultures: English (LR) and Arabic (right-to-left, RL). Monoliterates and biliterates in Jordan and the US performed speeded numerosity comparison to assess the directionality and magnitude of SNARC. Monoliterates’ results replicated previous effects of script direction and task: SNARC was weaker in RL than LR readers, and the LR group exhibited a task-dependency effect (SNARC in the “smaller” condition, reverse SNARC in the “larger” condition). Biliterates’ results showed no clear environment effect and, instead, only weak biases tending towards the LR bias found in English monoliterates. This lack of strong biases is explained in terms of the coexistence, and conflict, of three distinct spatial-numerical mapping codes—innate, cardinal, and ordinal—each variably weighted depending on individual and task factors.

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12:00-1:00 pm (1298)

The Influence of the Place Value System on Symbolic Number Perception. YVONNE OBERHOLZER, *Karlsruhe Institute of Technology*, MARCUS LINDSKOG, *Uppsala University*, BENJAMIN SCHEIBEHENNE, *Karlsruhe Institute of Technology* – Research on numerical cognition has suggested that there is compression in both, symbolic (e.g., Arabic numerals) and non-symbolic (e.g., dot clouds) number perception. More specifically, symbolic and nonsymbolic numbers are supposed to be mapped onto the same compressed mental analogue representation. However, experiments using magnitude estimation tasks show logarithmic compression of symbolic numbers while the compression of nonsymbolic numbers has a power-function shape. This warrants closer inspection at what differentiates the two processes. In this study, we hypothesized that estimates of symbolic numbers are systematically shaped by the format in which they are represented, namely the place value system. To investigate this, we tested adults ($n=188$) on a repeated magnitude estimation task with unfamiliar base-26 and base-5 scales and fitted a hierarchical logarithmic, a hierarchical power, and a hierarchical linear model to the data. Results revealed that adults showed systematic, logarithmic-looking underestimation on both scales, indicating that the place value system itself can cause the pattern.

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12:00-1:00 pm (1299)

Test-Retest Reliability of the Left Digit Effect in Number Line Estimation. LEAH VAIDYA, KELSEY KAYTON, HILARY BARTH, and ANDREA L PATALANO, *Wesleyan University* – The left-digit effect refers to the phenomenon whereby numerals with similar magnitudes but different leftmost digits (e.g., 199, 202) are estimated to be farther apart on a number line than is warranted. The phenomenon is robust, but it is not known whether the size of the left-digit effect reflects a stable individual difference. To address this question, we assessed the 1-month test-retest reliability of the left digit effect. An online sample ($N=142$ adults) performed the number line estimation task twice, approximately 1 month apart (with the same numerals in a different pseudorandom order each time). A large left-digit effect was found at each time point ($d_s > 0.99$); the correlation across time points was moderate ($r = .36$). The findings suggest that while there may be stable individual level contributors, these may not be a large source of variation, at least not with the present format of the estimation task.

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12:00-1:00 pm (1300)

Trial-Based Predictors of the Left-Digit Effect in Number Line Estimation. GINA GWIAZDA, CHARLES BONDHUS, KATHERINE WILLIAMS, HILARY BARTH, and ANDREA L. PATALANO, *Wesleyan University* – The left-digit effect is a cognitive bias whereby numerals with nearly identical magnitudes but different leftmost digits (e.g., 499 and 501) are estimated more differently than is warranted. To explore possible trial-based predictors of the left-digit effect, we reanalyzed data from a number line estimation task in which undergraduates ($N=278$) estimated the location

of numerals on a 0-1000 bounded line. We focused on the following predictors: pair type (boundary that paired numerals surround), pair distance (number of intervening trials), and pair order (whether upper or lower numeral was presented first). Using a linear mixed model, we found that both pair type and pair order were statistically significant predictors of the left-digit effect, but pair distance was not. The left-digit effect was found to be stronger when the lower paired numeral was presented before the upper numeral regardless of the number of trials separating them.



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12:00-1:00 pm (1301)

Left-Digit Effects in Atypical Number Line Estimation. HILARY BARTH, LEAH VAIDYA, LAUREN BARRAGAN, SELENA DELGADO, SARAH HAMMOND, COURTNEY LITTS, CAROLINA A. MONTANO, EMILY NEWMAN, SARAH A. OHIOMAH, ABBY WOLK, ANDREA L PATALANO, and SIERRA EISEN, *Wesleyan University* – Children's and adults' performance on number line estimation tasks is influenced by leftmost digits of target numerals, such that numbers like 899 and 901 are systematically placed too far apart despite their similar magnitudes. This left-digit effect has been explored in both children and adults in typical (0-1000) ranges but not in noncanonical number line ranges (such as 238-1238). The current study investigates whether the left digit effect is present for noncanonical number line ranges. Children and adults completed a number line estimation task with canonical and non-canonical number lines, with strong left-digit effects emerging for both canonical and noncanonical number line ranges. Adults showed a significantly greater left-digit effect for the noncanonical number line, while children showed no significant difference between number line ranges. These findings provide evidence for the generality of the left-digit effect in number line estimation.

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12:00-1:00 pm (1302)

Verbal and Spatial Working Memory Loads Decreases the Symbolic Numerical-Distance Effect on Simultaneous Comparison Task. FRAULEIN RETANAL  and ERIN A. MALONEY , *University of Ottawa* – The ability to compare two numbers is a fundamental numerical ability. This ability to select the larger (or smaller) of two quantities appears to represent a fundamental building block of higher-level mathematics as it is related to one's overall math ability. Despite the extensive research that has been conducted to date on numerical comparison tasks, there is not yet a universally accepted theory of how these comparisons are made. To complicate matters further, recent research suggests that the mechanisms underlying how the comparison is made can vary as a function of task instructions. The current study seeks to enhance our understanding of how individuals compare simultaneously presented digits by investigating the impact of a visuospatial working memory (WM) load on task performance. The results of two experiments demonstrate that solving simultaneous comparison under both a verbal and visuospatial WM load does not generate a numerical-distance effect (NDE). This indicates that the central executive WM is involved in





the comparison and simultaneous comparison of two digits can be achieved accurately without generating NDE. The implications of our findings within the theory of numerical processing are discussed.

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12:00-1:00 pm (1303)

'I Prefer the One with the Most Points': Number Lines Facilitate Understanding of Final Course Grades. DANIEL SCHEIBE, CHARLES J. FITZSIMMONS, and CLARISSA A. THOMPSON, *Kent State University* – Do professors thoughtfully generate grading schemes (i.e., total points available in a course)? This seemingly inconsequential decision may affect students' understanding of their grades (Thompson et al., in press). In the present study, 138 college students completed hypothetical grade calculation problems with or without the aid of a number-line visual display and provided open-ended responses regarding their grading-scheme preferences. Consistent with prior research (Sidney et al., 2019), participants performed better on the grade-calculation task when accompanied by number lines. Participants preferred the 1000-point grading scheme compared to the other three options (100, 387, and 400); students believed they had more flexibility to make up for poor performance on previous assignments. Additionally, participants reported willingness to "grade grub" for a higher proportion of course points in the 100- vs. 1000-point course. The present study exemplified how theoretical work from mathematical cognition combined with student perceptions can inform optimal grading schemes for college courses.

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12:00-1:00 pm (1304)

You Won't Guess That. On the Limited Benefits of Guessing when Learning a Foreign Language. EWA BUTOWSKA, MACIEJ HANCZAKOWSKI, and KATARZYNA ZAWADZKA, *SWPS University* – Guessing the meaning of a foreign word before being presented with the right answer benefits recognition performance for the translation compared to reading the full translation outright. However, guessing does not increase memory for the foreign-word-to-translation associations, which is crucial for language acquisition. We investigated whether this disadvantage of guessing in cued-recall tests would be eliminated if a restudy phase was added. We demonstrated that guessing resulted in lower cued-recall performance compared to reading, both before and after restudy. Even for items for which participants successfully recalled their initial guesses on the cued-recall test, accuracy levels did not exceed those from the reading condition. We also generalized our findings concerning restudy to a different set of materials: weakly associated word pairs. Even though this time guessing led to better performance than reading, consistent with previous studies, this guessing benefit was not moderated by adding a restudy phase. Our results underscore the importance of the initial learning phase for future learning and retention, while undermining the usefulness of the learning-through-guessing for acquiring foreign language vocabulary.

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12:00-1:00 pm (1305)

Are You Sure? The Impact of Uncertainty on Learning.

KAREN ARCOS, HANNAH HAUSMAN, and BENJAMIN C. STORM, *University of California, Santa Cruz* – Learners may encounter inaccurate information which may or may not be true. However, uncertainty may encourage people to critically assess the accuracy of information, thus enhancing learning. Uncertainty may also have negative effects, such as leading people to mistrust to-be-learned information or to subsequently confuse the accuracy of the remembered information. Participants in the current experiment learned historical statements. They were presented with only true statements or true and false statements while informed of each statement's accuracy. Participants in a third condition were presented with true and false statements, judged each statement's accuracy, and then received feedback on which statements were true and false. On a cued recall test, participants recalled key terms from true statements. Next, they read pairs of true and false statements and indicated which was true. Preliminary results suggest that being presented false information can, in some situations, enhance the learning of true information.

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12:00-1:00 pm (1306)

The Promises and Pitfalls of Premade Versus Selfmade Digital Flashcards.

INEZ ZUNG, *University of California, San Diego*, MEGAN N. IMUNDO, *University of California, Los Angeles*, STEVEN C. PAN, *National University of Singapore* – Students often use and share digital flashcards. Using digital flashcards made by others can save time and effort, but doing so forgoes potential benefits of generating one's own flashcards (Slamecka & Graf, 1978). In three within-subjects experiments we compared the efficacy of selfmade versus premade digital flashcards. Participants first read a text passage containing key terms. In the selfmade condition, participants made their own digital flashcards for the key terms by transcribing their definitions (Experiment 1), paraphrasing their definitions (Experiment 2), or using each key term in an example sentence (Experiment 3). The selfmade flashcards were then practiced. In the premade condition, participants practiced with an existing flashcard set featuring the key terms and their definitions. Although participants completed fewer practice repetitions per card in the selfmade conditions, a 48-hour delayed recall and application test revealed that paraphrasing the definitions yielded more learning, and transcribing definitions or generating examples yielded as much learning, as in the premade conditions. Generating one's own digital flashcards may therefore enhance learning when it involves effortful paraphrasing of material.

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12:00-1:00 pm (1307)

How Do Students Regulate their Use of Multiple-Choice and Cued-Recall Practice Tests?

SABRINA BADALI, KATHERINE A. RAWSON, and JOHN DUNLOSKY, *Kent State University* – Multiple-choice (MC) and cued-recall (CR) practice tests are beneficial for learning, and students encounter both types of question in





their everyday academic lives. The current project investigated students' self-regulated use of MC and CR practice tests and revealed that students used MC and CR practice tests similarly. For both question formats, students chose to stop testing after about one correct answer per item. We examined the effectiveness of students' self-regulated choices by including experimenter-controlled comparison groups in which participants completed either MC or CR practice tests until items were correctly answered 1, 3, or 5 times. Final test performance was lower in the self-regulated groups than in the experimenter-controlled groups and was lower in the groups that used MC practice questions compared to those who used CR practice questions. Students' self-regulated use of both MC and CR practice tests was suboptimal. Students could benefit from continuing to test themselves beyond one correct answer per item, particularly when using MC practice questions.

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12:00-1:00 pm (1308)

Learning with Flashcards: No Advantages for Adaptive Over Random Sequencing. CHERYL JOHNSON, MATTHEW D. MARRAFFINO, and DAPHNE E. WHITMER, *Naval Air Warfare Center Training Systems Division*, GABRIELA FLORES-CRUZ, *Zenetex, LLC*, BRIANAM. SOBEL and ALLISON E. GARIBALDI, *University of Central Florida* – Flashcards are commonly used by students for studying new material, but research shows that most students lack the metacognitive skills necessary to optimize use of this technique. Adaptive training methods that take an individual's performance into account could be applied to encourage more effortful retrieval and improve learning outcomes. In this experiment, 78 college students learned to identify tanks using an adaptive flashcard system in three different sequencing conditions, each using a different algorithm to sequence the flashcards. The between-subjects conditions included the following algorithms: adaptive reaction time-based sequencing (ARTS); Leitner, which is commonly taught in schools; and a random/non-adaptive control. Students' knowledge for trained and untrained images was tested immediately and 1 week later. The results showed no advantage for either adaptive algorithm over a random sequence of flashcards on the immediate or delayed retention and transfer tests. Implications for adaptive training will be discussed.

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12:00-1:00 pm (1309)

Can Performing Distinctiveness Processing Prior to Retrieval Practice Make Retrieval Practice More Effective? NOLA M DALEY and KATHERINE A RAWSON, *Kent State University* – Distinctiveness processing, or the combination of item-specific and relational processing, leads to improved memory compared to either process alone. Retrieval practice also leads to improved memory compared to restudying. Can performing distinctiveness processing prior to retrieval practice lead to greater memory benefits? College students learned items from 5 ad hoc categories (e.g., things that are green: apple, money). First, students either rated the pleasantness of the items (i.e., item-specific processing alone) or

sorted items into their categories (i.e., distinctiveness processing). Then, they practiced the items through either restudying or retrieval practice (i.e., free recall). One day later, participants took a final free recall test. Distinctiveness processing was more effective than item-specific processing, and retrieval practice was more effective than restudying. Most importantly, the effects of retrieval practice on recall were 67% greater with distinctiveness processing than without it, largely because distinctiveness processing boosted practice performance. Results were replicated in a second experiment. Thus, the combination of distinctiveness processing and retrieval practice promotes long-term retention.

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12:00-1:00 pm (1310)

When Pretesting Is Competitive With, and Even More Potent Than, Retrieval Practice. MICHELLE KAKU, *University of California, Los Angeles*, FARIA SANA, *Athabasca University* – Practice questions can enhance learning, but it remains unclear whether such questions are more effective when they are administered before or after information has been studied. Across five experiments, we compared the pedagogical efficacy of answering practice questions before information is studied (i.e., prequestions, also known as pretesting) versus afterwards (i.e., postquestions, also known as retrieval practice). In each experiment, undergraduate students answered practice questions before or after reading an educational text passage. Learning was measured on 5-minute or 48-hour delayed criterial tests in which repeated and transfer questions were posed. In each experiment, prequestions yielded substantially better criterial test performance than postquestions and for both previously tested (repeated) and untested (transfer) materials. That pattern of results belies common assumptions in the test-enhanced learning literature. Overall, our findings reveal that prequestions can match and even exceed the pedagogical benefits of postquestions, with important implications for research involving the pretesting and retrieval practice effects.

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12:00-1:00 pm (1311)

Examining the Use of Clicker Questions in the Classroom. MITCHELL GOROSPE and AMANDA WAPP-PRASAD, *California State University, East Bay* – Clickers are electronic devices students use to answer questions in the classroom. Clickers provide opportunities for active learning within a lecture. Some research has shown that active learning activities, while beneficial for all students, are particularly beneficial for students from underrepresented backgrounds. In the present study, clickers were used in two sections of Cognitive Psychology to assess whether answering clicker questions would improve performance for those topics on exams. Across two sections, there were 106 students (64 first-generation college students, 42 continuing-generation college students). We found a reliable effect of clicker use such that students did better on exam questions that were previously used as clicker questions or related to questions previously used as clicker questions than they did on control questions. The advantage for first-generation college students was numerically greater than the advantage for continuing-generation college





students, but this result was not statistically significant. These results suggest that question asking—and clicker use, more specifically—is beneficial for student learning and may help first-generation students more. Future research with a larger sample would shed light on this issue.

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12:00-1:00 pm (1312)

Testing Effects on Comprehension are the Same for True/False and Multiple-Choice Formats: 'False'. LENA HILDENBRAND, THOMAS D. GRIFFIN, and JENNIFER WILEY, *University of Illinois Chicago* – Practice testing is known to be an effective tool to enhance learning, yet how a practice test engages the learner is important for comprehension. To achieve comprehension a learner must not only remember the ideas as stated in the text, but also make connections between them and with prior knowledge. For closed-ended practice testing, a concern is that it may only prompt superficial processing that is limited to improving memory for ideas that are directly tested. The current study examined whether closed-ended practice testing can improve comprehension outcomes. It was also of interest whether there would be differences between true-false and multiple-choice test formats. Although both true-false and multiple-choice practice tests led to improved final inference test performance compared to a no-test re-exposure condition, performance was less predicted by student ability in the multiple-choice condition, with lower-ability students benefiting more compared to true-false practice.

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12:00-1:00 pm (1313)

Retrieval Practice Supports Acquisition of Tested and Nontested Language Mappings. REBECCA CROWLEY, CHLOE NEWBURY, JAKKE TAMMINEN, and KATHLEEN RASTLE, *Royal Holloway, University of London* – Proficient language requires acquisition of mappings between orthographic, phonological, and semantic representations. We ran two preregistered online studies to investigate the impact of retrieval practice on tested and nontested mappings. Experiment 1 required participants to learn to associate novel words printed using unfamiliar characters to meanings. One group was assigned to multiple blocks of study; another group, to alternating blocks of study and test. Results replicated the testing effect: interim testing on recalling the meanings of novel printed words boosted performance on this task 1 week later. However, the benefit of interim testing extended to a task probing the reverse mapping, in which participants were asked to spell novel words associated with particular meanings. Experiment 2 used the same design and training protocol except that participants also heard a pronunciation of each novel word in the study blocks. The pronunciation was not part of the interim test task; however, results revealed that interim testing on the novel printed words boosted performance in recalling the meanings of the pronunciations one week later. These findings show that benefits of testing extend to nontested language mappings.

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12:00-1:00 pm (1314)

Examining the Use of Retrieval Practice for Learning Statistics. MELTEM KARACA, LISA GERACI, and MARCUS LITHANDER, *University of Massachusetts Lowell* – Students often report that they struggle to learn statistics. Relative to restudy, retrieval practice has been shown to be an effective technique for learning various types of information. Given the effectiveness of this technique, the current studies were designed to investigate if retrieval practice could be used to improve learning of statistics. In two experiments, undergraduate students studied statistical concepts using either retrieval practice or restudy, and then completed a memory test for these concepts that occurred after 2 days (Experiment 1) or 1 week (Experiment 2). In both studies, results showed that there was no significant difference in memory performance for statistical concepts that were learned using retrieval practice compared to those that were learned using restudy. We discuss possible interpretations of these results and some potential limitations of using retrieval practice for learning complex materials, such as statistical concepts.

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12:00-1:00 pm (1315)

Retrieval-Based Learning and Element Interactivity: The Role of Prior Knowledge. ZACHARY BUCHIN, *Union College*, NEIL W. MULLIGAN, *University of North Carolina at Chapel Hill* – Retrieval practice benefits memory more than restudy—a testing effect. Despite high generalizability, educators call for more research on factors critical to education (e.g., prior knowledge), and a debate has emerged over its ability to enhance complex (high element interactivity) learning. Element interactivity assesses material complexity in relation to learners' prior knowledge and can be changed by varying either factor. To assess its causal effect, we experimentally manipulated prior knowledge by randomly assigning learners to complete training lessons in one of two academic domains over three days. Learners then studied new material related to the trained or untrained domain and engaged in focused restudy or retrieval with elaborative feedback in preparation for a delayed test, repeated for the second domain. By holding material constant, learning was either lower (trained) or higher (untrained) in interactivity. Retrieval was more effortful and benefited performance more than restudy. Training was effective and reduced interactivity, but identical testing effects were found on high and low interactivity tasks. Prior knowledge and element interactivity do not seem to be key boundary conditions of retrieval-based learning.

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12:00-1:00 pm (1316)

How Does Testing Affect Future Learning Strategies? DAHWI AHN and JASON C.K. CHAN, *Iowa State University* – Taking tests on previously learned material enhances new learning—the forward testing effect. One potential explanation for this benefit is that testing might enable participants to use more effective learning strategies subsequently. We investigated this possibility by asking participants to report their learning strategies in a multi-list foreign language learning paradigm. In Experiments 1 – 3, participants learned three





lists of Chinese-English pairs; one group took a test after every list (i.e., test condition) and the other group took a test only for the criteria List 3 (i.e., no-test condition). In addition, participants completed a study strategy survey. Although there was a forward testing effect in all experiments, participants in the test and no-test conditions did not report differences in strategies. In Experiment 4, we used a within-subject design so that we could correlate strategy use with the magnitude of the forward testing effect at an individual level. Interestingly, there was a positive correlation between imagery strategy and the forward testing effect.

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12:00-1:00 pm (1317)

Does Collaborative Practice Testing with Multiple-Choice Questions Facilitate Learning of Tested and Related Information in the Classroom? MEGAN N. IMUNDO, COURTNEY CLARK, and MELISSA PAQUETTE-SMITH, *University of California, Los Angeles* – Answering multiple-choice questions with competitive lures can enhance learning for both the tested information and related information (i.e., information about incorrect options) by eliciting retrieval about all answer options (Little et al., 2012). Yet students may not always carefully evaluate answer choices and may therefore lose out on one benefit of multiple-choice tests. Testing in groups may encourage students to consider all answer choices as group members negotiate to come to a consensus (controversy theory; Johnson et al., 1998). Here, we tested if collaborative practice testing as compared to individual testing enhances memory for related information in Introductory Psychology. Students ($n=456$) completed one multiple-choice test in small groups and the other alone. Tests contained questions where, for example, the correct response was “absolute thresholds” and one of the competitive lures was “difference thresholds.” They then took a cued-recall test on both tested (e.g., absolute thresholds) and related (e.g., difference thresholds) concepts (topics were counterbalanced across students). Our findings have implications for understanding how to best optimize students’ learning from multiple-choice practice tests.

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12:00-1:00 pm (1318)

Investigating How Executive Function Impacts Memorial Consequences of Collaborative Retrieval Practice for Key-Term Definitions. KATHRYN WISSMAN, *North Dakota State University* – Learning sometimes occurs in isolation, but arguably more often learning occurs in a social environment. Although collaboration has been shown to enhance later individual memory, recent research suggests these benefits may not extend to key-term definitions. During collaboration, learners must coordinate social efforts, while simultaneously completing the primary learning task at hand. Thus, executive function may impact the memorial consequences of learning alone versus in a group. The current examines how collaborative versus individual retrieval practice affects learning and retention of key-term definitions and the extent to which these effects vary as a function of executive function. Participants completed a measure of executive function and were then asked to learn key-term

definitions by engaging in retrieval practice collaboratively or individually. All learners completed an individual final test. Outcomes showed no benefit of engaging in collaborative retrieval practice for learning key-term definitions and did not differ based on executive function.

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12:00-1:00 pm (1319)

Backward Association Moderates the Effectiveness of a Mediator Cue. DONNELLE DIMARCO and HARVEY H. MARMUREK, *University of Guelph* – The mediator effectiveness hypothesis explains the testing effect in paired-associate learning as due to the activation of extra-list mediator items related to the cue word. Evidence for the hypothesis derives from those extra-list items being effective retrieval cues in a final test. The goal of the current experiment was to determine if the backward association of cue-mediator moderates the effectiveness of mediator cues. We varied the strength of the backward association (.00 vs. .20) from the original cue to mediator. In each of the backward association conditions, the final recall cues comprised a mixture of mediator cues (.00 or .20) and extra-list words that were weakly related to the target words. It was found that backward association of the original cue—mediator did not moderate the testing effect. However, a significant interaction determined that .20 backward association mediators were a more effective cue for target recall compared to the target-related cues but this was not the case for .00 backward association mediators. It appears that the backward association of original cue—mediators moderates how effective a mediator cue is when mixed with extra-list items that are weakly associated with the target.

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12:00-1:00 pm (1320)

Working Memory Testing and Episodic Memory: WM Capacity Matters for Remembering Items But Not for Associations. KATHY Y. XIE and PATRICIA REUTER-LORENZ, *University of Michigan* – Working memory (WM) helps us form and retrieve episodic memories (EM). However, different methods of probing WM could affect subsequent EM in different ways. We investigated whether testing WM using three-alternative forced choice recognition differentially affects long-term memory for word-pair associations (i.e., associative memory) and for individual words (i.e., item memory) and whether individual differences in WM capacity (assessed with change detection) influence the effects of WM testing on EM. Using hierarchical Bayesian multinomial process tree analyses of EM performance from an online sample of 120 participants, we found that associative memory was superior for word pairs tested during WM compared to pairs that were not tested, regardless of WM capacity, corresponding to the well-known benefits of retrieval practice. However, only participants with high WM capacity showed greater item memory for previously tested pairs, whereas participants with low WM capacity showed no testing effects on item memory. Our results indicate that whereas high WM capacity is associated with better EM overall and a testing benefit for long-term item





memory, testing WM benefits subsequent memory for associations regardless of WM capacity.

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12:00-1:00 pm (1321)

Retrieval Practice Difficulty Moderates the Forward Effect of Testing. HANNAH HAUSMAN, *University of California, Santa Cruz*, MATTHEW G. RHODES, *Colorado State University*, FLORIAN HAHNE, *University of Hagen*, VEIT KUBIK, *Bielefeld University* – Retrieval practice of previously studied information enhances memory that information but can also enhance learning of subsequently presented new information, known as the forward effect of testing (FET). According to the encoding effort hypothesis, taking a test on previously studied information enhances subsequent learning by introducing difficulty thereby encouraging participants to sustain effort and attention while encoding new information. The present experiments used different materials to test the encoding effort hypothesis. Participants studied three lists of word pairs and, after Lists 1 and 2, restudied or practiced retrieving the pairs. Retrieval practice difficulty was manipulated by providing or withholding hints (e.g., army—ho__er vs. army-____). The criterial test was a no-hint cued recall test after studying List-3. Consistent with the retrieval effort hypothesis, more difficult retrieval practice after Lists 1 and 2 led to longer List-3 study times and enhanced memory for List-3 pairs.

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12:00-1:00 pm (1322)

The Effect of Hint Strength on the Benefits of Retrieval Practice. KALIF VAUGHN, LESLIE L. FITZGERALD, DASIA HOOD, KARLEE Y. MIGNEAULT, and KELLY KRUMMEN, *University of the Cumberland* – Recent work by Vaughn and Kornell (2019) demonstrated that providing hints could increase rates of self-testing without sacrificing learning; however, this effect was primarily explored with carefully-crafted materials that involved unguessable, unrelated word pairs. We explored the influence of hints on retrieval with real-world materials. In Experiment 1, participants studied skeletal charts highlighting a bone region. After studying, participants received one test trial that either contained consonants-only (e.g., _cc_p_t_l), vowels-only (e.g., o_i_i_a_), or no hint (e.g., _____). The consonants-only trial produced the worst final test performance; however, participants rated that trial as the most effective, the most fun, and the trial they would use from now on. Experiment 2 replicated and extended these results using a criterion learning paradigm. These experiments show that participants prefer extremely strong hints during test trials, even when such hints impair performance. We discuss these results in terms of retrieval effort, item guessability, and metacognitive beliefs.

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12:00-1:00 pm (1323)

The Oddity Detection in Diverse Scenes (ODDS) database: Rated and Validated Real-World Scenes for Studying

Anomaly Detection. MICHAEL C. HOUT, MARIANA M. CAZARES RODRIGUEZ, HAILEY J. SANDIN, MEGAN H. PAPESH, PHILLIP G POST, JESSICA MADRID, and BRYAN WHITE, *New Mexico State University*, JUAN GUEVARA PINTO, *Rollins College*, JULIAN WELSH, DRE A. GOODE, REBECCA SKULSKY, and MARIANA M. CAZARES RODRIGUEZ, *New Mexico State University* – Medical image perception and camouflage detection are challenging search tasks for which standard laboratory search is a poor analogue. Whereas laboratory search often requires observers to search for known targets among isolated, nonoverlapping images randomly arrayed on clean backgrounds, medical image and real-world search present unspecified targets in noisy, yet spatially regular scenes. Those unspecified targets are typically oddities, elements that do not belong. To study this form of search in laboratory paradigms, we've created a database of scenes to mimic the clutter, structure, and anomalies that exist in expert search tasks. The database contains thousands of interior and exterior scenes that novices can easily search. Each scene includes 16 variants wherein an oddity (a subtle ripple) was hidden. Eight independent raters assessed target discriminability, which we correlated with raters' search accuracy and reaction times and further validated by correlating with naïve searchers' performance. Images in the ODDS database are broadly analogous to medical image perception or camouflage detection and thus should be helpful to researchers interested in studying visual search through challenging scenes.

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12:00-1:00 pm (1324)

Experts, What's Your Prior? Methodological Flexibility in Prior Elicitation. ANGELIKA M. STEFAN, *University of Amsterdam*, NATHAN EVANS, *The University of Queensland*, ERIC-JAN WAGENMAKERS, *University of Amsterdam* – Prior distributions are probability distributions that reflect pre-data knowledge about the relative plausibility of statistical parameters. They are a fundamental part of Bayesian modeling and can contribute to tightly constrained models that encapsulate precise psychological hypotheses. Prior elicitation has frequently been proposed as a principled method for deriving prior distributions based on expert knowledge. Here, we show that prior elicitation methods contain many potential sources of methodological flexibility that can influence the elicited prior distributions. We demonstrate how, among others, initial disagreement among experts, the choice of a specific elicitation technique, and different strategies for the mathematical combination of several elicitation results can each determine the outcome of the elicitation process. We argue that prior elicitation should therefore be conducted transparently and that sensitivity analyses and robust gold standards should be developed.

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12:00-1:00 pm (1325)

Item-Specific Overlap Between Hallucinatory Experiences and Cognition in the General Population: A Three-step Multivariate Analysis of International Multisite Data. ABHIJIT M. CHINCHANI, MAHESH MENON, and MEIGHEN





ROES, *The University of British Columbia*, HEUNGSUN HWANG, *McGill University*, PAUL ALLEN, *University of Roehampton*, VAUGHAN BELL, *University College London*, JOSEF BLESS, *University of Bergen*, CATHERINE BORTOLON, *Université Grenoble Alpes*, MATTEO CELLA, *King's College London*, CHARLES FERNYHOUGH, *Durham University*, JANE R. GARRISON, *University of Cambridge*, EVA KOZÁKOVÁ, *National Institute of Mental Health*, FRANK LAROI, *University of Liège*, JAMIE MOF-FATT, *University of Sussex*, NICOLAS SAY, *Charles University*, MIMI SUZUKI, *University College London*, WEI LIN TOH, *Swinburne University of Technology*, YULIYA ZAYTSEVA, *National Institute of Mental Health*, SUSAN L. ROSSELL, *Swinburne University of Technology*, PETER MOSELEY, *Northumbria University* – Cognitive mechanisms hypothesized to underlie hallucinatory experiences (HEs) include dysfunctional source monitoring, heightened signal detection, and impaired attentional processes. HEs can be pronounced in psychosis, but similar experiences also occur in non-clinical populations. Using data from an international multisite study on nonclinical subjects (N=419), we described the overlap between two sets of variables—one measuring cognition and the other HEs—at the level of individual items, extracting item-specific signal which might be considered off limits when summary scores are analyzed. This involved using a statistical hypothesis test at the multivariate level, and variance constraints, dimension reduction, and split-half reliability checks at the level of individual items. The results showed two distinct mechanisms emerge as candidates for separate pathways to the development of HEs in different individuals: HEs involving perceptual distortions on one hand (including voices), underpinned by a low threshold for signal detection in cognition, and HEs involving sensory overload and vivid imagery on the other hand, conceptually overlapping with absorption/dissociation, and underpinned by reduced laterality in cognition.

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12:00-1:00 pm (1326)

Improving the Millisecond Timing Accuracy of Participant Responses, Synchronization, and Event Marking in Studies of Human Performance. RICHARD R. PLANT, *The Black Box Toolkit Ltd* – A wide variety of scientists need to record participant responses to computer administered stimuli during their research (e.g. neuroscientists, cognitive psychologists, vision researchers). Participant responses might be made by pressing a button on a response pad or by making a vocal response using a voice key. Often these responses produce a time critical event mark or events need to be synchronized with other equipment such as EEG machines or eye trackers. In this paper we discuss using a new timing critical response pad that guarantees submillisecond response accuracy and synchronization. The 1- to 10-button “tPad” is designed to be platform and study agnostic and independently timestamps visual and auditory presentations and responses to them. It allows for any presentation and response to produce TTL event marks which can be used for timing critical synchronization (e.g., in EEG and eye tracking studies). Any event is timestamped using an inbuilt millisecond accurate timer. More accurately recording when stimuli are presented and responses made helps researchers be more certain of the quality

of their data, their conclusions, and the ability to replicate using other hardware in different labs.

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12:00-1:00 pm (1327)

Improving Subjective Interpretation of Visually Presented Data. BRADLEY C. SMITH, JACKIE SPEAR, and RANDY JAMIESON, *University of Manitoba* – People often misperceive and misinterpret the strength of statistical relationships in visually presented data. Alleviating the effects of the cognitive illusions that cause these misperceptions has become increasingly important as people are exposed to more statistical information in the digital age. For example, people were bombarded with statistics and graphs in relation to the COVID-19 pandemic in 2020. This information has been interpreted, and misinterpreted, in various ways. It would be advantageous if we could present data in a way that would limit or eliminate misinterpretations. We present a series of experiments with the aim of identifying methods that increase the accuracy of participants’ judgments of relationships in visually presented data. We first demonstrate systematic errors in participants’ responses and show how data can be best rendered and presented to alleviate those errors. From these experiments, we have identified some graphical features and techniques that may help people in interpreting visually presented data.

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12:00-1:00 pm (1328)

SEAM: An Integrated Activation-Coupled Model of Sentence Processing and Eye Movements in Reading. MAXIMILIAN M. RABE, DARIO PAAPE, SHRAVAN VASISHTH, and RALF ENGBERT, *University of Potsdam* – Reading models often neglect either postlexical language processing, or fundamental visual, attentional, and motor processes. Combining eye-movement control and sentence processing in an integrated model would mark an important step forward for mathematical models of natural language processing. We present an integrated approach by combining the SWIFT model of eye-movement control (Engbert et al., 2005) with key components of the LV05 syntax processing model (Lewis & Vasishth, 2005). The integrated model SEAM can reproduce eye movement patterns that have been explained in terms of similarity based interference in the psycholinguistic literature. A crucial problem for such complex models is parameter estimation. We build upon recent advances on successful parameter identification in dynamical models, investigate likelihood profiles for single parameters, and present pilot results on Markov chain Monte Carlo (MCMC) sampling within a Bayesian framework of parameter inference.

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12:00-1:00 pm (1329)

A Dynamical Latent Variable Model for Switching Cognitive Tasks. PAUL JAFFE, *Lumos Labs*, PATRICK G. BISSETT and RUSSELL A. POLDRACK, *Stanford University*, ROBERT J. SCHAFER, *Lumos Labs* – Cognitive performance generally





suffers whenever one switches between tasks. Existing models of this switch cost depend on a priori cognitive constructs, an approach which places strong conceptual limitations on derived explanatory accounts. Here we develop a data-driven deep learning framework for modeling cognitive tasks based on dynamical variational autoencoders (task-DyVA) which eschews predefined constructs, enabling a broader range of models to be discovered. In task-DyVA, an expressive dynamical system is trained to take experimentally observed sequences of task stimuli as inputs and generate humanlike responses as outputs. Models fitted to data from a task-switching game offered by Lumosity reproduced a range of behavioral phenomena with high temporal precision and captured individual differences in task performance. Adopting a state space perspective, we discovered that the two tasks were encoded in different regions of the latent space, and that the switch cost was directly related to the transit time between task regions. Moreover, the separation of task spaces conferred robustness to noise. Thus, the benefits of learning distinct task representations come at the expense of slow transitions between them.

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12:00-1:00 pm (1330)

Applications of Information Theory to Perceptual Independence and Separability. MIKAELA AKRENIUS, *Indiana University Bloomington* – Ever since the inception of the notion of perceptual independence, questions related to the processing of perceptually independent or separable dimensions have been intertwined with assumptions made about perceptual distributions, informational overlap, and channel capacity. Even though several successful empirical protocols and theoretical frameworks have been proposed for recognizing violations of perceptual independence or separability, few of them dissociate between different kinds of violations or on the potentially separate cognitive processes underlying these violations. We revive Garner and Morton's (1969) classic mutual uncertainty analysis, combine it with contemporary information-theory-based tools and metrics, and reanalyze a set of simulated and empirically observed confusion matrices from modern studies. Our results shed light on the locus of interaction of perceptually integral dimensions, help build bridges between different notions of perceptual separability, and identify areas of research in which uncertainty analysis could complement existing methods for inferring perceptual processes.

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12:00-1:00 pm (1331)

Investigating Synchrony Effects in Cognitive Inhibition and Processing Speed: A Multipart Online Study. HAYLEY TSENG and MARKUS DAMIAN, *University of Bristol* – A synchrony effect denotes the beneficial impact of aligning time of testing with an individual's chronotype. Synchrony effects in cognitive inhibition have been reported in a small number of prior studies (e.g., May & Hasher, 1998). Here, we explored the issue via an online study conducted on a large number of young healthy individuals, using the so-called faces task and the Deary-Liewald task. The former captures three components of cognitive inhibition (inhibitory control, response suppression, task switching) while the latter measures

processing speed. Participants were repeatedly tested across three sessions (morning, noon, afternoon), and their chronotype was identified. Results showed a significant time of testing effect in both tasks with slower latencies in the morning than at noon/afternoon. Critically, cognitive inhibition was constant across time of testing and chronotype. The implications of our failure to find a synchrony effect in cognitive inhibition will be discussed.

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12:00-1:00 pm (1332)

Switching Attention Between Simultaneous Voices: The Effect of Switch Probability. AMY STRIVENS and IRING KOCH, *Rheinisch-Westfälische Technische Hochschule (RWTH) Aachen University*, AURELIU LAVRIC, *University of Exeter* – Listeners can attend ("tune in") to one of multiple concurrent voices, but switching attention between voices incurs a substantial performance switch cost. Starting about a decade ago, several studies by the Aachen group found no reduction in switch cost (RISC) with increasing the preparation interval between the cue specifying the target voice and the multispeaker compound, suggesting it may not be possible to shift attention to another speaker in advance of hearing his/her voice. However, in our recent experiments we found a robust RISC effect suggesting that such advance "retuning" may in fact be possible. Here we examine one of the likely sources of the discrepancy between the two series of experiments—switch probability, which was higher in the earlier experiments (0.5, or 50% switch trials) than in the more recent experiments (0.33). In the present set of experiments, we first aimed to reproduce the settings from our recent experiments that found a robust RISC effect—except using the switch probability of 0.5 instead of 0.33. One experiment revealed a reliable RISC effect, but the second did not. For clarity, our next two experiments will directly manipulate switch probability within-participants: 0.25 vs. 0.75.

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12:00-1:00 pm (1333)

Effects of Probabilistic Reward on Voluntary Task Selection as Revealed by Eye Tracking. JUAN BALCAZAR and JOSEPH M. ORR, *Texas A&M University* – The balance between cognitive stability and flexibility has been shown to be influenced by trial-to-trial changes in reward magnitude. Most studies have used deterministic reward, but reward is often uncertain. Therefore, we examined voluntary task switching under probabilistic reward conditions, revealed by eye-tracking. We examined pupillometry and gaze fixation as a function of reward transition and task alternation. Consistent with prior studies, pupil dilation was greater for trials where reward increased vs. decreased relative to previous trial and for switch vs. repeat trials. Preliminary analyses for fixation duration suggest no effect of reward transition. Switch rates were greater for trials where the reward remained low; this condition has previously been associated with decreased switch rates. Interestingly, switch rates did not differ between high and low reward trials. These findings may





suggest that probabilistic reward has a different effect on switch rate compared to deterministic reward.

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12:00-1:00 pm (1334)

Task- But Not Stimulus-Specific Learning Is required for List-Wide Flexibility Adjustments. AUDREY SIQI-LIU and TOBIAS EGNER, *Duke University* – Adaptive behavior often requires finding the optimal tradeoff between focusing on a current task-set (cognitive stability) and updating that task-set when the environment changes (cognitive flexibility). Dynamic adjustments of cognitive flexibility are observed in cued task-switching paradigms, where switch costs, or the response time difference between slower switch trials and faster repeat trials, decrease as the proportion of switch trials over blocks increases. We conducted two experiments to investigate the specific learning mechanisms underlying this effect, here referred to as the list-wide proportion switch (LWPS), and the degree to which it relies on item- and task-level switch associations. Experiment 1 did not find the LWPS effect for an unbiased transfer task, which was equally associated with switches and repeats, suggesting that contextual-modulation of switch costs is task/item-specific. Building on this finding, Experiment 2 demonstrated that the LWPS effect can be found with trial-unique items which are not associated with task sets or with block-wide switch proportions. In conjunction, these two experiments indicate that task- but not item-level switch proportion biases are necessary for switch cost adjustments.

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12:00-1:00 pm (1335)

Withdrawn

12:00-1:00 pm (1336)

Name the Color, Not the Word: Stronger Evidence that Providing Goal Reminders Eliminates the Relationship Between Working Memory Capacity and Stroop Errors. AUDREY V. HOOD, BROOKE CHARBONNEAU, and KEITH A. HUTCHISON, *Montana State University* – Recently, we found that vocalizing the task goal every 12 trials eliminated the relationship between working memory capacity (WMC) and performance within a mostly congruent Stroop list (Hood & Hutchison, 2021). However, the non-reminder condition, which vocalized a task-unrelated statement, did not significantly differ from either the goal-reminder or true control conditions. The current study held congruency at 75% within each block, rather than simply overall, to reduce noise and included more trials, both overall and between breaks, to increase opportunity for goal neglect. Participants completed the automated operation span task (AOSPAN) followed by a Stroop task in which they vocalized either the task goal (“name the color, not the word”) or a task-unrelated statement (“I’m doing this for Psych 100”) every 24 trials. WMC correlated with Stroop errors in the nonreminder but not the goal-reminder condition, providing even stronger evidence that

goal reminders eliminate the relationship between WMC and Stroop errors.

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12:00-1:00 pm (1337)

Independent Adaptation of Cognitive Stability and Flexibility Undermine Assumption of Stability-Flexibility Tradeoff. RAPHAEL M. GEDDERT and TOBIAS EGNER, *Duke University* – Adaptive behavior requires the ability to focus on a single task and protect it from distraction (cognitive stability) and to switch tasks in light of changing circumstances (cognitive flexibility). Stability and flexibility are commonly thought of as opposing states, implying a stability-flexibility tradeoff: when stability is high flexibility is low, and vice versa. However, this assumption of reciprocity has rarely been tested empirically. Here, we tested this assumption using task switching and attentional set-shifting protocols allowing us to simultaneously measure switch costs (indexing flexibility) and congruency effects (indexing stability). We applied to these tasks independent block-wise manipulations of the proportion of incongruent/switch trials designed to induce adaptations in stability and flexibility, respectively. Across three experiments, varying the proportion of incongruent trials led to expected adaptations in congruency effects but did not modulate switch costs, and varying the proportion of switch trials led to expected adaptations in switch costs but did not modulate congruency effects. Thus, stability and flexibility can be regulated independently, contrary to the stability-flexibility tradeoff assumption.

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12:00-1:00 pm (1338)

The Congruency Sequence Effect Transfers Across Different Task Representations. YOON SEO LEE and YANG SEOK CHO, *Korea University* – It has been suggested that a single control mechanism can regulate conflicts of two different tasks if their task representations are less salient to distinguish. The purpose of the present study is to examine whether task representations play a critical role in determining the boundary of congruency sequence effect (CSE). To address this question, participants were asked to perform horizontal auditory and vertical visual Simon tasks alternatively in a trial-by-trial manner with unimanual aimed movement responses. Although the two tasks were clearly separated by stimulus modality, robust CSEs were obtained between the two tasks regardless of whether they shared the same task-relevant stimulus dimension (Experiment 1) or they had different task-relevant stimulus dimensions (Experiment 2). Furthermore, a CSE was evident between auditory and visual gender Stroop tasks in Experiment 3. These results indicate that the cognitive control mechanisms responsible for the CSE specifically exert their influence on stimulus and/or response dimensions rather than task representations.

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12:00-1:00 pm (1339)

The Size of Task-Switching Cost Does Not Predict the Cross-task Congruency Sequence Effect. JIEUN LEE and YANG SEOK CHO, *Korea University* – It has been suggested that task sets determine the boundary of control responsible for the congruency sequence effect (CSE), which is sequential modulation of the congruency effect between previous and current trials. If the CSE occurs between two tasks only when they are performed with the same task set, no or little task-switching cost should be obtained between them compared to the tasks showing no CSE between them. Two experiments were conducted to examine whether the presence of the CSE between two tasks is related to the magnitude of task-switching cost between them. Participants were asked to perform a horizontal color Simon task and a vertical shape Simon task or a horizontal color Simon task and a vertical color flanker-compatibility task in a fixed task sequence (AABB). A CSE was significant between the two Simon tasks when analyzing switching trials only, despite of a significant switching cost in the analysis of repeating and switching trials together. However, no CSE was obtained between the Simon and flanker-compatibility tasks even though a comparable amount of switching cost was obtained. These results indicate that task sets are not the only factor determining the boundary of control.

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12:00-1:00 pm (1340)

Effects of Distractor and Target Duration on Conflict Resolution in the Accessory Simon Task. MALTE MÖLLER and SUSANNE MAYR, *University of Passau* – Lateralized responses to central targets are facilitated when a distractor is presented ipsilaterally as compared with contralaterally to the response. This so-called accessory Simon effect (ASE) decreases and even reverses when the time between distractor and target increases, suggesting that spatial codes of distractors are inhibited. The present study investigated the effect of target and distractor duration on the time course of conflict resolution in a visual accessory Simon task. A lateralized distractor either occurred prior to or simultaneously with the target. Targets were presented briefly (Experiment 1) or persisted until the response (Experiment 2). Distractor duration (brief vs. persistent until response) was varied between participants. The results revealed that the time course of the ASE was determined by the interplay between distractor and target duration. Specifically, the ASE decreased with increasing SOAs in both experiments, but its time course was solely affected by distractor duration in Experiment 1, reversing with brief (but not persistent) distractors. Together, this indicates that (1) inhibition operates on irrelevant spatial codes and (2) continuous target activation contributes to conflict resolution.

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12:00-1:00 pm (1341)

Primary-Task activation in Task-Interruption Situations. PATRICIA HIRSCH and IRING KOCH, *Rheinisch-Westfälische Technische Hochschule (RWTH) Aachen University* – In the present study, we examined whether the pre-interruption subtask 1 (i.e., last subtask before the interruption onset) is activated during

secondary task processing. To this end, subjects performed a pre-defined sequence of three subtasks, and we manipulated the interruption position (i.e., before the second vs. third subtask) and the congruency between the interruption task and the pre-interruption subtask 1. We found that performance in a subtask after an interruption was worse than performance in the corresponding subtask of non-interrupted trials, indicating that task interruptions impaired performance in the primary task. Moreover, we observed congruency effects in the interrupted task for interruptions occurring before the third subtask, providing first evidence for the activation of the pre-interruption subtask 1 during secondary-task processing. We discuss the role of between-task interference for the performance in the present experiment and interpret the findings in the light of the memory for goals model.

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12:00-1:00 pm (1342)

Shifts in Proactive and Reactive Control Across Time. THE-RESA G. MOWAD, *Lehigh University* – The dual mechanisms of control model posits two modes of cognitive control: proactive and reactive. The AX-Continuous Performance Task (AX-CPT) captures proactive and reactive control by measuring performance on cue-probe pairs where a cue (A or B) determines the response to a probe (X or Y) with AX as the target probe. We studied shifts between proactive and reactive control when a cue is held across time. A multiple probes AX-CPT had cues precede a sequence of 3-10 probes. Trial type (AX, AY, BX, and BY) and position (First, Early, Middle, and Late) varied within participants. Cue predictiveness (Predictive and Neutral) varied between participants. For Predictive, AX and BY occurred on 37.5% of trials. For Neutral, trial types appeared equally. A mixed-measures ANOVA on errors found significant two-way interactions of trial type and each of the other factors. The interaction of trial type and position showed increasing errors on AY trials and decreasing errors on BX trials across position, suggesting a shift toward proactive control. The interaction of trial type and cue predictiveness showed AY > BX errors for predictive cues and BX > AY errors for neutral cues, suggesting predictive cues led participants to use more proactive control.

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12:00-1:00 pm (1343)

Temporal Negative Priming Is Affected by Relative, Rather than Absolute, Speed. TODD A. KAHAN and CAROLINE M BOGUE, *Bates College* – Temporal negative priming (TNP) is the finding that people take longer to identify when (in time) a target appeared if a distractor had just previously appeared at that same relative point in time (Kahan et al., 2020). However, in prior work on TNP a curious pattern has emerged where the negative priming effect is only found when the first display (the prime) is presented very slowly (taking more than 3 seconds to complete). This study examines whether or not speeding up the presentation rate of all trials will alter this pattern. Might TNP arise when the prime is made more rapid but all of the sequences are sped up as might be expected if relative, rather than absolute timing is critical? Alternatively, if the





fixed amount of time is important for the formation of episodic memory traces, then speeding up the displays might eliminate TNP here. Results (N=35) support the position that relative rather than fixed timing is critical. Findings are compared with Kahan et al. (2020) and implications for theories of negative priming are discussed.

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12:00-1:00 pm (1344)

A Hierarchical Bayesian Approach to the Reliability and Validity of Cognitive Control. JEAN-PAUL SNIJDER, *Heidelberg University*, JULIE M. BUGG, *Washington University in St. Louis*, RONGXIANG TANG, *University of California, San Diego*, ANDREW R.A. CONWAY, *Claremont Graduate University*, and TODD S. BRAVER, *Washington University in St. Louis* – Cognitive control is a set of fundamental processes that are utilized in a wide range of cognitive functioning: working memory, reasoning, problem solving, and decision making. Currently, no existing theory of cognitive control unifies experimental and individual differences approaches. Some even argue that cognitive control as a psychometric construct does not exist at all. These disparities may exist in part because individual differences research in cognitive control utilizes tasks optimized for experimental effects (i.e., Stroop effect). As a result, many cognitive control tasks do not have reliable individual differences despite robust experimental effects (Hedge, Powell, & Sumner, 2018). By hierarchical Bayesian modeling, we provide evidence that (1) reliable individual differences can be extracted from experimental tasks and (2) weak correlations between tasks of cognitive control are not solely caused by the attenuation of unreliable estimates. The implications of our findings suggest that it is unlikely that poor measurement practices are the cause of the weak between-task correlations in cognitive control and that a psychometric construct of cognitive control remains elusive.

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12:00-1:00 pm (1345)

Noticing the Frequently Ignored: Investigating How Individual Differences in Selective Attention Relate to Schizotypy and Altered States of Consciousness. JOJO MARTIS and TYLER DAVIS, *Texas Tech University* – The present study investigated how individual differences in selective attention, a key faculty that allows people to focus attention on specific information, relates to an individual's experience with altered states of consciousness (OAV) and schizotypy (STA). We created a novel category learning task designed to elicit blocking, a phenomenon related to selective attention. In Study 1, we tested whether higher OAV and STA would be associated with disrupted blocking due to less narrowed attention. In Study 2, we added additional feature inference trials, which required predicting missing features from associated features or category labels, to test whether the ability to infer missing features related to OAV or STA. In both studies, learning performance was lower in participants with higher OAV and STA. In Study 2, higher OAV and STA were associated with lower inference performance.

Results were inconsistent with wider selective attention in higher OAV and STA participants.

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12:00-1:00 pm (1346)

Targeted Memory Reactivation during Mind-Wandering in Younger and Older Adults. JESSICA NICOSIA and DAVID A. BALOTA, *Washington University in St. Louis* – Mind-wandering (MW) is a universal and prevalent cognitive process, however, the nature of how MW interacts with other cognitive processes remains a scientific blind spot. Across five experiments, we tested the hypotheses that MW may facilitate memory via consolidation processes and that age differences in MW may contribute to declines in episodic memory. Younger and older adults encoded paired associates, received targeted reactivation cues during the “Shapes” task which promotes MW, and were tested on their memory for the (cued and uncued) stimuli from the initial encoding task. Thought probes were presented during the Shapes task to examine participants' thought contents. Overall, younger adults were better able to make use of the cues to trigger reactivation of recently encoded information and promote consolidation when they were MW during the Shapes task. Additionally, the more an individual reported episodic MW during the Shapes task, the larger cuing effect they produced at recall. The results from these experiments were interpreted within a retrieval facilitation framework wherein the cues serve to reactivate the earlier traces, and this reactivation benefitted retrieval speed for cued items as compared to uncued items.

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12:00-1:00 pm (1348)

The Surprising Role of Stimulus Modality in the Dual-Task Introspective Blind Spot. DONNA BRYCE, *University of Tübingen*, DANIEL BRATZKE, *University of Bremen* – Being able to accurately estimate one's own performance is important in everyday contexts, and arguably particularly so in complex multitasking contexts. Here we examine a glaring gap in participants' introspection regarding their own reaction time costs in a dual-task context. This so-called introspective blind spot has been explained by a “consciousness bottleneck” which states that participants cannot consciously perceive a stimulus while attention is occupied by another task. We conducted a series of introspective psychological Refractory period (PRP) experiments to identify the determinants of an introspective blind spot; to our surprise, in half of the experiments, participants appeared to be aware of their dual-task costs. A single trial analysis highlighted the sensory modality of the two stimuli within the trial as an important predictor of introspective accuracy, along with temporal gaps in the trial. The findings call into question the existence of a conscious bottleneck. We propose a memory-based account of introspective processes in this context, whereby introspective accuracy is determined by the memory systems involved in encoding and rehearsing memory traces.

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12:00-1:00 pm (1349)

Becoming Aware of Something That Is Not There: Illusory Contours Facilitate Breakthrough from Continuous Flash Suppression. MAR NIKIFOROVA, DAVID E. HUBER, and ROSEMARY COWELL, *University of Massachusetts* – Continuous flash suppression leverages binocular rivalry to render observers unaware of a static image for several seconds. To achieve this effect, rapidly flashing noise masks are presented to the dominant eye while the static stimulus is presented to the nondominant eye. Eventually “breakthrough” occurs, wherein attention/awareness shifts to the static image in the nondominant eye. We tested the hypothesis that high-level Gestalt formation provides the spark that drives breakthrough. In three experiments, we presented several Pac-Man-shaped objects that might or might not align to form illusory contours. In this way, low-level aspects of the display were the same in all conditions, which differed only in terms of the high-level illusory contour. To measure the inception of breakthrough, observers were instructed to press a key as soon as they became aware of something, at a point of partial breakthrough. Breakthrough was faster when there was an illusory contour. After participants pressed the key to indicate partial breakthrough, they reported how many Pac-Man objects they had seen, and where they were located. Supporting the Gestalt hypothesis, observers were more likely to report Pac-Man objects that were connected by illusory contours.

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12:00-1:00 pm (1350)

Think and You’ll Miss It: Magical Misdirection Through Humor. ANTHONY S. BARNHART, ASHLEY R. LUNDELL, TAILYN R. LUDWICZAK, and BENNETT J. SHEBESTA, *Carthage College* – Magicians’ dogma asserts that humor, precisely the punchline of a joke, creates what they refer to as an “off-beat,” blinding audience members to the world around them. While other forms of the magician’s off-beat have been studied, humor-induced inattention blindness has not been explored in the laboratory. Here we describe the results of an experiment designed to verify the existence of this phenomenon and test one hypothesis for why humor may elicit inattention blindness. We propose that humor requires people to manipulate the contents of working memory to reinterpret a joke’s setup in light of the punchline, thus usurping attentional resources from the visual world. To test this hypothesis, we employed garden path sentences, which mimic the cognitive demands of humor. Participants listened to spoken garden path and nonsense sentences, judging their sensibility. Meanwhile, they engaged in a dot-probe detection task, monitoring a display of colored noise for the onset of a subtle dot. Dot onsets were manipulated relative to the deviation point in each garden path sentence. If our hypothesis is correct, participants would be slower and less accurate to detect dot probes if they happened on or after the deviation point.

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12:00-1:00 pm (1351)

Tracking Self-Reported vs. Probe-Identified Instances of Distraction with EEG. EMILY CUNNINGHAM, DIANE M. BECK,

SEPIDEH SADAGHIANI, and RANXIAO FRANCES WANG, *University of Illinois Urbana-Champaign* – A commonly cited goal in the literature on sustained attention is to relate the emergence of distracting or task-unrelated thoughts to continuous patterns of physiological activity with the aim of covertly predicting attentional state. Typically, emergence of task-unrelated thought is assessed with either spontaneous self-reports or periodic probes. However, it is not clear whether patterns of activity associated with these two types of measurement share common features. We address this question in the domain of EEG. Participants (N=18) completed two versions of an eyes-closed breath-counting exercise in which they either spontaneously self-reported meta-awareness of distraction or responded to periodic probes. In the self-report condition, we replicated prior reports of a sustained increase in oscillatory power in the alpha band (together with decreased frontal theta and increased beta power) following return to task (relative to the prereport interval). In the probe condition, effects were limited to the alpha band (greater alpha power prior to reports of being on- relative to off-task in the 1000ms prior to the probe). Classifiers applied to probe and self-report data were used to evaluate the time-course of these effects.

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12:00-1:00 pm (1352)

What Makes a Good Language Learner? Individual Differences in Cognitive Control Abilities and Success in Spanish-English Translation. SUSAN C. BOBB, *Gordon College*, NORIKO HOSHINO, *Tsuda College*, GRETCHEN S. SUNDERMAN, *Florida State University*, ANN BASCOM, SARAH N. HUTCHINSON, ALEXIS PALLESCHI, and KELBY T. COX, *Gordon College* – Previous research has documented a shift in how language learners process their second language (L2): Initially, they pay attention to how L2 words overlap in their spelling with words in the native language (L1). With increasing L2 proficiency, students are less susceptible to these form-related similarities across translations (Sunderman & Kroll, 2006) and focus on the meaning of words (Talamas, Kroll, & Dufour, 1999). At question in the current study is the extent to which individual differences in cognitive abilities attenuate the translation strategy less proficient learners use, as measured by their susceptibility to form-related interference in a translation recognition task. Do different cognitive control mechanisms, as indexed by the AX-CPT, reduce form-related interference across translations? Preliminary results from 27 beginner to intermediate L2 Spanish learners suggest that participants who rely more on reactive rather than proactive goal maintenance experience reduced form-related as well as semantic interference. We interpret these results in light of the Revised Hierarchical Model (Kroll & Stewart, 1994) and the Dual Mechanisms of Cognitive Control (Braver, 2012).

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12:00-1:00 pm (1353)

The MINT Sprint: Fast Administration of an Expanded Multilingual Naming Test. DALIA GARCIA and TAMAR H. GOLLAN, *University of California, San Diego* – We examined if time-pressured administration of an expanded Multilingual Naming





Test (MINT) would improve or compromise assessment of bilingual language proficiency and language-dominance. Eighty Spanish-English bilinguals tried to name 80 pictures presented in eight rows of 10 on a grid while instructed they have just 3 minutes in each language. MINT Sprint naming scores at 2 minutes, after a first pass through the grid, and after a second pass in which bilinguals were prompted to go back and try to name skipped items, were highly correlated with Oral Proficiency Interview scores for predicting degree of language dominance—matching or outperforming several other measures including self-rated proficiency. The 2-minute scoring procedure did not improve proficiency assessment, but the second pass improved assessment of language dominance (increasing naming scores, especially in the nondominant language). Self-ratings did not explain any unique variance in measuring language dominance when considered together with naming scores. While time-pressured naming did not significantly compromise proficiency assessment, breadth of vocabulary knowledge may be as important as retrieval speed for assessment of bilingual proficiency level.


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12:00-1:00 pm (1354)

Lost in Translation, Apparently: Bilingual Language Processing in a Translation Task in Regard to Turkish and English Evidentiality. SÜMEYRA TOSUN, *Medgar Evers College of the City University of New York*, MUSTAFA BATMAN, *Seton Hall University*, LUNA FILIPOVIC, *University of East Anglia* – Evidentiality is a linguistic property that encodes the source of knowledge, whether a narrated event was experienced firsthand or by hearsay or inference. Some languages, such as Turkish, mark evidentiality in the grammar; some other languages, such as English, encode it optionally. This study investigated whether this typological difference was noticed by bilingual speakers and whether their age of acquisition (AoA) would influence their translation accuracy. A total of 53 Turkish-English bilinguals were asked to translate simple declarative firsthand and nonfirsthand sentences in both directions. Additionally, they were asked to make a judgment on how confident they were in regard to whether the statement actually happened. The results demonstrated that AoA, the source of information, and direction of the translation influenced the speakers' translation accuracy and perception of evidentials. Firsthand sentences were translated more accurately and judged more confidently by both late and early bilinguals. Nonfirsthand sentences were missed almost always by early bilinguals and half of the time by late bilinguals. This effect was more apparent when translation was from Turkish to English.

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12:00-1:00 pm (1355)

Lexical Entrainment in Bilinguals L1 and L2. YONGJIA SONG, JUDITH F KROLL , and GREGORY SCONTRAS, *University of California, Irvine* – Lexical entrainment is a phenomenon in which speakers tend to use the same words as their conversational partners (Brennan & Clark, 1996). Past research suggests that although there is a robust tendency to entrain to partners' word choices, there are also individual differences that reflect variation

among speakers and situations (Tobar-Henríquez et al., 2020). The study we report examines the process of entrainment for bilingual speakers for whom the first (L1) and the second (L2) languages may differ in proficiency and in the context in which the two languages are used. Considering that bilinguals draw on cognitive resources to adapt to diverse language environments, we predict that they will tend to entrain more in L2 than in L1. Furthermore, past experience in interactional contexts that require alignment (e.g., whether they code switch frequently and whether the environment includes many similar bilingual speakers) may determine the frequency and patterns of entrainment.


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12:00-1:00 pm (1356)

Cross Language Influences in Bilingual Processing of Phonology and Lexicon. ANAT PRIOR and TAMAR DEGANI, *University of Haifa* – Cross language influence (CLI) is a ubiquitous feature of bilingual language processing, and is evident in phonology, lexicon, and grammar. CLI has been demonstrated in bilingual speakers of both typologically related languages that also share a script and typologically different languages that do not share a script. However, most extant evidence documents CLI in a single domain of language, and less is known about possible similarities and differences in how CLI operates across domains. In the current study, we investigate CLI from the first language (L1) to the second language (L2) of Hebrew-English bilingual young adults, with variable L2 proficiency. In a phonological discrimination task, we asked whether performance was better for phonemes shared across L1 and L2 when compared to novel L2 phonemes. In a semantic decision task on written words, we examined possible facilitation from cognates compared to noncognates. By testing the same speakers across two domains, we examine the convergence and divergence of phonological and lexical CLI, at the group level and at the level of individual differences.

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12:00-1:00 pm (1357)

Variation in Bilingual Experience Mediates the Impact of Spanish Proficiency on English Word Recognition: Evidence from Visual and Spoken Domains. MONA R. BOTEZATU and SARAH PETERSON, *University of Missouri*, JUDITH F. KROLL , *University of California, Irvine*, DALIA GARCIA, *University of California, San Diego* – We evaluated whether proficiency in bilinguals' two languages was associated with variation in the size of the regularity-consistency effect in visual word recognition and cohort density effect in spoken word recognition in English and whether the relationship was mediated by variation in bilingual experience. Classroom learners of Spanish and heritage speakers of Spanish, who varied on measures of English and Spanish proficiency, named English words with regular-consistent (e.g., DISH) and irregular-inconsistent (e.g., DEAF) spelling-sound mappings and identified spoken English words from dense (e.g., BAG) and sparse (e.g., BALL) phonological neighborhoods. Bilingual experience mediated the relationship between Spanish





proficiency and the size of regularity-consistency and cohort density effects. Higher Spanish proficiency was associated with smaller regularity-consistency and cohort density effects in classroom learners of Spanish, who used their two languages separately, but with larger regularity-consistency and cohort density effects in heritage learners of Spanish, who used their two languages in varied contexts. Results suggest that language use mediates the resolution of competition from the irrelevant language.


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12:00-1:00 pm (1358)

Working Memory, Phonological Memory, and Second Language Proficiency. KIRSTEN HUMMEL, *Laval University* – The objective of this study was to explore the role played by working memory (WM; executive function) and phonological memory (PM) in second language (L2) proficiency. WM is thought to subserve both storage and processing of information while the PM component is responsible for short-term retention of verbal information. WM has been examined for its role in aspects of L2 proficiency, with studies finding significant links with reading (e.g., Kormos & Safar, 2008) and grammar skill (e.g., Martin & Ellis, 2012). The PM component appears to play an important role in L2 development, in particular vocabulary acquisition (French, 2006; Martin & Ellis, 2012; Service & Kohonen, 1995). However, some studies (e.g., Hummel, 2020; Serafini & Sanz, 2016) suggest PM is primarily associated with L2 skill at lower proficiency levels, other factors outweighing its role in more advanced learners. This study examined both WM (composite complex and backward digit spans) and PM (nonword repetition, serial recognition) in Francophone university students (intermediate-advanced L2 level) in order to determine whether these are linked to results on an L2 (English) proficiency test. Results revealed only a PM measure predicted L2 proficiency.

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12:00-1:00 pm (1359)

Bilinguals' Representation of Emotion Concepts: Reduced Emphasis on the Arousal Dimension. ZEYNEP ASLAN SISMAN  and BOAZ KEYSAR, *University of Chicago* – Numerous studies have demonstrated the differences in the affective experiences of bilinguals when they use their two languages. These studies point to a reduced emotional resonance in the foreign language as compared to the native tongue. We propose a new explanation for this effect, that it results from the differences in the representation of emotion concepts in the two languages of bilinguals. To evaluate this hypothesis, we investigated the emotional conceptual structures of two different bilingual populations: Turkish-English and Chinese-English. Bilinguals were randomly assigned to judge the similarities between pairs of emotion words either in their native or foreign language. Similarity ratings were transformed into conceptual maps via multidimensional scaling procedure, yielding two main dimensions: valence and arousal. In two studies, bilinguals consistently placed less emphasis on the arousal dimension while rating emotion words in their foreign language as compared to native language. By providing insight into the conceptual world of bilinguals,

the results can inform theories on bilinguals' affective experiences and offer potential mechanism for linguistically modulated cognitive processes of bilinguals.

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12:00-1:00 pm (1360)

Limitations of the Bilingual Sentence Superiority Effect in Spanish-English Speakers. ROBERT W. WILEY and PORTIA N. WASHINGTON, *University of North Carolina at Greensboro* – A long-standing question about bilingualism concerns which, if any, representations are shared across languages. Recent work revealed a bilingual sentence superiority effect among French-English bilinguals reading mixed-language sentences. Specifically, word identification was significantly better in sentences when the word order was grammatical in both languages (e.g., “ses feet sont big” [his feet are big]) than when it was syntactically ungrammatical in both (e.g., “sont feet ses big” [are feet his big]). That result was interpreted as evidence of shared syntactic processing driven by rapid sentence-level parsing of parts of speech. Here, we replicate this general phenomenon in a sample of N=48 Spanish-English bilinguals (Experiment 1), and find that the effect is moderated by bilingual proficiency. We further extend the work to semantically (as opposed to syntactically) ungrammatical sentences (Experiment 2) and discuss implications of the results for the level of processing at which the bilingual sentence superiority effect arises.

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12:00-1:00 pm (1361)

Withdrawn

12:00-1:00 pm (1362)

Statistical Learning of Grammatical Classes Across Two Artificial Languages in Monolinguals and Bilinguals. ALLISON LINK, DANIEL J. WEISS, and MATTHEW T. CARLSON, *The Pennsylvania State University* – Recent statistical learning (SL) studies have discovered that learners struggle to acquire multiple languages in the absence of contextual cues. There also have been mixed findings with respect to whether monolinguals and bilinguals differ in their ability to form multiple representations. In this set of studies, we study distributional learning of grammatical classes (Reeder et al., 2013). We first tested learners on their ability to learn grammatical classes in the context of nonnative phonologies, using artificial languages based on Slavic and Romance languages, and replicated the original findings. Now we are collecting data on whether learners can acquire grammatical classes in both languages when presented consecutively. We are interested in whether each language is learned and whether learners generalize from the underlying grammar of one language and extend it to the other. Prior studies of multilingual input in SL have focused on encapsulated representations even though the languages of bilinguals are interactive and coactivated. Thus, we are interested in determining whether learners generalize





from one language to another and whether there are differences in learning between monolingual and bilingual participants.

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12:00-1:00 pm (1363)

Color, Emotion, and Cognitive Maps: The Geometry of Cross-conceptual Associations. ROBERTO BOTTINI, JEAN-VICTOR STEINLEIN, and DEBOTTAM KUNDU, *University of Trento* – Color-emotion associations are a ubiquitous phenomenon. However, the mechanisms underlying such associations remain unknown. Here, we present a dimensional theory of color-emotion associations building on a low-dimensional geometrical alignment of cognitive maps. We show that the cognitive maps of color and emotion reveal a similar two-dimensional circular space and that color-emotion associations can be derived from a geometrical alignment of these representations. Thus, the position of an emotion in the “emotion map” is systematically related to its color-association and to the association’s between-subject agreement. These findings replicate across different languages, using color percepts and words, as well as across congenitally blind individuals, disclosing a crosscultural and conceptually driven mechanism. Compellingly, low-dimensional geometrical alignments of cognitive maps might disclose a broader, neurally plausible mechanism underlying generalization and transfer of structural knowledge across novel conceptual and sensory environments.

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12:00-1:00 pm (1364)

Withdrawn

12:00-1:00 pm (1365)

Deciding While Moving: The Effects of Action Costs and Cognitive Crosstalk From Lower to Higher Levels in Nested Multitasking. PHILIPP RAßBACH, *Julius-Maximilians-University Würzburg*, ERIC GRIESSBACH and ROUWEN CAÑAL-BRULAND, *Friedrich Schiller University*, OLIVER HERBERT, *Julius-Maximilians-University Würzburg* – Humans engage in nested multitasking when they regularly make higher-level cognitive decisions (e.g., deciding to cross a street) while continuously performing a low-level motor task (e.g., walking). Sequential choice models predict an influence of higher cognitive to lower motor levels, but only embodied choice models predict bidirectional influences between action and decision making. We examined whether low-level motor task execution biases higher-level cognitive decision making due to cognitive crosstalk and action cost related discounting. Participants performed a multilane tracking task comprising a low-level task of tracking a stimulus on a lane and a higher-level cognitive decision task of moving to different lanes offering equal or unequal rewards; to disentangle cognitive crosstalk from action cost related discounting, the action costs for higher-level decisions varied as a function of the state of the low-level motor task. Higher-level cognitive decisions were biased both by the state of the low-level motor task and the varying action costs. These findings indicate that humans are prone to make biased decisions due to crosstalk from

lower to higher levels in nested multitasking as predicted by embodied choice models.

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12:00-1:00 pm (1366)

Guess my Weight: Effects of Emotional Expression and Novelty of Photographic Pose on Estimates of Model’s Weight. PHILIP MARSHALL, KENNETH GRAHAM, and ELIZABETH M. BRIONES, *Texas Tech University* – To replicate and extend research on the effects of facial emotions on judgments of persons’ weight (Voelkle et al., 2011; Weston et al., 2015), 179 participants saw side-by-side, full-figure photographs of a female model depicting a standard, single neutral pose with a bland expression and a constant assigned weight of 125 pounds. Over trials, new, similar pictures of the same model were presented alongside the standard, showing increased levels of novelty of pose and varying degrees of sad and happy facial emotions. Participants estimated the model’s weight in the comparison pictures. Increased novelty of pose lowered the mean weight estimate, sad emotions increased the mean weight estimate, and the greatest level of happiness resulted in the lowest mean weight estimate (all p ’s < .005). Results are consistent with and extend previous research, and suggest effects of embodied emotional cognitions of metaphors such as “feeling down” and “being on cloud nine.” Interestingly, the results also suggest that how one is depicted in photographs may have unintended consequences for aspects of how we are judged.

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12:00-1:00 pm (1367)

Insight Problem Solving: Motor Cues. ALEXANDER KURITSYN and ALEXANDRA CHISTOPOLSKAYA, *P.G. Demidov Yaroslavl State University* – According to the embodied cognition research program, the human body and its activity are directly involved in cognitive processes. We are interested in how motor cues can facilitate insight problem solving. Participants solved an insight symmetry task (Chistopolskaya & Kuritsyn, 2020) and performed motor tasks before and between problem solving. We formed three experimental groups and one control group: 1. embodied group (EG)—principals of decomposition and symmetry; 2. decomposition group (DG)—principal of decomposition; 3. symmetry group (SG)—principal of symmetry; and 4. control group (CG)—no principles of motor activity. We found no significant differences between motor cues with different number of principles of solving. The number of successful participants in each of experimental groups was greater in the CG (EG/CG: $\chi^2=9.6$, $p=.002$; SG/CD: $\chi^2=8.03$, $p=.005$; DG/CG: $\chi^2=5.16$, $p=.023$). Participants from EG performed the insight symmetry task faster than participants from DG ($t=-2.284$, $p=.035$). We also are testing whether watching a motor activity has a different effect on problem solving than performing the motor activity does. Supported by Ministry of Science and Higher Education of the Russian Federation grant No. 075-15-2020-798.

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12:00-1:00 pm (1368)

The Embodiment of Spatial Concepts in Science. JACOB FEILER and JASON SCOFIELD, *The University of Alabama* – One indication of success and longevity in STEM subjects is spatial thinking ability. Increasing evidence supports the idea that embodied learning may support spatial thinking by grounding spatial concepts in relatable bodily actions, by offloading cognition, and by supporting the use of analogies between the body and to-be-learned concepts. The goal of this study is, thus, to examine the effects of embodied learning on understanding spatial relationships in scientific domains. Approximately 100 undergraduate students (grouped by science/nonscience major and spatial ability) will study various images of spatial relationships as either embodied representations or simplified stick-model representations before being tested on their understanding of the relationships using a traditional, textbooklike image. Data collection was to begin in late summer, and it is hypothesized that embodied representations will facilitate greater accuracy and faster response times for all participants, especially participants who perform below average on two spatial reasoning measures. Data will be analyzed using a linear mixed-effect model.

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12:00-1:00 pm (1369)

Moving Up in Time. OMAR ESCÁMEZ, CARMEN CALIZO-ROMERO, PABLO SOLANA, and JULIO SANTIAGO, *University of Granada* – According to the “moving forward” view of time, people think about time as a spatial journey from a back (past) location to a front (future) location. This predicts 1) positive correlations between temporal distance and spatial distance estimations, both toward the past/back and the future/front; 2) positive correlations between spatial and temporal distance estimations on one side and time discounting on the other side; 3) asymmetric estimations toward past/back and future/front; and 4) negative correlations between past and future temporal distance, back and front spatial distance, and past and future time discounting. In the present study, we find support for prediction 1 but not predictions 2 (no relation between space/time distance estimations and time discounting), 3 (symmetry toward past/back and future/front), and 4 (the correlations were positive). This supports an alternative view of time whereby people move up in time to contemplate deeper temporal horizons.

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12:00-1:00 pm (1370)

Does Interoceptive Attention Modulate Processing of Emotion Concepts? ALEXANDRA E KELLY and EVANGELIA G. CHRYSIKOU, *Drexel University* – Emotions are inherently associated with particular bodily states that potentially necessitate context-specific embodied simulations for concept comprehension. Here, we manipulated attention to respiratory rate and used a property verification task to assess conceptual processing speed for emotion, concrete, and abstract (but non-emotion-related) concept-feature pairs. Half of the participants took deeper and slower breaths than usual for the duration of the experiment; at two randomized intervals during the task they reported an estimate of their breathing

rate during the preceding minute, effectively increasing attention to physiological state throughout the task. The remaining participants tracked the appearance of a visual distractor at random points during stimulus presentation. Relative to the control group, participants who tracked and reported breath rate tended to take longer to verify properties for emotion compared to concrete and non-emotion abstract concepts. These results provide evidence that resources dedicated to the monitoring of physiological state may be recruited for the processing of emotion concepts.

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12:00-1:00 pm (1371)

Are There Motor Semantics? The Effect of Motor Priming on Remembering. IGOR CHEKHONIN and VLADIMIR SPIRIDONOV, *Russian Presidential Academy of National Economy and Public Administration (RANEPA)* – According to the strong version of embodied cognition, sensorimotor representation is sufficient for processing semantic information. Several studies (Glenberg & Kaschak, 2002; Fischer & Zwaan, 2008) have shown that motor activity contributes to successful problem-solving. However, these works were performed with verbs of movements. The present study continues the line of analysis of the strong version and researches into the role of motor semantics, which is expressed in the mutual activation of sensorimotor representation and lexical meanings. We assumed that arm movements are included in the process of semantic processing not only of verbs but also of nouns semantically related to movements. The hypothesis about the activation using movements of the lexical meaning of nouns associated with motor activity was experimentally tested. The subjects (n=108) first performed a number of arm movements (3, 7, or 11) of the “disconnect” or “connection” type. Then they had to memorize a number of nouns, some of which were semantically related to these types of movements. The hypothesis was not confirmed; in our experimental conditions, we were unable to activate motor semantics, which would affect the memorization of nouns.

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12:00-1:00 pm (1372)

The Influence of Mode and Timbre on Valence Judgments and Memory. ANDREA R. HALPERN, *Bucknell University*, JAMES ARMITAGE and TUOMAS EEROLA, *Durham University* – Two important cues to musical expression are mode (major/minor conveying happiness/sadness) and timbre (conveyed by instrument). We looked at the effect of congruent and incongruent combinations in two valence judgment tasks and in recognition memory. Experiment 1 presented congruent (e.g., major tunes on marimba) and incongruent (e.g., major tunes on viola) tunes to musicians and non-musicians for speeded happy/sad judgments. RTs were faster for congruent and instrument had a larger influence than mode, regardless of musical experience. Experiment 2 asked for valence ratings followed by a surprise recognition task (in a neutral timbre). Ratings showed the expected influence of both factors; musicians showed more sensitivity especially to mode and nonmusicians relied more on instrument. Memory showed a trend to enhancement for incongruent





melodies. Thus, two very different cues to emotion, the instrument (evident from the first note) and mode (evident only as a critical note is heard), interact in coherent ways to quickly convey valence, even to nonmusicians, albeit less so than to musicians. The trend to better memory for incongruent melodies implicates increased attention at encoding rather than redundancy of codes at encoding/retrieval.

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12:00-1:00 pm (1373)

Withdrawn

12:00-1:00 pm (1374)

Do Revision Costs in Language Really Interact with Musical Key Manipulations? RACHEL THOMPSON and L. ROBERT SLEVC, *University of Maryland* – Processing musical and linguistic structure appears to involve shared cognitive resources; however, the specific resources shared are debated. Evidence that musical manipulations interact with syntactic ambiguity resolution in language (“garden path” effects; Slevc et al., 2009) supported claims of shared resources specific to syntactic processing. However, evidence for similar musical manipulations interacting with semantic ambiguity resolution (“semantic garden paths”; Perruchet & Poulin-Charronnat, 2013) motivated the idea that both domains rely on domain-general cognitive control to recover from misanalysis (Slevc & Okada, 2015). The present experiment assessed the robustness and replicability of these motivating findings by attempting to replicate the interactions between musical manipulations and both syntactic and semantic ambiguity resolution. Specifically, we assess if recovery from syntactic and semantic misanalyses is harder when paired with structurally unexpected musical information. This (online) replication showed no evidence for syntactic or semantic revision (“garden paths”) and no evidence that linguistic revision was impacted by (un)expectancy in concurrent musical structure.

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12:00-1:00 pm (1375)

Musicians’ Regressive Eye Movements: The Interaction of Skill and Complexity. JASON R. SCHMIDT AVENDAÑO, *University of South Florida*, MICHAEL A. ESKENAZI, *Stetson University* – The self-paced nature of lexical reading easily allows readers to make regressive eye movements to re-read words or phrases, which is necessary to maintain comprehension (Schotter et al., 2014). However, other forms of reading, such as music reading, are not self-paced. Musicians must read at a specific tempo when performing a composition, and it is unclear how regressive eye movements work during this form of time-constrained reading. The purpose of the current study was to explore how musicians of various skill levels use regressive eye movements when sight-singing simple or complex musical compositions. Participants sight-sung 16 musical compositions while their eye movements were monitored. Logistic mixed-effects analyses revealed interactions between skill and note type and skill and complexity on regressive eye movements. Low-skill musicians were more likely to make regressions out of rests than notes,

but high-skill musicians did not differ. All musicians were more likely to make regressions in simple pieces than in complex pieces, but this effect was larger for low-skill musicians. Unlike text reading, regressions were more common for simple texts, which indicates how time constraints can limit the use of regressions.

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12:00-1:00 pm (1376)

Does Tuning Influence Aesthetic Judgments of Music? Investigating the Generalizability of Absolute Intonation Ability. STEPHEN C. VAN HEDGER and HUDA KHUDHAIR, *Huron University College* – Listening to music is an enjoyable activity for most individuals, yet the factors related to aesthetic experiences are not completely understood. Here, we investigate whether the absolute tuning of music influences listener evaluations of music. In Experiment 1, participants rated unfamiliar musical excerpts, which were either tuned conventionally or unconventionally, in terms of liking, interest, and unusualness. In Experiment 2, participants judged whether sounds (notes, chords, scales, and excerpts) were “in tune” or “out of tune.” The results suggest that the absolute tuning of music has no influence on evaluations of music (Experiment 1), and these null results are likely caused, in part, by an inability to differentiate musical excerpts based on tuning (Experiment 2). Interestingly, listeners in Experiment 2 showed robust above-chance performance in classifying musical sounds as “in tune” versus “out of tune” when the sounds did not contain relative pitch changes (i.e., isolated notes and chords), replicating prior work. Taken together, the results suggest that most listeners possess some form of absolute intonation, but this ability has limited generalizability and does not appear to influence aesthetic judgments of music.

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12:00-1:00 pm (1377)

How are Active Music Making and Executive Functions Related? A Systematic Review and Meta-Analysis. CHRIST BILLY ARYANTO, *University of Sheffield*, AIREEN R. AISYAH, *Atma Jaya Catholic University of Indonesia*, EMMA BLAKEY, RENEE TIMMERS, and CLAUDIA C. VON BASTIAN, *University of Sheffield* – Musical training, musical ability, and music-related activities have been hypothesized to be associated with better executive functions, including cognitive flexibility, inhibitory control, and working memory updating. Whereas there is growing evidence for a relation between active music making and working memory, mixed results have been found for cognitive flexibility and inhibitory control. The aim of this study was to investigate how strongly active music making relates to each of the three executive functions factors. Search of four databases and citation chasing yielded 49 studies that fit the inclusion criteria. Overall, 60 effect sizes from studies with between-groups designs and 24 effect sizes from correlational studies were analysed. The results showed a significant association between active music making and cognitive flexibility ($g = .29$, 95% CI [.09, .49]), inhibitory control ($g = .48$, 95% CI [.07, .90]), and working memory updating ($g = .57$, 95% CI [.42, .72]). The results confirm that people who are more engaged in music making perform better in





tasks assessing all three factors of executive functions. However, the mechanisms underpinning this relation and its causal direction need to be further explored.

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12:00-1:00 pm (1378)

Affective Priming by Major and Minor Scales in a Word Evaluation Task. BRYAN R BURNHAM, *University of Scranton* – Recently, my lab observed an influence of musical scale direction (ascending vs. descending) on identification of major and minor modes. Specifically, ascending scales were perceived as “major-sounding” and descending scales were perceived as “minor-sounding” (Burnham, Long & Zeide, 2021; *Attention, Perception & Psychophysics*). The present study examined whether the interaction of mode and direction was driven by activation of positive and negative affective constructs. In an online study, undergraduate listeners heard ascending and descending, major and minor scales that served as primes in a word evaluation task, in which subjects identified words as positive or negative. Results revealed an influence of mode and direction on affective evaluation. Specifically, major scales (ascending or descending) had no influence, whereas ascending minor scales slowed responding to positive words relative to negative words. While the experiment needs to be replicated, the results suggest scale direction on the perception of mode may be driven by the activation of affective constructs.

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12:00-1:00 pm (1379)

Practice Makes Near Perfect: The Effects of Practicing Music on Perception of Time and Space. RACHAEL HANSEN, MIRINDA WHITAKER, and JEANINE K. STEFANUCCI, *University of Utah* – There are several theoretical accounts for the perceived relationship between space and time. One account, a theory of magnitude (ATOM), proposes that space, time, and number are processed by a common magnitude system, whereas metaphor theory suggests that we represent time using spatial metaphors. We tested these theoretical accounts by examining whether individual differences that alter performance on time estimation tasks (such as musical expertise) also affected performance on spatial estimation. In the current study, we recruited (N=42) nonmusicians and musicians (with over 6 years of experience) to complete a joint space-time task (similar to that of Casasanto and Boroditsky, 2008). Participants estimated the spatial length (displacement) or the duration of lines that varied in both displacement and duration. Findings showed that both the displacement and duration of lines were significant predictors of estimated duration and displacement, and musical expertise was a significant predictor of duration estimates, but not displacement estimates.

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12:00-1:00 pm (1380)

Crossmodal Schema Effect of Music Pairing on Visual Shape Sequences Acquisition. YIREN REN and THACKERY

BROWN, *Georgia Institute of Technology* – Music is a multidimensional sequence of pitches and temporal intervals that has a predictable structure over time. Because of music’s central role in daily life, studying how music interacts with other cognitive processes such as memory could help future utilization in applied ways. Schema theory has shown that new information that is related to a learned memory structure can be learned faster (Van Kesteren, 2012), although this has rarely been directly tested in the context of the learned structures of music. This study applied schema theory to understanding how the properties of musical sequences influence parallel visual item sequence encoding; in doing so, we tested whether listening to familiar and regularly-structured music had a crossmodal influence on the acquisition of visual sequences. We recruited 48 subjects and asked them to learn abstract shape sequences with background music. The results revealed an interactive effect of music familiarity and music regularity—listening to regularly structured familiar music facilitated, whereas irregular familiar music disrupted, parallel visual sequence encoding. Data also suggested the influences of music on sequential memory encoding might depend on music training history.

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12:00-1:00 pm (1381)

Event Elements and Event Structure Provide Insight for Prospective Memory Performance. ANDREA E. O’REAR, *Saint Mary’s College*, GABRIEL A. RADVANSKY, *University of Notre Dame* – Prospective memory (PM) tasks typically are categorized as either event-based or time-based. Event cognition research demonstrates that events are composed of multiple elements, including location, entity, and time. These elements are remembered differently in retrospective memory. The present study provides evidence that they are also remembered differently in prospective memory. Participants in a virtual shopping mall are given a series of PM tasks to complete while walking from store to store. The PM cues are either locations (stores), entities (people), or time (game clock). All cues are aligned across groups so that the cues are the only difference in experience. Preliminary results (N=28) show that location cues result in stronger memory (M=92%) than entity (M=51%), or time (M=52%) cues. These findings suggest that the “event-based” PM label is too broad, and event elements serve as more precise cue types. This study also supports recent findings that memory for multiple items is better when the items are encoded separately but refer to a shared situation (in this case, a shared cue).

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12:00-1:00 pm (1382)

Same-Different Matching with Stroop Color-Word Stimuli. ROBERT W. PROCTOR and TIANFANG HAN, *Purdue University*, K. VENKATA RAO, *Vignana’s Foundation for Science Technology and Research University* – When subjects classify stimuli as same or different, reaction time (RT) is often shorter and error rate higher to same than different pairs. Also, when stimuli match or mismatch on an irrelevant dimension, those comparisons speed same and different responses, respectively. Our experiments used Stroop





color-word stimuli. In Experiment 1, half the subjects were to judge same-different based on stimulus color and half on color word. For both groups, a congruent color-word stimulus (blue, green, yellow, or red) was presented, followed by the incongruent second stimulus. For half the trials the stimuli were same on the relevant dimension but different on the irrelevant one; for the other half the stimuli were different on the relevant dimension and same or different on the irrelevant one. Both tasks showed the fast-same effect, with error rate greatest for different trials with a same irrelevant dimension. Experiment 2 added congruent second stimuli. The fast-same/false-different effect was evident, but with the RT difference larger for the word task and the error difference for the color task. The disparity between same and different was larger when the irrelevant dimension was with the same as the first stimulus than when it was not.

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12:00-1:00 pm (1383)

Building Time-Based Expectancy in the Tactile Domain.

ALEJANDRA RODRIGUEZ-VELASQUEZ, *Albert-Ludwigs-Universität Freiburg*, HARALD EWOLDS and STEFAN KUENZELL, *University of Augsburg*, LAURA BROEKER, *University of Cologne*, MARKUS RAAB, *German Sport University Cologne*, JULIKA J. FELDMANN, AANDREA KIESEL, and ROLAND THOMASCHKE, *Albert-Ludwigs-Universität Freiburg* – Time-based expectancy can be defined as the anticipation of an event based on the passage of time (Thomaschke et al. 2015). For instance, in a two-alternative choice forced task, when targets can be probabilistically predictable by the duration of a preceding interval, participants adapt to this predictability by responding faster to frequent than infrequent combinations of interval duration and target. This phenomenon has been extensively studied in the visual domain using modified versions of the time-event correlation paradigm (Wagner & Hoffmann, 2010), but its investigation in the tactile domain remains largely unexplored. In a series of experiments, we explore the question of whether time-based expectancy can be built for vibrotactile stimulation. If possible, how robust is this effect? Finally, could building time-based expectancy in the tactile domain help reduce dual-task interference when combined with a concurrent cognitive task? We discuss our findings in relation to common interpretations in the human timing research as well as the implications for future research in the area of multitasking.

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12:00-1:00 pm (1384)

Attentional Fluctuations in a Timing Task.

SOPHIA KYRKOS, *Cleveland State University*, JILLIAN N. STRAWN, JEFFREY R. EDER, and ANDREW B. SLIFKIN, *Cleveland State University* – In studies where long sequences of movements were made to large targets, feedforward control was engaged and movement distance time series had a pink-noise structure. In contrast, when targets were small, visuomotor feedback processes guided the hand to the target, and a white-noise time series was observed. The feedforward-to-feedback shift reflected an internal-to-external shift in attention. Here,

we examine how such shifts influence time-series structure in timing: Participants produced 300 consecutive key presses at two inter-stimulus intervals (ISI; ISIs=500 and 2000 ms) within synchronization (SYNC) and continuation (CONT) timing tasks. During SYNC, presses were made in time with a metronome; that provided the opportunity to engage feedback control by attending to the metronome ISI and adjusting the intertap interval (ITI) accordingly. Feedback engagement should increase with the increase in ISI. Therefore, we predict that ISI lengthening should induce ITI time series whitening. During CONT, although the metronome was disabled, participants were instructed to produce ITIs that matched the target ISI; that forced reliance on feedforward control of timing under both ISIs. Thus, we predict pink-noise ITI time series under both ISIs.

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12:00-1:00 pm (1385)

Individual Variation in Sensorimotor Mu Frequency as a Function of Autistic Traits.

ALISON HARRIS, *Claremont McKenna College*, CAROLINE C. STRANG, *Scripps College*, CATHERINE L. REED, *Claremont McKenna College* – The sensorimotor mu rhythm decreases both when individuals perform actions themselves and when they observe others' actions, suggesting the same neural systems support "doing" and "viewing" actions. This effect is reduced in individuals with autism spectrum disorder (ASD) and in neurotypical individuals who score higher on the autism-spectrum quotient (AQ), a self-report measure of autistic tendencies. ASD has also been linked to slower oscillation of spontaneous occipitoparietal alpha rhythm. Yet individual variation in the sensorimotor mu rhythm, and how it relates to autistic tendencies, remains relatively unexplored. Here we quantified mu rhythm variation across individuals by directly comparing individual peak mu frequency (PMF) during action execution and observation. PMF for these two tasks was highly correlated, suggesting that they reflect the same underlying neural generators. We further observed a significant negative correlation between PMF and AQ, such that slower mu rhythms were associated with higher autistic tendencies in our neurotypical sample. Similar to prior results for alpha frequency in ASD, these results provide new insight into how the neurotypical mu rhythm varies as a function of autistic tendencies.

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12:00-1:00 pm (1386)

What Drives Directional Decisions During Egress? Investigating How the Relative Speed, Onset, and Onset Asynchrony of Neighboring Pedestrians Bias Exit Choices.

KRISTEN L MACUGA, LUCY DURAND, and ALEXANDER P. BOONE, *Oregon State University*, BERTRAND H. LEMASSON, *U.S. Army Engineer Research and Development Center (ERDC)* – In recent studies, we found that participants were more likely to follow faster pedestrians when exiting a room. Here, we extend that work to examine directional decisions in 109 remote participants who watched neighboring virtual pedestrians exit through a pair of doorways. If the relative speed of neighboring pedestrians drives directional decisions, participants should be more likely to follow





the faster pedestrian. However, if the relative onset of neighboring pedestrians drives following behavior, participants should be more likely to follow the earliest onset pedestrian. We also investigated whether the effect of speed varies depending on onset, and whether the effect of onset depends on onset asynchrony. Using the generalized estimating equation approach to fit a repeated measures binary logistic regression, we found that speed was a significant predictor of directional decisions, replicating our previous work. Relative onset was also a significant predictor of directional decisions, and the effect of onset was amplified by a longer delay. However, the effect of relative speed did not appear to be influenced by relative onset. These results help to characterize the influence of visual cues on pedestrian egress choices.

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12:00-1:00 pm (1387)

Shape Influences Visual and Haptic Perception of Affordances of Feelies. CATHERINE DOWELL, SEMIH KORKMAZ, and ALEN HAJNAL, *The University of Southern Mississippi* – Feelies are objects that were created by J. J. Gibson with no practical purpose or functionality. When observers were asked about potential uses for feelies, visual exploration resulted in more noun labels (e.g., “toy”) whereas haptic exploration in more verb labels (i.e., “throw”), suggesting that overlapping, but distinct classes of action possibilities are perceivable by sight and touch. Semantic network analyses and cluster analyses revealed that visual exploration resulted in object-oriented responses focused on object identification, whereas haptic exploration resulted in action-oriented responses. Affordance labels produced in the visual condition were more consistent, used fewer descriptors, were less diverse, but were more novel than those in the haptic condition. The shape of feelies (computed as the Hausdorff distance compared to an ideal cube as control) differentiated among affordance judgments as a function of perceptual modality. Interestingly, comparing shapes to an ideal sphere was not a significant predictor of perceived affordances.

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12:00-1:00 pm (1388)

External Context Can Temporally Segment Event Files. SUSANNE MAYR, RUYI QIU, and MALTE MÖLLER, *University of Passau*, IRING KOCH, *Rheinisch-Westfälische Technische Hochschule (RWTH) Aachen University*, CHRISTIAN FRINGS, *Trier University* – According to the event segmentation theory (Zacks et al., 2007), the beginning and end of an external context can induce the perception of event boundaries. Following this notion, and the fact that auditory stimuli develop over time, we tested whether the temporal extension of contextual sounds is able to support the segmentation of perceptual and response features into event files, with on- and offset of a sound indicating the beginning and end of an event file. Consequently, perceptual features and responses enclosed by an identical auditory context (i.e., the common context condition) should be more likely (or strongly) integrated than those separated by different auditory contexts (i.e., the changing context condition). This hypothesis was tested by investigating effects of feature binding

and retrieval in the negative priming paradigm (Experiment 1) as well as the distractor-response binding paradigm (Experiment 2). Results from both experiments revealed significant binding effects in the common context condition but not in the changing context condition. Together, these results indicate that external context can temporally segment event files, suggesting that common context acts as a binding principle.

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12:00-1:00 pm (1389)

Asymmetry in Mapping Effects of Red and Green Stimuli to Left-Right and Positive-Negative Responses in Choice-Reaction Tasks. JEONG-YOON CHOI and ROBERT W. PROCTOR, *Purdue University* – The present study examines mapping effects of red and green colors to left and right keypresses when unlabeled or labeled as positive and negative. In Experiment 1, participants performed a choice-reaction task of pressing a left or right key in response to stimulus color. Reaction time (RT) to green was faster when mapped to the right press, which tends to be coded as positive in relation to the left press, but red showed no difference between left and right. In Experiment 2, we tested whether a color-valence mapping effect independent of color-location mapping can be induced by referring to the response keys as positive or negative in instructions. The results replicated the asymmetric color-location mapping effect on RT of Experiment 1 but showed no effect of color-valence mapping. In Experiment 3, the labels “POS” and “NEG” were shown above the relative locations of the keys, with the label position varied randomly across trials. There was an advantage on RT of mapping green to positive but no similar effect of mapping red, and no effect of the color-location relation. The likely reason why only green showed the mapping effects is that it is associated with positive valence, whereas red has no strong valence association.

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12:00-1:00 pm (1390)

Withdrawn

12:00-1:00 pm (1391)

Moving Forward to Bigger Things: Response-Effect Compatibility when Zooming In and Out. JAMES MILES and ALICE WINTER, *California State University, Long Beach* – Actions are faster and more accurate when the anticipated outcome naturally corresponds to the response (response-effect compatibility). In some cases, the most natural response-effect compatibility is less obvious; for example, forward/backward movements are commonly used to shrink/enlarge objects on a display (zooming in and out). We report an experiment that examined the correspondence between forward and backward response movements used to shrink or enlarge a displayed circle. Results indicate that a forward/enlarge, backward/shrink mapping is most natural, as indicated by higher accuracy for both button presses and swiping movements and faster responses with swiping movements. The framing of the task (“move toward/away from the circle” or “move the circle toward or away from you”)





did not influence the direction of the compatibility effect. However, the inclusion of depth cues on the display had a small moderating influence response-effect compatibility. We discuss how response effect-compatibility in zooming tasks may be related to optic flow, with forward/backward movements leading to expectations of expanding/contracting visual stimuli.

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12:00-1:00 pm (1392)

The Relationship Between Multiple-Object Tracking (MOT) and Visually Guided Computer Mouse Pointing. MALLORY E. TERRY and LANAM M. TRICK, *University of Guelph* – Many tasks in everyday life involve performing coordinated actions towards specific items in dynamic environments (e.g. pointing, touching). This ability to keep track of specific items among others, referred to as multiple-object tracking (MOT), is proposed to rely on cognitive mechanisms required for coordinated actions (Pylyshyn, 2001). In support of this, visually guided touch was found to interfere with the MOT task, especially when the touched item was a distractor in MOT (Terry & Trick, 2021). The current experiment sought to investigate if this finding would extend to coordinated actions performed using a computer mouse as an extension of the finger (e.g., clicking). Participants tracked 2-3 targets in MOT while clicking on targets or distractors in MOT that changed colour. The results demonstrated that visually guided clicking also interferes with MOT, thus suggesting that these processes may rely on a shared cognitive mechanism.

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12:00-1:00 pm (1393)

Spatiotemporal Interrelations in Manual Interception for Visual and Auditory Stimuli. ANNA SCHRÖGER, *Friedrich Schiller University Jena*, MARKUS RAAB, *German Sport University Cologne*, ROUWEN CAÑAL-BRULAND, *Friedrich Schiller University* – High spatial and temporal precision is key to successfully catching a ball. Early perceptual studies showed that temporal judgements can be influenced by irrelevant spatial information (kappa effect; Abe, 1935; Cohen et al., 1953) and vice versa (tau effect; Benussi, 1913; Helson & King, 1931). We examined whether (i) such interrelations impact interception performance (catching a virtual ball) and (ii) whether spatial and temporal errors are differently affected by task-modality (cf. Recanzone, 2009). Visual stimuli (white circles on a touchscreen) or auditory stimuli (800 Hz pure tones) were intermittently presented on four locations moving from left to right with constant spatial and temporal intervals between presentations. Participants tapped the anticipated fifth location at the predicted time. We manipulated the spatial and temporal intervals and tested in linear mixed models for their impact on the temporal or spatial response, respectively. In auditory trials, spatial responses depended on the temporal intervals ($p < .001$) with taps being more distant with increasing temporal intervals (tau effect). No other significant effects were found. These findings indicate that spatiotemporal interrelations depend on task-modality.

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12:00-1:00 pm (1394)

Spatial Binding of Visual and Proprioceptive Effects in the Presence and Absence of Active Motor Control. MARVIN LIESNER, COLIN SCHWINUM, and WILFRIED KUNDE, *Julius-Maximilians-Universität Würzburg* – Spatial action-effect binding describes the phenomenon that the perceived distance between an object controlled by a one's movements and the body effector controlling that object movement shrinks compared to when the object is not under one's control. However, this effect is eliminated when sensory information from body and object are contradictory such as when their movement directions are inverted. This creates interference during action generation so that the organism downregulates one of the sensory signals. In the current study, we wanted to identify the influence that motor planning has on spatial binding. We compared a condition in which participants performed actions with the controlled object themselves with a condition in which the participant's body effector was moved passively. Without action generation in the passive condition, there should be no interference between sensory signals, so the inverted relationship between body effector and object should not eliminate spatial binding anymore.

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12:00-1:00 pm (1395)

Sense of Agency for Saccades. JULIAN GUTZEIT, MELINA DONATH, LYNN HUESTEGGE, LISA WELLER, and JENS J. KÜRTEEN, *Julius-Maximilians-Universität Würzburg* – The experience to be in control of one's actions and their outcomes is called sense of agency. We investigated whether typical findings from the well-studied manual domain generalize to the oculomotor domain. In our study, participants performed free-choice saccades to a stimulus on the screen. The stimulus changed its color after a certain delay and participants' task was to reproduce the delay between saccade landing and color-change. In different conditions, participants were led to believe that they could or could not influence the timing of the color-change. We also included a baseline condition in which participants fixated a stimulus, which changed its color after a certain delay. We found higher agency ratings and stronger temporal binding between saccades and color-change when participants believed that they had caused the color-change compared to the condition in which they believed they had no control over the color-change. Surprisingly, temporal binding was strongest in the baseline condition, while agency ratings were lowest. These findings indicate that oculomotor actions may generate a sense of agency comparable to manual actions, but peculiarities of the oculomotor effector system have to be taken into account.

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12:00-1:00 pm (1396)

Pantomime Grasps Are Influenced by the Ventral Visual Stream Late in the Reach Trajectory. RAYMOND R. MACNEIL, ROBERT L. WHITWELL, and JAMES T. ENNS, *The University of British Columbia* – Pantomime grasps (PGs) are used in virtual reality (VR) and by magicians when performing sleight of





hand tricks. In naïve participants, PGs exhibit kinematic profiles that differ from natural grasps (NGs) in ways that are discernible to naïve observers. These kinematic differences are thought to arise from different neural sources and mechanisms of control. NGs are guided by the fast and unconscious representation of a goal-object's spatial properties in the dorsal stream, while PGs are guided by the slower, conscious percepts of the ventral stream. We compared the tilt illusion's effect on PGs and NGs to examine the time-course of ventral stream influence on PGs. A mirror allowed us to present identical visual arrays for the PGs and NGs and, for the PGs, to remove a spatially coincident haptic target hidden behind it. The primary measure of interest was grip angle, taken at peak grip aperture and toward the end of the reach's deceleration phase. The tilt illusion emerged between the two time points only for PGs, in line with a late-acting influence of slow, conscious control mediated by the ventral stream. These results are important for improving human-computer interfaces that depend on PGs, such as VR and telerobotic control.

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12:00-1:00 pm (1397)

Spatial Vastness Affects the Perception of Object Size. MIRINDA WHITAKER, DEVIN GILL, MICHAEL AZBILL, and JEANINE K. STEFANUCCI, *University of Utah* – Vastness is a spatial percept that describes the experience of being in a space so large (such as looking out over the Grand Canyon) that it seems to extend without perceivable limits (Klatzky et al., 2017). Yet, vastness is difficult to measure as traditional depth cues become unreliable at the distances that characterize vast spaces. In the current study, participants made relative size comparisons of two homogenous oscillating rings (the first ring was projected onto a control image, and the second onto an image that varied in depicted vastness). If scenes that were rated as more vast were being perceived as larger in spatial extent, then we would expect that rings overlaid on these images would be estimated as larger than rings overlaid on images rated as less vast. As hypothesized, greater vastness in the background image was positively associated with larger estimates of ring size.

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12:00-1:00 pm (1398)

Withdrawn

12:00-1:00 pm (1399)

Quick Minds Require Quick Hands: Fast Gain on Computer Mouse Reveals the Most Competition. STEPHANIE HUETTE, *University of Memphis* – Computer mouse gain affects the amount of arm, wrist, and hand movement required to move the cursor on the screen; a high gain requires little real-world movement, and low gain requires more real-world movement. In many mouse tracking studies, the mouse gain is not reported. Moreover, in online studies with users at different computers, the gain is likely to be variable. In a replication of a simple color-choice computer mouse-tracking study, the degree of curvature toward competitors was examined at three different mouse gain levels. It was predicted that the most

likely outcome would be a low mouse gain would result in greater curvature, while the high gain setting would allow participants to respond so ballistically that curvature would be lost. However, the opposite pattern of results was observed, with high gain exhibiting the most curvature and low gain showing the least curvature. This pattern of results may be due to task and time course constraints, but it is arguable it would generalize to several tasks similar in design and cognitive load. Practical and theoretical implications as well as other typical mouse tracking metrics will be reported.

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12:00-1:00 pm (1400)

Phenomenology of Reading: Exploring the Effects of Visual and Verbal Thought on Transportation. PUREN ONCEL, CAITLIN S. MILLS, and LAURA K ALLEN, *University of New Hampshire* – Despite substantive work on the cognitive processes underlying comprehension, little research has examined the phenomenological nature of the reading process. The current studies examined relations between readers' moment-to-moment experiences of visual and verbal thought and transportation, as well as potential moderating influences of perspective-taking. Study 1 (n=133) manipulated perspective-taking with explicit instructions, whereas Study 2 (n=167) varied text-based point-of-view (i.e., first- vs. third-person). In both studies, readers reported the nature of their thoughts while reading and completed a post-reading transportation assessment. Results suggested that participants' average visual and verbal thought reports were consistently negatively correlated; further, transportation was positively associated with visual reports but negatively associated with verbal reports. Finally, we found no evidence that perspective-taking manipulations influenced participants' visual and verbal reports or transportation. Overall, these findings provide preliminary evidence that phenomenological reading experiences are relatively stable across a variety of reading situations.

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12:00-1:00 pm (1401)

Do Accent Marks Speed Up Silent Reading in Spanish? ANA MARCET and MANUEL PEREA, *Universitat de València* – In languages like Spanish or English, the position of lexical stress is variable. To help pronounce words in Spanish, a series of accentuation rules apply. But does the omission of accent marks slow down lexical access in skilled readers? To test this question, we designed an eye movement experiment where participants silently read sentences. Each sentence included a target word that required an accent mark (e.g., cárcel [jail]). The target word was written with its accent mark or not (cárcel vs. carcel)—all other words were presented with their accent mark (if required). Results showed similar first-pass durations regardless of format. However, when considering regressions (e.g., total time), fixation times were longer for carcel-type words. Thus, accent marks do not affect the initial contact with the lexical entries, but they may help integrate the word with its context.

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12:00-1:00 pm (1402)

Learning With and Without Images: An EEG Study on Novel Word Learning and Consolidation. DAISY LEI, YUSHUANG S. LIU, and JANET G. VAN HELL, *The Pennsylvania State University* – We examined offline consolidation of novel word meanings trained with definitions and pictures (definition-image group), or with definitions only (definition-only group), using EEG neural oscillations. Sixty-four participants received training on one set of novel words on Day 1 (remote condition) and another set on Day 2 (recent condition). Immediately after training on Day 2 and 1 week later, they completed an EEG semantic decision task on trained and untrained words. On Day 2, in the definition-only group only remote novel words elicited wordlike beta power decreases, while in the definition-image group both remote and recent novel words elicited wordlike upper-beta power decreases. On Day 8, in the definition-only group, both remote and recent novel words showed wordlike upper-beta power decrease. In the definition-image condition, both remote and recent novel words showed wordlike decrease in alpha, lower-beta, and upper-beta bands. These results will be related to neural memory models such as the Complementary Learning Systems account.

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12:00-1:00 pm (1403)

Salience Effects on Manner and Path Encoding of Motion Events in English. STEPANIE L. LOPEZ and JANET L. MCDONALD, *Louisiana State University* – English is a satellite-framed language, which encodes manner of motion on verbs. This may cause English speakers to attend to manner, particularly in verbal encoding conditions. This experiment manipulated the salience of manner and path in motion events to see if this bias could be overcome. Native English speakers performed a similarity rating task in three different encoding conditions: verbal, nonverbal, and verbal suppression. In the manner-match salient condition, they rated the similarity of, for example, “twirl straight” and “twirl zigzag,” while in the path-match salient condition, they rated the similarity of “walk zigzag” and “twirl zigzag.” We hypothesized that salient path-matches would cause participants to switch from focusing on manner to focusing on path as the basis for their similarity ratings, even in the verbal encoding condition. Our results support the claim that English manner bias most consistently exists when participants verbally describe motion events. This manner bias was overcome when paths were highly salient. This refutes the strong hypothesis of linguistic relativity but shows that physical properties of the stimuli as well as language can direct attention to certain aspects of motion events.

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12:00-1:00 pm (1404)

Examining Meta-Linguistic Judgments to Sarcasm. SAMANTHA LANGLEY and AMIT ALMOR, *University of South Carolina* – We report two experiments aiming to test the role of exposure to sarcasm on participants’ choices to use sarcasm themselves. In two experiments, we had participants choose between sarcastic and sincere responses in scripted dialogues with imaginary friends

(Experiment 1, N=227) or videotaped interlocutors (Experiment 2, N=125). In each experiment, participants took part in two blocks of 20-exchange dialogues, in which, for each exchange, they read an utterance (E1) or viewed a speaker making an utterance (E2) and then selected the response they believed to be most likely among four given choices. The response choices consisted of an agree, disagree, neutral, and a sarcastic response. The interlocutor in each block was either entirely sincere or entirely sarcastic. Participants either interacted with the same speaker in both blocks or a different speaker in each. Results indicated that participants chose sarcastic responses more often when interacting with a sarcastic interlocutor. Sarcastic choices in the second block were further affected by the interlocutors’ previous use of sarcasm, but only in E2 in which participants were interacting with a videotaped interlocutor. This shows that we answer sarcasm with sarcasm.

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12:00-1:00 pm (1405)

Juggling Uncertainty in Sentence Processing: Effects of Word Entropy in a Self-Paced Reading Study. SPYRIDOULA CHEIMARIOU, *The University of Alabama* – Word predictability is a major factor affecting reading times, in that predictable words are read faster than less predictable words. However, most of language is not predictable. A less studied factor affecting reading times is a word’s entropy, that is, reader’s uncertainty about these predictions. The two metrics are interrelated, as predictability accounts for the most likely continuation of a sentence, whereas entropy measures the number and strength of alternative responses given a specific context. Here, we asked whether entropy would affect reading times of target words over and above predictability. We tested 70 participants, in a self-paced online reading study using a carefully controlled set of sentences, in which we manipulated word entropy (high vs. low) while keeping word predictability constant (medium cloze). Entropy was not significant ($\beta=-0.01$, $SD=0.01$, $t = -0.84$, $p=.406$, $d=-0.19$). This may be because the effect of entropy was very small, requiring a large number of participants (N=139, according to our power analysis based on this effect size) to detect the effect or because self-paced reading may not be a sensitive measure to detect entropy effects. The data set will serve as a pilot study for future work.

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12:00-1:00 pm (1406)

Withdrawn

12:00-1:00 pm (1407)

The Effects of Language Experience on Syntactic Processing. ANSLEY POTTER and DUANE WATSON, *Vanderbilt University* – Individual variability in grammatical processing has been linked to language experience in a number of studies. For example, it has been observed that readers form probabilistic expectations of which words and syntactic structures are likely to occur based on experience. A prediction of experience-based accounts of language processing is that individual differences in language processing should reflect





individual differences in experience with language. We investigated how language experience predicts individual differences in online and offline sentence processing by having participants (N=200) complete a survey-based assessment of time spent reading and a self-paced reading task. In the reading task, subjects read sentences with subject and object relative clauses, which are known to elicit different reading times. We observed a Condition x Time Spent Reading interaction, such that participants who indicated higher weekly reading times had less difficulty processing object relative clauses, suggesting a link between daily language experience and processing skill.

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12:00-1:00 pm (1408)

The Role of Morphological Priming in Orthographic and Semantic Word Learning. MELDA COSKUN and VICTOR KUPERMAN, *McMaster University* – Understanding the morphemic structure of a word is crucial for expanding vocabulary knowledge. We examined the effect of morphological and identity priming on incidental word learning in adult L1 speakers. In the learning phase, low-frequency base words (e.g., caltrop) and novel derived words formed from those bases (e.g., caltroper) were embedded in short texts. We further administered posttests of orthographic and semantic learning for 1) derived forms of the word, primed by two repetitions of the base form (e.g., caltrop-caltrop-CALTROPER) each appearing in a separate sentence, and 2) base forms preceded by two repetitions of the derived form (e.g., caltroper-caltroper-CALTROP), and 3-4) words primed by identical forms (e.g., caltrop-caltrop-CALTROP, caltroper-caltroper-CALTROPER). We found that identical priming led to optimal orthographic learning. Yet semantic learning of base forms (2, 3) was stronger, regardless of the priming type. We discuss reasons for the asymmetric effect of morphological structure on orthographic and semantic learning.

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12:00-1:00 pm (1409)

Learning Novel Compound Words: The Use of Morphological Transparency and Semantic Context in Incidental Word Learning. SHAUNA DE LONG and JOCELYN R. FOLK, *Kent State University* – Research indicates that readers break down known complex words into morphological constituents during pre-semantic processing (Bowers et al., 2009). When novel compound words contain transparent morphemes, readers may also use morphological knowledge to derive meaning of those words (Brusnighan & Folk, 2012). The current research investigated the use of recently learned morphemes in word learning by presenting participants with novel, monomorphemic words (freeve) in semantically informative sentences followed by immediate posttests. After a 1-day delay, participants were presented with novel compound words (freevepad) in sentences that were semantically informative or uninformative and that contained a seminovel morpheme from the first session (freeve); these morphemes were either consistent or inconsistent with the meaning of the compound word. Word learning was assessed via spelling and meaning recognition posttests. Readers learned more

compound words when they contained a seminovel word they had learned in session one and when the compounds had consistent morphemes presented in semantically informative sentences. This is more evidence that readers spontaneously decompose novel compounds into their semantic constituents.

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12:00-1:00 pm (1410)

Parafoveal Preview Benefit Effects in Vertical Alphabetic Reading. MARYAM ALJASSMI, *Zayed University & University of Leicester*, VICTORIA A. MCGOWAN, FANG XIE, and KEVIN B. PATERSON, *University of Leicester* – The boundary paradigm is used to investigate parafoveal preview benefits in reading. In this, an invisible boundary is placed immediately before a target word in a sentence. This word is first shown normally or masked, so that preview is valid or invalid, and reverts to the target immediately upon the reader's gaze crossing the boundary. Fixation times on targets typically are shorter for accurate than inaccurate previews. With the present study, we investigated if preview effects can be obtained during both conventional horizontal and unconventional vertical reading. Sentences were displayed horizontally or rotated clockwise to create vertical displays, and included a boundary change where the target word preview was valid or invalid (i.e., a visually similar pseudoword). Vertical displays were read slower than horizontal displays. However, preview benefits were obtained for both displays, although larger for horizontal displays, revealing that parafoveal processing can adjust flexibly to changes in reading direction.

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12:00-1:00 pm (1411)

Variation in How Cognitive Control Modulates Sentence Processing. ABHIJEET PATRA, JEREMY S. KIRKWOOD, and ERICA L. MIDDLETON, *Moss Rehabilitation Research Institute*, MALATHI THOTHATHIRI, *The George Washington University* – Research suggests that cognitive control assists the comprehension of garden-path sentences that create conflict between interpretations. However, doubts remain about how cognitive control could influence a seemingly specialized and temporally tuned function like sentence processing. Our hypothesis tries to reconcile the two views by proposing that cognitive control might modulate (1) the online processing of sentences that require the integration of multiple conflicting cues but not other complex structures; (2) the offline decision processes related to choosing an interpretation and doing the task. We conducted a web-based study (N=78 adults aged 18-35 years) of self-paced reading interleaved with Stroop on day 1, and different cognitive control tasks on day 2. We found support for both hypotheses. Individual differences in cognitive control predicted variability in online processing for multiple-cue-conflict sentences but not other structures. For offline processes, cognitive control broadly influenced performance whenever the task involved decisions, irrespective of sentence type.

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12:00-1:00 pm (1412)

Loved (?) in Translation: Translation Non-Equivalence of Emotion Terms. HALSZKA K. BĄK, *Adam Mickiewicz University* – The presence of basic emotion concepts in different cultures is tacitly accepted, though there is evidence that the structure and relative size of these concepts differ across languages and cultures. In this study, words denoting basic emotions (anger, disgust, fear, joy, sadness, surprise) and their synonyms in Polish and English were subjected to a translation/back-translation study involving four professional Polish-English translators. Of the 1,764 emotion terms in English, only 85 (4.82%) reached complete agreement on both translation and back translation from all four translators. Of the 577 Polish terms, only 25 (4.33%) achieved complete agreement. More than half of those words in both sets were cognates. None of the prototypical basic emotion terms reached complete translation/back-translation agreement. The highest agreement was obtained in the translation of terms denoting the categories of sadness and happiness. The implications for crosslinguistic research on basic emotions in language and on their underlying concepts are discussed.

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12:00-1:00 pm (1413)

Listeners Deal with Prosodic Talker Variability Through Perceptual Learning. GIULIO SEVERIJNEN, *Radboud University*, GIUSEPPE DI DI DONA, *University of Trento*, HANS RUTGER BOSKER, *Max Planck Institute for Psycholinguistics*, JAMES M. MCQUEEN, *Radboud University* – A key challenge for listeners in speech perception is acoustic variability caused by talker differences. While previous research has mainly focused on how they deal with segmental talker variability, the present study investigated the use of a cognitive mechanism, perceptual learning, applied to suprasegmental talker variability. In an experiment with an exposure and test phase, Dutch participants heard minimal stress pairs (e.g., VOORnaam vs. voorNAAM, “first name” vs. “respectable”) spoken by two talkers. Crucially, one talker used only F0 to signal stress (with ambiguous intensity and duration values) while the second talker used only intensity. Afterwards, participants were tested (2AFC) on words containing conflicting cues to stress. For example, F0 signaled initial stress (VOORnaam) while intensity signaled final stress (voorNAAM) in the same word. If participants learn that a given talker typically used F0 to cue stress, they should be more likely to perceive the words at test as having initial stress (compared to a group that learn that the talker at hand used intensity). This was what was found. This finding demonstrates talker-specific adaptation through perceptual learning to suprasegmental variability between talkers.

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12:00-1:00 pm (1414)

Syllable Influence in Spoken Word Recognition Reveals Lexical Competition in Mandarin Chinese. KARL D. NEERGAARD, *University of Macau*, EILIEEN WAEGEMAEKERS, *University of Hong Kong* – Do speakers of tonal languages have a syllable influence when perceiving spoken words? In the current study

we performed two experiments with 61 native-Mandarin speakers using 503 auditory stimuli (239 monosyllables, 264 disyllables) within the auditory word repetition task. We compared two models of the lexicon; 1) PND model—disyllabic words are indivisible units that share phonological neighbors based on the addition, deletion, or substitution of a single segment or tone; 2) Syllable Degree (SyDegree) model—phonological neighbors of the first syllable are combined with those of the disyllabic word. In Experiment 1, larger effects were found for both monosyllables and disyllables from the SyDegree model, such that greater numbers of phonological neighbors slowed reaction times. In Experiment 2, in which the stimuli were imbedded in noise, the SyDegree model again produced larger effects for both mono and disyllables, such that greater numbers of phonological neighbors led to more errors. Our evidence suggests that, for tonal speakers, the first syllables of disyllabic words contribute to lexical competition (slowed reaction times and greater errors).

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12:00-1:00 pm (1415)

Temporal Dynamics of Lexico-Semantic Processing of Spoken Korean Homonyms. JOONWOO KIM, JINWON KANG, SOLBIN LEE, and JUGYEONG SUN, *Korea University* – Homonyms are words that have multiple unrelated meanings with a single form and pronunciation, which therefore provide a clue on how the semantic representation is retrieved and selected independent of orthography and phonology. In an event-related potential (ERP) experiment, we investigated the temporal dynamics of lexico-semantic processing in the spoken recognition of Korean words. Twenty-eight healthy participants performed an auditory lexical decision task during EEG data collection. ERPs evoked by homonyms and words with a single meaning were compared, while each condition had two different whole-form frequency (high [HF] vs. low [LF]). Behavioral results indicated inhibitory effects of lexical ambiguity for HF words, whereas facilitatory effects were shown in LF words. Neurophysiological results demonstrated that this lexico-semantic interaction was reflected in modulations in the late N400 component (450–550 ms poststimulus), preceded by whole-form frequency effect in the early N400 component (375–450 ms). Furthermore, the lexical ambiguity effect was reflected in the late positivity component (500–600 ms). We discuss these results in the context of scalp distributions and temporal dynamics of lexical and semantic activation.

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12:00-1:00 pm (1416)

Statistical Learning at a Virtual Cocktail Party. CHRISTINA PAPOUTSI, REBECCA FROST, and HANS RUTGER BOSKER, *Max Planck Institute for Psycholinguistics* – Statistical learning—the ability to extract distributional regularities from input—is suggested to play a key role in language acquisition. Yet, evidence for this comes mainly from studies where learning occurs without distractions from competing talkers, thus not reflecting naturalistic settings. Here, we examine how statistical language learning proceeds in a virtual cocktail party environment, where learning occurs in the presence of a competing speech stream. During exposure, participants





concurrently heard two novel languages, one produced by a female and one by a male talker (sex and language counterbalanced), with each talker virtually positioned at opposite sides (left/right) using binaural interaural time difference (ITD) and interaural level difference (ILD) manipulations. Group 1 was asked to closely attend to the male and Group 2 to the female. At test (2AFC), participants showed learning for both languages (word vs. part-word), but accuracy was significantly higher for trials from the attended (AL) vs. the unattended language (UL). Moreover, performance on AL trials by the dual-talker groups was similar to control groups who heard only one language from a single talker. These findings suggest that statistical learning is strongly modulated by selective attention.

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12:00-1:00 pm (1417)

Withdrawn

12:00-1:00 pm (1418)

Phonological Relatedness Judgments Reflect the Existence of (Somewhat) Distant Connections and Community Structure in the Phonological Lexicon. CYNTHIA S. SIEW, *National University of Singapore*, NICHOL CASTRO, *University at Buffalo, SUNY* – Network analyses of the phonological mental lexicon show that words are clustered into communities (Siew, 2013) and phonologically dissimilar words can be connected to each other through distant paths. Here we investigate whether behavioral traces of large-scale structure of the phonological lexicon can be obtained. Participants listened to pairs of words and made phonological relatedness judgments for word pairs with varying path lengths and community membership. Path length in the phonological network represented the number of steps needed to traverse from one word in the network to another and ranged from 1 to 5. Word pairs were either from the same phonological community or different communities. Results indicate that participants are sensitive to large-scale structure of the phonological lexicon. Word pairs residing in the same community were more likely rated as similar sounding than word pairs from different communities. Word pairs with longer path lengths were less likely rated as similar sounding than word pairs with shorter path lengths, but this was limited to those with path lengths of up to 3. Our results have implications for understanding the nature of phonological similarity representations in the mental lexicon.

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12:00-1:00 pm (1419)

Transferring Causal Knowledge Across Category Levels. DANIEL CZARNOWSKI and JESSECAE K. MARSH, *Lehigh University* – Learning causal relationships is important for understanding the world, but how do we transfer this knowledge to unfamiliar contexts? We explored how people transfer different types of causal knowledge. Participants read brief scenarios describing an intervention (e.g., applying fertilizer) being applied to a specific instance of a category (e.g., pink roses). Participants then judged whether that intervention would have similar effects on targets that varied in

similarity to the original instance. Targets ranged from being specific instances of categories (e.g., red roses), to belonging to different superordinate categories (e.g., earthworms). We found that category level influenced causal transfer judgments: instances at the same subordinate level were judged to have the same causal mechanisms (Experiment 1), that acted with the same strength (Experiment 2), and produced the same intended effect and side effect of the intervention (Experiment 3). These ratings decreased when moving up a category hierarchy to more dissimilar instances. We discuss implications for the impact of causal knowledge on learning.

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12:00-1:00 pm (1420)

Facilitating Comparison to Promote Relational Responding in the Relational Match-to-Sample Task (RMTS). MERCURY MASON and KENNETH J. KURTZ, *Binghamton University SUNY* – The relational match-to-sample task assesses preference for matches on relational content versus an object-based alternative. In prior research, participants showed greater relational responding with a pretask opportunity to actively describe or passively consider just the target item before the full triad. We address: 1) the impact of a pretask opportunity with the match options as opposed to the target; and 2) the effect of spatial alignment of triad elements. In a standard triangular format, we observed greater relational responding with initial presentation of the options (active or passive) versus baseline. With alignment (vertical arrangement with the options directly above/below target), we found no difference from baseline without pretask or with passive consideration of the match options, but elevated relational responding in the active condition. Initial consideration of the target or the options increases relational responding, and the only impact of spatial alignment was reduced relational benefit of the passive pretask.

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12:00-1:00 pm (1421)

Manipulating Chunk Decomposition in Matchstick Arithmetic Problems. TAYLOR STRICKLAND, STELLAN OHLSSON, and JENNIFER WILEY *University of Illinois Chicago* – Representation change theory (RCT) proposes that insight problems are solved by changing an incorrect initial representation through a conceptual change (constraint relaxation [CR]) or a perceptual change (chunk decomposition [CD]; Knoblich et al., 1999). The current research tested the assumption that CR and CD operate separately by manipulating the likelihood of CD and assessing the impact on the solution of matchstick puzzles that either required CR or CD. Cueing CD training improved performance while suppression training led to decreased performance on CD problems. In contrast, the same effects were not seen on CR problems. Additionally, solvers were asked to report if they experienced Aha! while solving the matchstick arithmetic problems so that the effect of the manipulations on the Aha! experience could also be explored. A follow-up study is being run to further investigate the effect of these manipulations.

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12:00-1:00 pm (1422)

The Effect of Lexical Semantic Activation on Reasoning About Evolution: A Crosslinguistic Study. JINGYI LIU and LAURA R. NOVICK, *Vanderbilt University* – We hypothesized that people of different language backgrounds (English vs. Mandarin Chinese) might think about evolutionary relationships among living things differently. In particular, some reasoning strategies may come from how living things are named. Our research examined if subword and sublexical elements in written Chinese influenced judgments of evolutionary relatedness. Some taxon names in Chinese are conjunctive concepts that include another taxon (e.g., beaver is called “river wildcat” in Chinese and the “camel” character has a semantic radical [semantic component of a character] that means “horse:”). These conjunctions might influence Chinese readers to believe conjunctive concepts are more closely related evolutionarily to their constituents, an inference that is often incorrect. We also hypothesized that Chinese students would judge living things with the same semantic activation in their taxon names to share biological characteristics, whereas readers in a language without lexical activation from conjunctive concepts in the same taxon (English) would not show such effects. This research provided insights into how differences in prior knowledge due to different language backgrounds affect thinking and reasoning.

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12:00-1:00 pm (1423)

Reduced Certainty Preference after Solving Problems with Insight versus Analysis. YUHUA YU and MARK BEE-MAN, *Northwestern University*, CAROLA SALVI, *The University of Texas at Austin* – When people solve with insight they may experience an aha moment: a feeling of suddenness, pleasure, and certainty. How does this experience affect the subsequent decision making? The current project addressed this underexplored but important question by measuring, on a trial-by-trial basis, how different ways of solving problems affect individuals’ certainty preference on a separate decision. Participants recruited from Amazon Mechanical Turk were asked to solve verbal puzzles (Compound Remote Associate), report whether they solved with insight or analysis, and then choose between two bonus options: a fixed payout of 25¢, or a risk payout with 50% chance to receive a low (5¢) and 50% chance to receive a high amount (e.g., 45¢). The bonus choice was calibrated to each participant’s baseline preference using a survey conducted at the beginning of the experiment. As predicted, participants were more likely to choose the risk payout (reduced certainty preference and higher risk preference) after they solved problems with insight than after solving with analysis. Grouped by gender, we found the insight effect was driven by male participants. We ran a second online experiment where we replicated our findings.

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12:00-1:00 pm (1424)

Reasoning Strategies Predict Base-Rate Neglect. TOMMI A. MAYERS and DUSTIN CALVILLO, *California State University, San Marcos* – Individual differences in reasoning strategies explain

performance in deductive reasoning tasks. According to the dual strategy model of reasoning, people reason with one of two strategies: a working memory intensive counterexample strategy that focuses on counterexamples to a given conclusion or a quick statistical strategy that focuses on the likelihood of a given conclusion. The present study extended previous work by examining the relationship between reasoning strategy and base-rate neglect. Participants (N=120) completed a reasoning strategy diagnostic, a cognitive reflection test, and 24 base-rate neglect problems in which they selected between base-rate and stereotypical responses. Analyses revealed that statistical reasoners neglected base-rates more than counterexample reasoners. Additionally, regression analyses illustrated that reasoning strategy predicted base-rate neglect over and above cognitive reflection. These results provide evidence that reasoning strategy is an important predictor of base-rate neglect: reasoners who rely on a statistical strategy are particularly prone to this error.

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12:00-1:00 pm (1425)

The Effects of Inference Complexity and Instructional Set on Conditional Reasoning. ROBERT RICCO, JAY VON MONTEZA, JASMINE BONSEL, and HIDEYA KOSHINO, *California State University, San Bernardino* – A recent paradigm in the study of conditional reasoning (CR) is the use of a dual instructional set. Participants are either instructed to respond in accordance with logical validity or on the basis of their beliefs. This paradigm makes it possible to assess cognitive processing that is counter to the processing favored by the set. Findings indicate that belief-based processing interferes with efforts to respond on the basis of logic and that logical processing interferes with efforts to respond on the basis of belief. In this study, we sought to determine whether the direction and degree of interference are a function of the complexity of the conditional inference involved. Using a sample of 150 college students, we varied two aspects of inference complexity. We contrasted modus ponens with modus tollens (MT) and we varied whether the wording in the conclusion of the argument matched, or was contrary to, the wording in the premises. We found that more complex inferences (MT or contrary wording) resulted in greater interference of belief-based processing on efforts to respond logically and less interference of logical processing on efforts to respond in accordance with beliefs. Results are discussed in terms of dual process theory.

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12:00-1:00 pm (1426)

Explaining the Bat-and-Ball Problem to High-School Students Helps Them Solve It Intuitively, Regardless of Cognitive Capacity and Numeracy. MATTHIEU RAOELISON, *Université de Paris*, MONICA RENEE POLICARPIO, *De La Salle University* – The bat-and-ball problem is notoriously difficult. Dual-process accounts of reasoning have used it to illustrate the need for deliberation to correct erroneous intuitions. Recent developments have challenged this long-held assumption, with studies showing that some people were even able to intuitively provide the correct answer. Cognitive capacity and numeracy have been suggested





as interindividual factors accounting for differences in our ability to avoid being biased in similar problems. Recently, a training intervention—presenting a short explanation on how to solve the bat-and-ball problem—was shown to sustainably improve reasoning accuracy in adult participants online, both intuitively and deliberately. In this preregistered study, we tested whether a similar intervention could help improve the reasoning performance of high schoolers in the Philippines ($n=80$) while looking at the contribution of cognitive capacity and numeracy, using a two-response paradigm. Cognitive ability and numeracy were both related to performance before the intervention and the improvement across groups. However, our intervention still had a significant effect when they were controlled for.

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12:00-1:00 pm (1427)

Sound Intuiting in the Stroop Task. AIKATERINI VOUDOURI, *Université de Paris*, BENICE BAGO, *Institute for Advanced Study in Toulouse*, GREGOIRE BORST and WIM DE NEYS, *Université de Paris* – An increasing number of studies on human thinking indicate that sound reasoners are able to generate correct responses intuitively when confronted with classic heuristics and biases tasks. In the present study, we focused on the classic Stroop task in an attempt to explore the generalizability of these findings to lower-level cognitive control tasks. We used the two-response paradigm in which participants were asked to provide two consecutive responses in each trial: a first response given under a cognitive load and a strict, pre-tested deadline (750 milliseconds), which we assume to be more intuitive, and a second deliberate response, without load or deadline. In 65% of the incongruent Stroop trials, participants responded correctly both in the initial and the final stages of the paradigm, compared to the 27% of trials in which participants gave correct final responses but incorrect initial ones. In agreement with the reasoning findings, these results suggest that correct Stroop responses were predominantly generated under conditions in which deliberation was experimentally minimized.

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12:00-1:00 pm (1428)

Sustainable Individual Differences in Preference of Mental vs Embodied Solving Modes in Problem Solving. NIKITA LOGINOV, VLADIMIR SPIRIDONOV, KURBAN KK KURBANOV, and VLADLEN ARDISLAMOV, *Russian Presidential Academy of National Economy and Public Administration (RANEPA)*, ARTUR AMMALAINEN, *SPBGU*, VARVARA VYAZOVKINA, *Russian Presidential Academy of National Economy and Public Administration (RANEPA)* – During problem-solving, participants regularly inform an experimenter that it is hard for them to solve a problem using motor activity, not “in the mind.” However, this fact contradicts a line of research related to the off-load effect of working memory. We suggested a hypothesis that there are two modes of problem-solving: mental solving and “embodied in motor activity” solving. The following research investigates sustainable individual preferences between the two problem-solving modes mentioned above. The participants solved arithmetic matchstick

problems individually. The process was videotaped and marked by a group of experts. As a result, two main variables were calculated: share of time spent on motor manipulations with the problem elements (matchsticks) and the length of a pause from the problem presentation until the first motor interaction with the problem elements. It was found that by using the shares of time spent on motor manipulations with the problem elements for the seven problems, it is possible to predict this parameter for the eighth problem. However, it was not possible to do so for the length of a pause from the problem presentation until the first motor interaction with the problem elements parameter.

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12:00-1:00 pm (1429)

The Wittiness Lies at the Heart of the Representational Change. POLINA MARKINA, *Institute of Psychology of Russian Academy of Sciences*, SERGEI KOROVKIN, *Yaroslavl State University* – The main source of difficulty in Mathematical Olympiad problems is how to change an initial representation to make a problem solvable. We varied a degree of representational change required using different types of solutions to creative vignette problems. In the experiment, participants were presented with problem solutions at different stages and asked to evaluate their aha! experience (Danek & Wiley, 2017). The solutions varied in terms of extent to which a representational change was required and solution remoteness from the initial representation. The results showed that a greater representational change is accompanied by an increase in the assessment of the wittiness of the solution, and witty responses evoke a more pronounced aha! experience. Interestingly, response time did not significantly affect aha!-experience scores. Thus, we can consider the wittiness of solution as an indicator of a representational change. Supported by RFBR 19-29-14189

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12:00-1:00 pm (1430)

The Unreportable Semantic Hints Influence Aha! Experience, Certainty, and Subjective Suddenness of the Solutions in Anagram Solving. ARTUR AMMALAINEN, *SPBGU* – Studies show that implicit hints increase solution rates and decrease solution times in problem solving. However, few works address the effect of hints on the phenomenology of insight. Bowden (1997) found that unreportable verbal hints to anagrams increase the ratings of solution suddenness. We (Ammalainen & Moroshkina, 2020) showed that the aha! ratings in anagrams were lower after reportable and unreportable pictorial hints than without hints. This study tests the hypothesis that the hints influence subjective experiences only when solvers are ignorant about them as the processing fluency theory suggests. We used anagrams with one solution and one short word within them. The unreportable hints were pictures semantically related to solutions (true hints) or short words (false hints). The results show that correct solutions obtained after true unreportable hints are more often considered as sudden compared to correct solutions obtained without hints. The aha! and certainty ratings after true hints did not differ from “no hints” condition but were significantly higher than after





false hints. The results support the idea of the attribution of processing fluency. The reported study was funded by RFBR, project number 20-013-00532.

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12:00-1:00 pm (1431)

Confidence Effects on Causal Judgment. KEVIN G. O'NEILL, *Duke University*, PAUL HENNE, *Lake Forest University*, PAUL BELLO, *US Naval Research Laboratory*, JOHN PEARSON and FELIPE DE BRIGARD, *Duke University* – Psychologists and philosophers have long debated whether causal judgments are graded (i.e., one event can be more causal than another) or binary (i.e., an event is either causal or not). By reanalyzing data from four recent studies, we provide evidence that causal judgments are actually multimodal: although most judgments were binary, there was also some gradation. We then tested two explanations for the gradation we observed: the confidence explanation, which states that gradation distinguishes between certain and uncertain causes, and the strength explanation, which states that gradation distinguishes between strong and weak causes. In support of the confidence explanation, Experiment 1 found that gradation in causal judgments was moderated by confidence. People tended to make graded causal judgments when they were less confident and tended to make discrete causal judgments when they were more confident. In support of the strength explanation, Experiment 2 found that causal judgments varied in the absence of changes in confidence. Overall, we found that causal judgments are multimodal and that observed gradation reflects independent effects of confidence and causal strength on causal judgments.

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12:00-1:00 pm (1432)

Withdrawn

12:00-1:00 pm (1433)

The Survival Memory Advantage Improves Remembering for Story Details. JOHN P. TAYLOR, *Southern Oregon University*, WILLIAM VON HIPPEL, *University of Queensland* – Storytelling is universal in humans, found across all cultures, both present day and historically. This universality may imply an evolved cognitive predisposition toward receiving and remembering stories. To investigate this possibility, we created six-sentence stories about either modern, mundane problems, or survival-relevant problems. We asked participants to identify their satisfaction with each story and, after a digit span distractor task, probed their memories for details from each sentence in the stories they read. While satisfaction did not vary across conditions, we did find memory improved for stories about survival as compared to mundane events. We propose that evolved cognitive modules are reflected in the remembering, but not the reception of, stories.

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12:00-1:00 pm (1434)

Investigating the Role of Stimulus' Meaning in Massive Visual Long-Term Memory. ROY SHOVAL, NURIT GRO-NAU, and TAL MAKOVSKI, *Open University of Israel* – Previous research demonstrated a massive capacity of visual long-term memory (LTM). This capacity was assessed using meaningful images, therefore, the capacity of a “pure” visual LTM that is independent of conceptual information still needs to be determined. In two experiments, participants memorized hundreds of images depicting real-world objects, along with visually similar images that were stripped of their semantic meaning. LTM was evaluated using a four-alternative forced choice test including old and new images and their counterpart mirror transformations. The results revealed superior memory for meaningful than for meaningless stimuli. Participants also were able to distinguish between memorized items and their mirrored versions, yet, while this effect was strong for the meaningful items, it was negligible for the meaningless items. Importantly, although overall performance was better than chance, we found no indication of massive LTM with the meaningless items. Taken together, our findings suggest that meaning is critical for massive LTM and for the ability to store visual properties per-se.

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12:00-1:00 pm (1435)

Forgetting as a Consequence of Retrieval Suppression: A Meta-Analytic Review of the Think/No-Think Paradigm. CHRIS CLARK, *Memorial University of Newfoundland*, DANIEL TODOROVIC, *University of Waterloo*, BENJAMIN J LEVY, *University of San Francisco*, KATHRIN C ESCHMANN, *Cardiff University*, MICHAEL C ANDERSON, *MRC Cognition and Brain Sciences Unit*, JONATHAN FAWCETT, *Memorial University of Newfoundland* – Suppressing retrieval of a memory has been shown to reduce its accessibility later on, a finding referred to as the suppression-induced forgetting (SIF) effect. The current meta-analysis examined the SIF effect produced by the think/no-think (TNT) paradigm to determine the typical magnitude of the effect as well as the impact of several key moderators. A literature search of online databases, review papers, and unpublished studies up to 2020 resulted in a final sample of 82 studies measuring SIF in general populations. Using Bayesian multilevel modelling, it was determined that a typical TNT study produces a small but credible SIF effect with broad heterogeneity depending on the methods. Additionally, it was determined that the SIF effect (a) was larger in studies using same probe (SP) than independent probe (IP) tests; (b) was larger when participants were given specific (direct suppression or thought substitution) instructions; and (c) increased as a function of repetitions. These findings provide a strong empirical basis for future investigations of the SIF effect and are discussed with respect to theoretical perspectives and boundary conditions.

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12:00-1:00 pm (1436)

Withdrawn

12:00-1:00 pm (1437)

Target Detection During Encoding Modulates Subsequent Free Recall Output Dynamics. ADAM BROITMAN and KHENA M. SWALLOW, *Cornell University* – In the attentional boost effect (ABE), increasing attention to an item that requires a response (e.g., a detection task target) boosts memory for concurrently presented but otherwise unrelated background items. However, it is unclear whether this effect influences the organization and retrieval of events from episodic memory. Participants memorized a list of individually presented words. At the same time, they pressed a button whenever a square that appeared with the words was in a predefined target color and made no response when the square was a distractor color. During subsequent delayed free recall, target-paired words were more frequently retrieved than distractor-paired words (replicating the ABE), and recency effects were enhanced for target-paired words. Though overall output position was similar between target- and distractor-paired words, target-paired words were more likely to be the first item output from each list. These results suggest that memory for behaviorally relevant events may be robust to retroactive interference, making them more available for output during memory search.

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12:00-1:00 pm (1438)

Delayed and Immediate Recall Performance Vary as a Function of Distractor Task Modality. JENNI REDIFER and RACHEL BRAGG, *Western Kentucky University* – We investigated immediate and delayed recall performance following simultaneous tasks in different vs. same modalities. Based on distinct cognitive resources theory, we expected larger dual-task performance costs due to simultaneous tasks in the same modality compared to different modalities, with the greatest performance differences occurring during delayed recall. Participants completed list-learning tasks in a visual-control (VC, no distractor), visual-visual distractor (VV), and visual-auditory distractor (VA) condition, with four immediate recall measures and one delayed recall measure for each condition/list. Finally, participants completed a demographics questionnaire and were awarded participation credit. Fifty-three participants completed all study tasks. There was a significant condition x time interaction, $F(4.09, 204.34)=9.07$, $p < .001$, $\eta^2 = .15$ (Greenhouse-Geiser correction). VC performance was significantly better than VV or VA performance during the first two immediate recall measures. For remaining measures, VA performance was not significantly different than VC performance. Overall, VV performance was significantly worse than VA and VC performance, including delayed recall. Results support distinct cognitive resources theory.

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12:00-1:00 pm (1439)

Order in Whole Report: The Influence of Previous Response Order and Perceptual Saliency. KATHERINE A. HERNANDEZ

and DAKOTA R. LINDSEY, *University of South Alabama* – Activities, like driving to work, require people to perform actions in serial order but allow a person to choose the order. We investigate what information people use when choosing the order of their responses, specifically addressing the influence of perceptual saliency and past experience. Participants completed a whole report task; they were briefly shown six letters and asked to recall them in any order. We manipulated font size differences between letters (small vs. large), observing the effects of perceptual saliency, and the consistency of letter-to-size mapping (fixed vs. random) to observe how saliency and past experiences interact. We tracked changes in accuracy and response order over practice. Perceptual saliency had very little effect on report order. Previous responses, or memory, were more influential in determining order of report.

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12:00-1:00 pm (1440)

The Effect of Aging and Mnemonics on Name Recall. YASHODA GOPI and CHRISTOPHER R. MADAN , *University of Nottingham* – Remembering names is an important aspect of everyday life. Failure to remember can result in frustration and negative self-evaluation of memory abilities, particularly among older adults, who already face negative stereotypes about memory and aging. One strategy is the face-name mnemonic, which involves three components to enhance memory: a name-transformation, a prominent facial feature, and interactive imagery. Name recall involves mentally retracing these steps. In our previous study with young adults, participants studied face-name pairs under one of four different instructions, then recalled the names when presented with the faces. A version of the face-name mnemonic, the name-transformation strategy, resulted in better name recall than an uninstructed approach and otherwise performed relatively comparable to other strategies. Here we further examined the influence of strategy instruction across different age groups (young, middle-aged, and older adults) on name recall to further assess strategy generalisability. Future research will examine mnemonic strategies to improve name recall with memory-impaired patients.

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12:00-1:00 pm (1441)

Does the Animacy Advantage in Memory Interact with the Level of Stimulus Specificity? CARLEE M. DEYOUNG and MICHAEL J. SERRA, *Texas Tech University* – The animacy advantage is the finding that people are more likely to recall animate or living words (e.g., duck) than inanimate or nonliving words (e.g., hammer). We became interested in whether or not the level of specificity of a given word would interact with this effect in any way. To our knowledge, no studies have yet examined whether these two factors interact. We created four lists of words, crossing animate vs. inanimate words within-Ps and high specificity (e.g., duck, hammer) vs. lower specificity (e.g., bird, tool) words between-Ps. We matched the four lists on a variety of other measures known to affect memory (letters, frequency, concreteness, valence, arousal, age of acquisition). Participants recalled more, less specific words than more specific






words, but we did not obtain an animacy advantage in recall, and the two factors did not interact. These results suggest that controlling for many factors related to memory, including the level of specificity of animate and inanimate words, can eliminate the animacy advantage.

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12:00-1:00 pm (1442)

Hypervigilance Effects on Memory Depend on Retrieval Context. SUMMER WHILLOCK , BRANDON G. SCOTT, and MICHELLE MEADE, *Montana State University* – We examined the influence of hypervigilance and state, trait, and memory-specific anxiety on younger adults' memory performance across free, forced, and warning recall conditions. Participants studied categorized word lists and were randomly assigned to complete an initial recall test under free, forced, or warning recall instructions, followed by a second test under free recall instructions, and a final recognition test. Moderated regression analyses showed that hypervigilance, but not state, trait, or memory-specific anxiety, is related to memory performance. Further, this relationship between hypervigilance and memory depends on recall condition. Under forced recall instructions, heightened levels of hypervigilance were related to higher levels of correct recall at Test 1 and lower levels of false recognition. Under free recall instructions, heightened levels of hypervigilance were related to lower levels of correct recognition and lower levels of false recognition. Under warning recall instructions, hypervigilance did not influence memory. The effects of hypervigilance on memory depend on retrieval context.

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12:00-1:00 pm (1443)

Memory Verbalization: A Cognitive Mechanism Underlying Emotion Regulation. ORLY ADLER, ASSAF KRON, and AINAT PANSKY, *University of Haifa* – Whereas emotion research has documented beneficial effects of disclosing unpleasant experiences on wellbeing, memory research has demonstrated apparently discrepant findings of memory enhancement for details of an event following its recollection—an enhancement that is usually accompanied by a strong sense of re-experiencing the original event. In two multi-session experiments, which employed different retrieval modes of a controlled traumatic event, we tested (and found support for) a cognitive account of this discrepancy. Accordingly, recounting creates verbal representations upon which rememberers rely when re-retrieving memories. This reliance on previous descriptions, rather than mentally traveling back in time to the original perceptual event, impairs the sense of re-experience, and attenuates negative emotion. Our findings suggest that repeatedly recounting a negative experience may alter the memory trace, and thus may not only offer a simple self-aid cognitive technique for emotion regulation, but also a resolution to the seemingly discrepant findings in the literature.

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12:00-1:00 pm (1444)

Pandemic Processing: Exploring Adaptive Memory through the Lens of COVID-19. STEPHANIE A. KAZANAS and BLAKE E. JOHNSON, *Tennessee Technological University* – The adaptive memory literature explores human cognition's tuning toward solving fitness-relevant problems. Research by Nairne and colleagues shows increased attention toward and memory for information processed for its survival-relevance (e.g., whether an item can help someone locate clean drinking water). Related work shows individual differences in mental health can affect these results (Chastain & Kazanas, 2020; Nouchi & Kawashima, 2012). The ongoing pandemic provides a unique opportunity to continue this research, specifically with regard to varying concerns for health and safety. Two experiments compared participants' recall after engaging in survival processing, contamination processing, or some control processing (e.g., pleasantness, moving). Participants' COVID-19 perseveration and avoidance behaviors also were measured and examined for their effect on these data. These findings help us better understand the role of participants' current stressors on their information processing and memory.

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12:00-1:00 pm (1445)

Enhanced Associative Memory for Emotional Words: Does Valence Matter? LENA NADAREVIC, *University of Mannheim* – People seem to show particularly good memory for emotional materials. For example, Nadarevic (2017) observed a better cued-recall performance for negatively arousing words than for neutral words, which was based on a retrieval advantage for the negative words. The present experiment tested whether this effect also holds for positively arousing words. Participants studied a list of nonword-word pairs that involved negatively arousing, positively arousing, and neutral words. After a short retention interval, participants performed a recognition test followed by a cued-recall test with the nonwords from the study phase as retrieval cues. Replicating Nadarevic (2017), cued-recall performance (but not recognition performance) was better for the negatively arousing words compared to the neutral words. Importantly, the same was true for the positively arousing words. Further analyses with a multinomial storage-retrieval model showed that both effects relied on the same underlying mechanism, namely a retrieval advantage for the arousing words compared to the neutral words in the cued-recall test. These results indicate that enhanced associative memory for emotional words is based on arousal, not valence.

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12:00-1:00 pm (1446)

Bridging the Gap: The Role of Temporal Lag in Binding Events into Coherent Memories. ANGELIQUE I. DELARAZAN, SARAH J. MORSE, ELENA BOSAK, and VERONICA F. LEE, *Washington University in St. Louis*, BRENDAN I. COHN-SHEEHY, *University of California, Davis*, JEFFREY M. ZACKS and ZACHARIAH M. REAGH, *Washington University in St. Louis* – Ongoing experiences are often remembered as discrete events, but sometimes come together as part of a larger narrative. Recent studies show





that temporally distant events can be linked together and are better remembered if the events could be integrated into a broader, coherent narrative (Cohn-Sheehy, Delarazan, et al. 2021). It is, however, unknown whether the temporal distance between linked events modulates the retrieval benefit for narrative coherence. Here, we investigate whether the narrative coherence benefit interacts with temporal lag between events during memory encoding. Participants learned and subsequently recalled events from picture stories that either formed one coherent narrative or two separate, unrelated narratives. Critically, we operationalized temporal lag by manipulating whether linked events were separated by four intervening events (short lag) or 12 intervening events (long lag). In line with previous work, preliminary results suggest that coherent narrative events are recalled in greater detail than unrelated narrative events. Ongoing analyses investigate the effects of coherence and lag on explicit memory for time.

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12:00-1:00 pm (1447)

The Roles of Item-Specific and Relational Processing In Value-Directed Remembering. DONALD J. SKINNER, REBEKAH E. SMITH, and R. REED HUNT, *The University of Mississippi* – Information considered more important or valuable can often hold a memorial advantage relative to less important or valuable information. One manner in which this phenomenon is studied is through the value-directed remembering (VDR) paradigm. Within VDR, participants are presented with a list of words arbitrarily associated with either high or low point values. They are instructed to maximize their score on an upcoming memory test by remembering as many high-value words as possible. Typically, participants demonstrate substantially better memory for high relative to low-value words and thus value-directed remembering. The current study aimed to explore a potential explanation of value-directed remembering by investigating the roles of item-specific and relational processing.

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12:00-1:00 pm (1448)

Withdrawn

12:00-1:00 pm (1449)

Effort and Strategy in the Presence of an External Memory Store. MEGAN O. KELLY and EVAN F. RISKO, *University of Waterloo* – Previous work demonstrates that individuals often recall less information if, at study, there is expectation that an external memory store will be available at test. One explanation for this effect is that when individuals expect access to an external memory store, they forgo intentional efforts at encoding. The present work tests this account by examining study effort, indexed by study time and self-reported strategy use, as a function of instructed external store availability. In two preregistered experiments, participants studied lists of to-be-remembered items for a free recall test and were either instructed that they could use their study list to support them at test or that they could not. Critically, participants controlled their own

study time, and no participant had their study list at test, regardless of instruction. Consistent with the effort at encoding account, external store availability influenced both study time and strategy use, and there was some evidence that these effects mediated the influence of external store availability on recall performance. Results are integrated with work investigating study time allocation more generally.

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12:00-1:00 pm (1450)

Assessing the Global Structure of Collective Memory: Application of the Representational Similarity Analysis. JINGWEN JIN, *The University of Hong Kong*, HAE-YOON CHOI, NICHOLAS W. PEPE, and GARRETT D. GREELEY, *Stony Brook University*, ELIZABETH KENSINGER, *Boston College*, APRAJITA MOHANTY and SUPARNA RAJARAM, *Stony Brook University* – When people recall the past together, they develop an increase in overlapping memories or collective memory. Our past work shows that collaboration also promotes collective memory structures—a similarity in how people organize these memories. Here we focus on two important advances: 1) Going beyond a local level understanding of collective memory structures, we implement novel applications of the representational similarity analysis (RSA) and multidimensional scaling (MDS) techniques to quantify global-level changes in the structures of collective memory and gain a deeper understanding of social influences on individual and collective memory; 2) going beyond research on only neutral information, we assess collective memory structures for both neutral and emotional information. We first replicated two key effects, collaborative inhibition in group recall and postcollaborative changes in individual recall. Applying RSA and MDS on pre- and postcollaborative recall, we found that collective memory structures emerged not only at local but also at global levels, and for both emotional and neutral information. Tracing memory through these social contexts, we find that collaboration has a powerful, normalizing pull on memory.

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12:00-1:00 pm (1451)

Long-Term Effects of Value-Driven Attentional Capture on Memory: Reward Influences Criterion But Not Discriminability. JONATHAN YUQUIMPO and AARON BENJAMIN, *University of Illinois Urbana-Champaign* – Value-driven attention capture (VDAC) is the process by which stimulus features associated with reward can involuntarily draw attention in contexts beyond the original one in which those associations were trained. Attention is a critical component of effective encoding into memory so it follows that VDAC may confer an advantage in remembering later stimuli that share those reward features. The aim of this study was to investigate whether participants trained to associate a color with probabilistically high or low reward amounts in one task would show improved memory for characters presented in a previously rewarded color on a separate memory task. In a learning phase, participants identified the orientation of a horizontal or vertical line positioned within a red or green circle. One color was paired with a higher reward contingency than the other color to imbue it with greater value. In a second task,





participants viewed three sequential characters and made old/new judgments on a test character. Some lists contained a character that was presented in a previously rewarded color. We found no evidence that rewarded colors improved memory, but recognizers tended to employ a more conservative criterion on lists with rewarded colors.

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12:00-1:00 pm (1452)

Can Impending Conflict Interfere with Encoding? Looking for the Next-In-Line Effect Beyond Performance Anticipation. MICHELLE A. DOLLOIS, HASSAN HA ANEES, MARK J. FENSKE, and CHRIS FIACCONI, *University of Guelph* – The next-in-line effect describes how performance anticipation for reading aloud in front of others results in a failure to encode information that is encountered just prior to presentation. If preparation for an upcoming challenge is at the root of this effect, then it should also be observable outside of scenarios that involve performance and social stress. In a series of experiments, we attempt to use the upcoming transition to the relatively difficult incongruent condition in a Stroop task to produce a next-in-line effect without performance anticipation. Results suggest that the transition to incongruent trials is not stressful enough to cause a cost in encoding. Conversely, there is some evidence to suggest that the upcoming transition between conditions may improve memory. The data presented also consider how task modifications influence encoding.


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12:00-1:00 pm (1453)

Recognition Memory Mechanisms and Attention-Dependent Encoding May Account for the Auditory Disadvantage for Remembering Objects. LAURA WERNER, MARGARET MCMULLIN, and JOEL SNYDER, *University of Nevada, Las Vegas* – Recognizing visual objects is easier than recognizing auditory objects, but it remains unclear why this difference exists. Examining the contribution of recollection and familiarity to auditory and visual object recognition memory might offer some insight into the source of this modality difference. In Experiment 1, recollection was greater for visual objects than for auditory objects, but this large difference was not present for familiarity. In Experiments 2 and 3, we divided attention during encoding to see if a manipulation that targets recollection would differentially affect the modalities. Divided attention substantially reduced recollection of visual, but not auditory, objects. It also affected familiarity in both modalities but to a smaller degree for auditory stimuli. Together these results suggest that auditory object memory is disproportionately reliant on familiarity, and that auditory recollection behaves differently than visual recollection. We suggest that these differences may be due to differences in the resolution of auditory and visual object representations in memory and (or) that the two modalities recruit attention to different degrees.


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12:00-1:00 pm (1454)

Schema Knowledge and Episodic Memory Trade Off to Influence Spatial Memory. MICHELLE M. RAMEY , JOHN M. HENDERSON, and ANDREW P. YONELINAS, *University of California, Davis* – Schema knowledge can dramatically affect how we encode and consolidate new memories, but how schemas impact memory retrieval is largely unknown. Although schemas and memory are thought to operate in conjunction, recent neurocognitive models suggest that they may instead compete. To test this possibility, we had participants search for target objects in semantically expected (i.e., congruent) locations within scenes or in unusual (i.e., incongruent) locations. In a subsequent test, participants indicated where in each scene the target had been located previously, then provided confidence-based recognition memory judgments that indexed recollection, familiarity strength, and unconscious memory for the scenes. In two studies, spatial memory was more accurate for schema-congruent than incongruent locations, but this congruency effect was weakened by unconscious memory and familiarity, and was eliminated entirely for recollected scenes. The results support competition models of memory-schema interactions and indicate that schema knowledge contributes to spatial memory primarily when recognition memory fails to provide precise information.

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12:00-1:00 pm (1455)

Quantity, Not Quality, of Competitors Impairs Memory-Guided Attention. Y. ISABELLA LIM and JAY PRATT , *University of Toronto*, KEISUKE FUKUDA, *University of Toronto Mississauga* – Attention can be guided by templates stored in visual long-term memory. At the same time, related visual memories can compete with one another and induce temporal forgetting. In this study, we conducted two experiments to examine the impact of competition among related visual memories on memory-guided attention. In each experiment, participants encoded a stream of object images from multiple object categories. Importantly, each object category was encoded four times, but the number of exemplars belonging to each category was varied to manipulate the quantity of competing memories. Subsequently, participants searched for the encoded exemplars in a visual search task. Here, we found that visual search was slower for the category with more competitors with less encoding opportunity (three competitors with one encoding opportunity each) than fewer competitors with more encoding opportunities (one competitor with three encoding opportunities). However, this effect only occurred with perceptually related visual memories (Experiment 1), but not with conceptually related visual memories (Experiment 2). This suggests that perceptual (not conceptual) competition underlies the induced impairment of memory-guided attention.

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12:00-1:00 pm (1456)

The Benefits and Costs of Context Reinstatement in Younger and Older Adults. OLIWIA ZABOROWSKA, *SWPS University*, LILIANE WULFF and BEATRICE G. KUHLMANN, *University of Mannheim*, KATARZYNA ZAWADZKA and MACIEJ





HANCZAKOWSKI, *SWPS University* – Reinstatement of the context in which the initial learning took place at the time of retrieval is commonly considered to benefit memory performance. However, more recently, reinstated context has also been shown to produce illusions of knowledge by which people think they remember more than they do and thus report incorrect information which normally would be withheld. Here, in a series of studies, we investigated the boundary conditions for one such context-driven illusion of knowledge. We presented participants with a series of to-be-studied objects superimposed over context backgrounds, and at test presented the same, similar, or new objects on either the same or changed contexts. We found that context reinstatement boosted hits, but also false alarms to similar objects (i.e., led to an illusion of knowledge). However, this context effect only emerged when instructions at study asked participants to associate the studied objects with contexts but not when context encoding was incidental. We also show that when this illusion of knowledge occurs, it does so in both younger and older adults. Together, our results urge caution when using context reinstatement as a memory technique.

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12:00-1:00 pm (1457)

Memory or Not...Here Comes Consistent Criterion Shifting Strategies. EVAN LAYHER, AARUSHI AGRAWAL, TANYA BHATIA, and MICHAEL B. MILLER, *University of California, Santa Barbara* – Individual criterion shifting strategies are remarkably consistent across time, tasks, and decision domains (Layher et al., 2020). In the current study we assessed how criterion shifting strategies are affected by the presence or absence of memory evidence. Participants performed recognition memory tests and earned points for correct responses, lost points for critical errors, but received no penalty for noncritical errors. Half of the trials included “hidden” images in which participants could not view the test image but the point structure remained the same, making it advantageous to maximize responses by only choosing the option that went unpenalized if incorrect. Shockingly, most participants failed to maximize decision criteria even in the complete absence of memory evidence! Although participants shifted to greater extents on average for hidden ($C=2.50$) versus present images ($C=0.96$), individual criterion shifting strategies remained consistent regardless of whether participants viewed test images or not ($r(34)=.51$). This suggests that individuals implement unique and consistent decision strategies in response to criterion manipulations regardless of whether decisional evidence is presented or not.

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12:00-1:00 pm (1458)

Beyond Picture Superiority: The Subtleties of Materials-Based Differences in Recognition Memory. KAITLYN FALLOW, JAMIE-LEE BARDEN, and D. STEPHEN LINDSAY, *University of Victoria* – Recognition memory studies in our lab have consistently found differences in response bias as a function of stimulus type, which we refer to as the materials-based bias effect (MBBE). Two particularly robust elements of this effect are

that response bias for images (e.g., paintings, photos of scenes) tends to be (a) conservative and (b) more conservative than bias for words tested under the same conditions (which tends to be neutral or liberal). We recently observed one exception to the MBBE: response bias was equivalently neutral for line drawings and names of the same objects (e.g., banana, lightbulb, mouse) when materials were manipulated within subjects. A follow-up study using black-and-white photos of the same objects produced a conservative bias, but interpretation was compromised by procedural differences across studies. Here we will summarize these findings and present the results of an ongoing study with a between-subjects manipulation of material type: line drawings, words, and photos of the same set of objects. These results will help distinguish among conceptual and perceptual accounts of the MBBE.

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12:00-1:00 pm (1459)

Recognition Memory Signals in Human Visual Cortex Elicited by Simple, Visual Stimuli. NATASHA M. DE LA ROSA-RIVERA, *University of Massachusetts Amherst* – Most theories of memory assume that long-term, declarative memory relies on the medial temporal lobes (MTL). In contrast, representational accounts claim that recognition memory for simple, visual stimuli should rely on visual cortex. In this study, participants studied a set of simple visual stimuli for 10-20 days via visual search training. Stimuli were built from conjunctions of shape and fill pattern. At test in the MR scanner, subjects saw studied items, recombination items (novel recombinations of features of studied items), and novel items. Participants responded “old”, “recombo” or “new”. Preliminary fMRI analyses contrasting “new” vs. “recombo” trials (a “feature memory” signal, because only the features of these stimuli differ in familiarity; the conjunctions are novel in both) show widespread recruitment across visual cortex. Analysis of the distribution of voxel activations to new, recombo, and old stimuli suggest that patterns elicited by old and recombo stimuli have reduced variance: voxels highly active to new stimuli “drop out” once stimulus features are learned. This occurs more prominently in later visual regions (e.g., LO, TO), hinting that visual feature memory may be localized to midlevel visual cortex.

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12:00-1:00 pm (1460)

Pupil Size Fluctuations Predict Item-to-Context Binding. JONATHON WHITLOCK, LILI SAHAKYAN, and RYAN HUBBARD, *University of Illinois Urbana-Champaign* – Eye-tracking measures of memory processes have focused on (1) eye movements in response to visual stimuli and (2) fluctuations in pupil size. The manner in which gaze is directed at stimuli provides a metric for assessing memory for those stimuli, whereas pupil size changes during encoding can provide an index of the state of arousal associated with memory formation, perhaps due to greater effort to learn those stimuli. We investigated the manner in which pupil size fluctuations during learning predict viewing behavior towards target stimuli at test both in single item recognition and in associative recognition





task. Pupil size dilation at encoding predicted the magnitude of viewing to selected target faces in a relational task but not in single item memory task, indicating that pupil dilations index relational encoding processes and provide a measure of binding between the learned stimuli and their originally associated context.

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12:00-1:00 pm (1461)

Can Musical Rhythm Primes Boost Memory for New Word Forms in Dyslexia? BRE-ANNA K. OWUSU and ELISABET SERVICE, *McMaster University* – Performance in grammar judgment tasks and memory for new words are poorer in dyslexic children compared to typical readers. Previous research has demonstrated that regular musical rhythmic primes can benefit subsequent grammar processing in children with dyslexia. Rhythms with regular beats orient listeners' attention over time—facilitating predictive cognitive processing. To test the presence of a rhythm attending effect on memory in dyslexic children, we adapted the methodology of a rhythmic-priming paradigm. In our procedure, the child first listens to 32-second regular or irregular rhythms. Following each prime, grammatically correct and incorrect spoken sentences containing a pseudoword are presented. Verbal memory for the pseudowords and grammaticality judgements are expected to be more accurate after children have listened to regular musical rhythms compared to irregular and unpredictable rhythms. We expect to replicate previous findings on impaired memory processing in dyslexic children. We also hypothesize regular rhythms to boost memory for pseudowords. Our hypothesized results would point to the benefit of using musical rhythms to boost verbal memory skills in dyslexic children.

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12:00-1:00 pm (1462)

Does Disfluency Improve Retention in Online Surveys? SACHIKO KIYOKAWA, *The University of Tokyo*, AYANA YOSHINO, *Nagoya University* – Disfluency through difficult-to-read English fonts has been shown to improve retention. We used difficult-to-read Japanese fonts to examine the disfluency effect in online surveys. In Experiment 1, we asked 24 adults to read 12 passages and answer comprehension questions presented in four types of fonts (one fluent and three disfluent). In Experiment 2, we randomly assigned 112 adults to one of the four conditions, using the same fonts as Experiment 1. We asked the participants to answer 50 items on personality traits and to take a recognition test. In Experiment 3, we randomly assigned 101 adults to one of the two conditions: fluent or disfluent font. We then asked the participants to answer the same items as Experiment 2, including a revised recognition test. The results showed no significant differences between the font conditions in terms of the correct rate, hit rate, and correct rejection rate. We discussed possible boundary conditions of the disfluency effect.

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12:00-1:00 pm (1463)

Should You Be in the Room Where It Happens? Comparing Supervised Versus Unsupervised Remote Data Collection in Memory Illusions. MARIANNE LLOYD, MARYCLARE COLOMBO, STEFANI MORGAN, ALICA FELLS, AMANDA CAPRIGLIONE, and AMY HUNTER, *Seton Hall University* – There is a large body of memory research on illusions of recognition memory. Two of these include fluency illusions and the revelation effect. Both of these rely on increased “yes” responses when certain types of material are presented before the test item. For the former, a matching prime can increase affirmative responses. For the latter, doing a cognitive task before making a memory decision increases both hits and false alarms. The data presented here compare the rates of these illusions across two semesters in the COVID-19 pandemic. During the fall, data were collected online with no researcher present because participants were sent a link to an online study. In the spring semester, students were supervised remotely by a research assistant. No differences in illusion rates were seen, suggesting that unsupervised remote data collection can be effective for such research. Significant fluency and revelation effect levels were observed and, further, these levels were similar to the in person data collection that was typical before the pandemic.

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12:00-1:00 pm (1464)

Episodic Familiarity and its Effect on Directed Forgetting. YI-PEI LO and LILI SAHAKYAN, *University of Illinois Urbana-Champaign* – Directed forgetting (DF) is affected by stimulus types, such that verbal materials produce larger DF compared to line drawings, complex photographs, or performed actions (Earles & Kersten, 2002; Hauswald & Kissler, 2008; Quinlan et al., 2010). In addition, studies employing depth of processing manipulations yielded inconsistent findings, with some demonstrating that deeper processing reduces DF (Dulaney et al., 2004; Lee, 2013; Geiselman et al., 1985), others finding larger DF with deeply encoded materials (Horton & Petruk, 1980), and yet other studies finding no effect of levels of processing on DF magnitude (Dulaney et al., 2004; Sahakyan & Delaney, 2003). Thus, stimuli memorability and depth of encoding can both influence DF. Here, we controlled episodic memory strength through objective repetitions. Experiment 1 used fractal images that were novel to subjects, and Experiment 2 used verbal materials. Our goal was to investigate how experimental familiarity affects the magnitude of DF. Before stimuli received Forget or Remember cues, they were shown in a preview phase, where they were repeated 0, 2, or 6 times. Therefore, during DF phase, some items were unfamiliar, whereas others were familiarized in the preview phase.

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12:00-1:00 pm (1465)

Direct Comparison of Strategic and Implicitly Reinforced Criterion Shifting. LUNA J. LI, EVAN LAYHER, and MICHAEL B. MILLER, *University of California, Santa Barbara* – There are considerable individual differences in how people adaptively shift their memory decision criterion to be more liberal/conservative





than their baseline state when motivated to do so, either by explicit instruction or by knowing the probability of memory items being old or new (Miller & Kantner, 2020). A more implicit form of criterion manipulation, the false positive feedback (FPF) paradigm, can also induce adaptive criterion shifting by selectively providing inaccurate feedback to memory decisions (Han & Dobbins, 2008). Strategic and implicit reinforcement-based criterion shifting were proposed to be independent mechanisms of criterion shifting. The current study is a direct, within-person comparison of the two criterion shifting paradigms in which participants undergo both strategic/probabilistic and implicit/FPF criterion shifting tasks in random order. We found that criterion shifting in both tasks are moderately correlated ($r(119) = .40$), suggesting that the two shifting mechanisms are not entirely distinct from each other, although old/new probability was more effective than false feedback in inducing criterion shifting. Most participants were unable to correctly identify the task that contained false feedback.

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12:00-1:00 pm (1467)

Distinctive Effects of Entropy and Variance of Reward in Value-Driven Attentional Capture. JANGKYU JU and YANG SEOK CHO, *Korea University* – It has been found that uncertainty of reward value generates an attentional bias. However, it is unclear whether attention is involuntarily shifted to objects with maximal reward information or those that signal the largest prediction error. The present study examined the effects of reward information (entropy) and prediction error (variance) in attentional bias. Participants were to search for either a red or green target circle and respond to the line orientation within the target. Each target color was associated with a different level of uncertainty: one color was paired with a single reward (zero entropy and variance) and the other with multiple reward values (Experiment 1) or one color had a high-entropy, low-variance reward contingency and vice versa for the other (Experiment 2). Attentional interference for distractors with high entropy was consistently greater than low or zero entropy distractors. In addition, when distractors with an identical level of entropy were given, variance was observed to modulate the attentional bias (Experiment 3). These results indicate that attention is primarily allocated to cues providing information about uncertain outcomes, while prediction error plays a secondary role.

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12:00-1:00 pm (1468)

Peak Moments Predict Memory for Average Emotions in COVID-19 Pandemic. HAIYUN ZENG, MATTHEW KILLINGSWORTH, ALEXA L. TOMPARY, and SHARON L. THOMPSON-SCHILL, *University of Pennsylvania* – How might learners summarize an experience that took place over an extended period of time? Would they differentially weigh the first day, last day, most typical day, or most extreme day to evaluate the experience? It seems counterintuitive to think that someone would weigh an atypical day more, but in some other research on shorter events, the atypical moments (i.e., peaks) contribute most to the estimation of overall

experience. In this study, participants rated their emotions (e.g., stress, shock, anger) every day throughout the first 2 months of the COVID-19 pandemic. One week and 1 month later, participants estimated their average emotions over that 2-month period. We found that the peak of emotions significantly predicts participants' estimated average emotions after controlling for other possible factors, such as their rating on the first day and their average rating across all days. These results reveal a tendency to overweight outliers in summarizing emotions over an extended period of time.

12:00-1:00 pm (1469)

Intrinsic and Extrinsic Factors in Second Language Grammatical Learning. MARTA RIVERA, DANIELA PAOLIERI, ANA I. PÉREZ, and TERESA BAJO, *University of Granada* – Learning a new language is an important goal that some people find difficult to achieve, especially during adulthood. Recently, several factors have related individual variability with different extrinsic (context of learning or complexity) and intrinsic (cognitive abilities) variables, but the interaction between them is barely unknown. In two experiments, we aimed to establish the implication of individual differences in proactivity and attentional focus during intentional and incidental learning of grammatical rules differing in complexity. Our results indicated that when learning an easy rule, intentional contexts benefited rule learning more than incidental contexts. However, this intentional advantage was not present when learning a complex rule. Individual differences in executive functioning predicted successful learning in interaction with the complexity of the context. Concretely, when learning an easy rule, local attention and proactive control benefited intentional learning. The benefit of proactivity was, however, reversed when learning complex rules under incidental learning conditions, suggesting that the intrinsic context interacts with extrinsic contextual conditions during grammatical rule learning.

Poster Session II

Saturday

Poster authors will be present for Q&A between 12:00 and 1:00 PM CDT, with posters available for viewing for 3 months following the conference.

12:00-1:00 pm (2001)

Bilingual Language Control: Bottom-Up Versus Top-Down. JEAN P. BODET and ARTURO E. HERNANDEZ, *University of Houston* – Bilinguals' language control mechanisms are well-researched and modelled. An overlooked aspect of their environment, however, is the language context. This research study asked whether extended immersion in a language context (bottom-up language information) can impact bilinguals' effortful language control mechanisms (top-down cognitive control). A novel paradigm accomplished this by manipulating auditory language distractors blocked into 30-second "contexts," rather than manipulating the bilingual through language-switch cues, while engaged in picture-naming. In the end, bilinguals' average response times (RT) did not differ between contexts, suggesting that context does not impact language control, though results did show that bilinguals' RT acclimated differently





over time to different contexts. Speed and amount of acclimation in each context were also mediated by a number of measures individual differences. The results and conclusions drawn from this naturalistic paradigm add to existing research concerning both the general nature and individuality of bilingual cognition.

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12:00-1:00 pm (2002)

(Reversed) Asymmetrical Switch Costs During Voluntary Language Switching. MATHIEU DECLERCK, LUZ MARÍA SÁNCHEZ, and ESLI STRUYS, *Vrije Universiteit Brussel*, ANDREA M PHILIPP, *Rheinisch-Westfälische Technische Hochschule (RWTH) Aachen University* – The most prominent measure used in the language control literature is the asymmetry of switch costs, which typically entails a larger cost to switching into the more dominant language than into the less dominant language. Since there have been concerns raised about the robustness of this effect, researchers have tried to pin down the characteristics that allow for this effect and which do not. Unfortunately, very few characteristics that have been put forward hold up across studies. One exception was voluntary language switching, which has consistently led to symmetrical switch costs—that is, until recently, when asymmetrical and reversed asymmetrical switch costs were observed in a voluntary language switching study. We looked further into this issue with two voluntary language switching studies. In Study 1, we relied on vocal sentence production with Spanish-English bilinguals, and in Study 2, we relied on single word typing with German-English bilinguals. Both these studies showed a reversed asymmetrical switch cost pattern. These findings indicate that, unlike previously assumed, voluntary language switching does not necessarily lead to symmetrical switch costs.

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12:00-1:00 pm (2003)

Multilingualism at the Market: An Immersive Virtual Reality Study of Bilingual Language Switching. ALEX TITUS and DAVID PEETERS, *Max Planck Institute for Psycholinguistics* – Bilinguals can express themselves in more than one language. Research has shown that both languages are active in parallel and compete for selection. However, most bilingual research investigating how bilinguals choose the context-appropriate language takes place in static laboratory settings with one-word utterances. In our preregistered study, we investigate the cognitive processes that allow bilinguals to switch between languages in a novel way. Earlier work has proposed that different types of inhibition underlie bilinguals' capacity to switch between languages. In two experiments, we test whether these (relatively uncontested) theoretical views generalize to situations that better resemble everyday life. In contrast to earlier work, our bilingual participants a) produce full sentences, b) speak to a life-size addressee, c) use a relevant message, and d) do so in a rich and immersive environment. Experiment 1 tests Dutch/English participants in a traditional static laboratory setting and uses colors as language cues. Experiment 2 then introduces our novel virtual reality approach to the study of bilingual language production. We

test whether traditional findings and interpretations extend to novel, arguably more naturalistic, circumstances.

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12:00-1:00 pm (2004)

Early-Multilinguals Differ from Later-Multilinguals in Naming Abilities. AARON FOSTER, KEVIN CHERRY, STEPHANIE BYERS, BERNARDO SOSA-ROSALES, and KAUYU-MARI SANCHEZ, *Humboldt State University* – This study addresses whether the language(s) learned at birth and perceived language exposure support individuals' picture naming task (PNT) accuracy. We hypothesized that multilinguals' exposure to multiple languages at birth would facilitate their accuracy on a PNT compared to those who were exposed to a single language at birth but later learned multiple languages. Using the BEST Dataset of Language Proficiency, multilingual participants (i.e., Spanish, Basque, and English speakers; N=650) were compared across two groups: those who learned a single language at birth and those who learned multiple languages at birth. Results indicated a significant three-way interaction between languages learned at birth, perceived language exposure, and objective language proficiency on PNT accuracy. Subjective language proficiency was only significant as a main effect. This suggests that those who learned multiple languages at birth may have more access to categories for naming items than those who learned a single language.

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12:00-1:00 pm (2005)

Will You Respect a Norm if It Sounds Foreign? Foreign Accent Bias and Social-Moral Norms. LUCA BAZZI OTERO, *Universidad Nebrija*, SUSANNE BROUWER, *Radboud University*, MARGARITA PLANELLES ALMEIDA and ALICE FOUCART, *Universidad Nebrija* – Foreign-accented (FA) speech generates psychological distance (out-group social member), cognitive load (linguistic disfluency), and reduced emotional response compared with a native accent (NA). These factors have been shown to affect our decisions. We investigated whether the accent—FA or NA—in which a social-moral norm is presented affects native speakers' decision related to this norm. In Experiment 1, Spanish native speakers listened to new social measures imposed during the COVID-19 pandemic, uttered either in a NA or FA and indicated 1) the efficiency and 2) how likely they were to respect it. Scores were not significantly different across conditions. Experiment 2 tested whether an accent affects the perception of social norms that have an intrinsic cultural and linguistic link (e.g., not littering on the street) and moral transgressions (e.g., consensual incest). Scores for 1) how likely participants were to respect each norm and 2) how wrong it was to commit a transgression were not significantly different across conditions. Hence, accent does not seem to affect decisions related to social-moral norms. Further research should investigate whether factors such as accent strength, comprehensibility, or stereotype modulate human behavior

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12:00-1:00 pm (2006)

Does Translation Affect Crosslinguistic Priming? ANNE NEVEU and MARGARITA KAUSHANSKAYA, *University of Wisconsin-Madison* – Bilingual nonselective language activation is evident in priming experiments, where use of a syntactic structure in production is more likely if the same structure was used in a previous sentence, even across languages. Here, we assess whether having to translate across two languages affects crosslinguistic priming. We hypothesized that the need to translate would enhance the crosslinguistic syntactic priming effect. Fifty-six Spanish-English bilinguals were randomly assigned to complete a syntactic priming task in one of three conditions: within-language (English), codeswitched (English/Spanish), and translation (English/Spanish). Logistic mixed effect models were constructed to analyze the extent to which condition, voice (active/passive), and Spanish proficiency predicted the likelihood of reusing prime sentence voice. Overall, results suggest that translating significantly increases the likelihood of reusing prime sentence voice, especially with passives. This finding was not affected by level of Spanish proficiency, suggesting that the process of translating strengthens priming of syntactic information across languages.

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12:00-1:00 pm (2007)

Withdrawn

12:00-1:00 pm (2008)

Will Knowing More English Reduce Perceptual Illusions in Mandarin Chinese? QILE CHEN and MATTHEW GOLDRICK, *Northwestern University* – Word-medial consonant clusters (e.g. [ʃp] in ‘dishpan’) are illicit in Mandarin Chinese. When Mandarin listeners perceive this sound sequence, their speech perception processes will “repair” it by adding an illusory medial vowel /i/. In an AX discrimination task, we ask whether the knowledge of a language with a less restrictive phonotactic system, in this study, English, will reduce the perceptual illusions resulting from the knowledge of a language with a more restrictive phonotactic system, Mandarin. Critical trials have a short vowel [i] or [y] and a long vowel with the same quality (/i/ or /y/). We predict that, for [y] trials, the perceptual repair process replaces [y] with /i/, leading to fewer incorrect “same” responses; for [i] trials, [i] is replaced with /i/, leading to more incorrect “same” responses; and critically, for [i] trials, the stronger perceptual repair process for Mandarin-dominant bilinguals will lead to more incorrect “same” responses relative to English-dominant bilinguals.

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12:00-1:00 pm (2009)

Codeswitching Judgments When Grammars Do Not Align. NATASHA VERNOOIJ and JULIE E. BOLAND, *University of Michigan* – Codeswitching occurs frequently in many Spanish/English bilingual communities, despite the different grammars. In two acceptability judgement studies, we found effects of stimuli variables such as grammaticality, word order, and codeswitching

cost, both when the grammars aligned and did not align. When the codeswitch (CS) occurred at a point when the two grammars did not align (between an adj/n pair), bilinguals preferred adj+n word order regardless of the matrix language. This probably reflects the more flexible Spanish word order. When the CS occurred between a determiner and the first word of the adj/n pair, two theories make distinct predictions. Bilinguals preferred the word order that corresponded with the language of the first word of the adj/n pair (First Word Hypothesis, Vernooij & Boland, 2020) as opposed to the word order of the Matrix Language (Myers-Scotton, 2002). Notably, these data reflect the judgments of a highly variable set of bilinguals, and the judgments were also highly variable. We were unable to capture this variance with participant variables such as language dominance, proficiency, and codeswitching habits. Future work will use a more sensitive paradigm and will focus on specific speaker groups.

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12:00-1:00 pm (2010)

Linking Processing Costs to Distributional Patterns of Bilingual Codeswitching. LAUREN SALIG, *University of Maryland*, JORGE VALDÉS KROFF, *University of Florida*, ROBERT SLEVC and JARED NOVICK, *University of Maryland* – Bilinguals demonstrate switch costs during language comprehension, taking longer to process codeswitched input than single-language input. However, certain switches may be harder to process than others. We tested whether the effects of codeswitching on comprehension are tied to the distributional regularities of switch types in production. Processing difficulty should be reduced for more frequent switches (e.g., perfective auxiliary switches, “la jefa has prepared”) compared to less frequent ones (e.g., perfective participle switches, “la jefa ha prepared”; Guzzardo Tamargo et al., 2016). In a self-paced reading task, 101 Spanish-English bilinguals read single-language and codeswitched sentences. Switches at the auxiliary location were processed faster than switches at the participle location, in line with production distributions (Guzzardo Tamargo et al., 2016), but masculine noun switches were not processed faster than feminine ones as production distributions would predict (e.g., Beatty-Martínez & Dussias, 2019). We will discuss how production distributions may (or may not) guide codeswitch comprehension and the factors that affect ease of codeswitch processing, including type of switch and individual language background.

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12:00-1:00 pm (2011)

Withdrawn

12:00-1:00 pm (2012)

Nonnative Noun Phrase Production: An ERP Study on the Role of Language Similarity. SARAH VON GREBMER ZU WOLFSTHURN, LETICIA PABLOS, and NIELS O. SCHILLER, *Leiden University* – Crosslinguistic influence (CLI) and language similarity are crucial to multilingual language acquisition and processing. Here, we study whether CLI effects in language production





are more pronounced in linguistically similar vs. dissimilar languages in late language learners. In a picture-naming task, we investigated CLI effects in a group of German learners of Spanish and a group of Italian learners of Spanish. We explored modulations of P300 amplitudes indexing conflict monitoring and inhibitory control and of N400 amplitudes indexing language co-activation and CLI effects. We observed CLI effects at the behavioural level, but no effect of language similarity. P300 amplitudes were modulated by CLI and larger for German-Spanish speakers compared to Italian-Spanish speakers. We found no evidence for an N400 effect across groups. Our results suggest CLI effects in late learners and distinct neural signatures of CLI effects on the basis of language similarity. Our study has important implications for the role of language similarity in nonnative language production.

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12:00-1:00 pm (2013)

Combined Lexical Frequency and Name Agreement Better Predict Word Retrieval Speed in Bilinguals than Language-Specific Characteristics. JASON WONG, *California State University, East Bay* – Lexical frequency and name agreement affect word retrieval speed: lower-frequency words and words with lower name agreement (i.e., more alternatives) are retrieved more slowly than high-frequency words and those with high name agreement. For bilinguals, activation of lexical items co-activates their translation equivalents. We tested whether word retrieval speed is influenced by frequency and name agreement of both target words and their translations. Two groups of Spanish-English bilinguals named a block of pictures in English and then Spanish. Group 1 named the same objects in both languages while Group 2 named different objects. The results of the linear mixed effects analyses showed that combining the name agreement of both the target and its translation significantly predicted English response times (RTs; $p < .05$) while English name agreement alone did not. The combined measure of lexical frequency significantly predicted Spanish RTs ($p < .05$) while Spanish frequency did not. A three-way interaction revealed that repetition of pictures across the language blocks resulted in greater crosslinguistic influence than naming different pictures in the two blocks. The results confirm that co-activation influences word retrieval speed for bilinguals.

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12:00-1:00 pm (2014)

Planning Ahead: Interpreters Predict Source Language in Consecutive Interpreting. ZHENGUANG CAI, *The Chinese University of Hong Kong*, NAN ZHAO, *Hong Kong Baptist University*, XIAOCONG CHEN, *The Hong Kong Polytechnic University* – Interpreting involves comprehending a source language (SL) sentence and producing a target language (TL) sentence. We examined whether interpreters predict lexico-semantic content in SL comprehension in consecutive interpreting to a greater extent than they do in regular language comprehension and whether such enhanced prediction is constrained by cognitive resources. In Experiment 1a and

1b, participants read an English sentence containing a critical word that was predictable or unpredictable from prior context (“Without the sunglasses/hat, the sun will hurt your eyes on the beach”) and later recalled it (a form of regular comprehension) or interpreted it into Mandarin Chinese (a form of SL comprehension). Participants were quicker at reading the critical word and/or the following regions in reading to interpret than to recall, suggesting a predictive advantage in SL comprehension in interpreting. In Experiment 2, participants read one sentence (in the low-load condition) or two sentences (in the high-load condition) to later recall/interpret. Enhanced prediction in reading to interpret was observed in the low- but not high-load condition, which suggests that SL prediction in interpreting requires cognitive resources.

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12:00-1:00 pm (2015)

Phrasal Planning Modulates the Costs of Language Switching. CHUCHU LI, VICTOR S. FERREIRA, and TAMAR H. GOLAN, *University of California, San Diego* – We investigated how default language selection affects control over language switching in bilingual sentence production. Spanish-English bilinguals described arrays of moving pictures in English that began with a complex phrase (e.g., [The shoe and the mesa] moved above the cloud) or a simple phrase (e.g., [The shoe] moved above the mesa and the cloud). Bilinguals named the second object in the more accessible language, which was English half the time (e.g., table) and Spanish (e.g., mesa) the other half, based on the training from a preceding session. In out-of-context picture-naming, such training led to cost-free language switches (Kleinman & Gollan, 2016), a result we replicated for speech onset latencies. Interestingly, in sentences beginning with a complex phrase, production durations of “shoe” and “and” were longer on switch than nonswitch trials. However, in sentences beginning with a simple phrase, speech rate was not affected by language switching until “mesa” itself was produced. Speech durations reveal broader switch costs than speech onsets; switches driven by lexical accessibility can be cost free only if they match default language selection, which operates on the phrase, the default scope of planning.

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12:00-1:00 pm (2016)

How Do Direct Retrieval and Compositional Parsing Interact in L2 Idiom Reading? MARCO SILVIO GIUSEPPE SENALDI and DEBRA TITONE, *McGill University* – The peculiarity of idioms (e.g. blow a fuse, face the music) resides in their hybrid nature as syntactically complex phrases with a unitary noncompositional meaning. Previous research suggests that when processing idioms in their L1, speakers are facilitated by variables promoting direct retrieval (e.g., familiarity) in early comprehension stages and are later inhibited by factors modulating a compositional analysis of the idiom string (e.g., semantic decomposability). The present study set out to explore how direct retrieval and compositional analysis interact when idioms are processed by L2 speakers. Thirty-seven French-English bilingual adults were presented with 60





English idioms in figuratively and literally biasing sentences while we tracked their eye movements. Linear mixed effects models of eye-tracking data revealed that verb-related decomposability drove early-stage L2 idiom recognition, while late comprehension was sped up by noun-related decomposability and by the availability of an equivalent idiom in the L1. In sum, while L2 idiom processing appears to be mostly compositional, the facilitating role of crosslanguage overlap suggests that the bilingual lexicon might be integrated also at the level of multiword units.

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12:00-1:00 pm (2017)

The Influence of Translation Ambiguity on Bilinguals' Reading in L1. XUAN PAN, YAE RAM KIM, JIA-WEI SHIH, ALEXANDRA SHERWIN, and DEBRA JARED, *University of Western Ontario* – Translation ambiguity occurs when a word in one language has more than one translation in another language (e.g., the English word bark means “dog bark” and “tree bark,” and they translate into distinct French words: aboie and écorce, respectively). The current study investigated the influence of such ambiguity in L2 (English) on bilingual's L1 reading. L1 French, Chinese, and Korean bilinguals read sentences in their L1 in an online self-paced reading task. Sentences were created based on the dominant meanings (dog bark) of the English homographs but the correct translation (aboie) was replaced either by the translation of the other meaning (écorce) or by a spelling control. Bilinguals spent less time reading the translation ambiguity error words than the controls. Differences in reading times were also observed one word and two words after the critical word. These findings provide evidence that bilingual's native language processing is influenced by L2-L1 translation ambiguity.

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12:00-1:00 pm (2018)

Crosslanguage Priming and Crosslanguage Form Similarity: The Case of Korean-English Verbicides. SOLENE HAMEAU, JAE-HYUN KIM, SACHIKO KINOSHITA, XIN WANG, and LYNDSEY NICKELS, *Macquarie University* – Korean verbicides are English loanwords that have only partial meaning overlap with their referent, and therefore are neither cognates nor false friends (e.g., 매니큐어, or /menikju/, i.e., “manicure,” means nail polish). We investigated the lexical organisation of this unstudied word class using crosslanguage masked priming of lexical decision in 50 proficient Korean-English bilinguals of varying language dominance. Four hundred twenty written English targets (210 words, 210 nonwords) were paired with five matched sets of Korean primes, a) unrelated control and b) experimental – verbicide, translation, cognate, transliteration or semantically-related (e.g., Verbicide condition—MANICURE primed by 매니큐어). We used (generalised) linear mixed effects modelling to analyse each set separately, with priming condition and language dominance scores and their interaction as fixed factors. Significant priming was found for verbicide, cognate, and transliteration primes. Significant interactions between priming condition and language dominance showed that verbicide, translation, and cognate priming effects were only present in Korean-dominant

participants. The implications of the results for the dynamics of bilingual lexical organisation will be discussed.

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12:00-1:00 pm (2019)

Foreign-Accented Speech Recognition in Quiet and in Noise by Monolinguals and Bilinguals. SITA CARRATURO and KRISTIN VAN ENGEN, *Washington University in Saint Louis* – Foreign-accented speech (FAS) recognition is typically studied with monolingual listeners, but bilinguals may have a different experience; their two phonologies offer flexibility in phonological-lexical mapping (Samuel and Larraza, 2015), which may be advantageous. On the other hand, the two languages cause greater lexical competition (Marian & Spivey, 2003), which may impede successful FAS recognition. Bilinguals are known, for example, to underperform monolinguals in speech-in-noise tasks (Rogers et al., 2006). To investigate the effect of bilingualism on FAS recognition, the current studies compare monolingual and simultaneous bilingual listeners. In the first study, both groups repeated sentences produced by speakers of Mandarin-accented English whose English proficiencies varied. In the second study, the stimuli were presented in varying levels and types of noise. Results replicated the prior finding that bilinguals perform worse for native-accented speech in noise, but mixed effects models revealed no differences in FAS recognition measures driven by listeners' language backgrounds. Possible interpretations, study limitations, and future directions are discussed.

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12:00-1:00 pm (2020)

The Influence of Visual Information on Phonetic Representations in Spanish-English Bilinguals. ZUNAIRA J. IQBAL, ANTOINE J. SHAHIN, MICHAEL J. SPIVEY, and KRISTINA C. BACKER, *University of California, Merced* – It is well established that visual information plays a significant role in our perception of speech, as highlighted with the famous McGurk illusion (McGurk & MacDonald, 1976). The presence of visual mouth movements can often drastically alter our perception of incoming speech. However, it is not well understood how the presence of visual information influences speech perception in bilingual individuals who speak two languages that categorize certain phonemes slightly differently. Here, we looked at the role of visual information in Spanish-English bilinguals compared to English monolinguals, examining key differences between Spanish and English phonology. English differentiates between the phonemes /b/ and /v/, while Spanish maps /v/ onto /b/. We examined how the presence of visual mouth movements corresponding to /va/ or /ba/ influences bilinguals' percepts of target speech along a /va-/ba/ continuum. Results suggest that for both language groups, the presence of visual mouth-shape information influences their perception of speech tokens along the /va-/ba/ continuum, with subtle differences for bilinguals.

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12:00-1:00 pm (2021)

Manipulating Degree of L1 Exposure in a Simulated Bilingual Language Learning Environment. JOHN D. PATTERSON and ELISABETH KARUZA, *The Pennsylvania State University* – Evidence suggests that learning a second language (L2) can affect representations of the first language (L1), such that L1 category boundaries converge with those of L2. However, the causal factors that influence such representational change are not fully understood. Here, we ask whether the degree of L1 exposure affects the degree of L2-related representational change. In other words, when learning the category structure of novel objects (i.e., their associated labels), does increased exposure to L1 buffer against the influence of L2? Guided by methods from the study of category learning, we use an artificial language learning paradigm that assesses L1 representations both before and after L2 acquisition. In one condition, learners receive equal exposure to both languages, while in the other, they receive three times the exposure to L1. We find evidence of L2-related representational change in both cases but, interestingly, it was not modulated by degree of L1 exposure.

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12:00-1:00 pm (2022)

One Fish, Uh, Two Fish: Effects of Fluency and Multilingualism on Adults' Novel Word Learning. EMMA LIBERSKY, ANNE NEVEU, and MARGARITA KAUSHANSKAYA, *University of Wisconsin-Madison* – Prior work has demonstrated that adults use filled pauses (e.g., “um” and “uh”) to predict novelty in upcoming referents. Here, we studied the effect of filled pauses on word learning in multilingual and monolingual adults using a paired-associate word learning task. One hundred eighty-seven adults (tested remotely) were taught nine novel labels for unfamiliar species of fish. The labels were embedded in carrier sentences that were matched for semantic and syntactic complexity. Sentence fluency was manipulated within subjects to create disfluent, fluent, and cough conditions. We used logistic regression to test the effects of condition, multilingualism, and their interaction on accuracy in a recognition task. Both multilingual and monolingual participants performed above chance at test across conditions, but there were no differences in learning by group or condition and no significant interaction between these variables. These findings indicate that filled pauses neither aid nor impair word learning, suggesting that effects of filled pauses on online processing may not extend to differences in word learning.

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12:00-1:00 pm (2023)

Belief Guides Information Search. DAVID A. ILLINGWORTH, *University of Maryland, College Park*, RICK P. THOMAS, *Georgia Institute of Technology* – Theories of how people value and search for information share the assumption that beliefs give rise to the perceived value of information. However, few studies have directly addressed the presearch processes that influence information foraging behavior. We test an assumption made by virtually all models of information foraging—that the strength of belief in hypotheses

determines the subjective value of information. Moreover, we implement a cognitive architecture that takes an initial step towards integrating information foraging theories with a model of hypothesis generation (HyGene). A sample of college students completed a hypothesis-testing medical diagnosis task. The experiment used medical tests with equal objective informative value before unveiling a presenting symptom intended to alter the strength of belief in different disease hypotheses. The simulated and empirical patterns of test selection suggest that changes in beliefs about disease hypotheses result in systematic and predictable changes in test preference—a notion we refer to as the principle of hypothesis-guided search. Our results contribute to the information search literature by demonstrating the role of presearch processes in information search.

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12:00-1:00 pm (2024)

Examining the Role of Extralegal Factors in Vehicular Heatstroke: How Does the Parent's Sex, Perceived Moral Character, and Prior Knowledge Impact Punishment? KENNETH J. BARIDEAUX, JENNIFER GRAY, and MORGAN KALTWANG, *University of South Carolina Upstate*, ALICE BIGANZOLI, *Palo Alto University* – A wealth of research has indicated that extralegal factors (e.g., defendant attributes) often influence juror decision making. However, few experimental studies have examined whether these factors play a role in judicial decision making for vehicular heatstroke cases. In the current study, participants read one of four scenarios involving the death of an 8-month-old girl who died in a vehicle because of prolonged exposure to elevated temperatures. In each scenario, the parent's sex (i.e., mother or father) and perceived moral character (i.e., described as a good parent or bad parent) was varied, and participants were asked to make a judgment about punishment after reading the scenario. The results revealed a significant three-way interaction between the parent's sex, perceived moral character, and prior knowledge level. When perceived as a bad parent, those with high prior knowledge believed that the father should be more severely punished compared to the mother. These findings suggest that several extralegal factors may contribute to the variation in judicial decision making for cases involving child vehicular heatstroke.

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12:00-1:00 pm (2025)

Multiple Anchoring: Does the Relevance of the Anchor Affect Judicial Decision Making? ANDRE DIDIERJEAN, *Université Bourgogne Franche-Comté*, CYRIL THOMAS, *University of Paris* – The anchoring effect (Tversky & Kahneman, 1974), which describes decisions biased by irrelevant numerical information, has been replicated in a wide variety of contexts (e.g., health, economical situations). Some studies have focused on the competition between anchors originating from different sources, but none have manipulated source reliability. We aim to investigate the effect of source reliability in the context of court decision-making. Participants were asked to read a text describing a trial in which two anchors of different sources—stemming from a prosecutor or from a baker—were





successively presented. Depending on the experimental condition, the prosecutor expressed themselves either first or second and proposed either 5 or 15 years of imprisonment. Overall, our results suggest that source reliability has a marginal effect. The presence of an unreliable anchor indeed drastically influences decision making, unless the reliable source is lenient and presented first.

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12:00-1:00 pm (2026)

Over- and Under-Estimation of the Number of Patients Infected by COVID-19. KUNINORI NAKAMURA, *Seijo University* – A tendency to overestimate small frequencies and underestimate large ones is a prominent feature of risk judgment. Regarding this phenomenon, the availability heuristic hypothesis assumes that certain rare events such as death by a natural disaster are frequently reported, whereas more frequent events such as death by cancer are seldom reported. Thus, disproportional availabilities are linked to events according to the tendency to overestimate small frequencies and underestimate larger ones. In this context, estimating the number of patients infected by COVID-19 would be a good sample to examine the availability hypothesis. The present study asked 110 Japanese undergraduates to estimate the number of COVID-19 patients in 100 countries. Moreover, this study also counted the number of searches that contained the following phrases, names of the countries, “coronavirus,” and “infection.” Contrary to the prediction of the availability hypothesis, the results demonstrated an overestimation of infection cases in countries with a small number of patients and an underestimation of cases in countries with a large number of patients; moreover, the number of searches were positively correlated with the number of patients in the countries.

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12:00-1:00 pm (2027)

The Influence of Self-Perceived Weather Knowledge on Severe Weather Protective Action Decisions. MARK A. CASTEEL, *The Pennsylvania State University, York* – Recent research by Nunley and Sherman-Morris (2021) found that individuals in the lowest quartile of self-assessed weather knowledge severely overestimated their actual scores on a weather knowledge test while those individuals in the top quartile underestimated their scores, a phenomenon known as the Dunning-Kruger Effect (DKE). These findings suggest that the DKE might be an important mediating variable determining whether individuals take appropriate protective action in cases of severe weather. The current study therefore investigated this possibility. Participants first took a test assessing their perceived weather knowledge, followed by a test that assessed their true knowledge of a variety of severe weather topics. They also estimated how they performed on the objective test, relative to everyone in the study. Participants then read a series of hypothetical tornado and hurricane scenarios. Following each scenario, participants made decisions about their likelihood of taking protective action. Implications of the results will be discussed, and potential next steps will be offered.

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12:00-1:00 pm (2028)

Decision Making in the Information Age: Effect of Number of Alternatives and Spatial Organization on Contextual Choices. JACOB M. STANLEY and DOUGLAS M. WEDELL, *University of South Carolina* – Decision making is heavily influenced by the context in which the decision is made. Preference for one of two equally valued alternatives has been shown to be significantly altered by the addition of a third alternative into the context. These effects have been extensively replicated using three alternative choice sets; however, modern technology has made decisions with large sets of alternatives more common, as in online shopping. Additionally, these shopping decisions are often aided by organizing filters. In two experiments we tested for the presence of the attraction and compromise effects in contexts with three and nine alternatives across formats of organization. Experiments 1 and 2 used within-subject designs to present grocery items varying in price and quality. Significant preference reversals were found for both attraction and compromise decoys in the three alternative sets. These effects were reduced for the nine alternative sets, with a significant attraction effect and nonsignificant compromise effect. Additionally, attraction effects increased in nine alternative trials with organized information compared to random presentation. Hence, contextual choice depends on both number of alternatives and their organization.

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12:00-1:00 pm (2029)

The First Attribute Heuristic in Risky Decision-Making. JOSEPH TEAL and PETKO KUSEV, *The University of Huddersfield* – Behavioural science theorists suggest that people’s judgments and decisions are often determined by the use of heuristics (e.g., Gigerenzer & Gaissmaier, 2011; Tversky & Kahneman, 1974) rather than computational processing (e.g., computing probability and money) as assumed by expected utility theory (von Neumann & Morgenstern, 1947) and prospect theory (Tversky & Kahneman, 1992). Accordingly, we propose that people’s preferences are determined by binary comparison on the first contextually available attribute. Thus, we argue for first attribute heuristic (FAH) where human decision-makers prefer the option with the higher value on the first contextually available attribute. We explored FAH in an experiment where participants had to choose between a hypothetical safe (high probability of winning a smaller monetary prize) and risky (low probability of winning a larger monetary prize) gambles. Congruent with FAH predictions, we found that participants chose the risky gamble relatively more when the first contextually available attribute was money than when the first contextually available attribute was probability. In contrast, participants chose the safe gamble when the first contextually available attribute was probability.

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12:00-1:00 pm (2030)

Can Vibrotactile Stimuli Elicit the Fast-Same Phenomenon? ÉLIAS DAIGLE, *Université de Moncton*, MICHIEL SOVI-JARVI-SPAPE, *University of Helsinki* – The fast-same phenomenon describes the unexplained speed advantage that “same” decisions have





over “different” decisions in the conjunctive same-different stimulus comparison task. The present study extended on the same-different task’s typical experimental design to use long-term memory retrieval cues presented visually or through vibrotactile stimulation, so that participants would compare one of four memorized criterion stimuli with a subsequent visual target stimulus and judge whether they were “same” or “different.” Results show response time and accuracy patterns similar to that of a standard same-different task including modelling results which posit that the elusive effect can be attributed to identity priming. In visual trials, the fast-same was present whereas it was abolished in the vibrotactile presentation condition. This difference between criterion presentation conditions lends support to the priming theory and further indicates that visual stimuli are not necessary to complete the task but are required to observe a fast-same effect.

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12:00-1:00 pm (2031)

Effects of Numeral Modification on Risky-Choice and Attribute Framing Effects. BERRY CLAUS, *Humboldt-Universität zu Berlin* – This study investigated the effects of three numeral modifiers on risky-choice framing (RCF) and attribute framing (AF) effects. In Experiment 1, in which the numerals were modified with the German equivalent of “exactly” to enforce a precise reading, there were significant RCF and AF effects. Experiment 2 (RCF) and 3 (AF) addressed the effects of the German equivalents of “at most” and “up to.” Both modifiers set an upper bound (maximally n), yet they exhibit a sharp contrast in evaluative contexts. In Experiment 2, there was a significant interaction of modifier and frame, with a reversed RCF pattern for “at most” (positive frame: preference for risky option; negative frame: preference for sure option) and a standard RCF pattern for “up to.” The modifier-by-frame interaction effect was replicated in Experiment 3 for AF. The results of all three experiments are challenging for ambiguity accounts according to which framing effects may result from lower-bound readings of bare numerals (minimally n). The findings on “at most” and “up to” are also difficult to reconcile with other accounts. To explain framing effects with bare and modified numerals, I propose an alternative account in terms of valence composition.

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12:00-1:00 pm (2032)

Local Sampling Can Explain Human Deviations from Randomness. LUCAS CASTILLO and PABLO LEÓN-VILLAGRÁ, *University of Warwick*, NICK CHATER, *Warwick Business School*, ADAM SANBORN, *University of Warwick* – Cognitive models usually assume independent, identically distributed samples to account for people’s inherent noisiness. However, when asked to produce random sequences, people fail to do so. A prominent explanation for these systematic deviations is that people use learned schemas to produce random sequences. Instead, we propose that these deviations arise because the samples people generate are drawn locally rather than independently. We test this hypothesis using a novel experimental design that allows us to discern between these two accounts: we

teach people one- and two-dimensional arrangements of syllables and ask them to generate random sequences from them. We find that local sampling accounts for participants’ sequences better than schemas. We also explore whether the temporal delays between utterances can predict patterns in the sequences and whether these predictions differ depending on the display participants learned. Our results are consistent with recent work that characterizes human cognition as an incremental process anchored on the last, local, state.

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12:00-1:00 pm (2033)

Conservatism, Caution, and the COVID-19 Pandemic: A Bayesian Latent Variable Approach to Misestimation and COVID-19. MADELYN QUIRK, JOHN JONIDES, MADISON FANSHER, POORTATA LALWANI, TYLER J. ADKINS, PRITI SHAH, and RICHARD L. LEWIS, *University of Michigan*, AYSE-CAN BODUROGLU, *Bogazici University*, MADISON CARLSON, *University of Michigan* – Initially, COVID-19 seemed to stump science as we know it. It felt like nobody knew anything, but everybody had an opinion, a dangerous juxtaposition in the face of a public-health crisis. From April 7-23, 2020, we ran a series of three studies in which participants were shown cumulative growth trends of the number of COVID-19 cases in the United States and were asked to forecast the future number of cases 3, 6, and 9 days after the last data point shown. Using Bayesian latent variable structural equation modeling, we offer a robust assessment of the structural relationships among latent constructs of political conservatism, misestimation of future growth, and social-distancing behavior. Our results suggest that liberals tended to overestimate future COVID-19 growth while reporting greater success at social distancing while conservative individuals showed the opposite trends. These politically motivated differences align with theories of cultural cognition where community identifications and worldviews influence threat perception of such a highly politicized global health emergency like COVID-19 and how our results extend to reasoning around other large-scale issues like climate change.

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12:00-1:00 pm (2034)

Inoculating Against the Spread of Islamophobic and Radical-Islamist Disinformation. MUHSIN YESILADA and STEPHAN LEWANDOWSKY, *University of Bristol* – Islamophobic and radical Islamist misinformation has negative consequences for public attitudes towards Islam. Interventions based on inoculation have been used to improve the public’s ability to scrutinise misinformation by highlighting some common logical fallacies in misleading information. This study aimed to assess the effectiveness of inoculating participants against the spread of Islamophobic and radical-Islamist disinformation. Participants were randomly assigned to an inoculation condition or a control group. Participants in the inoculation condition watched a video about how to identify common misinformation techniques. The control group watched a video about an unrelated topic. Participants then watched misinformation content, an Islamophobic video, or a video conduit to radical Islamist content.





Participants then answered questions to gauge their views on the content. The results showed that individuals who received the inoculation displayed less agreement with the misinformation, demonstrated less sharing likelihood, less perceived reliability, and less support for the misinformation. The study provides support for the use of inoculation in combatting extremist messages.

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12:00-1:00 pm (2035)

Impact of Visualization Format on Making Decisions about Exponential Risk. BURCU AVCI and AYSECAN BODUROGLU, *Boğaziçi University* – Exponential trends are conceptually hard to grasp and many critical natural phenomena show exponential growth (e.g., viral spread). Perceiving and understanding risk is affected by how information is presented and in turn, this affects decision-making. In the present study, we investigated risk perception and decision-making when exponential risk is presented with different formats. To investigate, we gave participants scenarios of balloons with popping probabilities increasing exponentially with each pump, and this information was presented either as tables or line graphs. All participants were shown scenarios involving two types of balloons varying in risk, and at each scenario, the balloons had been pumped a certain number of times. Participants reported how risky pumping one more time would be and whether they would pump it. As expected, participants were less likely to “pump” as the popping probability and the riskiness of the balloons increased. However, visualization format had no effect on risk perception or behavior. This finding suggests that participants were able to extract the critical information similarly from both line graphs and tables and respond in a more data-driven manner instead of relying on graph schemas.

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12:00-1:00 pm (2036)

Behavioural Adaptation in Multiple Goal Pursuit Within an Uncertain Environment. GRETA M FASTRICH, *University of Western Australia*, TIM BALLARD, ANDREW NEAL, and HECTOR D PALADA, *The University of Queensland*, SIMON FARRELL, *University of Western Australia* – We often have a number of goals we could pursue and must prioritise one goal over another. Goal prioritisation decisions are frequently made with the aim of reaching multiple goals within a given deadline. Past research has shown that people can differ in the strategies they adopt. Sometimes a “balancing” strategy is applied, where goals are pursued in parallel with priority given to the more difficult goal, or a sequential strategy in which the easier goal is prioritised. We asked whether people adopt different strategies depending on whether progress could be incidentally made on goals even if they weren’t explicitly prioritised. Participants played an online game in which they were presented with a series of decisions to prioritise one of two goals. Conditions differed in whether progress towards the nonprioritised goal was possible or not. In addition, both deadlines and progress were uncertain, and the progress needed towards each goal varied between trials. We found that when progress towards the nonprioritised goal was possible, the more difficult goal was likelier to be prioritised.

Even relatively minor changes to the goal pursuit environment can shift the apparent strategies that people adopt.

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12:00-1:00 pm (2037)

Informing Computational Models of Perceptual and Risky Decision Making with EEG and Individual Differences.

JOSEPH G. JOHNSON, ROBIN THOMAS, LAUREN DAVIDSON, ALLAN COLLINS, and ELIZABETH PETTIT, *Miami University* – We use a hierarchical drift diffusion model (HDDM) in conjunction with neural data (EEG) and individual differences to understand and compare perceptual and value-based choice. For perceptual decisions, participants selected among easy vs. difficult trials. For value-based choice, participants selected among pairs of gambles with two equiprobable outcomes. Gamble pairs had equal expected values but different outcome ranges, and we varied the difference between their ranges to produce similar vs. different levels of risk. We collected EEG data throughout both tasks and calculated a variety of frequency- and time-based measures to serve as continuous regressors in determining the HDDM model parameters. Finally, participants self-reported individual difference variables on decision-making styles, impulsivity, and personality. We present results that show the effects of task type, stimulus condition, and EEG signals on model parameters, such as lower drift rates for more difficult perceptual tasks and more similar risk levels. We also provide correlations between individually estimated model parameters and relevant individual difference measures, such as lower thresholds for more intuitive decision makers.

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12:00-1:00 pm (2038)

Trait Boldness Predicts Increased Risk-Taking in a Gambling Task.

KAITLIN M. MCOWEN, *Texas A&M University*, HILARY J. DON, *University College London* – In this study we examined how the constructs of boldness, meanness, and disinhibition, from the Triarchic Personality Measure (TriPM), predicted decision-making behavior in a mixed-gambles task where participants were asked to make repeated choices to accept or reject a 50/50 gamble with gains ranging from \$10 to \$40 in \$2 increments and losses ranging from \$5 to \$20 in \$1 increments. The TPM includes a novel dimension that is of potential relevance to decision-making: boldness. Measures of boldness focus on social efficacy, dominance, self-assurance, and emotional resilience. In Study 1 we found that participants higher in boldness showed greater sensitivity to the expected value of a 50/50 gamble, with a higher probability of accepting gambles overall. Participants high in boldness also showed a steeper relationship between the expected value of gambles and response times, deliberating more when the value was low, but responding quicker when value was high. Disinhibition was correlated with slower response times and negatively correlated with boldness. A replication of this study confirmed our findings. High-boldness individuals appear to take more deliberative, calculated risks during decision-making.

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12:00-1:00 pm (2039)

Caught on Camera! The Effect of Differential Witness Exposure and Witness Type on Juror Decision-Making.

LAUREN STORNELLI, MARIANNE KRAUSE, and GARRETT BERMAN, *Roger Williams University* – Police are increasingly using surveillance footage to investigate crimes and identify suspects. Previous research examining witnesses' ability to accurately face match from surveillance footage shows that police officers, despite increased training, are not more accurate in identifications than laypersons (White et al., 2014). To date, most of the eyewitness research involving surveillance identifications has focused on accuracy rates, but laboratories have yet to examine juror's perceptions of these new identifications at trial. The current study examined the effects of differential perpetrator exposures (pre-exposure vs. post-exposure) and witness type (detective vs. layperson) on mock-jurors' perceptions. Jurors rated the witness's identification as more honest when the witness made the identification after viewing the surveillance footage. Additionally, mock-jurors found the detective's identification after viewing the surveillance footage as the most accurate identification. Findings suggest that mock-jurors perceive identifications after viewing surveillance footage as more effective than identifying the suspect from a prior exposure. This highlights the importance of exposure to the perpetrators on jurors' perceptions.

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12:00-1:00 pm (2040)

Pattern Separation Predicts Which Memories Are Sampled During Decisions for Reward.

SHARON M. NOH, TYSON K. KERR, and AARON M. BORNSTEIN, *University of California, Irvine* – Recent models of decision-making have identified a key role of memory content, in addition to reinforcement learning, in shaping individual choices in ambiguous contexts. In the present study, we examined how memory mechanisms, specifically pattern separation, affect the kind of memories that guide decisions. Participants completed a decision-making task that involved making choices across six contexts. The contexts were grouped by category into three pairs—critically, contexts from the same category had different reward probabilities. We found that individual differences in pattern separation ability predicted the degree to which participant choices were driven by memory for the specific target context relative to a gist-level category representation of both target and lure contexts. Overall, these findings suggest that even when given the same set of experiences, the memories people use to make decisions depend on the type of memories that they initially form. Specifically, individuals who tend to form gist-based memories will more likely make decisions based on broad averages, relative to individuals who form more differentiated memories.

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12:00-1:00 pm (2041)

Modeling Counterfactual Retrieval in Evaluative Judgment.

FEIYI WANG, ADA AKA, and SUDEEP BHATIA, *University of Pennsylvania* – People often imagine counterfactual possibilities to an event. The study of how this occurs is central to many areas

of cognitive psychology and decision making; however, formal models of the memory processes at play during counterfactual generation have not yet been developed. Inspired by theories of list recall and semantic memory search, we build a Markov random walk model that examines how a sequence of counterfactual thoughts is retrieved from a set of all possible counterfactuals. Our model parametrically instantiates prior theories within a statistical model that can be fit to data from counterfactual generation tasks. Across three experiments, we show that our model describes and predicts the sequence of counterfactual thoughts that come to mind in response to a particular event, as well as the effects of these counterfactuals on subsequent evaluations. Our model can also explain key qualitative patterns in counterfactual generation and model the effects of contextual variables such as priming. Overall, we show how existing theories of counterfactual generation can be combined with quantitative models of memory search to provide new insights about the generation and consequences of counterfactual thinking.

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12:00-1:00 pm (2042)

Message Framing Effects Vary with Working Memory Capacity.

CHRISTOPHER A. SANCHEZ and NATHAN BAUER, *Oregon State University* – Previous research has suggested that how messages are framed or contextualized can have significant effects on decision making and the evaluation of outcomes. However, this framing effect can also interact with numerous individual characteristics such as mood or perspective. The current study extends this work and explores potential interactions between message framing and differences in working memory capacity. Participants who varied in working memory capacity read two differently structured messages (gain- or loss-framed) on the topic of maintaining a healthy lifestyle and diet. Participants were evaluated on their receptiveness to this message by performance on a fictional grocery item shopping task that contained healthy, unhealthy, and neutral shopping items. Results indicated that message framing can be effective for changing decisions for certain relevant items; However this effectiveness was dependent on participants' attentional abilities. Those lower in working memory capacity were more likely to be receptive to framed messages, which suggests that relevant cognitive differences can impact the effectiveness of messaging.

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12:00-1:00 pm (2043)

What Happens to Strategy Use and Effectiveness When Difficulty Is Manipulated on the RAPM Task?

DESTINY BELL, WHITNEY R. APPLGATE, and HEATHER BAILEY, *Kansas State University* – One common task for measuring fluid intelligence is the Raven's Advanced Progressive Matrices (RAPM). The "progressive" aspect of a RAPM task is it starts with easy problems that get increasingly harder, and performance depends on strategy use. Typically, the constructive matching (CM) strategy yields higher performance compared to the response elimination (RE) strategy, but recent research found participants switch to RE when perceived difficulty increases. In the current study, we assessed whether order of






presentation affects overall performance and strategy use. Participants completed the RAPM in different order conditions (easy-to-hard, hard-to-easy, and randomized) and reported strategies for each problem. Within all conditions, CM had higher performance across the task. Order of presentation did not affect overall performance but did affect strategy use. Specifically, participants reported using CM for easier trials and RE for harder trials in all three conditions, even though easy and hard trials were presented at different points across conditions. These results indicate that, despite being unaware of the order manipulation, participants tracked problem difficulty and implemented strategies accordingly.

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12:00-1:00 pm (2044)

Training Improves Discrimination of Judgements of Solvability, But Not How Well They Predict Later Problem-Solving Success. OLIVIA BURTON , GLEN E. BODNER, and PAUL WILLIAMSON, *Flinders University* – Deciding whether a problem is solvable is an important step in the problem-solving process. Research suggests that rapid, initial judgements of solvability can discriminate solvable from unsolvable problems. Using solvable and unsolvable anagrams, we explored if training improves discrimination of judgements of solvability and if judgements of solvability predict later problem-solving success. In a no-training condition, anagram presentation duration was 2 seconds in each of four blocks. In a training condition, anagram presentation duration started at 16 seconds and halved across blocks (16 seconds, 8 seconds, 4 seconds, 2 seconds). Judgements of solvability were discriminating in each block. Importantly, discrimination in the final 2 seconds block was more accurate after training. After making judgements of solvability, participants attempted to solve the solvable anagrams. In both experiments, anagrams deemed solvable were more likely to be solved than not solved. However, for anagrams in the 2 seconds block, training did not make judgements of solvability more predictive of anagram-solving success. In sum, judgements of solvability were discriminating and trainable, and they predicted subsequent problem-solving success—but their predictiveness did not improve with training.

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12:00-1:00 pm (2045)

Need for Closure Predicts Lower Mental Well-Being During COVID-19 Pandemic. HOLLY A WHITE, *University of Michigan* – The COVID-19 pandemic has negatively impacted mental health as well as physical health. Recent studies suggest that mental well-being during the pandemic may be influenced by disease threat, social support, financial stability, and prepandemic mental health, among other factors. The novelty and uncertainty of the pandemic may also play a role in mental health, especially for individuals who are not comfortable with ambiguity and have a high need for predictability and control. The present study tested Need for Closure—an individual's preference for structured, predictable situations and desire for personal control—as a predictor of mental well-being during the COVID-19 pandemic. A large sample of college students (N=300)

completed the brief version Need for Closure scale (Roets & Van Hiel, 2011), 7-item Generalized Anxiety Disorder Scale (Spitzer et al., 2006), and 10-item Perceived Stress Scale (Cohen et al., 1983). Results supported the hypothesized negative relationship between Need for Closure and mental well-being, as measured by perceived stress and general anxiety. Findings have implications for predicting individual mental well-being during the current pandemic and possibly under other climates of uncertainty.

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12:00-1:00 pm (2046)

Mnemonic Scaffolds Vary in Effectiveness for Serial Recall. FELICITAS E. KLUGER, DEBBY M OLADIMEJI, YUWEI TAN, NORMAN R. BROWN, and JEREMY B. CAPLAN, *University of Alberta* – Superior serial-order memory can be achieved by associating list items to anchors within a mnemonic “scaffold” (e.g., Method of Loci). We compared participant-generated mnemonic scaffolds for serial recall of 10-word lists: familiar routes (Loci), autobiographical stories (Story), parts of the human body (Body), and routine activities (Activity). The Body and Loci scaffolds were equally superior to the other scaffolds. Visual imagery aptitude and vividness and body responsiveness did not predict accuracy. Embodiment was not responsible for the high level of effectiveness of the Body scaffold. In sum, mnemonic scaffolds differ in effectiveness. The Body scaffold is a strong alternative to Loci. Visual imagery and embodied cognition and imagined navigation may not directly contribute to the success of mnemonic scaffolds. Rather, the effectiveness of mnemonic scaffolds may be based on the extent to which they provide concrete anchors in a reliable order.

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12:00-1:00 pm (2047)

Effects of Different Levels of Instructional Guidance on Decision-Making Competence. MARIA TSAPALI and MICHELLE R. ELLEFSON, *University of Cambridge* – This study, through two supplementary experiments, explores the effects of three levels of instructional guidance (explicit instruction, guided discovery and unguided discovery) on primary school students' decision-making competence. Experiment 1 adopts an experimental pretest/posttest design and classroom-based interventions with a sample of 190 11-year-old students in Greece. The results show that explicit instruction and guided discovery were significantly more effective than unguided discovery. When taking into account achievement level though, explicit instruction closes the achievement gap while guided discovery favours high-achieving students. Experiment 2 employs one-to-one think-aloud tasks with 30 students to capture their reasoning while they engage in socio-scientific decision-making. The results show that students in the explicit instruction paid more attention to the process they were following, listed the next steps, and provided more explanations about their decisions. Taken together, the results suggest that highly guided instruction is effective to introduce decision-making in mixed-level primary classrooms.

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12:00-1:00 pm (2048)

Impact of Lecture Modality and Visuals on Students' Learning Performance and Metacognitive Judgments.

NAYANTARA KURPAD and MIKO M. WILFORD, *University of Massachusetts Lowell*, NATE KORNEILL, *Williams College* – COVID-19 has forced many courses online, increasing the importance of video lectures. Research has demonstrated that students often overestimate their learning from video-recorded lectures and that this overconfidence can be exacerbated by a fluent instructor (Carpenter et al., 2013; Szpunar et al., 2014). But, fluency also can have a positive impact on students' actual learning performance (Wilford et al., 2020). The current research examined the effects of information modality (i.e., fluent or disfluent audio or video; Experiment 1), and the effects of visuals (i.e., via PowerPoint presentations; Experiment 2) on students' actual learning performance and judgments of learning (JOLs). In both experiments, participants showed effects of fluency on actual learning performance and judgments of learning (JOLs), replicating prior research. Furthermore, participants performed better when they listened to the fluent version of the audio-only lecture versus the video version. Our findings also underscore the importance of good PowerPoint presentations, as reflected by participants' increased learning performance. Thus, it appears that learning can be preserved in an online setting, when information is delivered fluently and paired with quality visuals.

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12:00-1:00 pm (2049)

Becoming Curious: Does Inducing Curiosity Enhance Self-Regulated Learning.

RYAN G. TAYLOR, *Radford University*, MORGAN D. SHUMAKER, *Texas Christian University*, KATHLEEN M. ARNOLD, *Radford University* – Several studies have shown that people better remember information when they are curious (Kang et al., 2009; Marvin & Shohamy, 2016). These studies have largely relied on natural variation of curiosity, showing that when people are intrinsically more curious about a question, they are more likely to remember the answer. The current study examines the effect of curiosity on learning when curiosity is induced, rather than relying on natural variation. Curiosity is manipulated by varying the gap in knowledge, such that when there is a larger gap in knowledge, curiosity should be enhanced (Loewenstein, 1994). Further, the current study explores a possible underlying mechanism for why curiosity may impact learning. Specifically, curiosity may enhance motivation and encourage deeper processing, which could be reflected in changes in how long learners choose to spend studying the material. In this study, learning was self-paced and the effects of curiosity on study time and subsequent memory were examined.

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12:00-1:00 pm (2050)

Withdrawn

12:00-1:00 pm (2051)

Are Handwritten Notes Better than Typed Ones for Recall? It's All About the Design.

LINDSAY D. RICHARDSON, GUY LACROIX, MOHAMMED ASWAD, VIJAY ROBINSON, and RENEE WHITTAKER, *Carleton University* – Students are encouraged to take notes in class because it improves academic performance (Dunkel & Davy, 1989). With the rapid evolution of educational technology, however, not all students take notes by hand. The effect that modality has on performance has yet to be agreed-upon by researchers. Some argue that handwriting is more conducive to learning (e.g., Gaudreau et al., 2014; Manzi et al., 2017; Mueller & Oppenheimer, 2014). Unfortunately, other researchers have found inconclusive or opposite result (e.g., Bui et al., 2013; Kutta, 2017; Morehead et al., 2019). Wammes et al. (2016) have determined that handwritten words are recalled more infrequently when compared to drawn ones, which has been coined the drawing effect. This research aimed to replicate Wammes et al.'s results while expanding upon it to demonstrate that handwritten words are recalled more frequently than typed ones. Two experiments were conducted, whereby participants were asked to draw, write, and type words and were later asked to recall as many as they could in a 1-minute timeframe. The results replicated Wammes et al.'s research as well as demonstrated evidence to suggest that handwriting lecture notes could be more beneficial than typing them.

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12:00-1:00 pm (2052)

Investigating the Relationship Between Feedback, Self-Efficacy, and Memory.

ANDREA N. FRANKENSTEIN, ONYINYE UDEOGU, ALLISON M. SKLENAR, PAULINE URBAN LEVY, and ERIC D. LSHIKAR, *University of Illinois Chicago* – Research shows that self-efficacy (confidence in one's ability) is positively related to memory. Other experimental work shows that different types of feedback can impact individuals' self-efficacy and how well they learn materials. In the current study, we examined the influence of feedback on participant's self-efficacy in an online learning setting, and whether any changes in self-efficacy were related to their memory performance on a final test. The experiment had two phases: 1) learning phase and 2) final test phase. Participants were randomly assigned to one of three feedback conditions (positive, neutral, or negative) and rated their self-efficacy before, during, and after learning. In the learning phase, participants watched lecture videos, engaged in retrieval practice, and received feedback. Final test phase was then completed 48-72 hours later. We predicted that feedback would influence self-efficacy, with positive feedback resulting in the largest increases, followed by neutral, and then negative feedback. We further hypothesized that increases in self-efficacy would be associated with better memory performance. Results partially confirmed these predictions, suggesting a relationship between self-efficacy and memory.

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12:00-1:00 pm (2053)

Withdrawn

12:00-1:00 pm (2054)

You're Not as Good as You Think: Using Metacognitive Feedback to Reduce the Influence of Inaccurate Information. NIKITA A. SALOVICH  and DAVID N. RAPP, *Northwestern University* – Exposure to inaccurate information can cause confusion, doubt about one's knowledge, and reliance on those inaccuracies. These effects are associated with people's failure to evaluate the accuracy of information during comprehension, even when they possess the prior knowledge to do so. We examined whether providing people with metacognitive feedback related to this susceptibility could encourage evaluative mindsets. Participants read accurate and inaccurate statements and subsequently answered questions related to those ideas. They were then randomly assigned feedback on whether their responses were problematically influenced by the earlier presented inaccurate statements (either more than average, less than average, or no feedback). When tasked with viewing and answering a new set of statements and questions, participants who received any form of feedback reproduced fewer incorrect answers and produced more correct answers than did no-feedback participants. After being confronted with their potential susceptibility to inaccurate ideas, people were less influenced by inaccurate information.

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12:00-1:00 pm (2055)

Motivation for Using Effective Learning Strategies: A Mixed-Methods Study on Students' Willingness to Use Effective Learning Strategies. MARLOES BROEREN, *Avans University of Applied Sciences*, PETER VERKOEIJEN, *Erasmus University Rotterdam*, ANITA HEIJLTJES, *Avans University of Applied Sciences*, GUUS SMEETS and LIDIA ARENDS, *Erasmus University Rotterdam* – Extensive research from cognitive psychology demonstrates that higher education students make limited use of effective learning strategies. Students report heavy reliance on ingrained ineffective strategies and even with relevant (metacognitive) knowledge, students experience difficulties with self-regulating the use of effective strategies. The present study investigated how motivational factors such as ability and expectancy beliefs, value, costs and learning goals affect students' willingness to use effective learning strategies during independent self-study. A mixed-method approach was used, which included a survey (n=240) and (online) focus group discussions (n=105). Participants were first-year students at a Dutch university of applied sciences. Preliminary results showed that students combine effective and ineffective strategies and that study habits are formed early on in secondary school. More importantly, students are reluctant to change their strategies due to risk of failure. Also, they tend to regulate their study efforts based on interest in the subject matter and importance of getting the desired grades. Full analyses and relevant conclusions will be presented.

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12:00-1:00 pm (2056)

Planning the Use of Learning and Motivational Strategies: Do Students Take Context into Account? YEO-EUN KIM and ANDREW C. BUTLER, *Washington University in St. Louis* – Although researchers agree about the importance of planning before learning (Pintrich, 2004; Zimmerman, 2000), we still know little about how students approach the task of selecting learning and motivational strategies and then creating a plan for their use (sequencing, time allocation, etc.). Our study investigated how students plan for their learning and whether their planning differs depending upon the demands of the learning context (e.g., the nature of the upcoming exam, a particular motivational challenge). A sample of 159 students completed a task in which they read a series of nine vignettes with different contextual demands. For each vignette, students selected specific strategies, indicated the planned order of use, and allocated time for each strategy. Critically, some of the strategies better matched the contextual demands than others. The results showed that students were effective in matching their planning to the contextual demand for learning strategies, but less so for motivational strategies. The students also reported their general perceptions of the strategies (effectiveness, ease of use, and frequency), and these perceptions were positively associated with their effective planning.

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12:00-1:00 pm (2057)

You Won't Know Until It's Too Late: Metacognition and Memory Offloading. CAMI L. CIESIELSKI, *Texas Christian University*, DANIEL M. OPPENHEIMER, *Carnegie Mellon University*, MARY L. HARGIS, *Texas Christian University* – Technological innovation has rapidly introduced powerful new tools which allow people to outsource cognitive tasks. However, this offloading is not without costs, and people may not be aware of those costs due to lack of available metacognitive cues. Across three studies, we assessed participants' awareness that using an external offloading tool leads to memory deficits as compared to information that was recalled without the use of the external store. In Study 1, participants predicted that their memory for offloaded words would be more accurate than their ability to remember words they had recalled themselves, when the opposite is true. Studies 2 and 3 suggest that task experience itself can promote understanding of the memorial costs of offloading, as participants recognized the difference in memory between offloaded and recalled words and gave accurate judgments after they had access to more metacognitive cues. We suggest that this accurate metacognitive calibration comes too late—people understand the costs of offloading only after they have already forgotten the information they offloaded.

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12:00-1:00 pm (2058)

Memory Performance in Interactive Tutorials vs. Traditional Lectures. ANNABEL D. GERAU, *University of North Carolina at Chapel Hill*, SARAH J. MYERS and MATTHEW G. RHODES, *Colorado State University* – COVID-19 has led to a need for research on effective online teaching methods. Although





PowerPoint recordings are commonly used, these may not be the most effective. The current study investigated whether interactive tutorials are more effective than traditional PowerPoint lectures. The tutorial consisted of short markerboard videos paired with narration and interspersed quiz questions. The traditional lecture used short, narrated PowerPoint videos interspersed with math problems. Participants viewed either the tutorial or traditional lecture and received a final test 2 days later. Those who watched the tutorial performed better on the final test than those who watched the traditional lecture. Experiment 2 will further investigate whether the animations, quiz questions, or both led to the observed learning benefits from the tutorial. This study suggests that recorded PowerPoint presentations may not be the best online teaching method and that incorporating active components into online lessons can aid student learning.

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12:00-1:00 pm (2059)

The Effects of Instructor Fluency and Preparedness on Student Learning and Instructor Evaluations. AMBER E. WITHERBY and SHANA K. CARPENTER, *Iowa State University* – Instructor fluency (the ease with which an instructor presents a lecture) can bias students' perceptions of their learning and the instructor, even though it typically does not affect actual learning. We explored whether these instructor fluency effects are evident when students watch online lectures and whether they are influenced by information students were given about the instructor's preparedness. Students watched a fluent or disfluent lecture. Half were told that the instructor had one day to prepare the lecture, whereas half were told that the instructor had one month to prepare the lecture. Next, students evaluated their learning and the instructor and then completed a test over the lecture. Although instructor fluency did not influence test performance, students rated the fluent instructor as more effective than the disfluent instructor. Instructor preparedness had minimal effects on any outcome. Thus, instructor fluency can bias students' perceptions in an online learning environment.

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12:00-1:00 pm (2060)

Examining the Mnemonic Impact and Frequency of Mind Wandering as a Function of Expected Test Format. SKYLAR J. LAURSEN, *University of Guelph*, JEFFREY D. WAMMES, *Queen's University*, CHRIS FIACCONI, *University of Guelph* – Individuals frequently think about things that are not related to the task at hand. This commonly reported off-task thinking is broadly defined as mind wandering. Mind wandering may be intentional, such that individuals deliberately think about things unrelated to the task, or unintentional, such that thoughts unrelated to the task occur spontaneously. Here, we investigated whether the extent to which individuals engage in mind wandering while studying material for an upcoming test depends on expected format. It is reasonable to suggest that when preparing for a relatively easier test format (e.g., forced-choice recognition vs. cued-recall), individuals may be more likely to engage in intentional mind wandering during encoding insofar as they believe the costs of doing so are minimal. Contrary to our

hypothesis, we found no evidence that rates of mind wandering vary based on expected test format. However, although mind wandering at encoding consistently led to poorer subsequent memory performance regardless of test format or difficulty, we did find some evidence to suggest that the cost of mind wandering is greater when the expected test format is more difficult.

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12:00-1:00 pm (2061)

Fetal Androgen Exposure Is Related to Reduction in Post-traumatic Stress Disorder Symptom Susceptibility Despite Childhood Adversity. STEVEN R. HOLLOWAY, and ROBIN MOORE, and JOSÉ E. NÁÑEZ SR., *Arizona State University* – Evidence suggests fetal androgen exposure and childhood experiences influence the development and function of the neuro-endocrine system; resulting hormonal dysregulation may contribute to mental disorders such as anxiety and depression. Recent research suggests self-compassion interventions may reduce posttraumatic stress disorder (PTSD) symptoms and that the experience of childhood trauma is related to increased empathy. Little is known about the impact of fetal androgen exposure on PTSD susceptibility. The current study aims to clarify the relations between these factors and to determine whether fetal androgen exposure could mitigate susceptibility to PTSD. A sample of 208 adults completed an online survey measuring fetal androgen exposure, childhood maltreatment, self-compassion, compassion for others, empathy, and PTSD symptoms. Findings show that the high fetal androgen exposure group scored significantly lower on the PTSD symptoms measure than the low fetal androgen exposure group. Significant correlations were discovered between empathy and compassion for others and between empathy and self-compassion. Future studies should explore the extent to which fetal androgen exposure influences PTSD symptom susceptibility.

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12:00-1:00 pm (2062)

Investigating the Effect of Affective Signals on Control Adaptation. MIKLOS BOGNAR, *Eötvös Loránd University (ELTE)* – Control adaptation is a well documented cognitive control mechanism which can be measured by the congruency sequence effect, where the congruency of the previous trial interacts with the congruency of the current trial creating a distinctive pattern. It is widely assumed that the effect is the result of conflict experienced on previous incongruent trials. The affective signaling hypothesis suggests, however, that the effect is not driven by conflict, but the (negative) affect elicited by the incongruent trials. To test this hypothesis we used negative and neutral words as affective but conflictless signals intermixed with a prime-probe task where we minimized the possibility of contingency and feature repetition confounds. With this design, we investigated whether affective signals without cognitive conflict can modulate congruency effect. The results reveal whether this design provides evidence that affective signal is sufficient in enhancing cognitive control on subsequent trials.

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12:00-1:00 pm (2063)

Training Self-Other Control Reduces Empathic Distress.

MICHAEL J. BANISSY and CHRISTOPHER J. EDGAR, *Goldsmiths, University of London*, GEOFFREY BIRD, *University of Oxford* – Self-other processes are important in adaptive empathic responses, particularly via the ability to switch focus between the self and other (self-other control). For instance, to experience empathy one may need to enhance representations of other people and inhibit the representation of one's own affective state; however, to prevent excessive personal empathic distress, it can be adaptive to inhibit the representation of the other's affective state and enhance the representations of the self. Here, participants completed a behavioural empathy measure (rating videos of others recalling emotional or neutral events) before and after completion of: 1) a self-other control training procedure designed to reduce the experience of empathic distress or 2) placebo-training. For the self-other training group, participants' ratings of personal empathic distress were significantly reduced when measured 24 hours posttraining, an effect that was specific to emotional stimuli (and not observed for placebo training). These findings provide evidence that self-other control training has the potential to reduce the experience of personal empathic distress, and show that empathy can be modulated via targeted training of its subcomponents.

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12:00-1:00 pm (2064)

Impact of Facial Masks on Audiovisual Emotion Perception.

SEWON OH and SVETLANA V. SHINKAREVA, *University of South Carolina* – Facial mask-wearing, once predominantly restricted to medical settings, became routine during the COVID-19 pandemic. Facial masks have been shown to hamper emotion recognition of static faces. Here we examined the effects of masks on audiovisual emotion perception. We presented participants with audiovisual clips that conveyed happy or sad emotions with or without masks and examined the effects of masks on emotion authenticity, intensity, recognition, as well as valence and arousal. Results showed that masks hinder emotion identification for dynamic expressions, similar to static faces. In the mask condition, happy emotions were perceived as less positive while sad emotions were perceived as less negative and less authentic. Both emotions were perceived as less intense, less arousing, and harder to identify. These results have implications for masked social communications.

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12:00-1:00 pm (2065)

Stress, Anxiety, and Cognitive Performance.

JESSICA A. MILLER and MICHAEL R. DOUGHERTY, *University of Maryland, College Park* – We have invited adults to participate in this research project for course credit. The purpose of the research is to develop a better understanding of how general stress and anxiety affect cognitive performance. More specifically, we are interested in measuring the amount of stress an individual experiences due to current events, such as the COVID-19 pandemic, food insecurity, racial/social unrest or injustice, and political climate. Furthermore, we want to better

understand how much these stressors affect general fluid reasoning. General fluid reasoning is known to be influenced by attention and persistence; therefore, we want to analyze if stress or anxiety relating to current events also influences general fluid reasoning. In addition, we want to control for an individual's general negative affect to look at state and trait differences of stress or anxiety in relation to cognitive task performance. The goal of the study is to develop a broad, yet impactful, grasp of current stress and general cognition.

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12:00-1:00 pm (2066)

Analogical Aha Moments Elevate Mood on an Experiment-Level Timescale.

CHRISTINE CHESEBROUGH, EVANGELIA G. CHRYSIKOU, and JOHN KOUNIOS, *Drexel University* – Aha moments have been theorized to be an epistemic emotion associated with intrinsic reward. However, little is known about how such moments influence affective processing. We examined affective antecedents and consequences of aha moments and individual differences in people's tendency to experience pleasure from aha moments during a novel analogical reasoning task. On each trial, participants described the overarching analogical relationship represented by a sequentially presented set of word pairs. Stronger aha moments occurred on trials where analogical mapping across word pairs yielded a surprising or abstract interpretation of the overarching analogical relation (e.g., ring : finger :: necklace : neck :: satellite : earth). Participants' mood was measured before and after the task with the Positive and Negative Affect Schedule (PANAS), and they completed a battery of personality questionnaires. In two samples (n=143), greater initial positive affect (PA) was associated with stronger subsequent aha moments. PA increased over the course of the experiment. This increase was mediated by reported aha strength, trait reward sensitivity, and intellectual curiosity. This shows that aha moments can elevate mood on an experiment-level timescale.

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12:00-1:00 pm (2067)

Moral Relief from the Lady Macbeth Effect Fails to Predict Pandemic Response Behaviors.

LOGAN K. DOYLE and SUSANNE FERBER, *University of Toronto* – The Macbeth effect describes how feelings of guilt or shame prime physical cleaning behaviors, such as hand washing, which in turn relieve these moral emotions. Over the past decade, several labs reported failures to replicate. We reasoned that the increased focus and moral weight put on physical cleanliness during a global pandemic provides a unique context to revisit the connection between physical cleansing and moral emotions. Recruiting from an online sample of students, participants first recalled a moral transgression from their past and then evaluated either a soap or lotion (control) product in detail. Ratings of moral emotions were collected before and after this priming of cleansing behaviors. Participants then completed a novel pandemic response scale, where they indicated their engagement in recommended COVID protocols. The preregistered analysis failed to find a significant difference in moral relief between the soap and lotion conditions, and a subsequent regression analysis on their pandemic





response scores also failed to reach significance. This study provides new evidence that even in a global state of heightened awareness to cleanliness, the Macbeth effect fails to replicate.

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12:00-1:00 pm (2068)

Is Happiness Facilitated in Discrete Emotion Word Processing? MARY C. AVERY, MICHAEL T. SPENCER, and JEANETTE ALTARRIBA, *University at Albany, SUNY* – Research on discrete emotion effects in word processing have been observed, such as that the category of emotion stimuli (e.g., happiness, anger, fear) contributes to processing differences not otherwise explained by valence, arousal, or other characteristics. Though happiness-related words (positive) have historically been facilitated in lexical decision tasks (Briesemeister et al., 2011), this pattern does not align with data from a recent experiment (Spencer et al., 2021). This discrepancy may be due to the unbalanced nature of stimuli, given a greater number of negative discrete categories (anger, fear, disgust) than positive (happiness), in many studies. Furthermore, stimuli presentation (randomly intermixed) may have obscured the expected facilitation for positive, happiness-related words. To further investigate the conditions under which facilitation of happiness-related words appears, this experiment employed a blocked stimuli design for each discrete word category (happiness, anger, fear, disgust, and neutral). Given that disruption can occur immediately following negative stimuli (McKenna & Sharma, 2004), we predicted that facilitation for happiness-related words would emerge in a blocked design.

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12:00-1:00 pm (2069)

Language Brokering Experience Affects How Spanish-English Users Experience Emotion-Laden Situations Across Languages. KARINA FEBRE, NAFISEH FAGHIHI, and JYOTSNA VAID, *Texas A&M University* – The impact of informal translation (language brokering) is increasingly being investigated as a source of variability among bilinguals. Our study examined whether frequency of prior brokering experience differentially affects judgments of emotional valence and intensity in Spanish-English adult bilinguals. Vignettes depicting positive or negative emotions were presented in each language to bilinguals varying in brokering frequency and language dominance. Affective judgments to negative emotions were comparable across languages and groups. For positive emotions, a stronger affective response was elicited in Spanish than English in bilinguals with greater brokering experience, and a stronger response was elicited in English among bilinguals with minimal brokering experience than among bilingual brokers. In contrast to previous research showing greater affective responses to emotion-laden words in the first (more dominant) language, no effect of language dominance was found for judgments of emotion-laden situations. These findings suggest that the experience of translating for family and/or community members may sensitize bilinguals to emotions expressed in their heritage language.

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12:00-1:00 pm (2070)

Negativity Bias in Source Memory? Enhanced Source Memory for Negative Source Information. NIKOLETTA SYMEONIDOU, NATHALIE C. BURTIN, LEILA M. PLOHMANN, BAS-TIAN C. SCHNIEDERS, TIZIA M. SCHOTT, and MARLENE S. SCHWEIZER, *University of Mannheim* – This research aimed to investigate whether source memory is enhanced for inherently negative source information. We used emotional (versus neutral) sounds as sources and paired these sounds with neutral male and female face items. Based on a prestudy (N=43) in which participants rated valence and arousal of 36 man-made sounds (e.g., crying or coughing), we selected two negative, two positive, and two neutral sounds to serve as sources in the main study. The three sound categories were matched on arousal and had medium arousal levels. The same participants (N=37) took part in our main study 3-4 weeks later. We analyzed data with a multinomial processing tree model to disentangle memory processes from guessing bias. Analysis revealed that source memory for negative sources was substantially better compared to positive sources and descriptively better compared to neutral sources. This suggests that people elaborate more on negative compared to positive and neutral source information. Future studies could investigate to what degree this negativity bias is driven by attentional (bottom-up) versus motivational (top-down) processes for example by introducing a dual-task component during source learning.

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12:00-1:00 pm (2071)

Withdrawn

12:00-1:00 pm (2072)

Emotional Bias in Semantic Retrieval During the COVID-19 Pandemic. AIDAN J. FLYNN, MEGHAN D. CAULFIELD, JASMINE JEUNG, JOY D. POLK, and IRENE P. KAN, *Villanova University* – Repetitive negative thinking (RNT) describes a recursive, maladaptive pattern of thought that is a common response to stress. Although typically studied through self-report, RNT has recently been examined as the activation of a negatively biased semantic network. As the COVID-19 pandemic has contributed to increased stress and anxiety, we considered how these changes may be reflected in semantic retrieval. Two college student samples completed a modified free association task to assess RNT in spring 2020 (April) and fall 2020 (September to November). Participants generated free associates in response to positive, neutral, and negative cue words, and RNT was characterized as the proportion of negatively valenced associates. We found that the fall sample generated more negative responses than the spring sample, but this was only evident in response to positive cue words. This pattern suggests that rather than a global increase in negative thinking, the pandemic may bias semantic retrieval toward negativity selectively.

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12:00-1:00 pm (2073)

Word Recall Following Incidental Learning: The Relative Contributions of Concreteness, Valence, and Arousal.

STEPHANIE A. KAZANAS and SARAH N. JONES, *Tennessee Technological University* – Word processing differences across word types are well-documented, with researchers finding significant differences across concrete, abstract, and emotion words. Some recent findings suggest an additional word type distinction between emotion (e.g., love, shame) and emotion-laden words (e.g., party, fever), that of recall differences following intentional learning (El-Dakhs & Altarriba, 2019). The present study extends these findings with recall comparisons across concrete, abstract, emotion, and emotion-laden words. Two experiments compared participants' recall following either intentional learning or incidental learning (concreteness, valence, arousal, or familiarity ratings), with word type manipulated within-subjects and learning condition manipulated between-subjects. Findings from these experiments confirmed recall differences according to both word type and rating condition. Results were then compared across positive and negative words, accounting for participants' current mood, as measured by both the Beck Depression Inventory and state portion of the State-Trait Anxiety Inventory.

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12:00-1:00 pm (2074)

Episodic Memory for Emotional Events: Free Recall and Recall Strategies.

NADA ALAIFAN, CHANTELE CHIN SIN-SHUEN, JANE KIM, SHENGXI MIAO, and PETER GRAF, *The University of British Columbia* – Emotional events (e.g., a car accident, a wedding celebration) are remembered better than for non-emotional or neutral events (e.g., driving to work, taking a shower), and this memory difference tends to be larger in women than men. There is evidence for this claim from research into autobiographical memory, but the results from investigation focused on episodic memory remain unclear. One possibility is that episodic memory is better for emotional than neutral events, but that this advantage becomes evident only when memory retrieval depends heavily on constructive, subject-initiated processing (e.g., free recall). To examine this possibility, we conducted a study with 188 undergraduate students (96 females). They studied a series of positive, neutral, and negative pictures, with arousal levels the same for the negative and positive picture sets. At study, participants rated the valence of each picture, and for the test, participants recollected out loud the pictures to the best of their ability. We transcribed and scored the recall protocols. Performance was higher for neutral than valenced pictures, and for positive and neutral pictures, women scored higher than men. There is also evidence of a strategic influence in free recall.

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12:00-1:00 pm (2075)

Emotion and Motion: Superior Recall of Emotional (But Not of Moving) Objects. ADAM COX, *University of Ottawa*, JULIEN LIORET and HANNA CHAINAY, *Université Lumière Lyon 2*, PATRICK DAVIDSON, *University of Ottawa* – Episodic memory can be influenced by many variables. For example, a large body of

research has shown that emotional objects are easier to remember than neutral ones. Fewer studies have examined the possible influence of object motion on memory, but a small literature on film clips suggests that moving scenes are easier to remember than static ones. Here we asked how stimulus emotion and stimulus motion might influence recall. We showed 60 concrete objects (an equal mix of negative, neutral, and positive valence) one at a time to ~120 undergraduate students online. Half of the objects moved and the other half were static (in two separate blocks). Free-recall followed each block. As expected, negative items were easier to recall than neutral and positive ones. Surprisingly, object motion had no significant influence. We replicated these findings in the laboratory with a separate sample of undergraduates. Our results suggest that movement effects, if present at all, are smaller than emotional valence effects on object recall.

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12:00-1:00 pm (2076)

Memory Retrieval for Disgust- vs. Fear-Related Stimuli: A Diffusion Model Analysis.

ELIF YÜVRÜK and AYCAN KAPUCU, *Ege University* – Previous studies revealed that disgust-related stimuli increased memory accuracy as well as liberal response bias compared to fear-related stimuli. Yet, retrieval dynamics of this disgust-related memory advantage have received little attention to date. We compared different retrieval components of disgust- and fear-related stimuli via diffusion model-based analysis. Participants studied three blocks of disgust-related, fear-related, or neutral pictures followed by an old/new recognition test. Preliminary analysis confirmed that participants were more liberal (in relative starting point) in responding to disgust-related pictures. Moreover, disgust-related pictures produced familiarity memory bias (in drift rate) indicating more efficient evidence accumulation favoring the “old” response, while fear-related pictures produced novelty memory bias indicating more efficient evidence accumulation favoring the “new” response. Next, we plan to compare participants' response cautiousness for those stimuli. The present study suggests that different retrieval mechanisms might underlie memory for specific emotions even when those emotions carry similar valence and arousal properties.

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12:00-1:00 pm (2077)

The Effect of Emotion on Memory for Type of Peripheral Information.

MARY J. CHAPMAN and JAMES A. KOLE, *University of Northern Colorado* – Emotion heightens memory for events (central information), but less clear is how emotion affects memory for details not directly part of those events (peripheral information). Most studies that investigate how emotion affects peripheral information use the same type of stimuli for central and peripheral information (e.g., word pairs) that are easily integrated. We attempt to disrupt the easy association of central and peripheral information by using words for central information (neutral, negative, or taboo) and either neutral words or a letter for peripheral information. Participants studied 30 central/peripheral pairs, followed by cued recall for





the peripheral word/letter. Accuracy in recalling the peripheral word/letter was higher for taboo and neutral central words than for negative central words. No difference was found between remembering peripheral words or letters, even though word-word pairs are more easily integrated than word-letter pairs. These results could indicate different attentional mechanisms. If the emotional event is negative but causes less arousal, attention may focus on central information, but if the event has mixed valence and high arousal, greater attention may be allocated to peripheral information.

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12:00-1:00 pm (2078)

Facial Mimicry Does Not Support Accurate Storage of Emotional Expressions in Working Memory. EMIL HOLMER, JERKER RÖNNBERG, and MATTIAS EKBERG, *Linköping University* – Facial mimicry is sometimes assumed to play a critical role in the processing of emotional expressions. However, whether it does in tasks tapping into higher-order reasoning is not yet established. In the present study, we examined the effect of facial mimicry interference on working memory for facial emotional expressions. Healthy, young adults (N=36) performed an emotional expression n-back paradigm with two levels of memory load, low (1-back) and high (2-back), and three levels of mimicry interference: strong, weak, and no interference. Further, we investigated whether an association between executive skill and performance on the 2-back condition was influenced by level of interference. Results showed that, regardless of memory load, mimicry interference did not influence accuracy. However, we did observe a stronger association between executive skill and performance during the high interference condition compared to the no interference condition. We conclude that facial mimicry does not play a critical role in working memory for emotional expressions. However, the impact that reduced facial feedback have on the processing of emotional expressions might be influenced by the individual's level of executive control.

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12:00-1:00 pm (2079)

Recognizing Brief Facial Expressions of Emotion with Varying Display Durations and Intensities. JUSTINA A. CHAMBERLAND and CHARLES A. COLLIN, *University of Ottawa* – Limited research has explored the temporal thresholds for recognizing brief facial expressions of emotion. However, the Japanese and Caucasian Brief Affect Recognition Task (JACBART) has been proposed as a standardized method for measuring recognition capabilities wherein a target expression is presented serially between two neutral expressions. The current study sought to explore the temporal thresholds for recognizing the six basic emotions using seven stimulus presentation durations (5, 10, 20, 40, 80, 160, and 500 ms), while also manipulating the intensity of the target expression (50% vs. 100%). Results revealed a significant interaction between the category of expressed emotion, its display duration, and its display intensity, whereby specific emotions were recognized at rates above chance with shorter display durations than others. Additionally, varying the intensity of the displayed expression was observed to influence recognition

capabilities for some emotions more than others. Altogether, the current results demonstrate the varying temporal recognition characteristics of the six basic emotions according to display intensity.

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12:00-1:00 pm (2080)

Executive Contributions to Perspective-Taking. ADAM W. QURESHI and REBECCA MONK, *Edge Hill University* – Visual perspective-taking—the ability to see the world from another person's perspective—has been studied extensively, but findings have been mixed as to the relative contributions of executive function. Specifically, it has been questioned whether visual perspective-taking requires executive functioning processes or whether these processes are merely facilitative. This presentation summarises a series of studies on level-1 perspective-taking in which participants carried out the dot task while also engaging different executive functions (updating, shifting and inhibitory control). Dual-tasking and brain stimulation techniques were also incorporated, along with path analyses to explore predictive relationships. Findings suggest that while some executive functions (inhibitory control) are required when dealing with interfering perspectives others (updating) may only be assistive. Results from these studies are combined toward a discussion of the potential implications for our understanding of simple perspective-taking and wider theory of mind.

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12:00-1:00 pm (2081)

The Effect of Sudden-Onset Distractors on Reading Efficiency and Comprehension. TANNER JENSEN and STEVEN G LUKE, *Brigham Young University* – Reading is an essential skill that requires focused attention. However, much reading is done in non-optimal environments. These days, much reading is done on digital devices or there is a digital device nearby. These devices often introduce momentary distractions during reading, interrupting with alerts, notifications, and pop-ups. In two eye-tracking experiments, we investigated how such momentary distractions impact reading. Participants read paragraphs while their eye movements were monitored. During half of the paragraphs, distractions appeared periodically on the screen that required a response from the participants. In experiment 1, the distractions were arrows that the participant had to respond to and then could immediately forget. In experiment 2, the participants performed a 1-back task that required them to remember the identity of the last distractor. Compared to the no-distraction condition, the respond-and-forget distractors of experiment 1 had minimal impact on reading behavior and comprehension, but the working-memory-load distractors of experiment 2 led to increased rereading and decreased reading comprehension. It seems a simple pop-up does not disrupt reading, but a message you must remember will.

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12:00-1:00 pm (2082)

Comprehension Monitoring in Children with ADHD.

OLIVIA J. WARD, DEBRA JARED, and DEANNA C. FRIESEN, *The University of Western Ontario* – The present study examined whether students with attention deficit hyperactivity disorder (ADHD) differed from their typically developing peers on their ability to monitor comprehension during text processing. Using a self-paced reading task, children (ages 9-14) read six texts about animals where half were consistent (semantically congruent) and half contained a piece of contradictory information (semantically incongruent). Following each text, participants performed a story recall. A significant interaction between group and congruence revealed that typically developing children spent more time processing the critical region when the text was incongruent relative to congruent, suggesting that they noticed the conflict. In contrast, children with ADHD did not differ in their processing of the two types of texts. These results provide evidence as to where comprehension breaks down in individuals with ADHD. Findings are discussed in terms of individual differences in encoding and retrieving information during text processing.

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12:00-1:00 pm (2083)

Reading Pseudowords in a Single-Route Model with Segments Defined by Visual Attention. ALI SAGHIRAN and SYLVIANE VALDOIS, *Centre National de Recherche Scientifique (CNRS) Laboratoire de Psychologie et Neurocognition* – In dual-route models, stimulus processing can follow one of two routes. Word stimuli are assumed to be processed by the lexical route, in a fully parallel manner, whereas pseudowords take the sublexical route, in a serial manner. However, these models lack a plausible explanation of how segments would be identified, and it is unclear whether parallel and serial processing can proceed simultaneously and independently of sensory visual processing. Here, we introduce BRAID-Phon, a single-route computational model of reading. In the model, the spatial distribution of visual attention, which defines the extent of the segment considered visually, is linked to a phonological attention component, to delimit the corresponding phonological segment. We present illustrative experiments to highlight properties of the model. First, we show that segment-based reading provides a continuum between purely parallel and letter-by-letter sequential reading. Second, we show that the reading output depends critically on chosen segments. The pronunciation of pseudowords (irregular or regular) and the type of reading errors (lexicalization of pseudowords, regularization of irregular words) varies depending on the segment size (long or short).

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12:00-1:00 pm (2084)

Modeling the Transition from Serial to Parallel Visual Processing in Orthographic Learning: The Effect of Visual Attention Capacity. ALEXANDRA STEINHILBER, EMILIE GINESTET, and SYLVIANE VALDOIS, *Centre National de Recherche Scientifique (CNRS) Laboratoire de Psychologie et Neurocognition*

– During reading acquisition, beginning readers transition from serial to parallel processing. Our aim was to explore the role of visual attention in this transition through computational modeling. We used the BRAID-Learn model, a Bayesian model of visual word recognition, to simulate the orthographic learning of 700 4- to 10-letter English known words and novel words that were presented five times to the model. Visual attention capacity in the model was manipulated to estimate its impact on the learning process. We measured the overall processing time and number of attentional captures across exposures and their impact on two markers of serial processing, the lexicality and length effects, depending on attention capacity. Results showed that the two effects diminished across exposures as visual attention capacity increased, due to higher ability to process more letters efficiently simultaneously. The simulated patterns are consistent with the developmental trajectories during reading acquisition. Overall, our study suggests that the efficacy of orthographic learning depends on visual attention capacity and that visual attention may be critical to explain the transition from serial to parallel processing.

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12:00-1:00 pm (2085)

The Effect of Grapheme Crosslinguistic Congruency and Complexity on Letter Detection by Spanish Children Learning English.

CARMEN HEVIA-TUERO, *Universidad de Oviedo*, SARA INCERA, *Eastern Kentucky University*, and PAZ SUÁREZ-COALLA, *Universidad de Oviedo* – The purpose of this study was to determine if the congruency and complexity of English graphemes influence letter detection in L2 learners (Spanish natives). We further investigated whether age group (7, 9, and 11 years old and undergraduates) determines the size of the effects. Participants completed two letter-detection tasks using the mouse-tracking paradigm. Experiment 1 examined the effect of grapheme-to-phoneme mappings congruency across languages. English words containing (1) congruent (“A” in park) or (2) incongruent (“A” in name) graphemes were selected. Results indicate that the congruency effect is weak. Experiment 2 examined the effect of grapheme complexity. English words containing: (1) simple (e.g., detect “A” in dark) or (2) complex English-specific (e.g., detect “A” in beach) graphemes were selected. Results indicate that the complexity effect is strong. Differences were larger among younger students, pointing to a greater reliance in a serial processing strategy at early stages of reading development. This investigation provides information about how Spanish children learning English process sublexical units.

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12:00-1:00 pm (2086)

Withdrawn

12:00-1:00 pm (2087)

Withdrawn





12:00-1:00 pm (2088)

Age-of-Acquisition Impacts Spelling Error Detection: Evidence from an Online Proofreading Task. MADISON LAKS and HEATHER SHERIDAN, *University at Albany, SUNY* – During reading, words are processed faster if they are rated as being acquired early in life compared to later in life (i.e., age-of-acquisition effects; AoA). Given that the task demands for proofreading differ from reading, we investigated if AoA effects extend to an online proofreading task. Specifically, early- and late- acquired target words were embedded in sentence frames after being matched for a variety of potentially confounding variables, including word frequency, length, imageability, OLD-20, and familiarity (using the stimulus set from Juhasz and Sheridan, 2020). The participants rapidly proofread these sentences for spelling errors, and our results showed that they detected spelling errors in early-acquired words more frequently than in late-acquired words. This advantage in proofreading performance for early-acquired words demonstrates that AoA effects, which have been extensively documented in reading tasks, can also extend to proofreading. We discuss the implications of our results for theories of AoA effects.

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12:00-1:00 pm (2089)

Eye Movements and FRPs Reveal Distinct Effects of Lexical Frequency on Parafoveal Processing. SARA MILLIGAN, *University of South Florida*, MARTÍN ANTÚNEZ and HORACIO A BARBER, *Universidad de La Laguna*, ELIZABETH R SCHOTTER, *University of South Florida* – Readers use both foveal input from the currently fixated word and parafoveal input from the upcoming word to achieve efficient visual and higher-level linguistic processing. The familiarity of a parafoveal word and the extent to which it matches the subsequent foveal input influence fixation durations (Schotter & Leininger, 2016), indicating that parafoveal processing has a substantial influence on eye movements. Word recognition unfolds over time however, and eye movements are limited in how much they can reveal about downstream integrative processes that occur independent of the eyes moving forward ballistically. In the current study, we coregistered eye movements and EEG to investigate how parafoveal information interacts with foveal processing during natural reading. We find that eye movements can be preprogrammed based on parafoveal input alone but that the underlying neural processes of word recognition incorporate both foveal and parafoveal information and do not conclude the moment the eye moves on.

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12:00-1:00 pm (2090)

Aphantasia and Phonological Processing During Reading. MICHAEL A ESKENAZI, MORGAN LIPKIN, LUCAS SURRENCY, and OLIVIA TIDD, *Stetson University* – Aphantasics have no conscious experience of visual images in mind. This lack of visual imagery is not simply an epiphenomenon as aphantasics demonstrate different behavioral patterns. Although aphantasia is mostly studied with visual imagery, there are also aphantasics who lack internal phonological representations. The purpose of the current study was

to determine whether phonological aphantasics demonstrate different behavioral patterns in two phonologically based word processing tasks. First, in the masked homophone priming task, a target (frog) is preceded by either a related prime (toad) or a homophone of the related prime (towed). Second, in the visual tongue twister effect, participants silently read sentences with six repeated word-initial phonemes or matched sentences with no repeated phonemes. Phonological aphantasics showed the same pattern of homophone priming as typical participants. However, phonological aphantasics showed no disruption from silently reading tongue twisters. Results indicate that aphantasia does not prevent phonological codes from being activated during word reading and that phonological aphantasia may be more associated with different working memory representations.

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12:00-1:00 pm (2091)

Withdrawn

12:00-1:00 pm (2092)

Schizotypal Personality Traits and their Influence on Reading and Reading-Related Abilities in Neurotypical Adults. NARISSA BYERS, CLARICE HOE SUE YEEN, and SARAH M. MACISAAC, *University of New Brunswick* – Although schizophrenia and developmental dyslexia are distinct disorders, there is growing evidence of a common neurodevelopmental basis. This includes genetic and pathophysiological overlap (e.g., greater schizotypal traits among people with dyslexia) and similar deficits in reading and reading-related processes (e.g., oculomotor control, auditory/phonological processing, executive functioning) (reviewed in Whitford et al., 2018). Here, we extend this work by examining the relationship between schizotypal traits and reading (as well as reading-related processes, such as language and executive functioning) in neurotypical young adults. Participants (N=43) completed a battery of standardized reading, language, and executive functioning tasks, as well as the Schizotypy Personality Questionnaire (Raine, 1991). Results revealed a negative association between phonological processing/reading fluency and schizotypal traits, but a positive association between executive functioning and schizotypal traits. Taken together, our findings suggest that the relationship between schizotypy and reading abilities extends to healthy individuals, lending additional support for a common neurodevelopmental basis between schizophrenia and dyslexia.

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12:00-1:00 pm (2093)

Oral Reading Errors of Russian Adolescents While Reading in LexiaD, the First Dyslexia-Specific Cyrillic Font. VLADISLAV ZUBOV and SVETLANA ALEXEEVA, *Saint Petersburg State University* – The LexiaD font was developed for Russian-speaking people with dyslexia. LexiaD demonstrated an advantage over other Cyrillic fonts (PT Sans and PT Serif) when children with and without dyslexia read silently (Alexeeva et al., 2020). In this study, we investigate adolescents' reading performance while reading aloud





from text in LexiaD and the familiar Arial font. We hypothesized LexiaD would produce fewer oral reading errors. We recruited adolescents in ninth and tenth grades (14–17 years old) with ($n=40$) and without ($n=32$) reading disorders. Participants read two texts; the order of the texts and fonts was counterbalanced across participants. We registered reading errors caused by substitution, insertions, deletions, and transpositions of sounds. Statistical analysis using mixed effect modeling was conducted (DV: number of errors, IVs: font, participant group, and their interactions). The effect of the font was insignificant, as well as the interaction between font and participant group. However, people with dyslexia made significantly more errors than those without dyslexia. Therefore, for adolescents, there was no evidence that the new LexiaD font outperformed the familiar Arial font. Funded by Presidential grant #MK-1373.2020.6.

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12:00-1:00 pm (2094)

Myside Bias Influence on Letter-Transposition Effects During Reading. SARAH-ELIZABETH DESHAIES and KIEL CHRISTIANSON, *University of Illinois* – Gilead et al. (2018) reported a grammaticality judgment study on statements in the form of opinions. When participants read grammatically correct opinion statements, they were slower to rate the statement as correct when they disagreed with the opinion than when they agreed with it. Participants were still accurate; however, reaction times were slower, indicating increased scrutiny on opinions they did not agree with compared to ones they did. This current work sought evidence of scrutiny in opinion statement reading using the transposed-letter (TL) effect (swapping or substituting letters) as a tool to probe the effect. Results from a self-paced word-by-word reading experiment replicated the classic TL effect: reading times on the TL word were not significantly different from correctly spelled words, and significantly increased reading times were seen on substituted-letter (SL) words. However, reading times on the SL word were reduced when the participant strongly agreed or strongly disagreed with the statement, indicating a lack of scrutiny or noticing this normally disruptive misspelling. Additional work will investigate this finding in an eye-tracking study and on the grammatical level.

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12:00-1:00 pm (2095)

Are There Independent Effects of Constraint and Predictability on Eye Movements During Reading?. ROSLYN WONG, AARON VELDRE, and SALLY ANDREWS, *The University of Sydney* – Evidence of processing costs for unexpected words presented in place of a more expected completion remains elusive in eye-movement studies (e.g., Frisson et al., 2017; Luke & Christianson, 2016). The current study investigated whether such prediction error costs might depend not only on the degree of constraint for the most expected completion, but also on the source of such constraints. Participants' eye movements were recorded as they read sentence passages containing predictable and unpredictable target words that were matched in cloze probability but differed in whether the source of predictability was limited to the local context (i.e., the constraint

for the most predictable word stemmed entirely from the final preceding sentence), or emerged from the global context (i.e., the constraint for the most predictable word depended on the entire preceding passage), or due to the combined local and global context. Linear mixed models assessed the relative impact of the type of prior constraint on readers' early and late processing of unexpected input. We interpret our results within a hierarchical generative framework of language comprehension and consider their implications for existing theoretical models of predictive processing.

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12:00-1:00 pm (2096)

Effects of Text Length and Line Spacing on Eye Movements During Reading. STEVEN G. LUKE and WALLACE M. DODDS, *Brigham Young University* – In many eye movement studies of reading, the stimuli consist of single sentences presented on a single line, even though most reading involves multisentence passages. When longer texts are used in eye-tracking studies, they are often presented with maximal between-line spacing, which again deviates from the usual conditions under which people read. In a pair of experiments, we examined how these common laboratory reading conditions (single sentences, maximal line spacing) contrasted to more naturalistic reading conditions (paragraphs, minimal line spacing). A single sentence presented in isolation was read more slowly and reread more than that same sentence presented as the first in a paragraph. Reducing the line spacing of a paragraph led to longer first fixation durations, longer total reading time, and more runs on each word. Furthermore, the word frequency effect was weaker for more closely spaced paragraphs in the analysis of first fixation duration but stronger in the analysis of total reading time. Single-sentence reading experiments may overestimate reading and rereading times while increasing line spacing leads to underestimates of reading times and misrepresentations of frequency effects.

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12:00-1:00 pm (2097)

A Similarity-Based Approach for the Analysis of Individual Differences in Reading. NOAM SIEGELMAN, *Haskins Laboratories*, JAY G. RUECKL and JULIE BROWN, *University of Connecticut*, LAURA M. STEACY and DONALD L. COMPTON, *Florida State University* – A growing literature shows that readers are differentially impacted by the properties of written words and that differential sensitivity to multiple word features (e.g., frequency, phonological consistency, imageability) is associated with variation in reading skill. Yet given the large number of potentially relevant item characteristics, a need arises for a method that can reveal patterns of responses across items without a need to specify the target properties. We propose such an approach, which uses an inter-subject similarity analysis of responses across items. Using word naming data from both developmental and adult samples, we show that individuals who show greater similarity in the pattern of responses across items in the naming task are also more similar in their reading skills. This finding holds even when similarity is computed on centered matrices that do not include information on subjects' mean accuracy and reaction





time (RT). We further show that the similarity-based approach captures variance not accounted for by theory-driven analysis focusing on specific item properties. We discuss how our data-driven method can inform reading theory, presenting an upper-bound of variance that theory-based analysis should strive to explain.

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12:00-1:00 pm (2098)

Reading for Fun or Study? Effect of Mind Wandering on Text Reconstruction While Pursuing Different Reading Goals.

ALEXIS LOMBARD and MARIANA RACHEL DIAS DA SILVA, *Tilburg University*, CAITLIN S. MILLS, *University of New Hampshire*, SILVY COLLIN, *Tilburg University*, CAITLIN S. MILLS, *University of New Hampshire*, MARIE M. POSTMA, *Tilburg University* – In this study, we investigated how induced reading motivation modulates the impact of mind-wandering episodes on knowledge reproduction and text reconstruction. Participants (N=161) were instructed to read either a coherent or incoherent version of a text while pursuing study or entertainment reading goals. While reading, participants answered probes assessing the occurrence, relatedness and intentionality of their mind-wandering episodes. They then answered 18 multiple-choice questions about the content of the text and reconstructed it in their own words. Linear model analysis revealed that though mind wandering in interaction with the reading goals and text coherence did not have any impact on knowledge reproduction, it did affect text reconstruction (measured by means of Levenshtein distance). The reported mind-wandering episodes were more detrimental to the quality of the reconstructed texts when they were motivated by study purposes. These results indicate that the relationship between mind-wandering and task performance depends on the reader's motivation for reading.

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12:00-1:00 pm (2099)

Task-Switching While Reading Impairs Long-Term Memory for Some But Not All of a Passage.

AMY SMITH, *Quinnipiac University*, GREGORY I. HUGHES, *U.S. Army Combat Capabilities Development Command (DEVCOM) Soldier Center*, LEAMARIE T. GORDON, *Assumption College* – Reading is often briefly interrupted from sources like messaging apps. In general, switching between two tasks is detrimental for cognition. However, each time a reader is interrupted and must reorient to a text, they must revisit the last part of the text that they were reading before the distraction occurred. Thus, a reader's memory for the revisited parts of the passage could be strengthened relative to other parts of the passage. We aimed to determine whether task-switching differentially influences long-term memory for information that does and does not precede a distraction. In a replication and extension of Pashler, Kang, and Ip (2013), participants read a text passage while either receiving no interruptions (control group), random interruptions (random group), or interruptions that occurred immediately after reading the information that would be tested on the subsequent cued-recall test (planned group). Relative to the control group, we found that planned interruptions resulted in similar cued-recall performance

but random interruptions resulted in lower cued-recall performance. Thus, task-switching while reading may impair learning, but not for parts of the text that immediately precede distractions.

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12:00-1:00 pm (2100)

The Impact of Implicit Narrator Reliability on Accepting (Mis)information During Fiction Reading.

ANGEL HOUTS, *University of Arkansas* – Readers acquire accurate and inaccurate information from fiction. This study examined whether implicit narrator reliability moderated the impact of misinformation. Participants read stories that each contained three assertions. The first two setup assertions were either correct information (e.g., Jupiter is the largest planet) to establish a reliable narrator or implausible misinformation (e.g., Pluto is ...) to establish an unreliable narrator. After these assertions, the last, critical assertion was either truthful, implausible, or plausible misinformation (e.g., emus are the largest nonflying birds). Answers on a subsequent general-knowledge test to questions associated with critical assertions showed that misinformation led to lower accuracy, and plausible misinformation led to higher production of misinformation. The setup assertion manipulation interacted with the critical assertion such that when the critical assertion was correct, reliable narrators led to greater accuracy than did unreliable narrators. The implications of these results for theories of comprehension and memory will be discussed.

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12:00-1:00 pm (2101)

Examining the Effect of Phonology on Incidental Word Learning.

MEGAN E. DEIBEL, DONALD L. KNAPP, and JOCELYN R. FOLK, *Kent State University* – Phonological neighborhood density refers to the number of words that differ from a target word by one single phoneme, and words with high phonological neighborhood densities have been shown to facilitate word identification (Yates, 2005; Yates et al., 2008). The present study investigated if the incidental learning of novel words with large phonological neighborhood densities in print is similarly facilitative. Novel words with high (e.g. “phise”) and low phonological neighborhood densities (e.g. “jorve”) were embedded in sentences. One hundred and ten Kent State University participants read the sentences silently for comprehension at their own pace and were not told of the post-tests that followed. Thus, learning was incidental rather than intentional. After reading the sentences that contained the novel words, participants completed spelling and meaning recognition tests to assess learning. Results indicated that high phonological neighborhood densities facilitated learning the meanings of the novel words, but there were no differences in learning the spellings.

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12:00-1:00 pm (2102)

Context Variability Promotes Generalization in Reading Aloud: Computational and Behavioral Evidence.

IAN MILLER, *University of Toronto Scarborough*, NICOLAS DUMAY,





University of Exeter, MARK PITT, *The Ohio State University*, BLAIR ARMSTRONG, *University of Toronto Scarborough* – Recent neural network simulations and human data on reading aloud suggest a warping mechanism governs the extent to which a newly learnt pronunciation generalizes to similar letter strings (Armstrong et al. 2017; Kim et al. 2013). Here, we explored whether variation in orthographic context promotes this generalization behaviour. Human participants and a version of the Plaut et al. (1996) PDP model both were trained on spelling-sound mappings based on either one, two or three exemplars (e.g., “bive – kive – tive” for /kIv/), for the same amount of exposure overall. Additionally, whereas half of the participants were trained immediately before the test, the other half were trained 48 hours before. In both participants and the model (see Miller et al. 2020), variation in adjacent context increased the likelihood of generalizing novel and subordinate pronunciations to test probes (e.g., “mive”). And in humans, this graded effect was seen only in the delayed group. These results indicate that context variation promotes warping of representational space and that warping itself comes about only after a period of incubation.

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12:00-1:00 pm (2502)

Bittersweet Holidays: Personal and Cultural Impact on a Reader’s Emotional Situation Model of a Story. ANGELA BRUNSTEIN, JOERG BRUNSTEIN, and MARTIN ROSENSTOCK, *Gulf University for Science and Technology* – When reading narratives, readers construct a situation model of the story that probably includes related emotions. This study investigated what happens when the reader’s emotional attitudes meet cultural stereotypes, for example for happy holidays and boring waiting time in governmental offices. German and Kuwaiti participants read narratives with their eye movements, heart rate, and electrodermal activity (EDA) recorded. It shows that for homogenous cultural stereotypes, readers seem to override their personal attitude – their (hated) family gatherings are perceived as happy as everybody else’s. In contrast, with more ambivalent cultural perceptions, readers’ personal attitudes have a stronger impact—waiting rooms become even more awful than everybody else’s. This illustrates that readers integrate both general public perceptions and their own experience when reading narratives.

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12:00-1:00 pm (2103)

Positional Dependencies, Optimal Identification Performance, and Similarity Effects in Sequential Eyewitness Lineups. JEROME D. HOOVER, ANDREW L. COHEN, and CAREN M. ROTELLO, *University of Massachusetts Amherst* – Recently, eyewitness research has favored a signal detection framework for examining performance and decision bias. Within this framework, previous research has noted several position effects that occur as a consequence of administering the lineup sequentially. For example, position-independent models have shown that criterion locations decreased as position decreased. Position-dependent models have revealed increased memory discriminability as position

increased. The present work is a replication and extension of these studies. In an experiment using abstract stimuli, we examine how memory discriminability and decision criteria change as a function of lineup position when choice is forced and the culprit is present and when choice is not forced and the culprit is present half of the time. Next, we examine the extent to which it is optimal to change criteria to maximize percent correct. Finally, we examined how similarity relationships between previously rejected stimuli and the culprit affects current decision-making. A number of position effects were detected, participants deviated from optimal decision policies, and memory traces from previously rejected stimuli were observed. Implications and future directions are discussed.

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12:00-1:00 pm (2104)

Memory Enhancement from the Cognitive Interview May Depend on Imagination. HEATHER M. KLEIDER-OFFUTT and BETH B. STEVENS, *Georgia State University* – The cognitive interview (CI), over standard interview procedures, has been successful at increasing the number of scene details remembered by eyewitnesses. In addition to open-ended questioning, police ask witnesses to report details in reverse order from how they occurred and to take the perspective of another person at the event and report details as they would have seen them. Although the CI assists in retrieval of information, this technique relies heavily on mental imagery, a skill that varies among individuals and is lacking in about 10% of the population (aphantasics). Thus, individual differences may influence the efficaciousness of the CI as a recall technique. In this study, we indexed imagery ability prior to showing crime videos followed by either the CI or no CI. Preliminary results suggest that people with lower imagery ability are not advantaged by the CI as the number of details and accuracy of remembered information did not differ from control. This suggests that low imagery people may not be advantaged by investigative techniques that require imagination.

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12:00-1:00 pm (2105)

Promoting Eyewitness Recall Through Sketching in the Self-Administered Interview. CHRISTY PARAMO and JACLYN K. MAASS, *University of Central Oklahoma* – The cognitive interview (CI) is a widely researched investigative method that promotes accurate and detailed recall from eyewitnesses. One major limitation of the CI is the time and training needed to properly administer it. To combat these limitations, Gabbert (2009) developed the Self-Administered Interview (SAI), a booklet emulating the CI without the need for trained interviewers. One portion of the SAI requires eyewitnesses to sketch the crime scene, and additional research (Matsuo & Miura, 2017) has examined whether the sketch itself includes a significant number of new details about the event above what is produced through free recall. The present study investigates whether generating a sketch allows more information to be elicited from subsequent free recall. Drawing a sketch may prime or spread activation to details from the event that an eyewitness would not have otherwise recalled as a simple statement of fact. We predict





that those who generate a sketch as part of the SAI will recall more event details during free recall than those who do not sketch before recalling the event.

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12:00-1:00 pm (2106)

Criterial Variability in Eyewitness Identifications.

REBECCA DIDOMENICA and SCOTT GRONLUND, *The University of Oklahoma* – Lineups typically induce superior performance compared to one-person identification procedures or showups. Understanding what makes the lineup a superior procedure is important to reduce identification errors. Differential filler siphoning, diagnostic feature detection, and criterial variability each attempt to explain lineup superiority. We test the hypothesis that accuracy of an identification is impacted by group-level variability in criterion placement. Experiment 1 showed greater variability in criterion placement in the showup condition, although overall performance was not worse than the lineup condition. Experiment 2 uses different photos of faces from study to test and introduces a constrained showup condition designed to lessen criterial variability by increasing criterion conservatism. We replicate the finding that people set their criterion more variably in showups compared to lineups but found greater criterial variability in the constrained-showup condition relative to the showup condition. Signal detection modeling explores the aforementioned hypotheses.

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12:00-1:00 pm (2107)

The Influence of Instructions on Simultaneous Lineups: Accuracy and Eye Tracking Record.

IGNACIO SIFRE, NIEVES PÉREZ-MATA, and MARGARITA DIGES, *Autónoma University of Madrid* – In the present study, 140 participants were presented with absolute judgment instructions or relative judgment instructions when they were facing a present perpetrator lineup or an absent perpetrator lineup. Participants' eye movements were recorded during the lineup presentation to assess whether they were able to implement the explicit instructions given. Results showed no significant differences between the type of instruction and the identification accuracy in any of the lineups. However, eye-tracking records showed that participants with absolute instructions made significantly less inter-photograph comparisons than those with relative instructions on both types of lineup. Finally, participants' metamemory evaluations about their own visual examination pattern indicated some grade of correspondence between participants' self-reports and their eye-tracking records. Although eye movement measures showed that participants in the absolute judgment condition could implement partially the instructions given, this pattern of results did not translate into a higher accuracy rate in any of the lineups.

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12:00-1:00 pm (2108)

Cognitive Processing of Police Body-Worn Camera Video Footage.

KATHY PEZDEK and TYLER SHAPLAND, *Claremont*

Graduate University – In three experiments with active duty police officers and civilians, we showed that (a) viewing body-worn camera (BWC) video footage of officers' participation in a simulated use-of-force incident altered officers' memory for the incident, (b) viewing the BWC footage multiple times did not enhance this effect, and (c) when responses of civilians viewing officers' BWC footage were compared to those of participating officers, officers remembered having shot their gun twice as many times as they actually had (whereas civilians were more accurate), rated the incident as generally more dangerous, perceived the start of danger earlier in the incident, and were more accurate remembering which equipment they had drawn first. Officers also indicated that they were more justified in the level of force they had utilized. In *Graham v. Connor* (1989), the US Supreme Court specified that actions of law enforcement officers should be "judged from the perspective of a reasonable officer on the scene, rather than with the 20/20 vision of hindsight." Here we show that the participating officer's perspective is likely to differ from that of civilians viewing a BWC recording of the event afterward.

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12:00-1:00 pm (2109)

Online Co-Witness Discussions Can Lead to Memory Conformity.

ERIC Y. MAH, BENNETT P. KING-NYBERG, KELLY E. GRANNON, and TIMOTHY FRIESEN, *University of Victoria*, SAMANTHA A. RASOR and KIMBERLEY A. WADE, *University of Warwick*, D. STEPHEN LINDSAY, *University of Victoria* – Co-witnesses can influence each others' memory reports (memory conformity). In the MORI paradigm, in-person pairs are led to believe that they witness the same event, but actually witness different versions, discuss the event, then take individual memory tests. This in-person paradigm has revealed robust co-witness conformity effects across cultures (Ito et al., 2019). Rasor et al. (2021) found memory conformity effects using a virtual online paradigm in which videos were presented to participants (N=80) separately and participant discussions occurred via text chat. We conducted an initial pilot in a student population (N=18) examining memory conformity with online video-based discussions. We also found memory conformity effects: Lower accuracy for details about which participants were misled or exposed to misinformation during the discussion, relative to items about which participants were not misled or exposed to misinformation. In a planned follow-up experiment, we will examine co-witness conformity effects in live online video discussions with community participants recruited via Prolific. Ultimately, we hope to demonstrate the viability of online co-witness experiments.

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12:00-1:00 pm (2110)

Improving Eyewitness Identification of Masked Individuals.

RACHEL O'DONNELL, JASON C.K. CHAN, and GARY L. WELLS, *Iowa State University* – As a result of the COVID-19 pandemic, many nations have passed laws that require people to wear face masks in public settings. Manley et al. (2019) demonstrated that after viewing a masked face during encoding, presenting a lineup of





masked faces can improve identification of that masked face relative to a lineup of unmasked faces. Using more ecologically valid materials, we replicated this masked-lineup superiority effect in Experiment 1. However, in some real-life eyewitness situations, investigators might show the eyewitness an unmasked lineup before asking the lineup members to put on masks, so eyewitnesses might view a masked and an unmasked lineup. In two additional experiments, participants had a brief view of a masked lineup before making an identification from an unmasked lineup or a brief view of an unmasked lineup before making an identification from a masked lineup. Performance on these lineups was compared to a singular masked or unmasked lineup. The masked-lineup superiority effect was replicated even when participants were initially exposed to an unmasked lineup.

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12:00-1:00 pm (2111)

Crossmodality on Memory Conformity. IN-KYEONG KIM, ENOCH S. KWON, JULIA SANCHEZ, and HANNAH SITANG-GANG, *La Sierra University* – The present study investigated the social influence on memory of the event with conflicting visual and auditory information. The iKIM procedure was used to test memory accuracy under group pressure without confederates. Four participants (one minority and three majority) in a group watched slightly different videos (participants assumed it was the same one) on their cell phones, and in succession, answered questions about what they saw one at a time in a group setting. The minority saw and heard different information regarding the critical scenes on the video. For the critical scenes, the minority was always asked last, and what the majority and minority saw was different but what they heard was the same. Three days later, they were asked the same questions with specific answers on what they heard and saw. Results indicated that the minority conformed on what they saw to what the majority said, and the memory conformity about the video with auditory information was similar with the video with no sound. This study therefore suggests that the impact of social pressure on what people heard from others was substantial and the memory conformity was similarly observed crossing modalities between visual and auditory information.

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12:00-1:00 pm (2112)

The Influence of Prior Suspect Familiarity on the Cross-Race Effect. ALEX WOOTEN, SOHA MUNIR, and HANA P. OLOF, *Hollins University*, CURT A. CARLSON, *Texas A&M University-Commerce* – Researchers have consistently supported the finding that individuals suffer a deficit from recognizing other-race faces using basic recognition and lineup paradigms (Brigham et al., 2007). The purpose of this study was to test whether this cross-race effect (CRE) would be influenced by prior familiarity with a suspect in a lineup. To test this, white participants studied a series of faces of white and Black males during the first stage to create familiarity. Later, participants took part in a multiple-block eyewitness paradigm in which they encoded a target face (i.e., guilty suspects), followed

by a distractor task, and received a lineup where the suspect was Black or white, familiar (studied earlier) or unfamiliar (completely new), and either guilty or innocent. We replicated the CRE for both unfamiliar and familiar suspect lineups (discriminability was harmed for other-race faces). Interestingly, this effect was attenuated when the suspect was familiar.

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12:00-1:00 pm (2113)

Toward a More Complete Modeling of Sequential Eyewitness Identifications. RYAN MCADOO and DAVID KELLEN, *Syracuse University* – The sequential lineup procedure remains one of the most commonly used in police departments across the United States. While it has seen much empirical research (Stebly, Dysart, & Wells, 2011), there has been comparatively little work formally modeling this procedure. Furthermore, previous attempts to model the sequential lineup have not properly considered that decisions made in sequence are uniquely different than decisions made at one timepoint (Baumann et al., 2020). To examine this, we performed an iterative series of signal detection theory based models of the sequential lineup in which we allowed discriminability, response bias, or both to vary across sequence position. We found that models allowing response bias to vary across position provided the best fit to data from a large-scale study (Wilson et al., 2019). This result does not support the diagnostic feature-detection hypothesis (DFD; Wixted & Mickes, 2014), which predicts only changes in discriminability across sequence. Future researchers are encouraged to formally model lineup data and think outside the box in terms of what questions we can ask of our data. Furthermore, the DFD hypothesis requires more research on its predictions for lineup performance.

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12:00-1:00 pm (2114)

The Relationship Between Face Recognition Ability, Lineup Identification, and the Cross-Race Effect. MEGAN CAPODANNO and HEATHER OFFUTT, *Georgia State University* – Facial recognition ability can vary widely from person to person. This variation has the potential to influence real-world scenarios, such as lineup identifications, in which the stakes for identifying or misidentifying a face are high. Another potential influence is the cross-race effect, or the tendency to better recognize same-race faces. To assess facial recognition ability, the Cambridge Face Memory Test (CFMT+) has been used to identify a spectrum of facial recognition ability, from prosopagnosia (face blindness) to what Duchaine and Nakayama (2006) call super-recognizers (those with superior face recognition ability). The current study examines if CFMT+ scores predict participants' ability to correctly identify perpetrators from crime scene videos from a lineup while accounting for the cross-race effect. Preliminary results suggest a relationship among CFMT scores, correct identification, and cross-race variables. Further regression analyses will be conducted.

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12:00-1:00 pm (2115)

Optimizing the Information Value of Lineups: The Exhaustive Simultaneous Procedure. MICHAEL TUTTLE, JEFFREY J. STARNES, ANDREW L. COHEN, and CAREN M. ROTELLO, *University of Massachusetts Amherst* – A standard eyewitness lineup consists of a single suspect and a number of fillers. The fillers are known to be innocent, but the suspect may be innocent or guilty. The goal of the lineup is to gain as much information as possible about the guilt or innocence of the suspect. Fillers, while helpful for many reasons (feature comparison, filler siphoning, etc.), may also be detrimental to obtaining information about the suspect. In a standard simultaneous lineup, if a filler is picked, the eyewitness never makes a response to the suspect directly and therefore only provides limited information about their guilt or innocence. In this study, we take a preliminary look at a lineup procedure, the exhaustive simultaneous, that aims to correct this issue by always getting a direct confidence rating for all lineup members, including the suspect. Using a signal detection theory framework, we discuss advantages and disadvantages of the exhaustive procedure compared to a standard simultaneous lineup. Results showed that direct confidence ratings for the suspect discriminated guilty and innocent suspects even for witnesses that identified a filler as the culprit, showing that filler identifications can hide information in a standard lineup.

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12:00-1:00 pm (2116)

Through the Filtered Lens: How Do Filtered Photos Impact Subsequent Facial Recognition? NICK GARCIA and SARA D. DAVIS, *University of North Florida*, RACHEL E. DIANISKA, *University of California, Irvine*, KRISTA MANLEY, *Iowa State University* – Over the past five years, the ability for applications like Snapchat and Instagram to digitally alter photos of faces has increased in popularity. These “filters” can change the appearance of the face in two ways: by occluding the features of the face (e.g., by superimposing a dog’s ears, mouth, and tongue onto the face) or by distorting the features of the face (e.g., by slimming the jaw, widening the eyes, etc.). As these types of digital records are increasingly displayed on social media over nonfiltered photos, it is important to understand how exposure to these faces might influence subsequent face recognition. This is particularly the case for missing persons, for whom it is important to quickly disseminate accurate photos in order to facilitate their later recognition. Participants in our experiment encoded a series of 24 faces that were presented unfiltered, filtered by occlusion, and filtered by distortion. After a brief filler, participants then saw 24 of the same unfiltered faces with new facial expressions and 24 new faces and were required to indicate which faces had been previously encoded. Our results indicated that using filtered faces for encoding may inhibit subsequent face recognition.

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12:00-1:00 pm (2117)

Examining Lineup Composition Effects on Eyewitness Identification by Varying Filler Similarity. ALYSSA R. JONES, *North Carolina Wesleyan College*, CURT A. CARLSON,

Texas A&M University–Commerce, ROBERT F. LOCKAMYER, *SUNY Oneonta*, JACOB HEMBY, *Texas A&M University–Commerce* – After a crime occurs, police will often ask the eyewitness to make an identification (ID) from a photographic lineup that contains a suspect and fillers (i.e., individuals known to be innocent). It has been argued that lineups should be composed of similar looking fillers, so that the suspect does not stand out (Lindsay & Wells, 1980; U.S. Department of Justice, 1999). However, when all lineup members are highly similar to each other, eyewitness ID performance declines (Bergold & Heaton, 2018; Carlson et al., 2019). In the current study, we aimed to explore effects of lineup composition on ID performance by varying the number of high- vs. low-similarity fillers included in the lineup. A nationwide sample of participants (N=8,973) were presented with a target face and were later asked to make an ID from a target-present or -absent (i.e., no fillers) lineup or showup. Results show that lineups containing more high-similarity fillers produced better eyewitness discriminability compared to showups, and lineups with more low-similarity fillers increased participants’ willingness to ID the suspect. These results suggest that at least one filler should be high in similarity to the suspect.

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12:00-1:00 pm (2118)

One Perpetrator, Two Perpetrators: The Effect of Multiple Perpetrators on Eyewitness Identification. ROBERT F. LOCKAMYER, *SUNY Oneonta*, CURT A. CARLSON, *Texas A&M University–Commerce*, ALYSSA R. JONES, *North Carolina Wesleyan College*, ALEX WOOTEN, *Hollins University*, MARIA A. CARLSON and JACOB HEMBY, *Texas A&M University–Commerce* – Most eyewitness identification research simulates single perpetrator crimes, but real-world crimes often transpire at the hands of multiple perpetrators. It is unclear how multiple perpetrators might impact the ability of eyewitnesses to discriminate between the guilty and innocent. To address this issue, we conducted two experiments in which large nationwide samples of participants read a vignette about a crime being committed and then viewed 1-2 target faces. If there were two targets, they were either similar or dissimilar and presented either simultaneously or sequentially. Participants later viewed a target-present or -absent lineup for each target. As predicted, presenting one target enhanced discriminability compared to two targets presented simultaneously (Experiments 1 and 2) and two targets presented sequentially (Experiment 2). Results were mixed regarding the effect of similarity, with discriminability better for dissimilar compared to similar target pairs in just one experiment. Lastly, high confidence indicated high accuracy across all conditions.

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12:00-1:00 pm (2119)

Using Eyewitness Behaviors Extracted from Lineup Videos to Postdict Suspect Guilt. NYDIA T. AYALA, ANDREW M. SMITH, and GARY L. WELLS, *Iowa State University* – Decades of research demonstrates that confidence, decision time, automaticity, deliberative strategies, featural references, and other postdictor variables are useful for assessing the reliability of suspect identifications





from lineups. Yet, with few exceptions, postdictor variables have been examined in isolation, with confidence and decision time receiving the lion's share of attention. This may be attributable, in part, to the fact that many eyewitness behaviors are difficult to capture in typical experimental paradigms. We randomly assigned participants to view a target video from one of five simulated viewing distances (10, 60, 110, 160, or 210 feet). Afterwards, a "blind" experimenter administered a culprit present/absent lineup via Zoom. "Blind" raters scored each witness on 92 behavioral variables. Logistic regression analysis with a LASSO constraint revealed that identification decisions, confidence, decision time, cognitive effort, and encoding conditions independently predicted the reliability of eyewitness identification decisions. These postdictors proved useful for suspect identifications, and, as we predicted, not-present responses.

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12:00-1:00 pm (2120)

The Effect of Lineup Size of Eyewitness Memory when Fillers are Highly Similar to the Suspect. KYROS SHEN, JOHN T. WIXTED, and CHUN LIT ALLAN LAM, *University of California, San Diego* – A typical lineup consists of one suspect (innocent or guilty) and some number of innocent fillers who resemble the suspect. Previous studies found that increasing the number of fillers beyond one (i.e., lineup size=2) does not affect lineup discriminability. Such results are inconsistent with the Ensemble model, which predicts that discriminability should increase with lineup size. Yet the Ensemble model is strongly favored in studies that manipulate filler similarity instead of lineup size. In our study, we utilized a face morphing software to directly manipulate the similarity of the fillers to the suspect and varied the number of such fillers to investigate how the effect of lineup size interacts with filler similarity. The results showed that when filler similarity was high, increasing lineup size decreased discriminability. Our model-fitting results suggest a possible switch of decision-making strategy from the Ensemble model to the Independent Observations model when the fillers are extremely similar to the suspect. If so, the use of dissimilar fillers should cause the lineup size effect to be reversed (such that the results would now accord with the Ensemble model).

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12:00-1:00 pm (2121)

Is the Perceptual-Scaling Approach to Eyewitness Identification Superior to the Traditional Lineup? ANDREW M. SMITH, *Iowa State University*, LAURA SMALARZ, *Arizona State University* – A promising new approach for collecting eyewitness identification evidence was recently developed in which lineup members are presented to the eyewitness in pairs and the eyewitness' preference for the suspect is scaled relative to the other lineup members (perceptual-scaling procedure; Gepstein et al., 2020). The originators of this procedure argued that it demonstrated similar classification performance to that of traditional simultaneous and sequential lineups; however, this conclusion was based on a crossstudy comparison confounded by differences in lineup fairness that biased the results in favor of the perceptual-scaling procedure. We show that

after removing this confound, the perceptual-scaling procedure undermines classification performance. We present results from the first experiment that directly compared the perceptual-scaling procedure to a traditional simultaneous lineup.

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12:00-1:00 pm (2122)

Verbal Justifications Improve the Predictive Value of Numeric Judgments of Learning for Eyewitness Identifications. JESSICA N GETTLEMAN and CHAD DODSON, *University of Virginia* – Judgments of learning (JOLs) assess the likelihood that presented information will be remembered in the future. While JOLs are predictive of face recognition performance (e.g., Sommer et al., 1995), they are typically less predictive of performance than postdictive confidence judgments, including in eyewitness identification paradigms (Nguyen et al., 2018; Whittington et al., 2019). Using a paradigm in which participants provide immediate JOLs for target faces and then respond to lineups associated with these faces after a short delay, this experiment aims to improve the predictive value of JOLs by asking participants to provide justifications for their JOLs by providing specific details about why they selected a particular rating for a given face. The text from the justifications was analyzed using a machine learning approach to determine which words were most predictive of correct identifications and whether these verbal justifications add predictive value above and beyond that provided by the numeric JOLs alone. We found that justifications were reliable predictors of identification accuracy, as these verbal statements contained diagnostic information that was not already captured by the numeric JOL ratings.

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12:00-1:00 pm (2123)

Does Face Recognition Awareness Impact the Diagnostic Value of Eyewitnesses' Verbal Confidence Statements? JESSE H. GRABMAN and CHAD DODSON, *University of Virginia* – Previous research finds a strong association between eyewitnesses' numeric confidence and identification accuracy. However, real-world witnesses typically provide confidence, "in their own words," rather than numerically. In this study, 300 mock witnesses completed 12 lineups (half target-present), a self-assessment of face recognition ability (CFMQ), and an objective assessment of face recognition ability (CFMT). After each lineup decision, participants registered numeric confidence (0%-100%), described their certainty in their own words (e.g., "very certain"), and provided verbal justifications (e.g., "I remember his eyes."). We compared multiple machine-learning methods of predicting the accuracy of identifications from the participants' verbal statements. We find that numeric and verbal confidence provide non-overlapping diagnostic information toward predicting lineup identification accuracy. Moreover, objectively stronger face recognizers wrote statements that were more diagnostic of correct identifications than weaker recognizers. Finally, higher self-perceived face recognition ability corresponded with greater changes in average verbal confidence across objective face recognition ability.

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12:00-1:00 pm (2124)

Mechanisms of False Memories in Bilinguals. BIANCA V. GURROLA, DIANA URIBE, and WENDY S. FRANCIS, *The University of Texas at El Paso* – We investigated false memories in bilinguals using a Deese–Roediger–McDermott (DRM) procedure with three goals. First, we attempted to replicate the previous finding that false memories in bilinguals are more likely when the study and test are in different languages (Howe, Gagnon, & Thouas, 2008; Marmolejo, Diliberto-Macaluso, & Altarriba, 2009). Second, we examined whether bilinguals could integrate information across languages at encoding to form false memories and how this compares to information integration within a language. Third, we examined the association of language proficiency with susceptibility to falsely remembering the critical lures. Spanish-English bilingual participants studied lists of words associated to particular critical words that were not presented. These lists were either English only, Spanish only, or alternating English and Spanish. After each list was studied, participants attempted to free recall all studied items in the designated language, English or Spanish, and upon completion of all study-recall cycles, there was a yes/no recognition test. Analyses focused on false recall and recognition of the critical lures.

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12:00-1:00 pm (2125)

Illusory Truth Effect for Wellness Claims?. ANNA M. WRIGHT and SARAH BROWN-SCHMIDT, *Vanderbilt University* – The rate at which false and seemingly contradictory information is spreading online through various formats has sparked an increase in research on the illusory truth effect, the phenomenon in which repeated information is processed more fluently and perceived as more true. In a series of preregistered experiments, we investigated the effect of repetition on the perceived truth of statements within the domain of online wellness messages. Participants were exposed to real messages that, despite being in circulation, are either widely known truths, widely known falsehoods, or messages with contradictory scientific evidence. The findings of our first two experiments reflect a repetition-induced illusory truth effect, with repeated claims rated as more true than those not seen at study. Follow-up research examines the magnitude of the effect when the same statements are formatted as article headlines presented alongside an image and short caption, similar to how wellness claims are presented as headlines online. This work speaks to the impact of viewing real claims about wellness information on beliefs about truth.

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12:00-1:00 pm (2126)

Examining Lexical and Associative Factors that Predict Phonological False Memories. KAI CHANG and JEN COANE, *Colby College*, ÁNGEL FERNÁNDEZ and EMILIANO M. DíEZ, *Universidad de Salamanca*, MARÍA A. ALONSO, *Universidad de La Laguna*, CLAUDIA SANCHEZ-GUTIERREZ, *University of California, Davis*, DAWN M. MCBRIDE, *Illinois State University* – In the Deese–Roediger–McDermott (DRM) paradigm, participants study lists of words that are designed to elicit the recall or

recognition of a critical item (CI). Semantic backward associative strength (BAS) is the strongest predictor in the DRM effect. Comparable false memory effects are found with phonologically associated lists, but there is limited knowledge about what predicts such errors. To examine this, we used phonologically related DRM lists in English and in Spanish and administered free recall and recognition tests. The average list-to-lure Levenshtein distance (LD) provided a measure of lexical similarity. We conducted regression analyses with five CI-level lexical features (length, frequency, age of acquisition, imageability, concreteness) and two list-level variables (average list-to-lure LD, average veridical memory) as predictors. Average list-to-lure LD only predicted phonological false memory in Spanish but not English. The results suggest that different word decoding strategies adopted by native English and Spanish speakers lead to different false memory processes.

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12:00-1:00 pm (2127)

Withdrawn

12:00-1:00 pm (2128)

The Role of Correction Saliency in Misinformation Reminder Effects on Memory and Beliefs. PAIGE L. KEMP and SYDNEY M. GARLITCH, *University of North Carolina at Greensboro*, VANESSA M. LOAIZA, *University of Essex*, and CHRIS N. WAHLHEIM, *University of North Carolina at Greensboro* – The ability to update memories and beliefs with accurate information is essential in a posttruth society. Reminding people of misinformation before corrections can facilitate such updating. We examined the role of conflict saliency in those effects. Participants first viewed news headlines with factual information and misinformation. Participants then saw factual headlines that corrected misinformation and repeated correct information. Some corrections appeared with no indication of their accuracy, and others that appeared following a misinformation reminder were labeled as corrections. A third set of corrections were labeled but did not follow a reminder. Replicating earlier findings, memory and belief accuracy was greater when reminders appeared than when corrections appeared alone. Critically, memory and belief updating was intermediate when corrections appeared without reminders. These results show that heightening conflict salience between true and false information enhances memory and belief updating, but conflict salience cannot completely explain the updating benefits conferred by misinformation reminders.

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12:00-1:00 pm (2129)

The Effect of Animacy on False Recall and Recognition: A DRM Study. ANDRONIKOS BOTSAS and MARIE POIRIER, *City, University of London* – This study investigated the role of animacy in recall and recognition using the Deese–Roediger–McDermott [DRM] paradigm. Animacy is the classification of entities as either animate (living) or inanimate (nonliving). Previous research indicates an advantage in the veridical recall and recognition of





animate items. However, how animacy might affect false recall and recognition had not been investigated to date. One view suggests that animates benefit from more elaborative processing. This can result in a greater contextual memory, making lures more easily identifiable as unstudied, in turn reducing false memories. Participants were presented with mostly animate and mostly inanimate lists, with each followed by a free recall task. Upon presentation and free recall of all lists, participants were given a recognition test. Results indicated significantly improved veridical memory for animate items relative to inanimate ones, in both recall and recognition tests. Furthermore, animate lists were associated with a significant decrease in false memory for both recall and recognition. These findings are further discussed in relation to current proposals explaining the animacy advantage.

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12:00-1:00 pm (2130)

The Effect of Accountability on False Memory. HALEY MCCOY, *Towson University* – False memories occur when we remember events that did not happen. These errors have important real-life implications (e.g., faulty eyewitness testimony). This study evaluated whether holding participants accountable for their answers would reduce false memory. Using the Deese-Roediger-McDermott (DRM) and misinformation paradigms, participants were assigned to either social (told a researcher would look at their dataset to check for proper saving), performance (told their answers would be evaluated for accuracy), or no accountability conditions. Overall, accountability did not influence false memories in either paradigm. However, one marginal result emerged when including only participants who passed the manipulation check: Those in the performance accountability group had higher rates of false memory in the misinformation portion than the other groups. This result could be due to performance accountability being similar to stress (prior research has shown that stress can increase false memory). These findings suggest that accountability has little impact on false memory, although the research should be reproduced with in-person (vs. online) participants before strongly endorsing this conclusion.

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12:00-1:00 pm (2131)

Phonological and Semantic False Memories Across Memory Systems. ELIZABETH M. MARSH, *Illinois State University*, KAI CHANG, *Colby College*, DAWN M. MCBRIDE, *Illinois State University*, JEN COANE, *Colby College* – The present study compared false memories in short- and long-term tests for semantic and phonological lists. Participants studied 18 semantic and 18 phonological lists related to a nonpresented critical item (CI) to create false memories. The first study used six-item DRM lists; the second study used four-item DRM lists. In the short-term memory (STM) condition, lists were presented one at a time followed by an immediate one-item recognition test (< 1-second delay). In the long-term memory (LTM) condition, after all lists were presented, participants completed a recognition test of all lists following a 1-minute break. Results showed a dissociation in false alarm rates: In STM, false alarms were higher

in phonological lists, whereas in LTM false alarms were higher in semantic lists. In STM, phonological coding drove errors but after a delay the effect reversed, with semantically driven errors increasing in LTM. The four-item list study replicated the six-item list study results with almost identical mean proportions of false alarms, suggesting the effects were not due to STM lists exceeding working memory capacity. Overall, distinct processes appear to be involved in false memory production in STM compared to LTM.

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12:00-1:00 pm (2132)

The Effect of Remembering Perceptual Details on True and False Memory in the DRM Paradigm. YAYOI KAWASAKI, *Waseda University*, FERGUS I. CRAIK, *Rotman Research Institute, Baycrest* – Eight 15-word lists of semantically related words were presented to be studied for a memory test. In Condition 1, each word was presented in the same color (red or blue) in the center of a screen. In Condition 2, words in each list varied in color (red/blue) and in screen location (upper/lower); in this condition, participants were instructed to remember the color and location of each word. After a 3-minute distraction interval, the DRM test for both groups contained list items, new words, and critical lures, presented individually for a yes/no recognition test. Recognition of list items ($H - FA$) was .85 and .67 for Conditions 1 and 2 respectively, a significant difference; false recognition of critical lures was .77 and .75 respectively. In Condition 3, presentation conditions and instructions were identical to Condition 2, but in addition, participants made color and location judgments at test. Results echoed Condition 2; recognition levels of list items and critical lures were .69 and .78 respectively. The necessity to remember perceptual details reduces later recognition memory, but has no effect on false remembering. Making perceptual judgments at test has no further effect.

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12:00-1:00 pm (2133)

Withdrawn

12:00-1:00 pm (2134)

Effects of Picture Presentation on False Memories from Different Sources. PAUL LOPRINZI, REBEKAH E SMITH, and R. REED HUNT, *University of Mississippi* – Presenting associatively or categorically related words at study can lead to robust levels of false memory on a later memory test; however, presenting pictures at study can, but does not always, reduce false memories. The present study uses a criterial recollection test to evaluate whether reductions in false memories from presentation of pictures at study is influenced more by the relationship of the different lure types (related or unrelated to the studied material) or by the source of the false memory (internal or external). The results show that the source of the false memory, rather than the relationship between the studied items and lures, is a key factor in determining whether pictures at study reduce false memories.

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12:00-1:00 pm (2135)

Effect of Divided Attention on Emotional False Memory Depends on Test Format. AMERICA ROMERO, *California Polytechnic State University* – Prior work shows that negative emotion enhances false memory and that divided attention at testing impairs memory for neutral stimuli more for recall than recognition. Does the effect of divided attention at encoding on emotional false memory depend on retrieval format? Subjects studied 20 Deese-Roediger-McDermott lists [half neutral (e.g., bread), half negative (e.g., hate)] under divided or full attention (within-subjects). Memory was tested via free recall or recognition (between-subjects). Two separate ANOVAs, one examining recall and the other recognition, showed that divided (vs. full) attention at encoding led to more false memories when tested via recall ($p=.012$) but fewer when tested via recognition ($p=.042$). While false memories for negative vs. neutral lures were comparable when tested via recall, there were more false memories for negative lures with recognition ($p=.040$). There was also a marginal emotion by attention interaction ($p=.071$) using recognition, where false memories were most prevalent under full attention and when negative. In sum, the effect of divided attention on false memory depends on retrieval format—an important consideration, especially in emotional situations like eyewitness testimony.

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12:00-1:00 pm (2136)

Warnings Affect Subjective Assessments of the Source of Memories: Evidence from an Eyewitness Memory Experiment. MCKINZEY TORRANCE, *Tufts University*, JESSICA M KARANIAN, *Fairfield University*, ELIZABETH RACE and AYANNA THOMAS ✉, *Tufts University* – Research suggests that warnings about the threat of misinformation improve eyewitness memory and reduce misinformation susceptibility. The present study examined the effect of warnings on subjective assessments of the source of memories. Participants watched a video of a crime, took a memory test, listened to a retelling of the crime that included misinformation, took a second memory test, and then made a global assessment of the source of their memories. Participants were warned about the veracity of the audio retelling either prior to the retelling, were warned after the audio retelling, or were not warned. Participants who received a warning demonstrated better memory accuracy and reduced misinformation selection when compared to unwarned participants. Further, we found that warnings, regardless of timing, affected which memory source participants reported during introspection. Overall, our findings suggest that warning not only affects how participants engage in memory retrieval but also how they reflect on that process.

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12:00-1:00 pm (2137)

Prospective Remembering in First- and Second-Language Contexts. CRISTINA C. LÓPEZ-ROJAS, ALEJANDRA A. MARFUL, and ANA I. PÉREZ, *University of Granada* – Recalling future intentions (i.e., prospective memory [PM]) plays an essential role in everyday life, but sometimes, if the person is involved in a demanding

ongoing task, PM is unsuccessful. This is especially relevant for bilinguals who in many situations, have to recall intentions while performing a task in their weaker second language (L2). Our aim was to explore whether PM is modulated by the linguistic context (L1 or L2) in which PM takes place. In the study, bilinguals performed an ongoing linguistic task (ON) in their L1 or L2, and they were instructed to perform an intention when a previously encoded PM cue appeared on the screen. Furthermore, we manipulated the nature of the PM cue (focal/nonfocal), the monitoring demands (baseline/focal/nonfocal) and the linguistic difficulty of the ON task (congruent/incongruent). In general, results showed an overall impairment in the recall of future intentions when the task was performed in L2. This impairment was especially evident in the more demanding conditions (nonfocal and incongruent conditions), suggesting that increments in attentional demands due to L2 processing, impair the monitoring processes required for prospective remembering in nonfocal tasks.

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12:00-1:00 pm (2138)

When the Goal Is to Be Less Stressed: Academic and Self-Care Goal Setting and Execution. STEPHANIE H. WELLS, ANGELA KRUCK, STEPHANIE GEORGE, VERY CATLETT, MCKINELY JACKSON, SAMUEL CULVER, LUKE WILEY, and JILL T. SHELTON, *University of Tennessee at Chattanooga* – The demands of college have come to be synonymous with stress for many students, with stress generally being related to academic success (Mirsa & Castillo, 2004). Recently, the global pandemic and associated instructional shifts have provided an additional source of stress (Elasem et al., 2020). This stress can make it more challenging for students to set and execute academic goals (Carver & Scheier, 1990; Ferrari & Scher, 2000) and can inhibit engagement in self-care behaviors (Ingram et al., 2020). The ability to successfully execute academic goals is known to lead to positive academic outcomes (Acee et al., 2012), while unfulfilled goals may lead to increased stress (Martin & Tesser, 1996). Although connections have been drawn previously in the literature between self-care behaviors, academic outcomes, and stress (Larson et al., 2016; Wunsch et al., 2017), self-care goal completion has yet to be studied in the same context as academic goal completion. In the current study, I investigate undergraduate students' completion of self-set academic and self-care goals in a naturalistic setting over a 5-day period, also considering the impact of stress and individual differences factors such as resilience and need for cognition.

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12:00-1:00 pm (2139)

Prospective Memory, Language, and Metacognition in Aging. MARION LETELLIER and GEOFFREY GB BLONDELLE, *University of Picardy Jules Verne* – Prospective memory (PM) refers to the ability to remember to perform planned intentions in the future. Talking about the activities we plan to do and the extent to which we think we can do them is an important part of our interpersonal interactions. In this study, we investigated how lexical production





and metacognitive abilities influence PM performance during aging. Eighteen young (20-40 years) and eighteen older participants (60-80 years) performed a laboratory-based PM task and two verbal production tasks. They also completed two self-report questionnaires about perceived PM and language abilities. Results revealed a negative effect of aging on PM and verbal fluency performances. Moreover, we found a positive correlation between lexical production and PM performance for each age group. Finally, older participants were overconfident in their memory and language performances, while younger participants were under confident. Overall, these findings show that verbal fluency and metacognitive abilities should be taken into account during PM assessment. Clinically, this study confirms the importance of screening this memory to identify disorders and allow a therapy adapted to patients.

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12:00-1:00 pm (2140)

Age Matters: Recognition of a Young Adult is Greater When the AMBER Alert Shows a Photo of the Same Age. VICKI S. GIER, *Mississippi State University–Meridian*, DAVID S. KREINER, *University of Central Missouri* – AMBER Alerts are intended to help locate missing children. We investigated whether recognition of a young adult (age 18) would vary depending on the age of the person as shown in the alert. Specifically, would recognition be greater if the photo in the alert was closer in age to the person as shown at recognition? We randomly assigned 363 college students to view one of seven AMBER alerts of the same child containing the original photo and another photo between the ages of 4 and 18 years. We found a significant effect of age as shown in the alert for both longer-haired recognition photos (similar to the alert photos) and short-haired recognition photos, although the pattern differed depending on hair length. For both types of recognition photo, recognition was greatest when the age in the alert was closest to age at recognition, but there was not a linear increase in recognition rates according to age in the alert. Women were more likely to recognize the short-haired target than men, while participant ethnicity, empathy scores, and conscientiousness scores did not predict recognition. The results support the importance of including photos in missing person alerts that are close in age to the current age of the missing person.

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12:00-1:00 pm (2141)

Concurrent Commission Errors in Prospective Memory under Acute Stress: Effects of Saliency and Semantic Association. EVAN R. HUGHES and DEBORAH M. CLAWSON, *Catholic University of America* – Prospective Memory (PM) is remembering to follow through with future intentions under the correct circumstances. Individuals make two main types of errors: omission (i.e., misses) and commission (i.e., false alarms). The current research investigated the effects of saliency and semantic association on individuals' propensity to make omission and commission errors under acute stress. In individual teleconferencing sessions, participants (N=60) completed an online version of the Trier Social Stress Test (TSST) to induce acute psychosocial stress before receiving

instructions for the PM task embedded within an ongoing trivia game. The PM task's cue words, semantically associated lure words, and nonassociated words were presented either saliently or nonsaliently throughout the trivia game. As expected, saliency decreased participants' omission errors. Saliency and semantic association, as well as their interaction, had significant effects on participants' concurrent commission errors. These results have implications for understanding the frequency and type of PM errors people make in their daily lives.

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12:00-1:00 pm (2142)

Mechanisms of Effective Prospective Memory Reminders. PHILIP PEPPER and B. HUNTER BALL, *The University of Texas at Arlington* – Prospective memory (PM) refers to our ability to plan and complete future actions. Memory demands can be reduced by offloading intentions onto our environments through reminders (e.g., smartphone alerts). We have previously shown that reminders are more beneficial for PM target-response pairs with weak associations (e.g., cow-table) compared to strong associations (e.g., salt-pepper). However, reminders in that study included both target and response information. Experiment 1 of the current study replicated this procedure with weak associations, but also included a target-only and a response-only reminder condition. Somewhat surprisingly, reminders were only effective when both the target and response were presented. In a second experiment, we are testing whether target-response pairs with strong associations improve the effectiveness of reminders for the target or response alone. These findings will have important implications for the development of effective reminders, as preliminary findings suggest that both attention (noticing) and memory (retrieval) must be taken into consideration.

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12:00-1:00 pm (2143)

Proactive Interference in Prospective Memory. ELIZABETH WIEMERS and B. HUNTER BALL, *The University of Texas at Arlington* – Prospective memory, memory for plans that need to be fulfilled in the future, involves a prospective component (attention) and a retrospective component (memory). While manipulations that reduce retrospective memory performance often produce similar declines in prospective memory, previous research has demonstrated that prospective memory may be relatively impervious to proactive interference effects. To test this, participants were given cue-target pairs (e.g., dog-table), and were asked to type in the target (e.g., table) when the cue (e.g., dog) appeared during a lexical decision task. We show that repeating a prospective memory cue or target from a previous intention (prior list) results in lower accuracy than for pairs that have both a new cue and a new target. Further, when evaluated separately, interference effects are clearly present in the memory component and preliminary results also show some evidence for interference in the prospective component. These findings indicate that proactive interference can be shown in prospective memory, at least when memory demands are sufficiently high.

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12:00-1:00 pm (2144)

Adaptive Memory: Animates Help to Improve Prospective Memory. SARA B FÉLIX, *University of Aveiro*, JOSEFA N. PANDEIRADA, *University of Aveiro & Purdue University* – From an evolutionary perspective, it would be adaptive to prioritize the processing of animates, due to their relevance to fitness (e.g., animates can be predators, prey, sexual mates; Nairne et al., 2017). A mnemonic advantage for animates—the animacy effect, or the finding that people remember better animates/living beings over inanimates/nonliving things—has been reported in the literature. However, the effect has been studied mostly in retrospective memory. Considering that memory’s function is mostly future-oriented, we propose that prospective memory (PM) should also be particularly sensitive to animacy. Using a procedure similar to that of Smith and Hunt (2014), 76 undergraduate Portuguese native speakers performed a PM task embedded in a color-matching ongoing task (sample size calculated, for $\alpha=.05$, $1-\beta=.85$, $d_z=.35$; Faul et al., 2007). For each participant, the PM targets were an animate (e.g., DANCER) and an inanimate word (e.g., BOTTLE). The proportion of correct PM responses was significantly higher for animate than for inanimate targets suggesting that animacy also improves PM performance. Theoretical and potential applied implications of these results are discussed.

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12:00-1:00 pm (2145)

Chronic Pain, Sleep Quality, and Prospective Memory. ALEXANDER J. KUKA and REBEKAH E. SMITH, *The University of Mississippi* – Chronic pain is among the most widespread and disabling conditions worldwide. Prospective memory, the process by which people remember to perform an action in the future after a delay, appears to be affected by the experience of pain, especially when a prospective memory task is more cognitively demanding. While self-report studies of individuals with chronic pain suggest that pain adversely affects both their retrospective and prospective memory, there is scant literature investigating this relationship with more objective methods. Similarly, few studies have been conducted that examine the role of subjective ratings of sleep on prospective memory performance. The current study administered an online prospective memory task to participants with and without chronic pain to address whether prospective memory is differentially affected by pain status and to investigate the interplay between sleep, pain, and prospective memory.

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12:00-1:00 pm (2146)

Self-Reported Strategy Use for Prospective Memory Tasks that Vary in Cue Salience. ERIN HARRINGTON, *The Pennsylvania State University*, RACHAEL TURNER and CELINDA R. MELANCON, *Oklahoma State University* – Prospective memory (PM), or memory for future intentions, is vital to everyday life. The present study extends prior work on strategy and PM (Reese-Melancon et al., 2019) to address the relationship between self-reported strategy use and PM performance on tasks with varying degrees of cue salience (i.e., focal, nonfocal-category, nonfocal-syllable). Findings indicated

that PM performance for both nonfocal conditions was significantly better when participants reported using a strategy, whereas the strategy-performance relationship was not apparent in the focal condition. Further, self-reported strategy use was associated with significant cost to the ongoing task (a lexical decision task), but only in the nonfocal-syllable condition. This work suggests strategy use is beneficial only under certain conditions and that costs must be considered. Findings related to strategy repertoire and methods of eliciting reports of strategy use are also described.

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12:00-1:00 pm (2147)

Strategic Reminder Setting in Time-Based Prospective Memory: Effects of Delay Length and Metacognition. PEI-CHUN TSAI and SAM J. GILBERT, *Institute of Cognitive Neuroscience* – In daily life, people sometimes use external aids such as setting an alarm to complete time-based prospective memory (PM) tasks successfully. Previous studies with event-based PM tasks have found that individuals’ metacognitive judgements about their PM abilities predict reminder usage. This study investigated how people choose cognitive offloading strategies using a time-based PM task. Participants were required to press the spacebar at designated times while also performing an ongoing 2-back task. Reminder usage was significantly correlated with confidence and metacognitive bias (i.e., the difference between confidence and actual performance). Moreover, participants used more reminders when the delay of until the designated PM response was longer. These findings show that participants’ use of reminders for time-based PM is based on both the characteristics of the task and metacognitive judgements.

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12:00-1:00 pm (2148)

Alpha Phase Causally Underlies Discrete Visual Perception. SHEN-MOU HSU, CHIH-HSIN TSENG, and JYH-HORNG CHEN, *National Taiwan University* – Human perception is thought to operate in a discrete sampling manner and such discretization is framed by the cyclic alpha phase in the brain in particular. Despite its appeals, this theory remains unsettled as opposing evidence has been recently reported. Moreover, to examine the theory, previous progress heavily relies on either the post-hoc correlation approach, which probes an indirect link between phase and perception, or on non-invasive brain stimulation to manipulate the phase of ongoing brain oscillations, which is subject to several methodological limitations. With a newly developed algorithm, this study adopted a brain state-dependent approach to monitor real-time phase activity from magnetoencephalography (MEG) recordings. This information was used to guide online phase-locked stimulus presentation while participants performed near-threshold visual detection. The results showed that detection rates depended on the alpha phase at which the stimuli were delivered. These findings were further supported by offline behavioural and neural evidence, indicating distinct processing of the detected stimuli according to different alpha phases and in





turn, revealing the causal role of the alpha phase in shaping discrete perception.

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12:00-1:00 pm (2149)

The Effect of Progressive Learning on Auditory Perceptual Learning: A Child Appropriate Conceptual Replication.

BARBARA A. CHURCH and BROOKE N. JACKSON, *Georgia State University*, MATTHEW G. WISNIEWSKI, *Kansas State University*, JONATHAN D. RODGERS and CHRISTOPHER LOPATA, *Canisius College*, EDUARDO MERCADO, *University at Buffalo, SUNY* – Theory suggests that children with autism have abnormalities in perceptual learning (Mercado et al., 2020). However, supporting research comes exclusively from the visual domain. Auditory perceptual learning is greater after experiencing stimuli in a progressive order (easy to hard) when compared to random orders, and this is true both after training and unrelated exposure (Church et al., 2013). We designed a conceptual replication of Church et al. with a different auditory discrimination task that is developmentally appropriate for children. Participants completed four harmonic-saturation discrimination tasks. Two presented 60 initial stimuli in a progressive order of difficulty, and two were randomly ordered. One of each directly trained the discrimination during these trials and the others made memory judgments about the sounds. There were always 30 final trials of difficult discrimination judgments. Adult results replicated Church et al., and preliminary results from children with and without high-functioning autism suggest similar findings.

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12:00-1:00 pm (2150)

Using fNIRs to Measure Neural Attenuation to Tones.

ANASTASIA KERR-GERMAN, JAYLIN TUMAN, and JASON JOHN, *Boys Town National Research Hospital* – The neurocognitive underpinnings of auditory attention are difficult to study in both young children and individuals who have assistive listening devices. The current study examined the feasibility of using fNIRS to measure neural attenuation to background noise (i.e., decreased neural responding following repeated or prolonged exposure to a sound). Adults (Age=19-29, N=17) were to attend to a visual memory task while an eight-tone sequence played in the background. Sequences came from one of three conditions: (1) tones of the same frequency, (2) tones randomly selected from a set of frequencies, or (3) tones of the same frequency with random intertone-intervals. HbO peak activation in auditory cortex decreased across time in all three conditions. Further, bilateral frontal cortex increased as conditions became more difficult (i.e., conditions 2 and 3). These data indicate that auditory cortex attenuates to repeating tones, while frontal cortex is selectively recruited in remaining conditions to maintain attention and suppress distracting auditory information. The current data follow trends seen in studies using EMG, MEG, and fMRI and therefore provide a baseline of fNIRs data for future work of auditory attention in hard-to-test groups.

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12:00-1:00 pm (2151)

How Does Listening Affect the Performance of a Concurrent Monitoring Task under Different Load Levels? A Pilot Study.

PHEOBE SUN and ANDREW HINES, *University College Dublin* – The cognitive load resulting from listening can be indicated by the behavioural performance using a dual-task design. However a performance difference will not be observable if the overall task load is too low or too high (Johnsrude et al., 2015). To find the appropriate overall load level for extra cognitive load to manifest in behaviour, we quantified the load effect on performance for 10 different load levels. At each level, the subject's performances for a single task and a dual-task were compared. For the single task subjects used keyboard controls to correct an object's deviation from a centreline. In the dual-task, subjects also listened to nonrepetitive content-neutral speech recordings. The overall task load was controlled by the speed the object deviated. We recruited six participants and measured the object's average deviation from the centre as a proxy for the subject's performance. We found an overall larger deviation in dual-task than in single-task trials. This confirmed that the crossmodal interference occurred in our experiment setting. The extent of performance difference observed was largest under medium load. The difference was not observable under low load, and was low and inconsistent across subjects under high load.

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12:00-1:00 pm (2152)

Measures of Audiovisual Semantic Relatedness for Real-World Objects.

KIRA WEGNER-CLEMENS, *The George Washington University*, GEORGE L. MALCOLM, *University of East Anglia*, SARAH S. SHOMSTEIN, *The George Washington University* – Semantic information is an important feature used to guide attention in real-world environments. To date, the role of semantic influence on attention has primarily been studied in vision, in part because of the difficulty of defining semantic relatedness across sensory modalities. To address this, we created a constrained audiovisual stimulus set to derive similarity ratings between each item within three categories: animals, instruments, and household items. Manipulation included an auditory prompt and visual choices, and a visual prompt and auditory choices. A set of 140 participants judged which of two images was more similar to a given sound and which of two sounds was more similar to a given image. Judgments were then used to calculate similarity of any given crossmodal pair. The derived quantified judgments will be made available in a database form to the wide research community to be used as a measure of semantic relatedness in cognitive psychology experiments. These measures will enable more robust studies of semantics in audiovisual environments.

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12:00-1:00 pm (2153)

Speech and Sound Cues Provide Comparable Levels of Facilitation when Controlling for Stimulus Uncertainty Effects.

KELLY DICKERSON and PETER C GERHARDSTEIN, *Binghamton University SUNY*, MARGARET DUFF, *The Charles Stark*





Draper Laboratory, Inc, ALECIA MOSER, *Auckland University*, SARAH OLSEN, *University of Minnesota* – The everyday environment is a complex mixture of sights, sounds, and language. It is well established that auditory and visual information can influence each other, but the temporal extent of this influence is not well documented. The present study looks at the ability of speech and sounds to influence visual object recognition using the visual world paradigm (VWP). This approach presents a visual array with a single item representing the “target” and other “distractor” objects and a related “competitor” object. The array is presented in the context of a simultaneous or post array spoken word cue or an associated environmental sound. The results of duration of the interstimulus interval and the denotivity of the auditory cue were key drivers of gaze shifts from distractor and competitor ROIs to the target ROI. Additionally, by submitting gaze data to a divergence analysis technique, differences in the time course of influence of auditory information on visual object recognition could be observed. These findings are presented in the context of associative spread of information for supramodal semantic concepts.

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12:00-1:00 pm (2154)

The Benefit of Bimodal Training in Voice Learning. SERENA ZADOORIAN and LAWRENCE D. ROSENBLUM, *University of California, Riverside* – Listeners can learn to recognize the voice of familiar (Compton, 1963) and unfamiliar talkers (Tomlin et al., 2017) by using talkers’ vocal qualities, such as breathiness and fundamental frequency of phonation (Bricker & Pruzansky, 1976). However, talkers also can be identified through their articulatory style or idiolect (Remez et al., 1997) that is available both auditorily and visually (lip-reading; Rosenblum et al., 2007) and can be shared across modalities (Simmons et al., 2021) for purposes of talker learning. Also, voices learned while seeing faces are recognized better than voices learned alone (Sheffert & Olson, 2004; von Kriegstein et al., 2008). The current study examined whether this face facilitation of voice learning is based on the presence of crossmodal articulatory style information. An initial study confirmed the face facilitation effect. A follow-up study tested the sufficiency of articulatory style information by isolating the mouth in the visual stimulus. Results show that this stimulus did not provide an advantage in voice learning. Follow-up studies will examine whether face facilitation of voice learning is based on non-articulatory facial information and/or articulatory information existent beyond the mouth.

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12:00-1:00 pm (2155)

Facial Emotion Detection Modulated by Accompanying Auditory Screams and Cries. LAURA M. GETZ and SARA E. DEJBAKSH, *University of San Diego* – Our research focused on assessing the influence of auditory cues on visual facial emotion identification through a multimodal study. In our study, we added auditory screams and cries to a 10-level visual continuum of facial expressions morphed from angry to sad expressions. Participants responded to a 3AFC task to signify the expression perceived on

the face (angry, sad, other) with each of the accompanying sounds (screaming vs. crying). We predicted that ambiguous facial expressions in the middle of the continuum would show more influence of the auditory signals than clear facial expressions on either end of the continuum. Instead, we found main effects of continuum position [$F(1,23) = 167.23, p < 0.001, \eta^2 = 0.79$] and auditory sound [$F(1,23) = 5.00, p = 0.035, \eta^2 = 0.09$], but no interaction. Screams resulted in approximately 9% more angry facial expressions identified at each level of the continuum (range 3.1%-13.5%). These results suggest that auditory cues influence visual emotion detection regardless of facial ambiguity, which helps us better understand multimodal attention processes.

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12:00-1:00 pm (2156)

Auxiliary Movements Contribute to Maintaining Mental Tempo. KAZUHIKO YOKOSAWA, RIKO R MONJO, and KEIJI KONISHI, *The University of Tokyo* – Musical performances often involve auxiliary movements such as foot-tapping, head swinging, and forearm movements, seemingly unrelated to playing an instrument or vocalizing but synchronized with an external rhythm essential to music. We presented a sequence of auditory stimuli in advance at regular intervals to participants of this study, and they maintained a mental count of the stimuli and pressed a key every eight counts to measure the mental tempo. We simultaneously manipulated the presence or absence of auxiliary movements to examine the effect of the exercises on the mental tempo. Results indicated that auxiliary movements were associated with lower synchronization errors in participants with more extensive musical experience, whereas the errors increased in those with less extensive music experiences. Moreover, the standard error of mental tempo decreased with auxiliary movements. These results suggest that the auxiliary movements suppressed standard error while promoting the synchronization error in participants with low musical experiences. We concluded that musical experience facilitated overcoming the adverse effects of auxiliary movements, and musical training might enable people to utilize exercises.

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12:00-1:00 pm (2157)

Distraction and Expertise: How Experienced Athletes Are Affected by Grunting. I SAK KIM, *University of Hawai‘i at Mānoa*, ALAN KINGSTONE, *The University of British Columbia*, SCOTT C. SINNETT, *University of Hawai‘i at Mānoa* – In laboratory settings, task-irrelevant sounds often facilitate visual perception. However, in different sporting contexts grunting may distract individuals. Previous findings indicate that a simulated grunt (white noise) leads to slower and less accurate judgments of the ball- and kicking-direction in tennis and mixed martial arts (MMA), respectively. These findings suggest that grunting has a distracting effect. However, participants in these past studies were not experienced in either sport. Expert tennis and MMA athletes may have unique strategies to circumvent the distracting effect of grunting. The current investigation examines the effect of simulated grunting when





discriminating ball- or kicking-direction in tennis and MMA, respectively. Critically, the participants will consist of expert athletes in tennis or MMA to assess the effect of simulated grunting on shot/kick perception. If expertise is associated with decreased distractibility in their sport, athletes should be less distracted by a grunt but only in their sport.

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12:00-1:00 pm (2158)

Crossmodal Correspondence Between Angularity and Hardness in Visual-Tactile and Auditory-Tactile Dimensions. YUSUKE SUZUKI and MASAYOSHI NAGAI, *Ritsumeikan University* – The presentation of task-irrelevant words suggesting hardness/softness (e.g., “diamond”/“fur”) facilitated the discrimination of “Bouba-Kiki” angularity/roundedness shapes, demonstrating the crossmodal correspondence between visual angularity and tactile hardness (Walker, 2012). Here, we examined this correspondence with a different methodology and addressed the audio-tactile correspondence as well. In Experiment 1 participants were required to discriminate between visual angular and rounded shapes by pressing a hard or soft key, covered with pumice stones or a fluffy cloth, respectively. Reaction time was shorter in the congruent condition (hard/soft key for angular/rounded shape) than in the incongruent condition. In Experiment 2, sound-symbolic angular/rounded speech sounds (e.g., “kipi”/“moma” as in Maurer et al., 2006) were introduced and showed the similar trend of data. The current results consistently showed the crossmodal correspondences between visual and auditory angularity and tactile hardness, and its underlying mechanism will be discussed.

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12:00-1:00 pm (2159)

Representation of Affective States Based on Behavioral Data and Physical Features of ASMR Stimuli. JUNHYUK JANG, HAEUN KO, EUNSAEM JO, and JONGWAN KIM, *Jeonbuk National University* – Autonomous sensory meridian responses (ASMR) are specific sounds and phenomena that give a person a sense of psychological stability or tingle. This study compared affective representations derived from ASMR stimuli that are composed of auditory stimuli only or both visual and auditory components. Behavioral ratings and physical features of ASMR stimuli were measured to investigate whether affective states and modalities of positive, neutral, and negative ASMR stimuli could be mapped onto the lower dimensional space of core affect. Ratings were correlated and then submitted to multidimensional scaling (MDS) and vector fitting. Classifications also were performed to identify valence and modality. Results revealed that ASMR stimuli were located on the core affect dimensions for both modalities, confirming modality-general valence. Also, we were able to predict valence based on both behavioral ratings and physical features.

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12:00-1:00 pm (2160)

Attention and Body Awareness: Inhibition and the Management of Cognitive Resources in the Perception of Spontaneous Sensations. SARA SALGUES, GAËN PLANCHER, and GEORGE A. MICHAEL, *University of Lyon* – When the body is attended to and viewed, only a subset of bodily sensations would enter awareness. Some of these sensations can be felt on the skin even though no stimulation triggers their perception: they are referred to as spontaneous sensations (SPS). Inhibition and the management of cognitive resources would be involved in their perception through phenomena of amplification and suppression. Yet the involvement of these processes in body awareness remains poorly understood. We investigated the relationship between attentional abilities and the perception of SPS in order to provide further information regarding this matter. A dual-task paradigm involving visual search and auditory detection was used to assess attentional abilities. SPS perceived when attending to the glabrous and visible surface of the hand were also measured. Difficulties in inhibiting distractors were associated with a lower perception of SPS, while difficulties in managing cognitive resources were associated with an increase in the frequency of SPS and a decrease of paresthesia-like SPS. We discuss how these attentional processes contribute to the conscious awareness of the body.

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12:00-1:00 pm (2161)

Examining the Influences of Expectation and Perceptual Representation on the Experience of Subjective Duration. CORINNA D. MCFEATERS and DANIEL VOYER, *University of New Brunswick* – The processing principle proposes that subjective duration is positively related to the strength of a stimulus’ perceptual representation. Under this principle, expectation lengthens subjective duration because it facilitates the creation of sharper percepts. Visually degraded stimuli should, therefore, produce a weaker perceptual representation, making them seem shorter in duration than undegraded stimuli, although expectations may be able to exert a lengthening effect even on the degraded stimuli. The current study used a method-of-comparison task to investigate the relationship between expectation, perceptual representation, and subjective duration using pixelated images. Contrary to predictions, pixelated stimuli were perceived to be longer in duration than undegraded images. Additionally, this relationship was unaffected by the probability of pixelation, suggesting that an expectation for pixelation was not a factor in the duration expansion for pixelated images. Expectation was, however, observed to lengthen subjective duration for repeated images, which is consistent with previous findings. The discussion will emphasize the implications of these findings for accounts of repetition in time estimation.

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12:00-1:00 pm (2162)

Measuring Proactive Control Over Emotion-Induced Blindness While Manipulating Distractor Location Uncertainty. NADIA BOKHARI, *Wake Forest University* – Target detection is impaired following the presentation of an irrelevant but negatively





valanced image, a phenomenon referred to as emotion-induced blindness (EIB). We tested whether proactive control is effective at reducing the attentional priority participants assign to emotional distractors when there are multiple stimuli competing for attentional selection and the location of the emotional distractor is unknown. Participants monitored two vertically positioned rapid serial visual presentation streams of neutral images for the appearance of a rotated target image. On half of all trials, a negative distractor appeared in one of the streams before the target. Across all blocks of trials, participants received warnings regarding the presence and/or location of the negative distractor. Target-detection accuracies were lower when the target and distractor appeared in the same stream than when they appeared in opposite streams, supporting EIB. However, the magnitude of EIB did not differ according to the warning type, suggesting that individuals may be unable to proactively suppress the distractor when there are stimuli competing for attentional selection at multiple locations, regardless of the distractor's spatial predictability.

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12:00-1:00 pm (2163)

Examining Tracking and Search Efficiency in a Modified Multiple Object Tracking Task. MENGZHU FU and MICHAEL DODD, *University of Nebraska at Lincoln* – Previous research examining attention in dynamic contexts has demonstrated that people are able to track up to 4-5 moving objects simultaneously (Pylyshyn & Storm, 1988) with some debate regarding the degree to which attentional resources are flexibly allocated during tracking (Meyerhoff, Papenmeier, & Huff, 2017). Moreover, research examining dynamic visual search has shown “pop-out” effects can be observed for color targets though it is unclear whether these effects are attributable to the same mechanisms driving pop-out in static displays. The current study combined a multiple object tracking task with a dynamic search paradigm to examine 1) the ability to process secondary task information while tracking objects, 2) whether dynamic pop-out may still be observed within a dual tasking setting, and 3) the degree to which nontracked objects are processed (does color pop-out occur for both tracked and untracked objects).

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12:00-1:00 pm (2164)

The Complex Influence of Task-Irrelevant Semantic Features on Attentional Allocation. ELLIE R. ROBBINS, *The George Washington University*, JOSEPH C. NAH, *University of California, Davis*, DICK DUBBELDE and SARAH S. SHOMSTEIN, *The George Washington University* – High-level features of objects bias attention, even when task-irrelevant, but the mechanism by which semantic attentional guidance is instantiated is unclear. We hypothesize that task-irrelevant semantic features bias attention by grouping mechanisms, such that meaning organizes visual input by semantic relatedness. Specifically, when presented with task-irrelevant items, search is more efficient within a group of semantically related items. Participants were shown four stimuli of either color squares (low-level), grayscale real-world objects (high-level), or color real-world objects (low- and high-level features). On each trial, two or three of

the four items belonged to one category (e.g., clothing, blue squares). A target appeared randomly on one item, independent of relatedness. For all manipulations, search was equally efficient in groups of equal number. For unequal size groups, in color squares and grayscale objects, large groups yielded less efficient search—consistent with grouping. In color objects, search was more efficient in a larger semantically related group—consistent with semantic bias. Results show that singular features group displays, but complex stimuli bias attention beyond simple grouping.

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12:00-1:00 pm (2165)

A New Paradigm for Holistic Face Processing. YUNTAO ZHOU, YUNTAO ZHOU, and GUOMEI ZHOU, *Sun Yat-sen University* – It is well documented that faces are processed holistically. Several paradigms have been developed to measure holistic face processing. However, none of them measure people's tendency to integrate the facial features. Following the feature integration theory and the task in Treisman, Sykes, & Gelade (1977), we used natural faces as stimuli, generated some conjunction faces which consist of local features across faces, and manipulated their orientation (upright or inverted) and alignment (aligned or misaligned). Participants saw two old faces and then one or two old faces or conjunctions faces. Their task was to judge whether an old face appeared. We found a lower percentage of old responses to upright aligned conjunction faces than inverted or/and misaligned ones. This result indicated a strong tendency to integrate the facial features of upright aligned faces.

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12:00-1:00 pm (2166)


No Evidence for Proactive Suppression: Enhancement of Explicitly Cued Distractor Features. DOUGLAS A. ADDLEMAN and VIOLA S. STOERMER, *Dartmouth College* – Visual search benefits from knowing features of nontarget items in advance. For example, when people are told to ignore red items, they are faster at finding a target among red nontargets than other colored items. However, it is unknown whether these negatively cued features are suppressed in advance (proactively) or after the search display appears (reactively). To test this, we measured the perceptual representation of to-be-ignored colors during a visual search task. Participants (N=200) performed a search task in which they were either cued to a target color (Experiment 1) or nontarget color (Experiment 2) on each trial. On a small subset of trials, a brief colored probe appeared (which could be the cued color or not), and participants indicated whether they saw the color probe. As expected, both target and nontarget cues speeded search; interestingly, detection rates of the cued color during probe trials were increased for both positive and negative cues, indicating that to-be-attended and to-be-ignored colors were both enhanced. These results demonstrate that nontarget features are not suppressed proactively, and instead support reactive distractor accounts, where anticipated nontarget features are ignored via strategic enhancement.

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12:00-1:00 pm (2167)

Individual Differences in Mindfulness and Multisignal Processing Efficiency. KANTHIKA LATTHIRUN , *National Cheng Kung University* – It is well-known that mindfulness meditation has beneficial effects on cognitive functioning, especially for attentional selection. The increased levels of attentional selection can subsequently influence the information accumulation process during decision-making. However, less is understood about the direct effect of mindfulness meditation on the multisignal information processing. In the present study, we investigate the relationship between the level of mindfulness and information processing efficiency. Subjects were divided into high and low mindfulness groups assessed by the Mindfulness Attention Awareness Scale (MAAS) with 60 subjects for each. According to Systems Factorial Technology, a redundant target task was conducted to assess the individuals' multisignal processing efficiency by comparing the redundant to single-target performance. Our results revealed that high mindfulness group has a significantly higher processing capacity than the low mindfulness group, especially for the faster responses. Thus, the results highlight the beneficial effect of mindfulness attention on the early-stage integration of multiple signals during decision making.

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12:00-1:00 pm (2168)

Attentional Preparation to Distractors. KILLIAN BONNIN, MANUEL MERCIER, and VIRGINIE LECLERCQ, *Université Paul-Valéry Montpellier* – In our environment, onset of distractors can be expected. For example, when we drive a car, we know that advertisements will be presented on the side of the road and that they are irrelevant information. How do we prepare for these distractors? Different authors propose that a feature-based inhibition of distractors can take place during preparation (Gaspelin & Luck, 2018). On the contrary, others propose that when distractors are expected, preparation to the distractors results in allocation of more attentional resources to the distractors (Makovski, 2019). We investigated these two propositions using the LaBerge's Attentional Preparatory Test paradigm (2000) in which participants prepare to process a target while distractor can appear previously. With this paradigm, our results seem to support distractors inhibition, but additional experiments are necessary to have a more detailed understanding of preparation to distractors.

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12:00-1:00 pm (2169)

Scene Gist and Local Meaning Guide Attention and Build Memory Representations: Evidence from Mouse Clicks. DEBORAH A. CRONIN, *Drake University*, and JOHN M. HENDERSON, *University of California, Davis* – How do global and local semantic information interact to guide attention in and memory for a real-world scene? Using the BubbleView paradigm (Kim, Bylinskii, et al., 2017), we monitored movements of attention via mouse clicks during scene-viewing. We manipulated access to scene gist by providing a scene preview on some trials. Click maps were compiled from participants' click locations and compared to fixation density

maps and meaning maps for the same scenes. Click maps were similar to fixation density maps, suggesting that clicks in the BubbleView paradigm approximate the locus of overt attention. In two experiments, access to gist guided attention to locally meaningful scene regions. Local meaning also guided attention even in the absence of gist. These results support cognitive guidance theories of attention. Access to gist and attention to meaning were also important for participants' memory for the scene images: participants were more likely to remember the image at test when they had access to gist and when they had clicked more meaningful scene regions. Taken together, our results suggest that global (scene gist) and local scene semantics influence both where we attend in a given scene and our subsequent memory for it.

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12:00-1:00 pm (2170)

Psychological Experiences and Restorative Characteristics of Virtual Nature and Urban Images: A Replication and Extension. BROOKE CHARBONNEAU and AUDREY V. HOOD, *Montana State University*, CHRISTIAN TOWNER, *University of Colorado Denver*, ALEXANDRE MAROIS, *Thales Research and Technology*, KEITH A. HUTCHISON, *Montana State University*, and JASON M. WATSON, *University of Colorado Denver* – Attention restoration theory states that experiences in nature restore fatigued attention. Our labs aimed to replicate and extend previous findings of differences in psychological properties for nature and urban images (see Charbonneau et al., 2020 Psychonomic Society Annual Meeting). In a large-scale norming study, several hundred participants recruited from Amazon Mechanical Turk (MTurk) were asked to view nature and urban images for 5 seconds each, subsequently providing ratings on fascination, likeability, mystery, anxiety, mindfulness, and resilience. Thought probes were included on 20% of the trials to measure mind wandering. Consistent with prior results, we hypothesized that participants would rate nature images as more fascinating, mysterious, and likable. We further hypothesized that nature images would elicit greater self-reported levels of state mindfulness and resilience while eliciting lower levels of anxiety and mind wandering. This normative data will be useful for researchers interested in investigating what properties of nature may underlie attention restoration, permitting selection of images along dimensions of psychological experience while controlling for other variables in future intervention studies.

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12:00-1:00 pm (2171)

Taking Prevalence Effects on the Road: Rare Hazards Are Often Missed. ANNA KOSOVICHEVA and SIMRAN KANDA, *University of Toronto Mississauga*, JEREMY M. WOLFE, *Brigham & Women's Hospital*, BENJAMIN WOLFE, *University of Toronto Mississauga* – If all the drivers in your city are bad, are you better at detecting dangerous events on the road? What if they are all good drivers? Research on target prevalence in visual search suggests that when events, like weapons in bags or abnormalities in medical images, are rare, these events are missed more frequently. Does this





finding extend to dynamic environments with inherent time pressure, like driving? Participants watched 333 ms clips of real road scenes and reported whether a not a hazard was present, under low (4%) and high (50%) prevalence conditions. The miss error rate was twice as great at low prevalence (40%) compared to high prevalence (18%). A signal detection analysis revealed a criterion shift toward more hazard-absent responses in the low prevalence condition, while sensitivity (d') was similar between the two conditions. This replicates the pattern in visual search data. In the absence of trial-by-trial feedback, no prevalence effect was seen. This work extends findings on prevalence to dynamic, real-world scenes, and suggests that laboratory studies that use artificially high prevalence may not reflect drivers' real-world behavior when it comes to detecting hazards.

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12:00-1:00 pm (2172)

Top to Bottom: A Complete Analysis of Object and Scene Location Saliency. MATTHEW D. LANGLEY and MICHAEL K. MCBEATH, *Arizona State University* – Past research demonstrated a top saliency bias in object identification, with random shapes appearing more similar when they share the same top vs. same bottom (Chambers et al., 1999). This is consistent with the tops of natural objects and living things tending to be the most informative locations of intentionality and functionality, which leads observers to favor attending to tops. However, this bias may also reflect a generic downward vantage tendency, with more informative aspects of scenes tending to lie below the horizon. Here, two experiments test for a top saliency bias with objects and bottom saliency bias with scenes. Participants observed picture triptychs and judged if the central object or scene appeared more similar to comparison objects or scenes that contain the same top vs. the same bottom. Experiment 1 stimuli were impoverished, information-balanced polygons or scenes comprised of polygons. Experiment 2 extended the triptych stimuli to naturalistic objects or scenes. Results support that observers tend to assume a downward vantage when viewing impoverished and naturalistic objects and naturalistic scenes, consistent with saliency varying as a function of the more informative aspects of visually attended stimuli.

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12:00-1:00 pm (2173)

Loss Aversion in Selective Attention. SUNGHYUN KIM, *Korea University*, MELISSA R. BECK, *Louisiana State University* – Toward further understanding the extent to which prospect theory (Kahneman & Tversky, 1979) operates in selective attention, the current study tested whether the loss aversion principle of prospect theory operates in selective attention using a value-driven attention paradigm. In the training phase, participants searched for red and green targets. One color was associated with gain outcomes and the other was associated with loss outcomes. According to the loss aversion principle, losses loom larger than gain. Thus, losses are a stronger motivator than gains. However, in the test phase where red and green colors became distractor colors which should be ignored, response time was not different between for the red and green distractors,

implying that the loss-related color distractor did not attract attention more than the gain-related color distractor. Using the value-driven attention paradigm, the loss aversion principle was not evident in selective attention.

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12:00-1:00 pm (2174)

The Misrepresentation of Spatial Uncertainty in Visual Search. JAMIE M. TROST, ANDREW D. BAKER, and BRADLEY S. GIBSON, *University of Notre Dame* – The free energy principle in computational neuroscience contends that individuals generally seek to minimize uncertainty in their interactions with the world. We examined this imperative within the domain of visual search by giving observers the choice between two search tasks: one that had reduced spatial uncertainty in virtue of containing a cue vs. one that had maximal spatial uncertainty in virtue of containing no cue. Independent groups were offered cues of different types (arrow or onset cues) and validities (100%, 70%, or 25%; note, the spatial uncertainty of the latter context and the no-cue context were equal). All participants completed 640 task selections followed by the ensuing visual search trials. Inconsistent with the free energy principle, observers consistently choose the no-cue context more than expected, even when the spatial cue was 100% accurate. However, subsequent experiments suggested that observers overestimated the uncertainty of arrow and onset cues, thus potentially preserving the free energy principle.

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12:00-1:00 pm (2175)

Influence of Brief Distractor-Matching Cues on Distractor Suppression. VAISHNAVI H. MOHITE and RAMESH H. MISHRA, *University of Hyderabad* – Models of search assume that adjustment in the priority map is an unconscious process. In an eye-tracking study, we tested this assumption given the hypothesis that priority of salient distractor can be modulation through unconscious cues. Subjects searched for a circle among other polygons. The colour of one of the distractors was unique on 50% of the trials, salient distractor present trials. A cue—matching the salient distractor in color, location, or both—was presented, in separate blocks, before the search display, for a brief period of 16 ms. RTS and latency on first target saccade were faster on salient distractor present trials than salient distractor absent trials; presence of the brief cue, however, influenced the difference in saccade latency alone. In cued block saccades, the difference in latencies between distractor absent and present trials was significantly lower than in uncued blocks. Moreover, although the percentage of first saccades to the salient distractor was lowest both in cued and uncued blocks, the difference between non-salient and salient distractor location was higher in the uncued block. These brief precues hampered attentional suppression of the salient distractor during active visual search.

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12:00-1:00 pm (2176)

Search Guidance Is Limited by Resource-Dependent Precision of the Search Templates, Not by their Number. DOMINIQUE LAMY, *Tel Aviv University* – We investigated whether attentional guidance is limited by a fixed number of search templates, or by the resources required for storing templates precise enough to guide search. We reasoned that searching for high-discriminability colors (Experiment 1) should require less precise templates, and therefore fewer resources, than searching for low-discriminability colors (Experiment 2). We used a spatial-cueing paradigm, where observers searched for targets defined by either one or two colors on a trial-by-trial basis. The cue could match a target template (active color), a possible target color not currently relevant (inactive color) or a nontarget color (irrelevant color). Active-color cues yielded cue validity effects, whereas inactive- and irrelevant-color cues were ignored. Crucially, we compared cue-validity effects for active-color cues during one- vs. two-target search. When the target-defining colors were highly discriminable, cue-validity effects were unaffected by the number of search templates. By contrast, when these colors were poorly discriminable, cue-validity effects were strongly reduced in two- vs. one-target search. The results support a limited-resource account over a limited-slots account of search guidance.

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12:00-1:00 pm (2177)

Selection History Biases the Strategic Control of Attention. SANGJI LEE, ANDY J. KIM, JAMES GRINDELL, and BRIAN ANDERSON, *Texas A&M University* – Attention is biased toward features aligning with task goals and stimuli previously allocated attentional priority (selection history). It is unclear whether the strategic control of attention can itself be modulated by selection history. The present study examined this issue using a modified version of the adaptive choice visual search task. Participants were tasked with searching through stimuli presented in two talk-relevant colors on each trial to find a target. The distribution of stimuli rendered in these two colors was manipulated between-subjects, with one group receiving more imbalanced displays during training. Participants who experienced the more imbalanced displays quickly learned to search more optimally. Critically, these participants continued to search more optimally in a subsequent test phase in which all participants were exposed to the same displays, reflecting a persistent shift in search strategy. Our results demonstrate that, without explicit instruction, the choice of how to perform visual search is to some degree the product of selection history.

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12:00-1:00 pm (2178)

Withdrawn

12:00-1:00 pm (2179)

Withdrawn

12:00-1:00 pm (2180)

Alerting Does Not Occur in Compound Visual Search Tasks. NADJA JANKOVIC, VINCENT DI LOLLO, and THOMAS M. SPALEK, *Simon Fraser University* – Simple visual search involves the single step of finding a target (e.g., a square shape) among a set of distractors (e.g., ring shapes). On the other hand, compound search involves two steps. For example: (a) locate the unique item in the stimulus array and (b) identify the tilt of a line inside that item. Two effects that are known to facilitate search performance are “alerting” (e.g., briefly brightening the screen before display onset) and “priming” (e.g., repeating the unique item on successive trials). In the present work, we examine the joint effects of alerting and priming in visual search. We found that alerting does occur in simple search but not in compound search, unless conditions allow the compound search to be performed as a simple search. In our work, this occurred when the location of the target was repeated on successive trials, allowing attention to linger at that location thus bypassing the first step of the compound task. A comprehensive account of alerting effects in both simple and compound search tasks is proposed in terms of the temporal relationship between the phasic activation of the locus coeruleus–norepinephrine neuromodulatory system and the hypothesized sequence of processing stages in visual search.

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12:00-1:00 pm (2181)

Intertrial Location Priming Influences Covert Attentional Selection. TRAVIS N. TALCOTT, ALYSSA P. LEVY, and NICHOLAS GASPELIN, *Binghamton University SUNY* – Recent models of visual attention have suggested that selection history can strongly influence attentional allocation. One specific form of selection history is intertrial location priming whereby the previous-trial target location attracts attention on the current trial. However, it is currently unclear whether location priming influences covert attentional allocation, per se, or instead later cognitive stages after attentional allocation. The current study examined location priming effects using a modified capture-probe paradigm. Participants searched displays for a target shape amongst distractor shapes and the location of the target was randomly selected. On some trials, probe letters were briefly presented at each search location before being masked, and participants recalled as many letters as possible. The results indicated that probe report accuracy was massively improved for letters at the previous-trial target location compared to baseline levels. This suggests that location priming effects can powerfully influence covert attentional allocation during visual search.

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12:00-1:00 pm (2182)

Target Template Variation Reduces Attentional Bias by Statistical Learning. INJAE HONG, *Yonsei University* – The current study aimed to figure out the influence of target template variation on spatial statistical learning. The search array consisted of one target (hexagon or octagon) and 11 distractors (octagons or hexagons), and participants were instructed to find a singleton shape among homogeneous sets of distractors. The target and distractor shapes were fixed





for the target-consistent group, while the shapes were not predictive until the search array for the target variant group. The target was frequently presented at one possible search region unbeknownst to the participants. When the target template was consistent throughout attentional learning, statistical knowledge persistently guided spatial attention to the frequent target location. In contrast, when the target template was inconsistent and variant during learning, the extent of spatial bias was reduced compared to when the target template was invariant. The results indicate that alternative use of target templates may interfere with spatial statistical learning. The spatial statistical learning not only relies on the number of attentional shifts toward the frequent target location but also on search circumstances.

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12:00-1:00 pm (2183)

It'll Be Easier If I Show You: Target Template Specificity and Background Typicality in Visual Search. KATHERINE MOEN and JOSIAH P. HEUN, *University of Nebraska at Kearney* – Target template specificity and background context have been shown to independently impact visual search performance. The goal of the current study was to determine if search performance for specific target templates was further enhanced with a typical background context. Participants searched for targets that were cued with a picture or a word, among objects in typical backgrounds or atypical backgrounds. Consistent with previous research, participants found targets cued with pictures faster than targets cued with words, and targets in typical backgrounds faster than targets in atypical backgrounds. Additionally, a significant interaction revealed that targets cued with words and paired with atypical backgrounds had significantly slower response times compared to targets cued with words and paired with typical backgrounds. However, search time for targets cued with pictures was similar regardless of background type. Overall, these data suggest that a specific target template is sufficient to guide visual search, independent from background information. However, search benefits from background information when the target template is less specific.

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12:00-1:00 pm (2184)

Gaze and Actions Are Tightly Linked in Efficient Visual Foraging. JAN TÜNNERMANN and ANNA SCHUBÖ, *Philipps-Universität Marburg* – Visual foraging tasks in which participants search and collect multiple instances of multiple targets can be employed to investigate selective attention and visual search in naturalistic conditions. Such experiments have revealed that, under favorable conditions, foragers enter fast-paced selection runs. We hypothesize that foragers engage in tight attend–fixate–collect loops in these phases, which should be reflected in a close link of gaze and collection trajectories when participants forage with high efficiency. In an experiment, we established highly efficient and less efficient foraging conditions by defining targets either via a simple feature (e.g., color, known to lead to efficient foraging) or via a combination of features (less efficient foraging). Multiple measures of agreement between gaze and collection behavior confirm an almost one-to-one

relationship in the efficient foraging condition, which is weaker in the less efficient condition, in which foragers need more eye movements to coordinate their actions.

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12:00-1:00 pm (2185)

Background Information Slows Down Parallel Search Efficiency by Reducing the Strength of Interitem Interactions. YAORYUN CUI, ALEJANDRO LLERAS, and SIMONA L. BUETTI, *University of Illinois* – In efficient visual search tasks with fixed targets, response times increase logarithmically as a function of set size. The slope of the logarithmic function is sensitive to at least two factors: target-distractor similarity (the less similar target and distractors are, the flatter the slope) and interitem interactions (the more similar neighboring distractors are to one another, the flatter the slope). We recently showed that there is a possible third factor: background complexity; complex backgrounds tend to slow down search efficiency compared to solid backgrounds (Cui et al., 2021). Here we investigated whether background complexity is a new factor by itself or whether background complexity simply acts to reduce the strength of interitem interactions. We compared performance across two studies in which we manipulated background complexity. The results suggest that the background effect on search efficiency is simply an effect of interitem interactions; placing objects on different (nearby) surfaces reduces the visual system's ability to compute interitem similarity relations between distractors.

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12:00-1:00 pm (2186)

The Effect of Search Aid Accuracy for a Visual Search Task: An EZ Drift Diffusion Analysis. COLLIN SCARINCE, and MIGUEL A. MORENO, *Texas A&M University–Corpus Christi* – Participants completed a visual search task with the assistance of an automated aid to study how perceived aid accuracy affects search behavior. Search arrays consisted of 100 English alphabet characters, and the task involved searching for either a specific letter, a letter with a particular feature, or a letter from a category. Participants were assigned to one of two experimental conditions with an aid or a control condition with no aid. Participants in the experimental conditions were warned about presence or absence of a target before the start of each trial. In one condition, participants were told the aid was 95% accurate and in the other they were told it was 75%; the true accuracy of the aid for both was 85%. Generally, search was less efficient (lower hit rates and longer reaction times [RTs]) for categorically defined targets compared to the other target types. The aids also improved search performance, particularly for categorical targets. A drift diffusion model was used to further analyze the decision process for target-absent trials. Categorical targets were found to have a lower drift rate and featural targets had a lower boundary. The aids also substantially reduced the nondecision component compared to the control condition.

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12:00-1:00 pm (2187)

Exploring the Relationship Between Mental Health and Trauma Experience and Surveillance Performance. LYNDSEY K. LANAGAN-LEITZEL and KRISTALYN SALTERS-PEDNEAULT, *Eastern Connecticut State University* – Research on surveillance tasks is often limited to performance under manipulated conditions. What is not commonly investigated is how mental health factors interact with these experimental manipulations. Two factors that may relate to surveillance performance are anxiety and trauma experience, which may bias attention toward internal thought processes and away from the environment (producing worse performance) or bias attention toward the environment under conditions of threat (producing better performance). Participants completed a simulated lifeguard surveillance task (moving semicircles that “drowned”) with several manipulations (set size [4/12], drowning type [stop/disappear], motion type [lap/meander], struggle [slow/same speed]), and completed several survey measures of anxiety and trauma experience. Preliminary results suggest that accuracy varied by an interaction of trauma experience with set size and with drowning type. For response time, participants with a history of trauma responded slower when the target slowed down prior to drowning. These preliminary results suggest that mental health could predict performance on these tasks in the field, and this should be investigated further.

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12:00-1:00 pm (2188)

A Computational Modelling Investigation of the Cognitive Mechanisms Subserving the Gaze Cueing Effect. MANIKYA ALISTER, DAVID K. SEWELL, and NATHAN EVANS, *The University of Queensland* – Gaze cueing refers to the tendency for people to respond faster to targets that appear at gazed-at locations rather than those that are gazed away from. This is thought to reflect a shift in selective covert visual attention via others’ directional eye gaze and is theorized to occur because following others’ eye gaze is an important social-cognitive mechanism. However, although this effect has been widely studied, little is known about the precise nature of this shift of attention because there has been less research investigating the potential subserving mechanisms. Specifically, it is unclear whether these response time differences are driven by early perceptual shifts, short priming effects, or sustained increases in information processing towards the gazed-at location. Using a formal evidence accumulation modelling framework—specifically, the diffusion model—we tested seven potential explanations for why the gaze cueing effect occurs. These findings provide the first in-depth assessment of potential subserving mechanisms using computational modelling and thereby contribute to furthering our theoretical understanding of the gaze cueing effect.

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12:00-1:00 pm (2189)

The Performance Costs of Interruption During Visual Search Are Determined by the Type of Search Task. DAVID ALONSO, MARK LAVELLE, and TRAFTON DREW, *University*

of Utah – Prior research has shown that interruptions lead to a variety of performance costs. Under some circumstances, interruptions lead to large decreases in accuracy on the primary task, whereas in others, response time increases but task accuracy is unaffected. The current experiments aimed to determine if the performance costs of interruption depend on whether working memory (WM) is recruited during visual search. In two experiments, we varied the memory demand associated with the search task and found that interruptions increased response time in both experiments but reduced accuracy only when the search task engaged WM. Our findings suggest that it is important for research to consider the cognitive processes a task engages in order to predict the nature of the adverse effects of interruption. In applied setting such as radiology, our results suggest that the disruptive effects of interruptions will depend on the memory demand that is associated with a medical evaluation.

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12:00-1:00 pm (2190)

Learning Search Strategy Through Scene Gist. JULIANA D. ADEMA, SHURAN TANG, and NAHAL ALIZADEH SAGHATI, *University of Toronto* – A vast array of information can be used to guide attention in visual search of naturalistic scenes, including but not limited to stimulus salience, task demands, and selection history. Meanwhile, the role of semantic information, such as scene category, remains ambiguous. Here, we ask if this rapidly available guidance signal can be leveraged to learn new attentional strategies. In a variant of the scene preview paradigm (Castelhano & Heaven, 2010), participants learned that target location and scene gist were linked, significantly increasing search efficiency over time. Importantly, scene gist previews led to more efficient searches. A computational model analysis integrating VGG16 and EBRW suggests scene previews may impact search by strengthening the associative link between gist and attentional strategy, potentially leading to speeded search with an accumulation of experience during learning.

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12:00-1:00 pm (2191)

The Cognitive Cost of Loneliness During a COVID-19 Lockdown: An Ecological Momentary Assessment Study. EYAL ROSENSTREICH, LIEL COHEN, and UZI LEVI, *Peres Academic Center* – The sociocognitive model of loneliness suggests that perceived social isolation may cause hypervigilance to social cues, thus impairing attention and memory. The present study was designed to test this notion in the context of a nationwide COVID-19 lockdown in Israel. Using seven ecological momentary assessment waves, participants aged 18-74 completed self-report questionnaires of negative affect and loneliness (familial, social, and romantic), along with affective visual search tasks in which smiling, sad, and neutral targets were hidden among mostly sad or mostly smiling facial distractors. Wave 7 also included a recognition task for neutral and negative words. It was found that lonely participants were slower to identify targets among smiling distractors, but this effect diminished over time. Furthermore, participants experiencing familial loneliness were slower to identify targets among sad distractors, but only before holy





days of highly familial importance. Finally, loneliness and worrying about COVID-19 interacted, as loneliness was associated with poor recognition for negative words among worried participants. Thus, our findings support the sociocognitive model of loneliness.

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12:00-1:00 pm (2192)

Local and Global Effects of the Frequency of Interruptions in a Visual Search Task. TOBIAS RIEGER, TARA RADOVIC, and DIETRICH MANZEY, *Technische Universität Berlin* – We investigated the impact of frequency of interruptions in a simulated medical visual search task. Participants (N=150) performed the visual search task during which they were interrupted by a number-classification task in 25%, 50% and 75% of all trials, respectively, reflecting the frequency conditions (i.e., low, mid, high). Target presence (i.e., present vs. absent) and interruption (i.e., uninterrupted vs. interrupted) were varied within subjects, and interruption frequency was varied between subjects. Globally, on a frequency condition level, participants in the low-frequency condition had longer mean response times (RT) than in the high condition, but there were no other performance differences between the three frequency conditions. Locally, on the level of specific interruption effects, accuracy strongly decreased directly after interruptions for target-present but not for target-absent trials. Furthermore, interruptions caused significant resumption costs, reflected in slower overall RTs in interrupted than in uninterrupted trials. The combined findings show that especially for critical visual search tasks as in the medical field, interruptions—regardless of frequency—should be avoided.

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12:00-1:00 pm (2193)

Attentional Control Settings in a Dynamically Color-Changing Environment. YUNYUN MU, *Philipps-Universität Marburg*, JAN TÜNNERMANN, CHRISTOPH WITZEL, *University of Southampton*, ANKE M. ALBERS, *Justus-Liebig-Universität Gießen*, ANNA SCHUBÖ, *Philipps-Universität Marburg* – When humans search for objects in a scene, they are known to employ different attentional control settings dependent on the nature of the stimuli and the task. However, little is known about which environmental factors drive control strategies or about how observers adapt them when the environment changes dynamically. In two experiments, we examined how observers adapt their attention when searching for shape singletons in a dynamically color-changing environment. Participants had to find one of two shape targets that differed in color. They were free to choose whichever target they preferred. The results showed that participants adapted their choices to the color ratio: they tended to select the target from the smaller color set and switched preferences as the color ratio varied between two color sets, though the color was task-irrelevant and the two color sets had subtle difference. We concluded that participants adapted their behavior to slight variations in the environment by statistical learning. We will present a Bayesian modeling approach that quantifies this statistical learning

and reveals the influences of perceptual and categorical color differences on participants' adaptive choice behavior.

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12:00-1:00 pm (2194)

The Effects of Emotion on Hindsight Bias in Younger and Older Adults During the 2020 U.S. Election. MANE KARA-YAKOUBIAN and JULIA SPANIOL, *Ryerson University* – Hindsight bias (HB) is the tendency to overestimate one's knowledge about an event once its outcome is known. Older adults are more vulnerable to HB than younger adults, but little is known about how emotion influences HB. The current study examined HB in younger and older adults in the context of the 2020 U.S. presidential election. Before the election, participants (N=284) predicted electoral-college outcomes for Democratic, Republican, and third-party candidates. After the election, participants recalled their original judgments. Compared with Democrats, Republicans exhibited greater HB for Biden's electoral-college result, suggesting that negative emotion may have inflated HB. A control experiment assessing HB for answers to general-knowledge questions differing in emotional valence also demonstrated greater HB for negative versus positive or neutral information. Taken together, these findings raise the intriguing possibility that negative emotion may be associated with greater HB in both younger and older adults.

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12:00-1:00 pm (2195)

Who Believed Fake News about Fraud in the 2020 U.S Election? DUSTIN CALVILLO, *California State University, San Marcos*, ABRAHAM M. RUTCHICK, *California State University, Northridge*, RYAN J. GARCIA, *Naval Postgraduate School* – Following the 2020 U.S. election, misinformation about irregularities in the election proliferated on social media, including false claims of voter fraud tweeted by politicians. This disinformation likely played a role violence across the country, including the January 6 storming of the U.S. Capitol. The present study examined belief in false headlines about election fraud in the week after the election. Participants (N=401) rated the truthfulness of false election headlines about election fraud among a set of true election headlines, and they completed several individual difference measures. Those with poorer cognitive reflection, more conservative ideology, greater presidential approval, and greater endorsement of conspiracy narratives demonstrated greater belief in false headlines about election fraud. Consuming politically conservative election news was also associated with greater belief in these headlines. Identifying the factors related to susceptibility to false claims of election fraud offers a path toward countering their influence.

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12:00-1:00 pm (2196)

Predicting, Understanding, and Influencing Health Perception. ADA AKA and SUDEEP BHATIA, *University of Pennsylvania* – Lay perceptions of medical conditions and treatments determine





people's health behaviors, guide biomedical research funding, and have important consequences for both individual and societal well-being. Yet it has been nearly impossible to quantitatively predict lay health perceptions for hundreds of everyday diseases due to the myriad psychological forces governing health-related attitudes and beliefs. Here we present a data-driven approach that uses text explanations on healthcare websites, combined with large-scale survey data, to train a machine learning model capable of predicting lay health perception. We use our model to analyze how language influences health perceptions, interpret the psychological underpinnings of health judgment, and quantify differences between different descriptions of disease states. Our model is accurate, cost-effective, and scalable and offers researchers and practitioners a new tool for studying health-related attitudes and beliefs.

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12:00-1:00 pm (2197)

Judgments of Value and Sequentially Increasing and Decreasing Changes in Prices: Judgments of Value and Response Time. MASAYO NODA, *Kinjo Gakuin University*, HIROKI C. TANABE, *Nagoya University*, MASATO KIMURA, *Konica Minolta, Inc.* – This study examined the influence of sequentially increasing and decreasing prices on judgments of value and response time. Participants were asked to take part in a game purchasing barley on a computer and then evaluate their satisfaction. Sequential data (increasing vs. decreasing) x Days (5-day vs. 2-day) x Price change (¥40, ¥80 vs. ¥120) ANOVA was performed. Value judgment results showed a significant three-way interaction ($F(3,33) = 3.24, p < .05$). The participants were more satisfied in the increasing 5-day condition as the amount increased; however, the participants were dissatisfied in the decreasing 5-day conditions. In addition, the response time was longer in the increasing 5-day conditions compared to the 2-day conditions; however, there were no significant differences in the decreasing conditions ($F(1,27) = 2.82, p < .10$). These results indicate that when people calculate the sequential gains, they require more time to make a judgment.

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12:00-1:00 pm (2198)

Fake News, Repeated Exposure, and Vaccine Attitudes. THOMAS SMELTER and DUSTIN CALVILLO, *California State University, San Marcos* – The prevalence of misinformation and fake news online is troubling. One problematic consequence is that exposure to misinformation may alter people's attitudes and sway political and medical decisions. However, studies have yet to address this question empirically. Therefore, we assessed whether misinformation or scientifically accurate information differentially affected people's attitudes about COVID-19 vaccines. Among a set of true general news headlines, participants were randomly assigned to either see five true or five false COVID-19 vaccine headlines. Participants then completed COVID-19 attitude questions and finally rated their belief in 20 COVID-19 vaccine headlines, 15 of which were new and the five they had previously been exposed to. Headlines that were viewed previously were believed at higher rates than new headlines,

replicating the illusory truth effect. While differences in vaccine attitudes were not significant, participants in the true headline condition outperformed those in the false condition at discerning true from false COVID-19 headlines.

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12:00-1:00 pm (2199)

Can Fabricated Data Be Ignored When It Is Detected?. ADAM T. RAMSEY and JENNIFER TRUEBLOOD, *Vanderbilt University* – As information sharing via social media increases, individuals are increasingly exposed to misinformation. Even when misinformation is later invalidated, individuals often utilize it when forming inferences. Over five experiments, we investigated whether this “continued influence effect” occurs when participants judge for themselves whether information is fabricated. Participants viewed sets of values sampled from Gaussian distributions to estimate the underlying means. They attempted to ignore fabricated data, which were outlier values inserted into the value sequences. Results indicated participants were able to detect outliers, and that higher detection confidence was associated with greater estimate accuracy. However, even when participants were most confident that they detected fabricated data, their estimates were still pulled in the direction of the outlier. The addition of visual misinformation cues and a confidence-first response order did not eliminate systematic over- and under-estimation. These findings suggest individuals may incorporate fabricated data they meant to ignore when forming beliefs.

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12:00-1:00 pm (2200)

Conflicting Media Messages in a Health Crisis: Asymmetric Updating and COVID-19. AUSTIN L. KATZ, BRITTNEE HAMPTON, and SANDRA L. SCHNEIDER, *University of South Florida* – People encounter an abundance of information from the media, yet they may be selective about which details they accept. Polarized media messages may cause asymmetric updating wherein people accept agreeable information from preferred news sources but are skeptical of disagreeable information and sources. We tested updating of future COVID-19 death estimates when exposed to varying information from different news sources. Participants first estimated expected COVID-19 deaths, then viewed information from either a liberal or conservative cable news outlet suggesting either that COVID-19 death rates would be fewer or more than previously expected by experts. Participants then gave their own updated estimates. We predicted that participants who receive information from a preferred, favorable source would update their beliefs more than participants who received information they viewed unfavorably. Although our results did not fully confirm our predictions, they nevertheless shed light on the sensitivity of estimates to new information about polarizing issues.

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12:00-1:00 pm (2201)

Perceived Risk and Extended Warranty. JOSE FANA, *St. John's University* – Decisions often involve some level of risk. However, in many cases, there can be a wide divergence between perceived risk and probable “real” risk. Here, we investigate how socio-economic status and mathematical ability relate to perceived risk. In an online study, we gauged undergraduate participants’ (n=67) perceived risk by asking them to evaluate the value of 10 extended warranties on a 7-point Likert scale. Participants then completed short math evaluations and reported on both personal and family income. We did not find that mathematical ability or income predicted warranty evaluation. However, we did note that participants tended to rate warranties for personal electronics as being more valuable than warranties for fashion items. Further investigation into the causes of these evaluations is warranted.

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12:00-1:00 pm (2202)

Impact of Spacing and Repetitions on the Illusory Truth Effect. JESSICA UDRY and SARAH BARBER, *Georgia State University* – Repetition increases perceptions of truth. Although prior research shows that this illusory truth effect depends upon both the number of repetitions and the spacing of repetitions, the potential interaction between these two factors has not been examined. To address this, in Experiment 1 participants read a series of trivia facts presented either one, two, three, or four times with either zero, one, or two intervening items between the repetitions. One week later, participants rated the truthfulness of the previously seen trivia facts, as well as novel trivia facts. Overall, participants rated the repeated facts as more truthful than the novel facts, but neither the number of repetitions nor the spacing of the repetitions affected perceived truth. A different pattern emerged for Experiment 2. Here, facts were presented two or 10 times with zero or 10 intervening items between the repetitions. Results showed that after a 1-week delay, participants rated facts as more truthful when they were presented 10 times rather than two times and more truthful when the repetitions occurred with a lag of 10 intervening items compared to zero intervening items. However, there was no interaction between number of repetitions and spacing.

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12:00-1:00 pm (2203)

Believing in Nothing and Believing in Everything: The Underlying Cognitive Paradox of Anti-COVID-19-Vaccine Attitudes. DEVORA NEWMAN, *The Hebrew University of Jerusalem*, STEPHAN LEWANDOWSKY, *University of Bristol*, RUTH MAYO, *The Hebrew University of Jerusalem* – Why do some people easily believe baseless claims from unknown sources, while rejecting scientific evidence and experts? To examine this paradox, we created a scale of well-accepted truths and fabricated “alternative facts,” unrelated to COVID-19. Assuming that anti-COVID-19-vaccine attitude is a manifestation of distrust in science, we hypothesized that the paradox would manifest in those who oppose the vaccine compared to those supporting it. We sampled participants from

Prolific who were prescreened for their attitude toward COVID-19 vaccine and found that compared to supporters of the vaccine, those that oppose the vaccine believe “alternative facts” significantly more while believing the facts of our shared reality significantly less. We find that lesser truth differentiation is significantly correlated with greater distrust, greater reliance on intuition, a greater belief in conspiracies, a greater need for chaos, and less intellectual humility. This research offers a novel cognitive conceptualization of beliefs in fake news, disinformation, and conspiracies and therefore could prove to be crucial in the effort of restoring trust in our shared reality and social structures.

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12:00-1:00 pm (2204)

Qualitative Individual Differences in the Truth Effect. MARTIN SCHNUERCH and LENA NADAREVIC, *University of Mannheim*, JEFFREY N. ROUDER, *University of California* – The repetition-induced truth effect refers to the phenomenon that people rate repeated statements as more likely true than novel statements. Whereas there is a large body of research on the average truth effect, only few studies have addressed the question of how the effect differs across individuals. In this study, we document a surprising finding: While the majority of participants display the usual positive truth effect, a minority are qualitatively different—they reliably discount the validity of repeated statements, what we refer to as negative truth effect. We examine eight truth-effect data sets composed of 1,105 individuals performing 38,904 judgments. Through Bayes factor model comparison, we show that reliable negative truth effects occur in five of the eight data sets. This result has important theoretical implications because it seems unreasonable that the mechanisms underlying the positive truth effect are the same that lead to a discounting of repeated statements’ validity. Moreover, the presence of qualitative differences motivates a different type of analysis of individual differences based on ordinal (i.e., Which sign does the effect have?) rather than metric measures.

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12:00-1:00 pm (2205)

From Observation to Social Transmission: How Communication through Cues Shapes the Construction of Healthiness and Tastiness Perceptions. SIMONA HAASOVA, *University of Lausanne*, KAROLIN SALMEN, *Heidelberg University*, ARND FLORACK, *University of Vienna*, KLAUS FIEDLER, *Heidelberg University* – This research advances a novel theoretical position, a semiotic serial reproduction approach, to investigate the relationship between healthiness and tastiness of food in cue-based perception and communication. In two exploratory and one confirmatory study, we show that all cues used to communicate healthiness or tastiness show overlap of some degree. This semiotic characteristic predicts systematic changes in healthiness and tastiness perception, amplified by repetition, and the choice of cues moderates the effect size. This results in a perceived positive relationship between healthiness and tastiness of specific food items, even if they





are stereotypically negatively related. Our research bears implications for health communication and marketing, and it highlights how the influence of semiotic characteristics (e.g., cue overlap) can override the influence of stereotypical expectancies.

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12:00-1:00 pm (2206)

Metacognitive Accuracy and the Recollection of Contextual Details. ALEXANDRA GRANINGER, *University of Maryland* – The noncriterial recollection hypothesis posits that the retrieval of seemingly irrelevant information learned with the target information can influence later judgments about how well one feels one knows that target information (Brewer, Marsh, Clark-Foos, & Meeks, 2010). Previous research has examined this hypothesis in the context of feelings of knowing (FOKs; one's perceived ability to later recognize currently unrecalled information). Yet, few studies have examined this phenomenon in the context of judgments of learning (JOLs; one's perceived ability to later recall learned information) or retrospective confidence judgments (RCJs; one's perceived confidence in the correctness of recently recalled information). Therefore, the goal of the present study was to examine the impact of the recollection of contextual (noncriterial) details on metacognitive judgment magnitude, metacognitive judgment accuracy, and the recollection of target information for both RCJs and JOLs. Results of this study replicate previous findings related to the noncriterial recollection hypothesis and provide insights into how noncriterial information influences a variety of metacognitive judgments.

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12:00-1:00 pm (2207)

The “Said-It-All-Along” Effect: Pragmatic, Constructive, and Reconstructive Memory Influences on the Hindsight Bias. KAROLIN SALMEN, FLORIAN K. G. ERMARK, and KLAUS FIEDLER, *Heidelberg University* – After knowing how events turned out, we are quick to say we “knew it all along.” Decades of research on hindsight bias has shown that outcome information biases what we later present as our original judgments. Combining established between- and within-participant designs in a longitudinal study, this research offers a new theoretical perspective that integrates pragmatic, constructive, and reconstructive memory processes underlying the hindsight bias. It is found that participants successfully exclude outcome information from their judgments, even directly after giving a judgment that is biased by the outcome information. However, if the same request appears not directly after the biased response, but 2 weeks later, no successful exclusion occurs. After this delay, judgments on scenarios where participants last excluded outcome information remain unbiased, while judgments on scenarios that ended with biased answers remain biased. These results extend the reconstructive memory approach with the constructive influence of cooperatively given responses. Thereby, we provide a new line of explanation for the hindsight bias.

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12:00-1:00 pm (2208)

Withdrawal

12:00-1:00 pm (2209)

Semantic Context Creates Overconfidence in Foreign Language Abilities. KAYLA JORDAN, *University of Waikato*, DANIEL M. BERNSTEIN, *Kwantlen Polytechnic University*, NIELS PETER NIELSEN, *Aarhus University*, MARYANNE GARRY, *University of Waikato* – Semantic context helps people comprehend information, but it can also create illusions of truth and understanding. To what extent does increased semantic context increase people's confidence in their ability to perform highly technical skills, such as understanding a foreign language? We investigated this question by playing subjects Danish audio clips that varied context along two dimensions: [1] the audio clips were accompanied by subtitles or not and [2] with a title describing what the audio clip was about. We found people who heard a foreign language paired with subtitles and a title thought they would understand more of that language in new situations compared to those who simply heard the language, even though their actual understanding didn't improve.

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12:00-1:00 pm (2210)

Predicting Students' Postpandemic Preferences Using Need for Cognition and Academic Locus of Control. JACLYNN V. SULLIVAN, *Mount Mercy University* – This study sought to determine if students' Need for Cognition Scale (NFC) or Academic Locus of Control Scale (ALC) scores would predict their preference for continuing hybrid courses and their desire to take more online courses when the pandemic ended. Forty-one participants from a Midwestern university were given the NFC and ALC and responded to questions about pandemic and postpandemic course offerings. Regression analyses revealed three significant predictive relationships. These predictions were significant regardless of student GPA and judgment of the pandemic's effect on their grades. NFC predicted less desire to continue hybrid education and to continue online college courses ($R^2=.30$, $F(1,39)=16.80$, $p<.001$, $\beta=-.55$, $p<.001$). ALC predicted how successful one felt at developing and maintaining autonomy in completing their schoolwork ($R^2=.12$, $F(1,39)=5.09$, $p<.05$, $\beta=.34$, $p<.05$). Evidence suggests that students in need of reasoning and critical thinking will return to in-person learning as will students who could not develop the ability to work alone.

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12:00-1:00 pm (2211)

Social Media and Fake News: The Role of Repetition and Encoding Variability on the Perceived Accuracy of Fake News. BLAIR BRAUN, *Kent State University*, DUSTIN CALVILLO, *California State University, San Marcos*, LIZA KIEFER and JARUDA ITHISUPHALAP, *Kent State University* – With shares, retweets, and curated feeds based on algorithms, false claims can quickly spread across multiple social media platforms—exposing users to fake





news multiple times and in different contexts. The goals of the present study were to investigate 1. the role of multiple repetitions (0, 1, or 3) on the perceived accuracy of fake news headlines in social media contexts (Facebook, Instagram, or Twitter), and 2. whether the perceived accuracy of repeated fake news headlines would be amplified by encountering them in different, as opposed to the same, social media context. We found clear evidence of an illusory truth effect but failed to find evidence that three repetitions increased perceived accuracy relative to a single exposure. In addition, participants rated false headlines as truer when they were repeated three times in the same social media contexts as compared to when they were encountered in three different social media contexts.

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12:00-1:00 pm (2212)

News Headline Frequency Is Associated with Greater Risk Perception. TRISTAN T. HERRING, MARK LACOUR, and MICHAEL J. SERRA, *Texas Tech University* – People’s perception of risk plays an important role in decision making, including political and medical decisions. The perception of risk depends on how one encodes and estimates the frequency of an event from that category (e.g., overestimating the frequency and risk of shark attacks, underestimating the frequency and risk of phone-related car crashes). Because news media play a large role in disseminating information, we examined how accurately people process the frequency of news headlines. We presented headlines from various categories (e.g., shootings, global warming) to participants at varying frequencies. We asked participants to estimate the number of headlines they saw from each category and to rate the risk that each type of event posed to society. Participants’ frequency estimates for headlines from each category were associated with greater perception of risk from that type of event, and greater risk perception also was associated with greater overestimation of frequency. These results have implications for how one’s media consumption influences perception of risk and subsequent decision making. Future research should explore whether encoding, retrieval processes, or both are involved in this relationship.

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12:00-1:00 pm (2213)

The Elusive Nature of Informational Masking. SARAH KNIGHT and SVEN MATTYS, *University of York* – Speech-in-noise research typically distinguishes between energetic masking (EM, interference between target and masker at the periphery) and informational masking (IM, interference higher in the auditory pathway). IM is currently poorly understood, in part because it is extremely difficult to manipulate it without also altering EM. However, a key feature of IM is that it often involves linguistic and cognitive factors, such as whether or not a masker includes intelligible speech. It is generally believed that intelligible maskers, which involve both EM and IM, are more detrimental to target perception than acoustically-similar but unintelligible maskers, which involve only EM. However, in this study we show that, under some circumstances, speech-based maskers (including natural and noise-vocoded speech)

can actually be less detrimental to target intelligibility than acoustically-matched, unintelligible equivalents. By systematically varying our maskers along a range of parameters, we have taken steps towards isolating the specific masker characteristics contributing to the effect. Results are discussed in terms of the difficulty of consistently characterizing and empirically quantifying IM during speech-in-noise listening.

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12:00-1:00 pm (2214)

Use of Perceptual Restoration in Understanding Degraded Speech by Monolingual and Bilingual Listeners. ERIKA L. EXTON, KALIYAH GOWING, and ROCHELLE S. NEWMAN, *University of Maryland, College Park* – Listeners often need to understand speech in the process of background noise or other degraded conditions; doing so is particularly difficult for children and for bilingual speakers (i.e. Tabri et al., 2010; Nelson et al., 2005). Perceptual restoration (PR) may be a helpful speech perception mechanism in noisy settings: this auditory illusion describes the phenomenon where the brain “fills in” missing information, causing listeners to perceive a speech signal interrupted with noise as if it were complete. Monolingual adults and children can use PR in understanding both sentences and individual words (Newman, 2004), and adults may also use it to identify individual words in a second language (Ishida & Arai, 2016). The purpose of this project was to test how listeners’ ability to use PR in understanding sentences in noise is affected by both age and bilingual status, by measuring the repetition accuracy of monolingual and bilingual adults and children (5 years old) for sentences presented in a variety of degraded conditions. Preliminary evidence suggests differences in PR between language groups at both ages. Possible implications for bilinguals’ use of top-down information in supporting speech perception will be discussed.

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12:00-1:00 pm (2215)

Is There a Known-Word Facilitation Effect of Speech Segmentation in Bilinguals?. SEJIN LEE and KRISTINA C. BACKER, *University of California, Merced*, SVEN MATTYS, *University of York*, HEATHER BORTFELD, *University of California, Merced* – When monolingual English speakers listen to a novel artificial speech stream, their speech segmentation is impacted by both top-down (i.e., prior knowledge) and bottom-up (i.e., the structure of the input signal) information (Palmer et al., 2019). It is unknown whether bilinguals are similarly impacted by top-down lexical information when segmenting the same artificial speech. We familiarized English monolinguals and Spanish-English bilinguals with either a control stream (artificial speech consisting of novel “words”) or a test stream (the same artificial speech stream containing occasional instances of a known English word). Following familiarization, all participants were tested on their ability to correctly recognize the novel words from the stream. Overall, participants recognized significantly more novel words in the test stream than the control stream. However, this known-word facilitation effect was more pronounced in monolingual than bilingual participants, suggesting that





language experience modulates the use of prior lexical knowledge during segmentation of artificial speech.

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12:00-1:00 pm (2216)

Does Sensitivity to Acoustic Variation Within an L1 Phoneme Category Help L2 Learning? EFTHYMIA C. KAPNOULA, *Basque Center on Cognition, Brain and Language (BCBL)*, ARTHUR G. SAMUEL, *Basque Center on Cognition, Brain and Language (BCBL), Stony Brook University & Ikerbasque* – Listeners differ in how they categorize speech sounds in their L1, with some listeners showing higher sensitivity to within-category phoneme differences (Kapnoula et al., 2017; Kong & Edwards, 2016). Higher sensitivity to within-category differences is likely due to more gradient perceptual encoding of acoustic cues (Kapnoula, 2016; Kapnoula & McMurray, under review): Some listeners may be less strongly affected by their phonological prototypes (Samuel, 1982), resulting in weaker perceptual distortion/warping of the acoustic cues. Here we examined the links between perceptual gradiency in L1, exposure to different languages, and L2 learning. Several measures were collected from 134 Spanish-Basque bilinguals, including exposure to and proficiency in English, sensitivity to within-category phoneme differences and phoneme categorization consistency in L1, working memory (Corsi), and auditory temporal acuity. The results reveal a positive link between L1 perceptual gradiency and L2 learning—particularly for late bilinguals. This pattern suggests that in the absence of early exposure to many languages, high perceptual gradiency may facilitate L2 learning.

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12:00-1:00 pm (2217)

Predictors of Listening-Related Fatigue Across the Adult Lifespan. RONAN MCGARRIGLE, *University of Bradford*, SARAH KNIGHT, *University of York*, BENJAMIN HORNSBY, *Vanderbilt University Medical Center*, SVEN MATTYS, *University of York* – Listening-related fatigue is a potentially serious negative consequence of an aging auditory and cognitive system. However, the impact of age on listening-related fatigue, and the factors underpinning any such effect, remain unexplored. Using data from a sample of adults ranging in age from 18-85 years, we conducted a conditional process analysis to examine potential mediators and moderators of age-related changes in listening-related fatigue. Mediation analyses revealed opposing effects of age on listening-related fatigue; aging was associated with increased listening-related fatigue for individuals with higher self-reported hearing impairment, but also decreased listening-related fatigue via reductions in mood disturbance and sensory-processing sensitivity. Results also suggested that the effect of auditory attention ability on listening-related fatigue was moderated by sensory-processing sensitivity; for individuals with high sensory-processing sensitivity, better auditory attention ability was associated with increased fatigue. These findings help to shed light on the perceptual, cognitive, and psychological factors underlying age-related changes in listening-related fatigue.

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12:00-1:00 pm (2218)

Emotional Prosody Subprocesses: No ERP Evidence for Interdependency. RUI GOMES, SÃO LUÍS CASTRO, and SUSANA D SILVA, *University of Porto* – Vocal emotion recognition comprises various subprocesses, such as sensory processing, perceptual integration, extraction of emotional significance, lexico-prosodic integration, and cognitive evaluation. It is yet unknown whether these subprocesses are interdependent. To address this question, we measured EEG correlates of violations in pitch contour (indexing perceptual integration), violations in congruity between meaning and prosody (indexing lexico-prosodic integration), and both violations combined. Participants listened to emotional words spoken with well- vs. ill-formed pitch contour, lexico-prosodically congruent vs. incongruent (e.g., negative word with positive prosody), or well-formed and congruent vs. ill-formed and incongruent, while performing prosody-unrelated tasks. Violations of pitch contour elicited central-posterior negativity, peaking around 170 ms, and lexico-prosodic incongruity elicited generalized positivity between 190 and 560 ms and anterior positivity between 610 and 740 ms. No significant differences emerged when single and combined violations were contrasted, suggesting that perceptual and lexico-prosodic integration are independent.

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12:00-1:00 pm (2219)

The Effects of Musical Instrument and Talker Gender on Spoken Word Recognition. BETHANY COX and CONOR T. MCLENNAN, *Cleveland State University* – Previous experimental data have provided evidence that listeners retain surface information associated with spoken words, such as the gender of the speaker (Palmeri et al., 1993; Goh, 2005). While listening to musical instruments, listeners also associate the instruments with a gender (Abelles, 2009; Stronsick et al., 2018). In the current study, we examined the effects of musical instrument gender and talker gender on spoken word recognition. Participants heard a moment of silence or a male, female, or neutral instrument play a song followed by either a male or female talker saying a word or nonword. Participants responded by indicating whether the talker said a word or a nonword. More efficient lexical decision responses were predicted in the match condition (e.g., male instrument, male talker) compared to the mismatch (e.g., female instrument, male talker), neutral (e.g., neutral instrument, male talker), and silent (e.g., no music, male talker) conditions. The results of the current study could aid in the understanding of how humans process auditory stimuli and contribute to a body of research revealing connections between environmental sound processing, including (perhaps especially) music, and spoken word recognition.

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12:00-1:00 pm (2220)

Classifying Human Voice Similarity with Artificial Intelligence. OLIVER JAGGY, STEPHAN SCHWAN, and HAUKE S. MEYERHOFF, *Stiftung Medien in der Bildung (SbR)* – Artificial intelligence (AI) can be used for classification tasks. Here, we present a case study of such classifications for human voice similarity.





We trained a deep neural net on a speaker verification task in which each voice gets embedded in a 256-dimensional space such that utterances from a single speaker are close together while utterances from different speakers are more distant. Using this deep neural net, we probed whether an AI can predict how similarly humans judge different voices. In Experiment 1, participants rated pairs of voice samples in terms of their dissimilarity. Using mixed-effects model, we observed a quadratic relationship between AI ratings and human dissimilarity ratings (conditional $R^2=0.27$, $Mdn\ rs=0.37$). In Experiment 2, we investigated the reliability of dissimilarity ratings by asking participants to rate each speaker pair twice. We observed a median correlation of $rs=0.57$. Considering this reliability score, an attenuation correction for Experiment 1 suggests a correlation of $rs\ corrected=0.48$. Our results show that AI can predict human judgments of voice similarity, and we discuss implications for persuasion and education.

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12:00-1:00 pm (2221)

The Inhibitory Effect of Production During the Incidental Formation of Novel Tone Categories. JONATHAN WRIGHT and MELISSA BAESE-BERK, *University of Oregon* – Studies examining the effect of production during vocabulary learning seem to provide robust evidence for the benefit of production during learning. However, when learners attempt to learn words containing novel phonological features, production of the target word following auditory exposure has been shown to hinder perceptual learning. Thus far, studies have not looked at the effect of production during novel tone category formation, where learners have no previous experience with tone categories, nor have studies investigated the impact of production during the incidental formation of novel sound categories. Further, studies have not investigated the incidental formation of natural tone categories, more generally. In the present experiment we use an incidental learning paradigm to examine the effect of production during the perceptual formation of novel tone categories. Results indicate participants are able to perceptually form four novel tone categories in a single session but that production during incidental learning severely inhibits the perceptual formation of novel tone categories. These results add to a growing body of research suggesting an inhibitory effect of production on novel sound category acquisition.

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12:00-1:00 pm (2222)

Individual Differences in Signal-Based vs. Knowledge-Based Cues for Speech Perception. ANNE CRINNION, *University of Connecticut*, CHRISTOPHER C. HEFFNER, *University at Buffalo, SUNY*, EMILY MYERS, *University of Connecticut* – Listeners are often confronted with phonetic ambiguities in the speech signal. Speech rate information and semantic context can influence how speech is perceived; of interest is whether listeners vary systematically in their propensity to use either cue. We examined the perception of words with a final voicing contrast (e.g., cup-cub) when embedded in sentences containing both acoustic and semantic cues

to this final word. Rate information was either biased toward voiced or voiceless interpretations of this sound (a fast rate tends to lead to voiced stop interpretations). Similarly, semantic information was either voiced or voiceless biasing (“The lion sat near the cu?” would bias responses toward “cub”). We found that listeners robustly used both cues, suggesting that signal-based and knowledge-based knowledge can influence speech perception. However, the weighting of different cues varied substantially between individuals. Ongoing work examines how cue use differs systematically across individual listeners.

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12:00-1:00 pm (2223)

Increased Reliance on Top-Down Information to Compensate for Reduced Bottom-Up Usage of Acoustic Cues in Dyslexia. HADEER DERAWI, *University of Haifa*, EVA REINISCH, *Austrian Academy of Sciences*, YAFIT GABAY, *University of Haifa* – Speech recognition is a complex operation wherein listeners have to integrate the detailed phonetic information present in the acoustic signal with their general linguistic knowledge. In the present study, we tested the assumption that speech recognition is effortful for people with developmental dyslexia (DD) using a dual task setting. Specifically, we tested the Ganong effect (i.e., lexical bias on phoneme identification) while participants performed a secondary task of either low or high cognitive demands. We found a larger Ganong effect in the DD group under high-cognitive load compared to low-cognitive load, and this modulation was larger than for typically developed (TD) readers. Furthermore, phoneme categorization was less precise in the DD compared to the TD group. These findings are taken to suggest that individuals with DD show increased reliance on top-down lexically mediated perception processes, likely as a compensatory mechanism for reduced efficiency in bottom-up usage of acoustic cues.

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12:00-1:00 pm (2224)

Regular Rhythm Aids Speech Intelligibility in Noise. ANNA ROBINSON, ANN BRADLOW, and JENNIFER COLE, *Northwestern University* – Previous work suggests that regularity in the acoustic signal facilitates predictive processing. However, which phonetic or phonological cues give rise to that regularity is a matter of debate. We implement Tilsen and Arvaniti’s (2013) metric based on variation in amplitude modulation (AM) of the speech waveform to calculate a rhythm index for each utterance. Participants listened to syntactically normal but semantically anomalous sentences embedded in noise and transcribed what they heard. Results showed that, as expected, participants were overall less accurate when there was more noise in the signal. In addition, an effect of rhythmicity emerged in the low signal-to-noise ratio condition. Sentences with more regularly spaced amplitude peaks (low-varying AM) were more robust against degradation in noise than sentences with irregular rhythm. This finding suggests that regular AM is a factor that promotes speech intelligibility in noise. Overall, the results support models of speech perception that take neural oscillators phase-locking to amplitude fluctuations





in the signal as a mechanism underlying the neurological processing of speech.

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12:00-1:00 pm (2225)

Sequence Effects and Speech Perception: Cognitive Load for Speaker-Switching Within and Across Accents. DREW J. MCLAUGHLIN, JULIE M. BUGG, and KRISTIN VAN ENGEN, *Washington University in Saint Louis* – Prior work in speech perception indicates that listening tasks with multiple talkers (as opposed to a single talker) result in slower processing. Notably, however, the trial-to-trial demands of switching between speakers, as well as the demand for switching between speakers with different accents, have yet to be examined. We used pupillometry, a physiological index of cognitive load, to examine the demands of processing native- and non-native-accented speech when listening to the same speaker consecutively (no switch), a novel speaker of the same accent (within-accent switch), and a novel speaker with a different accent (across-accent switch). Inspired by research on sequential adjustments in cognitive control, we anticipated that trial-to-trial demands of switching between speakers may depend on speech processing demands on the preceding trial. Results indicate that switching between speakers universally increases cognitive load, and there is an asymmetry such that switching from native to nonnative accent is more demanding than the reverse. We discuss these novel findings in the context of congruency sequence effects and a linguistic account of the cognitive demands of resolving acoustic-phonetic variability.

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12:00-1:00 pm (2226)

Exploring Lexically Driven Perceptual Recalibration for Substituted Phonemes. JEANNE CHAROY, *Stony Brook University*, ARTHUR G. SAMUEL, *Basque Center on Cognition, Brain and Language (BCBL)*, *Stony Brook University & Ikerbasque* – The speech perception system must maintain flexibility to accommodate the lack of invariance in the speech signal. For example, the system is able to adjust phoneme categories based on current speech input and lexical context—a phenomenon called lexically driven perceptual recalibration. Recalibration has been studied mostly using accented sounds maximally ambiguous between two phoneme categories (e.g., a sound ambiguous between /f/ and /s/ in a word like “superpower”). However, this scenario doesn’t represent the full range of variations present in speech (e.g., nonnative accented speech). In the current study, we used a new exposure task to expand recalibration to cases where the artificially accented phoneme is fully substituted with a different phoneme (a “bad map” situation; e.g., /f/ instead of /s/ resulting in “shuperpower”) rather than ambiguous. Our exposure task encourages listeners to treat these items as words despite the high ambiguity—an important step for successful recalibration. We find that recalibration is less robust for “bad map” phonemes, compared to maximally ambiguous ones. In addition, effects were modulated by the position of the accented phonemes in their carrier words.

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12:00-1:00 pm (2227)

Rhyme Neighbors Inhibit Lexical Facilitation in Phonetic Categorization. JASON ZEVIN, *University of Southern California* – Previous studies have shown facilitative effects of lexicality and lexical neighborhoods on phonetic categorization (i.e., task-relevant phonemes of the target word and phonological neighbors facilitate the disambiguation of unclear bottom-up target phoneme). The current study aimed to investigate whether there are both inhibitory and facilitative effects of lexical neighborhoods on phonetic processing using a phonetic categorization task. Fifty participants categorized the speech stimuli from 20 VOT continua. These continua differed in lexicality and frequency-weighted phonological neighborhood density (relative onset density between two end points, rhyme density of the continuum and total density of the continuum). The results showed that the rhyme density of the continuum inhibited lexicality effects, but no facilitative or inhibitory effects of relative onset density and total density were found. The finding suggests that there could be multiple inhibitory and facilitative forces in the processing stream that counteract each other. Their influences on phonetic processing may depend on the particular activation and competition dynamics of the target word and its phonological neighbors.

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12:00-1:00 pm (2228)

Testing the Linguistic Similarity Hypothesis Under Spectrally Matched Conditions. VIOLET BROWN, *Washington University in St. Louis*, NASEEM H. DILLMAN-HASSO, *Carleton College*, KRISTIN VAN ENGEN, *Washington University in Saint Louis* – According to the linguistic similarity hypothesis, segregating speech streams should be more difficult when the streams are linguistically similar. However, most research on the topic has compared same-language maskers with different-language maskers (e.g., English vs. Mandarin masking of English speech) or has used multiple masking languages that differ from one another spectrally as well as linguistically. The current study compared the extent to which three languages (English, Dutch, and Mandarin) differing in linguistic similarity to the target language (English) affect sentence identification. Across two experiments differing in signal-to-noise ratios, we found that maskers produced in the same language as the target provided more interference than maskers produced in different languages. However, we found no evidence that a language that is linguistically similar to English (Dutch) provides more interference than a less similar language (Mandarin), as would be predicted by the linguistic similarity hypothesis. Thus, when spectral differences between maskers are removed, linguistic similarity between target and masker does not seem to influence word recognition, but linguistic sameness does.

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12:00-1:00 pm (2229)

Linguistic Release from Masking as a Measure for Language Proficiency. BRITTANY T. WILLIAMS, ADELIN OBRZUT, and CHEYANNE K. WALLER, *The Pennsylvania State University*, SUSANNE BROUWER, *Radboud University*,





GIULI DUSSIAS and NAVIN VISWANATHAN, *The Pennsylvania State University* – Measures of language proficiency are varied and range from self-reported assessments of proficiency to standardized national tests. We explore whether a well-studied phenomenon in speech-in-speech recognition may be utilized to augment current measures of language proficiency. Specifically, a phenomenon called linguistic release from masking (LRM). LRM occurs when intelligibility of a target language (e.g., English) increases in the presence of differing language backgrounds (e.g., Dutch or Mandarin). LRM persists for highly proficient bilinguals, and its magnitude varies according to listeners' familiarity with the background language. To explore whether LRM is related to proficiency and thus serves as an implicit measure, we examined its relationship with language proficiency measures. In Experiment 1, we tested monolingual English and bilingual Chinese-English listeners. We found that highly proficient Chinese-English listeners showed monolingual-like LRM effects. In follow-up experiments, we are extending investigation to Dutch-English and Spanish-English bilinguals using online methodology. Together, these studies will evaluate whether LRM may be a useful measure of language proficiency.

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12:00-1:00 pm (2230)

Examining the Time Course of Priming Effects in Spoken Word Recognition. SAMANTHA E. TUFT, *Cleveland State University*, SARA INCERA, *Eastern Kentucky University*, CONOR T. MCLENNAN, *Cleveland State University* – In spoken word recognition, long-term repetition priming effects have been obtained across several behavioral tasks, including lexical decision (i.e., repeated—primed—words are responded to more efficiently than new—unprimed—words). However, to our knowledge, long-term repetition priming effects have not been examined using computer mouse tracking in an otherwise traditional lexical decision task, which would provide data regarding the time course of long-term repetition priming effects. Consequently, we compared participants' lexical decision responses using a computer mouse to primed and unprimed words. The mouse-tracking paradigm allowed us to evaluate the continuous dynamics of the responses over time. We predicted that primed words would be responded to more efficiently than unprimed words. Obtaining long-term repetition priming effects in mouse tracking data should motivate future investigations examining the time course of various long-term repetition priming effects.

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12:00-1:00 pm (2231)

Causal Inference in the Perception and Learning of Audio-Visually Presented Speech. SHAWN CUMMINGS, GEVHER KARBOGA, MENGHAN YANG, and T. FLORIAN JAEGER, *University of Rochester* – A central challenge in speech perception is that mapping from categories (sounds/words) onto the speech signal varies between talkers. Prior work suggests that listeners overcome this challenge in part through perceptual learning of talker-specific pronunciations. However, pronunciations can reflect temporary/incidental causes (ICs; e.g. pen in the mouth) rather than

talker characteristics. We investigate 1) whether speech perception implicitly takes into account plausible causes for unexpected pronunciations and 2) how this affects interpretation of subsequent input. We use a novel exposure-test paradigm to factorially manipulate a) acoustic & visual cues to articulation and b) visual absence/presence of ICs (pen in mouth vs. hand). Experiment 1 and Experiment 2 (N=64 each) found listeners compensate when an IC is present, categorizing otherwise identical acoustic inputs differently. Experiment 3 (N=256) found that talker-specific perceptual learning takes this compensation into account. Passive exemplar storage of speech along with its visual context (Kraljic & Samuel 2011) cannot explain these results. Rather, both perception and learning seem to draw on causal inferences about what factors explain the perceived signal (Kraljic et al., 2008; Liu & Jaeger, 2018).

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12:00-1:00 pm (2232)

When a Second-Language Speaker Produces Frequent Pronunciation Errors, Native Listeners Can Learn to Treat the Misproduced Sounds as Less Informative. ERIC PELZL, MATTHEW T. CARLSON, CARRIE N. JACKSON, and JANET G. VAN HELL, *The Pennsylvania State University* – Listeners can adapt to second-language (L2) pronunciation as they gain familiarity with a speaker or accent. But can listeners learn to ignore frequent L2 pronunciation errors? We tested whether native Mandarin speakers could learn to give less weight to tone cues when confronted by frequent tonal errors in L2 speech. Thirty-six Chinese participants completed two blocks of a Mandarin word matching task. In one block, an L2 speaker made tone errors on 60% of trials; in the other, a second L2 speaker made errors on only 20% of trials. Four target words were displayed on screen. In well-formed trials, spoken words matched one target perfectly; when tone errors occurred, spoken words matched one target's onset but another's tone, forcing listeners to choose between the two cues. Surreptitiously, test trials with ambiguous word onsets were interspersed throughout each block. Test trials forced a choice between an uninformative onset and a tone that matched one target word. Results showed that participants favored onsets more when the speaker made frequent tone errors, providing evidence that they had down-weighted the speaker's tone cues. We will discuss theoretical implications for accent adaptation and "unlearning" of speech cues.

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12:00-1:00 pm (2233)

Contributions of Bottom-Up and Top-Down Processes in Speech Cue Encoding: Evidence from EEG and Machine Learning Techniques. MCCALL E. SARRETT, *Villanova University*, BOB MCMURRAY, *University of Iowa*, JOSEPH TOSCANO, *Villanova University* – The acoustics of spoken language are highly variable, and yet most listeners extract meaningful information from the speech signal with ease. Psycholinguistic work has revealed which acoustic dimensions are relevant when listeners categorize speech sounds, and how listeners use higher-level expectations to shift their categorization responses. However, the real-time





neural mechanisms subserving such processes are not well understood, including which perceptual distinctions are detectable in neural responses and whether higher-level information influences perceptual encoding directly. We present three electroencephalography (EEG) studies that address these issues. First, we examine perceptual encoding of speech sounds using decoding techniques (N=27). We find that this approach can reveal neural sensitivity to phonetic contrasts that are indistinguishable in traditional EEG analyses. Second, we examine how top-down influences, such as sentence context (N=31) or visual information (N=33), affect perceptual encoding. We show that neural representations of speech sounds are influenced by listeners' context-based expectations in some cases, specifically, when acoustic cues are ambiguous.

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12:00-1:00 pm (2234)

Mutually Informative Decisions about Prominence and Grouping. MICHAEL WAGNER, *McGill University* – We tend to hear rhythmic groups even in sequences of equally spaced identical sounds (Bolton, 1894; Baath, 2015). Moreover, we tend to hear groups with initial prominence in such sequences. For example, when we hear an equisound sequence as grouped into binary groups, we tend to hear trochees. This poster explores how prior knowledge about the cue distribution may explain such rhythmic percepts. We first show based on perception data from an experiment with two forced choices that decisions about prominence and grouping mutually inform each other: listeners take their prominence decision into account when making the grouping decision and vice versa. This makes sense, since prominence and grouping often provide competing explanations for the same cues (e.g., a long sound could be final or prominent). Deciding about prominence and grouping is, in that sense, similar to decisions about the size and distance of an object in the visual domain. We then show that a trochee bias can be predicted given the cue distribution, using a bivariate Bayesian logistic models fit to matching production data, which models both decisions at the same time, but only if listeners are assumed to have a bias to hear the sequence as structured to begin with.

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12:00-1:00 pm (2235)

Perceptual, Statistical, and Incidental Learning: Relationship with the Perception of Challenging Speech in Normal Hearing Young Adults. RANIN KHAYR and KAREN BANAI, *University of Haifa* – The role of different forms of implicit learning in speech perception is not well understood. Previous studies demonstrated that listeners with faster perceptual learning for speech also have more accurate speech perception when tested with independent tasks. Still, this correlation could reflect a modality specific or task specific effect. Our goal here was to explore the structure of correlations among different domains of learning—perceptual, statistical, and incidental learning—and the perception of challenging speech (i.e., natural fast, vocoded and speech in noise). Fifty-one participants (ages 19-35) completed a comprehensive test battery, including challenging speech perception tests (fast speech, vocoded speech and

speech in noise), cognitive measures, a speech perceptual learning task, and two visual learning tasks (statistical and incidental). Learning was not correlated across the different learning tasks. However, significant and unique correlations were found between learning on each of the tasks and the perception of natural fast speech. This was not the case for the other speech tasks. Findings suggest a complex and nondomain-specific association between speech perception and implicit learning.

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12:00-1:00 pm (2236)

Cents and Shenshibility: The Role of Reward in Talker-Specific Phonetic Recalibration. HANNAH MECHTENBERG, SAHIL LUTHRA, and EMILY MYERS, *University of Connecticut* – During speech comprehension, listeners may be more or less motivated to attend to various aspects of the signal, including differential attention to one talker over another. Talkers have distinct ways of producing certain speech sounds, and listeners readily recalibrate to these phonetic differences. An open question is whether phonetic recalibration is affected by external reward. In the current lexically-guided perceptual learning study, participants heard two talkers—"Jane" and "Austin"—with characteristically distinct pronunciations of two fricatives. During exposure, participants performed a phoneme-monitoring task and were more likely to receive a small monetary reward for correct responses for one talker over the other. We hypothesized that listeners would show greater learning for the more-rewarded talker. Initial results indicate that external reward may instead undermine learning for both talkers. These results raise questions for how listener adaptation to idiosyncratic speaking styles may be modulated by the perceived social value of a talker.

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12:00-1:00 pm (2237)

Validation of Measures of Listening Effort in a Sequential Dual-Task Design. CYNTHIA R. HUNTER, *University of Kansas*, HAYK ABRAHAMYAN, *University at Buffalo, SUNY* – Listening effort refers to the allocation of working memory resources in order to accomplish a listening task. Here, we report on a validation study for a sequential (memory load) dual-task design for measuring listening effort during speech perception. On each trial, participants reported the final words of spoken sentences presented in multitalker babble and also recalled visually presented digit sequences. Sentences were presented at a range of signal-to-noise ratios (SNRs). In addition to word identification accuracy, which quantified speech intelligibility, three objective measures of listening effort were examined: word identification response time, digit recall accuracy, and digit recall response time. In Experiment 1 (N=20), SNR was randomized on each trial. In Experiment 2 (N=20), SNR varied across blocks. Across experiments, all measures tracked with SNR, indicating increased listening effort as SNR decreased. However, the relation of SNR to one measure, digit recall response time, was less reliable when analysis excluded trials with incorrect word responses. Results provide validation for each measure of listening effort, but





indicate that not all measures track with SNR independently of speech intelligibility.

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12:00-1:00 pm (2238)

Withdrawn

12:00-1:00 pm (2239)

Want to Become a Better Listener? Read Lips, Not Text!

JEAN VROOMEN, FAEZEH POUR HASHEMI, THIJS VAN LAARHOVEN, and MARTIJN BAART, *Tilburg University* – When listening to distorted speech, does one become a better listener by looking at the face of the speaker or by reading subtitles that are presented along with the speech signal? We examined this question in two experiments in which we trained participants to understand spectrally distorted speech (four-channel noise-vocoded speech). During short training sessions, listeners were presented with auditorily distorted words or pseudowords that were disambiguated by concurrently presented lip-read information or by text. After each training session, listeners were tested with new auditorily only distorted words. Results showed that adaptation to distorted speech was more effective if listeners were trained with words rather than pseudowords (a lexical boost), and that training with lip-read speech was more effective than training with text (a lip-read boost). This advantage of lip-read speech over text was surprisingly long lasting and was found when participants were tested more than a month later. These findings have potential therapeutic consequences for training people with hearing distortions.

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12:00-1:00 pm (2240)

Mechanisms of Predictability and Repetition-Priming Effects on Speech Recognition in Noise. LIAM J. GLEASON and WENDY S. FRANCIS, *The University of Texas at El Paso* – Predictability and repetition of sentences are both known to facilitate speech recognition in noise and increase recognition accuracy. While both effects have been attributed to top-down processing, they may operate at different processing levels. In the case of semantic constraint, top-down effects could reasonably come from the semantic level, but the repetition effects may be top-down only within the perceptual system. We therefore crossed manipulations of semantic constraint (high/low) and repetition and added a visual repetition condition. Specifically, participants listened to 1/3 of the sentences and read 1/3 of the sentences before beginning a test block in which repeated and new sentences were presented, with varied levels of background noise. After listening to each sentence, participants attempted to report the final word and rated the level of background noise. Constraint and repetition impacted both accuracy and noise ratings, and the effects in accuracy changed across actual noise levels. Reading sentences before the test also increased accuracy, suggesting that the top-down processing comes from a modality-general level of representation outside the perceptual system.

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12:00-1:00 pm (2241)

Star-Gazing: Evaluating Gaze-Contingent Augmented Reality Interfaces in Simulated Soldier Tactical Augmented Reality.

AARON L. GARDONY, *U.S. Army Combat Capabilities Development Command (DEVCOM) Soldier Center*, ALDIS SIPOLINS, *Draper Laboratory*, KAI T. RENSHAW and JAMES I. GARIJO-GARDE, *Tufts University* – Soldier augmented reality (AR) head-up displays (HUDs) require interaction techniques and user monitoring methodologies that enable effective and intuitive information control. To address this need, we evaluated two novel gaze-based interfaces in a simulated dynamic marksmanship task. Participants shot moving targets in virtual reality (VR) while viewing simulated task relevant and irrelevant AR displays. They also monitored for a secondary stimulus, a frequently appearing distinct target, that indicated participants temporarily cease shooting. AR displays were either always visible (Always On), toggled by single stage visual dwell (1 Stage), or toggled by a single dwell followed by a second, confirmatory dwell (2 Stage). During the experiment, we tracked marksmanship performance and gaze behavior and periodically assessed cognitive workload and user experience. Our findings suggest simple gaze-based AR interfaces improve performance in information-rich dynamic situations. We discuss these findings in the context of the eye tracking and human computer interaction literatures.

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12:00-1:00 pm (2242)

Predicting Phishing Susceptibility Using the Phishing Awareness Scale (PAS).

DAWN M. SARNO, JEFFREY BLACK, ELIZABETH M. PARADISE, JULIANA STOKX, and MORGAN E. SUMMERS, *Clemson University* – Previous research demonstrates conflicting results regarding individual differences in phishing susceptibility. Such research often suffers from small samples and limited email sets and has yet to include a phishing awareness scale. To remedy this, the present study recruited 150 participants (aged 20-80 years) from Amazon's Mechanical Turk (MTurk). Participants were asked to complete a variety of survey measures, including a novel 14-item phishing awareness scale (PAS), and classify a diverse set of 50 emails (50% phishing). Results indicated that higher levels of agreeableness, conscientiousness, and openness to experience relate to an increased ability to classify emails, whereas higher levels of extraversion, neuroticism, and impulsivity relate to decreased email classification abilities. Email classification accuracy also varied across the lifespan, with younger adults being less accurate. Lastly, although the PAS did not predict accuracy for participants generally, it did predict email classification accuracy for individuals with higher metacognition. These findings provide insight for researchers and corporations to assess and predict phishing susceptibility.

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12:00-1:00 pm (2243)

Withdrawn





12:00-1:00 pm (2244)

Examining the Impact of Using the Internet on Creative Performance in the AUT. MERCEDES OLIVA and BENJAMIN C. STORM, *University of California, Santa Cruz* – Research has shown that using the Internet to access information can influence memory, metacognition, and how people choose to access information in the future. We expanded upon this work in the current study by investigating the impact of relying on the Internet to think creatively. A total of 294 participants completed a version of the Alternative Uses Test (AUT) in which they were asked to list five uses for each of four common objects (e.g., a brick). Half of the participants did this entirely on their own, without help from the Internet. The other half used the Internet to generate uses for the first two objects and then generated uses for the last two objects without the Internet. Responses were rated in terms of their creativity, effectiveness, novelty, and rarity relative to the rest of the sample. Results indicate that using the Internet can affect creativity, both in the moment, and in the future when people are no longer using the Internet.

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12:00-1:00 pm (2245)

Collaborative Remembering in a Fully Online, Chat-Based Environment: Implications for Remote Study and Work. GARRETT D. GREELEY, TORI PEÑA, and SUPARNA RAJARAM, *Stony Brook University* – Online study and work environments have become a feature of daily life, making virtual collaboration a routine practice. There is considerable laboratory-based, in-person research on collaborative remembering, but we do not know how online collaboration affects memory. To examine this question, we used the standard collaborative memory paradigm in a fully virtual environment. In Experiment 1, online participants studied a word list and in a chat room recalled the words either alone or with two other participants. Collaborative inhibition—the robust finding of lower recall in collaborative groups than controls—disappeared in this setting. Here, control participants, who worked alone, recalled less than what we see in similar, in-person studies. In Experiment 2, online participants again recalled studied items in a chat room. We modified the procedure to recover performance of control participants by implementing intentional study (instructions to study for a test), modified forced recall (more words to recall than typically observed), and experimenter supervision. Control performance improved, resulting in collaborative inhibition in recall. We discuss the impact of virtual settings on engagement and performance.

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12:00-1:00 pm (2246)

Does Taking Photos of Lecture Slides Impair Memory for Lecture Content? ANNIE S. DITTA, *University of California, Riverside*, JULIA S. SOARES, *Mississippi State University*, BENJAMIN C. STORM, *University of California, Santa Cruz* – Research has shown a photo-taking impairment effect, in which people remember photographed information less well than unphotographed information (e.g., Henkel, 2014; Soares & Storm, 2018). Under some circumstances, photo-taking can benefit memory for visual information,

but the same study found impaired memory for auditorily-presented information (Basasch et al., 2017). We examined this effect in the context of students taking photos of lecture slides because in a typical lecture, students are responsible for learning information that is presented on slides (visual) as well as lectured information spoken aloud (auditory). In two experiments, participants took photos of lecture slides—either volitionally or nonvolitionally—and took a test on the material. Half of the tested information was presented on the slides and the other half was only spoken by the lecturer. Preliminary results suggest that taking photos of lecture slides may actually show a photo-taking enhancement effect, but only for information presented visually on the slides.

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12:00-1:00 pm (2247)

In Search of ‘Google Effects’ on Memory. PETER SHEPHERDSON, *University of Akureyri*, MYVIENNE NGUYEN, *University of Zurich*, EVA M. BENEDIKTSÓTTIR, *University of Akureyri* – In a highly publicised study, Sparrow et al. (2011) found that believing that information would be accessible via an external store led to inferior performance on a memory test for that information—a so-called “Google effect” on memory. We investigated whether offloading information to an external store in this manner affects memory for gist, for details, or for both. In Experiments 1-3, we obtained evidence against an effect on either gist- or detail-focused memory performance. A subsequent direct replication of one of Sparrow et al.’s (2011) experiments also failed to yield any effect of the manipulation. Experiment 5, with an enhanced manipulation, produced an effect, with worse recall and recognition performance for participants told they would have access to information later; however, data collection ceased with a small sample owing to the pandemic onset. Two further online experiments using the same enhanced manipulation produced evidence against any effect. In sum, the results suggest that neither the method designed by Sparrow et al. (2011), nor our enhanced manipulation, reliably produces “Google effects” on memory, raising doubts about the utility of this approach in investigating the effects of offloading on memory.

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12:00-1:00 pm (2248)

Effect of Test Order and List Saving in Saving-Enhanced Memory. CHIARA SCARAMPI, *University of Geneva*, CHHAVI SACHDEVA, *University College London*, SAM J. GILBERT, *Institute of Cognitive Neuroscience* – People often rely on external tools and resources to support their cognitive processes. This is known as cognitive offloading (Risko & Gilbert, 2016). Previous research has investigated the consequences of saving the contents of one computer file on memory for the contents of another file (Storm & Stone, 2015; Runge et al., 2019) and found that saving a first list of words significantly improved recall of the contents of a new one. We conducted an online experiment aimed at extending on this previous finding by investigating whether 1) saving the contents of List 2 leads to any memory enhancement for List 1 and 2) whether memory enhancement of List 2 when List 1 is saved still holds when List 2 is recalled





second rather than first. In line with the list-method directed forgetting literature, we found that saving List 1 led to memory enhancement of the second list whereas saving List 2 resulted in spared recall for List 1 items. Furthermore, List 2 saving-enhancement was larger when it was recalled first. Implications of our findings on how to optimally support memory using devices will be further discussed.

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12:00-1:00 pm (2249)

Internet-Induced Forgetting: Does Engaging in Internet Search Behaviors Lead to Forgetting of Related Information? KELSEY K. JAMES, *University of California, Santa Cruz* – Searching the Internet can lead to a variety of behavioral consequences, such as increased likelihood to rely on the Internet in the future. However, it is not entirely clear what memory consequences might arise from retrieving information from the Internet as opposed to from memory. Retrieval-induced forgetting (RIF) is a well-established finding in which the retrieval of some information leads to poorer memory on a later test of related information as compared to control. In our experiment, we compare the effects of memory retrieval and Internet search on related, nontested information. We hypothesized that if participants are searching the Internet—in a way that does not involve covert retrieval processes—unsearched, related information would be unaffected. Participants either engaged in a typical RIF paradigm in which they attempted to generate difficult exemplars in category-exemplar pairs from memory or they engaged in an internet search for the same information. In both conditions, participants performed worse on a final test of initially untested, related information as compared to control, replicating the typical RIF effect even when the Internet was used.

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12:00-1:00 pm (2250)

To Chat or Not to Chat: Text-Based Interruptions from Peers Improve Learner Confidence in an Online Lecture Environment. SARA G. GOODMAN and EMILY MOORE, *St. John Fisher College* – Technology-driven interactions are becoming commonplace; precipitated by a global pandemic, online classes, telecommuting, and virtual meetings across distances and time zones have all increased in popularity. Web conferencing systems (e.g., Zoom, Skype, Webex) use synchronous audio-visual communication supported by text-based chat, emoticon responses, and other supplementary functions. Given this uptick in the use of web conferencing with dynamic integrated features, it is important to understand how attention and cognitive resources may be taxed in these environments and how this may impact participants' ability to comprehend the target content. In the current study, we investigated the impact of topically relevant student-initiated text chat frequency on comprehension during an online lecture. The findings revealed that chat involvement alone does not affect learning. Chat activity was not found to be a distraction but rather a facilitator of increased confidence in learning in an online lecture environment when controlling for other outside distractions. Overall, the findings suggest that relevant chat content

is not distracting and can be helpful in reinforcing concepts through supportive examples in adjacent modalities.

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12:00-1:00 pm (2251)

On the Behavioral and Metacognitive Consequences of Using the Internet to Access Information. DANA-LIS BITTNER and BENJAMIN C. STORM, *University of California, Santa Cruz* – Searching for information online can increase the likelihood of searching for other information, a phenomenon known as the Internet fixation effect. Research has also shown that online searching can increase metacognitive self-assessments of internal knowledge. It seems counterintuitive that online searching increases both one's confidence in their own memory and one's dependency on the Internet. In the current research, we sought to elucidate this apparent dissonance by conducting two experiments in which participants were asked to answer an initial set of questions either from memory or using the Internet, and then to respond to a new set of questions. We replicated the Internet fixation effect, but we failed to find any evidence of participants becoming more confident in their ability to answer new questions. These results provide new insight into how people's interactions with the internet can affect the way they use and make metacognitive judgments about their memory.

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12:00-1:00 pm (2252)

Translations at Your Fingertips: Implications for Metacognition and Learning. EMMALINE D. ELISEEV and ELIZABETH J. MARSH, *Duke University* – The Internet has become the dominant tool for looking up and learning new information. This study investigates how using an online translation tool affects people's learning and their metacognitive judgments of learning. Participants learned English translations of Swahili vocabulary words (e.g., wingu – cloud). In the learning phase, participants in the online search condition used Google Translate to look up the English translations of the target Swahili words, while participants in the control condition were simply given the same translations to learn. After completing the learning phase, participants in both conditions predicted how many English translations they would recall at test. Critically, participants who searched for translations online expected to recall fewer translations than participants who were given the translations to study. Our findings suggest that how information is acquired has implications for both metacognition and learning, and we discuss potential explanations for these results.

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12:00-1:00 pm (2253)

Does Social Media Multitasking Influence Response Inhibition Skills in People? AMIRUN HAQQIM, STEVE M. JANSSEN, and AHAMED MIFLAH H. ISMAIL, *University of Nottingham Malaysia* – Aspects of excessive social media use, such as social media multitasking (SMM; using social media whilst simultaneously engaging in another type of media or nonmedia related activity), are





often related to reduced executive functioning skills, such as poor response inhibition. However, the causal relationship between the two is still unclear. This study examined the effect of a 4-week-long longitudinal intervention—aimed at reducing the amount of time spent on SMM—on response inhibition skills. Response inhibition performance was measured using a go/no-go task in 32 adults, at the beginning and end of a 4-week period. During the 4 weeks, half the participants (intervention group) were instructed to reduce their average daily SMM durations by two-thirds, while others (control group) were asked to maintain their average use. After the 4-week period, greater reductions in SMM and greater improvements in response inhibition were found in the intervention group compared to the control group. Our findings demonstrate that excessive SMM may alter response inhibition skills. We also show that short-term interventions can be effective at improving fundamental executive functioning skills, in this case, response inhibition.

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12:00-1:00 pm (2254)

Withdrawn

12:00-1:00 pm (2255)

Pooling Resources—A Comparison Study of Online Subject Pools and their Suitability for Various Psychology Experiments. CONSTANTIN REZLESCU and SIDHARTH PRABHU-NAIK, *University College London* – The relative ease of participant recruitment through online participant pools has led to online experimentation becoming ubiquitous in psychological research. Amazon Mechanical Turk (MTurk) in particular has taken a large share of the recruitment process. More recently, however, dedicated research platforms such as Testable Minds and Prolific have been set up to provide a source of more reliable data quality. While there has been much research into the advantages and disadvantages of these platforms, to date there has not been a comprehensive comparison of the data they produce. In this study, we recruited US- and UK-based participants from the three aforementioned platforms and ran a wide array of classic psychology experiments to compare effect sizes between the groups. We also compared the groups on the number of participants who needed to be excluded for poor engagement, and on demographic, clinical, and personality dimensions. We found substantial differences between the groups in terms of data quality, with the US-based Mechanical Turks the worst performers. These differences were even more pronounced for particular experimental paradigms. The groups also differed on a number of personality dimensions, anxiety, and self-esteem.

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12:00-1:00 pm (2256)

The Use and Interpretation of Emojis During a Pandemic. MELISSA K. JUNGERS and ABIGAIL M. SEDZIOL, *The Ohio State University at Newark* – The COVID-19 pandemic forced many individuals to communicate differently. The current study examined if emoticons (emojis) influenced sentence interpretation and whether

individuals used emojis differently during the pandemic. Introductory psychology students (n=136) took an online survey assessing emoji usage by gender. The study also tested participants' emotion ratings of sentences as more positive or negative depending on the emoji (smiley, frowny, no emoji) and familiarity of the sender (familiar, unfamiliar). Most participants reported daily emoji use with no change during the pandemic. Women used emojis more often than men. Participants interpreted sentences differently depending on the emoji and the familiarity of the sender, with smiley emojis and familiar senders rated as the most positive. These results suggest emojis may be important extralinguistic cues in a commonly used form of communication.

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12:00-1:00 pm (2257)

Profiling Online Grooming Characteristics by Means of LSA and LIWC. AYLA GUERRA and IRAIDE ZIPITRIA, *Universidad del País Vasco / Euskal Herriko Unibertsitatea* – As technology advances, online grooming (OG) is becoming a prevalent problem in society. OG has serious consequences for vulnerable victims and therefore must be further explored. Current research shows differences between conversations containing OG and conversations that do not. Those studies focus on detecting the presence of OG. However, they do not take into consideration different levels of OG with their specific characteristics. The present study compares 521 conversations containing OG divided in four severity levels with 75 conversations without OG to detect the most prevalent profile for each severity level. The results confirm that there are certain specific indicators in the different stages of OG that could be used to differentiate the severity of the OG stage and act accordingly. These patterns seem to be more prevalent as the grooming becomes more severe, suggesting that when looking for OG, its severity levels should be taken seriously.

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12:00-1:00 pm (2258)

Attentional Disengagement from Spatially Separated Distractors Is Not Disproportionately Impacted in Healthy Aging. SHIREEN PARIMOO, CHERYL GRADY, and ROSANNA OLSEN, *University of Toronto & Rotman Research* – Prior work has shown that older adults are more susceptible to visual distraction than younger adults, which can lead to preserved memory for the previously distracting information. We investigated whether age differences in attentional orienting or attentional disengagement and reorienting contribute to distractor processing and subsequent recognition. In an incidental encoding task, healthy older (N=48) and younger adults (N=48) viewed a target and distractor image on each side of the computer screen and made animacy judgments for the target stimulus. Prior to stimulus onset, an arrow cue indicated the location of the upcoming target with 75% validity. Older adults were slower to respond overall, but they were not disproportionately slower on the invalidly cued trials. Participants later completed a surprise recognition task for targets, distractors, and novel stimuli. There were no age differences in the recognition of targets or





distractors, irrespective of whether they had previously been encountered on validly or invalidly cued trials. Together, these results suggest that when targets and distractors are spatially separated, older adults are able to disengage from distraction to the same extent as younger adults.

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12:00-1:00 pm (2259)

Knowledge-Based Biases in Young and Older Adults: Might They Be Related to Fall Risk? MARIE POIRIER, *City, University of London*, ANNE TOLAN, *University of Southern Queensland* – Falls are the main cause of injury among older adults. In 2018, in the older adult population of the United States, there were an estimated 3 million emergency hospital visits, more than 950,000 hospitalizations, and approximately 32,000 deaths resulting from fall-related injuries. In this study, we examined if individual differences in susceptibility to knowledge-based biases might relate to fall risk. We asked 28 older adults and 29 younger adults to remember the size of recently presented common objects (photos) as well as less familiar objects. From this task, we estimated their propensity for knowledge-based biases. Participants were also asked to complete a step-up task, where they were asked to take a step up—the height of the step was manipulated to be closer or farther away from the standard step rise. Participants were wearing sensors that measured the minimal toe clearance relative to the top of the step. The results showed that older adults had a smaller toe clearance relative to the average for young adults; in other words, their foot was closer to the lip of the step, increasing their risk of a toe-to-step-lip collision. Moreover, we examined if the cognitive and motor biases were related.

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12:00-1:00 pm (2260)

The Experience of Subjective Age During Everyday Life. MATTHEW HUGHES, *University of North Carolina at Greensboro* – The age someone feels predicts outcomes in health, cognition, and well-being above their chronological age. Determining the momentary contexts associated with changes in subjective age may help us find ways to promote younger subjective ages and better health. This study used ESM to capture fluctuations in subjective age during daily life and connect these fluctuations to specific contexts. Past work has demonstrated change in subjective age following a brief intervention; after taking a memory test, which older adults find cognitively stressful, they reported older subjective age. Taking a vocabulary test did not increase subjective age. This study integrated a similar experimental manipulation in the ESM protocol to examine the impact of cognitive stressors on changes in subjective age during daily life. On six occasions for 7 days, we prompted participants to answer a short questionnaire regarding their current activities on a smart phone. Participants were then either prompted to complete a short memory test, vocabulary test, or no test. Finally, participants were asked about their subjective age. Preliminary results will be discussed to provide a foundational understanding of how situational variation impacts subjective age.

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12:00-1:00 pm (2261)

Age and Psychosocial Variables Predict Ratings of Highly Emotional Words. MEREDITH A. SHAFTO and LISE ABRAMS, *Pomona College*, LORI JAMES, *University of Colorado Colorado Springs* – Lexical processing is affected by a word's emotional content, and recent research suggests that age reduces emotional reactivity. The current study included words with two types of strong emotion: taboo and humor. We examined how ratings of taboo and humor related to ratings of arousal and valence, as well as to participant characteristics, including age and psychosocial variables. To the extent that taboo and humor ratings reflect general emotional reactivity, ratings may decline with age. However, because taboo and humor are socially-determined, ratings may be affected by psychosocial factors which vary with age, including political viewpoints, religiosity, or the desire to avoid profanity. Participants across the adult lifespan provided word ratings and self-report background measures. Results indicated that participants with more conservative beliefs were more emotionally reactive. Increased age was associated with more conservative views but with lower emotional reactivity. Finally, age and psychosocial variables made independent contributions in predicting ratings, suggesting that cognitive aging and historical trends in social expectations have separable effects on emotional language processing.

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12:00-1:00 pm (2262)

The Longer-Term Impact of the COVID-19 Pandemic on the Cognitive Functioning and Well-Being of Older Adults. SARAH DE PUE and CÉLINE GILBERT, *KU Leuven*, EVA DIERCKX, *Vrije Universiteit Brussel & Alexianen Zorggroep Tienen*, EVA VAN DEN BUSSCHE, *KU Leuven* – The first peak of the COVID-19 pandemic strongly impacted the well-being of older adults (De Pue et al., 2021). Between June and July 2021, when COVID-19 cases, hospitalizations and deaths in Belgium were very low, we re-assessed the cognitive functioning, well-being, sleep quality, and activity level of 453 older adults. These measures were compared to those assessed for the period before COVID-19. A two-step cluster analysis was performed on the difference scores, identifying three clusters. A first cluster (N=206) reported slightly improved well-being and activity level and similar cognitive functioning and sleep quality compared to before COVID-19. The two other clusters reported moderate (cluster 2: N=214) or strong (cluster 3: N=33) decreases for all measures. The clusters significantly differed with regard to gender (resp. 48.5%, 61.5%, and 78.8% women in the clusters), depression (depression scores increased across clusters), and social network and resilience (cluster 3 reported a smaller network and less resilience than the other clusters). We conclude that the longer-term impact of COVID-19 on older adults varied. During an abated COVID-19 period, some had recuperated well, whereas others still reported decreased mental health.

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12:00-1:00 pm (2263)

An Examination of Clustering, Switching, and Lexical Frequency to Better Understand Changes in Verbal Fluency Performance in Amnesic Mild Cognitive Impairment (MCI). LAUREN A. LATHAM, JANINE M. JENNINGS, AMBER K. ADKINS, and ANDIE P. BLANKENSTEIN, *Wake Forest University* – Efforts to assess changes in executive functioning (EF) and semantic memory in individuals with mild cognitive impairment (MCI) have been undertaken by analyzing clustering and switching on different verbal fluency tasks (Troyer & Moscovitch, 2006). However, the findings have been inconsistent. Consequently, the current study attempted a more comprehensive approach by assessing clustering and switching on both semantic and phonemic fluency in individuals with stable amnesic MCI (i.e., no change in status over at least 2 years) compared to individuals with stable normal cognition. In addition, the lexical frequency values of generated words were examined as an alternative measure of semantic network functioning (Vonk et al., 2019). We found the amnesic MCI group showed 1) reduced switching for semantic but not phonemic fluency and 2) higher word frequency values for both types of tests, but 3) no group differences in clustering. Correlations between these variables and other neurocognitive measures, along with implications for the effects of amnesic MCI on EF and semantic memory will be discussed.

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12:00-1:00 pm (2264)

Inherence Bias in Explanation Increases with Age. JEFFREY ZEMLA, *Syracuse University*, BLAKE H. CHAMBERS and JOSEPH L. AUSTERWEIL, *University of Wisconsin-Madison*, ANDREI CIMPIAN, *New York University* – People tend to explain events using inherent more than extrinsic factors, a phenomenon known as the inherence bias. This bias is hypothesized to be more pronounced when cognitive resources are scarce. Here, we tested an important prediction of this account: namely, that aging and cognitive impairment should increase the inherence bias in explanation. Participants were shown vignettes of surprising scientific discoveries and were asked to generate and evaluate explanations for those events. Our results indicate that as age increased, participants were more likely to generate inherent explanations, though age did not lead participants to endorse more inherent explanations when generation was not required. Older adults with mild cognitive impairment generated a similar proportion of inherent explanations as healthy adults on average, though they did not do so increasingly with age. These findings suggest that cognitive deficits due to aging can have downstream effects on how we engage in complex reasoning.

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12:00-1:00 pm (2265)

Chatting with a Young Partner Can Facilitate Older Adults' Trustworthiness Learning: Comparison Between Inter- and Intra-Generational Communication. ETSUKO T. HARADA, RYUTA R. TAKAWAKI, TOMOYASU SAWADA, RIKO OKABE, and NANA NAKAO, *University of Tsukuba* – Suzuki (2018) reported

that in the repeated investment game (a task in which a participant had to decide whether to trust and make an investment with a person shown in a mugshot), older adults, unlike younger adults, did not improve their performance in the reliability judgment. In exploring possible ways to support older adults, Harada et al. (2020) paired an older participant with a younger adult, and reported changes in their decisions and performances compared to the solo condition. However, because it is not clear whether a pairing itself or pairing specifically with a younger partner was effective, we executed an additional experiment to compare intergeneration pairs with intrageneration pairs. Twelve pairs of younger- and older- adults did the repeated investment game, as 12 younger-younger and 12 older-older pairs did, where all members were new to each other. Results showed that only older-older pairs showed different patterns of decision changes, while older members in the older-younger pairs showed the similar pattern of learning as younger-younger pairs. Data implied that shifts in regulatory focus of older participants, not their memory improvements, may be resources of those changes.

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12:00-1:00 pm (2266)

An Electrophysiological Study of Aging and Perceptual Letter-Matching. PETER R. MALLIK, *Ashland University*, PHILIP A. ALLEN, *University of Akron*, MEI-CHING LIEN, *Oregon State University*, ELLIOT C. JARDIN, *Miami University*, MICHELLE HOUSTON, *University of Akron*, JAMES R. HOUSTON, *Middle Tennessee State University*, BRIANNA K. JURASIC, *Eastern Kentucky University* – Using P300 (an index of familiarity in stimulus categorization), we examined whether older adults have more internal noise than younger adults using a sequential letter-matching task. Previous studies indicated that older adults show larger “fast-same” and “false-different” effects relative to younger adults. According to Krueger’s (1978) noisy-operator theory, internal noise in visual processing distorts “same” trials into appearing as different whereas distortion for “different” trials does not affect processing. This could be the result of internal noise perceptual processing which increases with age (Allen, Kaufman, Smith, & Propper, 1998). Behavioral results indicated that, overall, individuals responded faster to “same” trials than to “different” trials but were less accurate. For P300, older adults showed similar P300 across trial type whereas younger adults produced a larger P300 amplitude for “same” trials, suggesting that older adults showed relatively less familiarity for “same” trials than did younger adults—a major prediction of the noisy-operator theory.

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12:00-1:00 pm (2267)

Lexical Retrieval in Healthy Ageing: Investigating the Role of Semantic Context in More Naturalistic Word Production. NAVEEN HANIF, NAVEEN HANIF, ELIZABETH JEFFERIES, and ANGELA DE BRUIN, *University of York* – Healthy ageing is associated with word-finding difficulties. During picture naming, older adults typically exhibit longer response times than younger adults. In contrast to popular picture naming tasks requiring naming in isolation, natural language is produced within conversation.





The current study aims to examine how healthy ageing influences language production in context. Participants will name pictures in response to questions (comparing age effects on naming in isolation and in context). Furthermore, question context will be manipulated such that questions are matched (predicting the target word), mismatched (predicting a different word), or neutral (not predictive). We expect faster naming times for matched than mismatched contexts. We also examine whether older adults benefit from matching contexts to overcome lexical-retrieval difficulties and whether they have greater difficulty in mismatched contexts due to reduced inhibition and semantic control. Consequently, this study will elucidate the role of ageing in language production in context, while developing more ecologically valid measures.

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12:00-1:00 pm (2268)

Age-Related Differences in Large-Scale, Individual Semantic Networks and their Role in Cognitive Aging.

SAMUEL AESCHBACH, *University of Basel*, SIMON DE DEYNE, *University of Melbourne*, RUI MATA and DIRK U. WULFF, *University of Basel* – Cognitive performance varies between people of different age. One potential driver of this are differences in semantic representations. To investigate the role of semantic representations in age-related differences in cognitive performance, we obtained large-scale, individual-level semantic networks from four younger and four older individuals and concurrently assessed cognitive performance. We observed age-differences in macroscopic network statistics consistent with those reported in earlier studies: older adults had larger networks, lower degrees, lower clustering coefficients, and longer shortest average path lengths. Furthermore, we observed that the centrality and relatedness of words in the free association networks predicted performance in each of the cognitive tasks. However, we also observed that individual networks were not better predictors of cognitive performance than an aggregate network created from the responses of all individuals. Additional simulation analyses revealed that considerably larger assessments of individual level networks are likely necessary to reliably link individual-level networks and cognitive performance.

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12:00-1:00 pm (2269)

Does Unitization Strategy Improve Older Adults' Familiarity in Associative Memory?

LINGQIAN LI and LIXIA YANG, *Ryerson University* – Associative memory is based on both recollection and familiarity. In older adults, the former tends to decline whereas the latter remains intact. Recent research demonstrated that unitization strategy (i.e., uniting two unrelated objects into a single entity which represents characteristics of both) could improve young adults' familiarity and associative memory performance. Two studies were conducted to examine whether this associative memory benefit also applies to older adults. In Study 1, 36 young and 36 older adults completed an associative memory task in which they encoded word pairs using either a unitization or a nonunitization strategy; then their item and associative memory was tested. The unitization

strategy boosted familiarity but failed to enhance associative memory in older adults. Study 2 replicated the results with 32 older adults, using a within-subjects design and intentional encoding paradigm. These results are discussed in light of the cognitive resource account of age-related associative memory deficits.

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12:00-1:00 pm (2270)

The Role of Metacognitive Uncertainty in the Delayed Retrieval Shift of Older Adults.

GEOFFREY MCKINLEY, *Georgia Institute of Technology*, JACK M. KUHNS and DAYNA R. TOURON, *University of North Carolina at Greensboro*, CHRISTOPHER K. HERTZOG, *Georgia Institute of Technology* – The noun-pair lookup task (NPLT; Ackerman & Woltz, 1994) requires matching a presented pair to one of 12 pairs shown in a table at the top of the screen. Older adults show delayed shift to a more efficient retrieval-based strategy made possible because the pairings are constant over hundreds of practice trials. We examined the role of metacognitive uncertainty in explaining older adults' delayed retrieval shift. In two experiments, older and younger adults first learned paired associates to a criterion, then performed NPLT with pre-learned items intermixed with new items. In one condition a pre-cue was presented that indicated whether the item had been previously learned. Participants then selected a strategy for a given item. Older adults' delayed shift for prelearned items was reduced by pre-cueing when one pair element was presented to prompt strategy selection (with a choice response deadline; Experiment 1), and when given the full pair prompted strategy selection with no deadline (Experiment 2). Younger adults manifested no pre-cueing effect. Pre-cueing had no cost on NPLT accuracy, suggesting that older adults' delayed retrieval shift can be exacerbated by metacognitive uncertainty about whether the items are known.

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12:00-1:00 pm (2271)

An Analysis of Training Effects on Cognitive Aging Using a Large Dataset.

PRIYAM DAS and MARK STEYVERS, *University of California, Irvine* – It is well known that abilities of fluid intelligence, such as working memory or attention, decline as we age. What is still not well understood is whether and to what extent cognitive training can help mitigate this form of cognitive decline. Previous studies of cognitive training with older adults are often limited by small sample sizes and short training durations. In this work, we utilized a large-scale cognitive training dataset which contains data from more than 36,000 participants collected over 6 years to investigate the effects of training on measures of fluid intelligence. We found that cognitive training results in improvement on cognitive performance over the lifespan and that the extent of improvement depends on task features and length of training. In some cases, older adults who spend a lot of time training are able to match or exceed the performance of younger adults who train much less. These results indicate that some cognitive aging effects can be overcome.

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12:00-1:00 pm (2272)

Adult Age Differences in Free Recall Dynamics and Subjective Reports of Retrieved Context. SYDNEY M. GARLITCH and CHRIS N. WAHLHEIM, *University of North Carolina at Greensboro*, LAUREN L. RICHMOND, *Stony Brook University*, B. HUNTER BALL, *The University of Texas at Arlington* – Older adults show impaired monitoring of retrieved context. We examined the dynamics of such deficits using subjective reports of context retrieval in dual-list free recall. Older and younger adults studied two lists, recalled from one list, and used remember/know judgments to indicate whether each retrieval elicited contextual information. Extending prior work, older adults showed poorer correct recall and more false recollection of intrusions than younger adults. On delayed tests, both age groups initiated retrieval comparably with enhanced primacy when context was recollected, but age differences emerged after the first retrieval. Serial position effects indicated less distinction between correct recalls and intrusions across positions traversing lists for older adults. This likely reflected the decrease in recollection of context reported by older adults following the first retrieval. By characterizing the dynamics of age-related context retrieval deficits, this study constrains models assuming a key role for context processing in free recall.

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12:00-1:00 pm (2273)

The Butcher on The Bus Is as Familiar to Older Adults as She Is to Younger Adults. EVI MYFTARAJ and NICOLE D. ANDERSON, *Rotman Research Institute, Baycrest* – The “butcher on the bus” is an iconic example of the familiarity we feel when we find a person familiar but fail to recollect how we know them due to the new context. To address age-related differences in the “butcher on the bus” phenomenon, younger and older adults from our participant database viewed faces in scene contexts. At test, participants viewed studied faces in studied scenes, studied faces in new scenes, and new faces in new scenes. Participants made old/new and recollect/familiar/new judgments for the faces, and source judgments to indicate if the test scene matched the studied scene. Changing the scene context decreased the recollective aspects of face recognition (discrimination, recollection, source memory), especially for older adults. However, familiarity for people regardless of context was not affected by age. The butcher on the bus is as familiar to older adults as she is to younger adults. These results conflict with our previous data for the same study, collected on Prolific, which found no age differences between younger and older adults on any measure including recollection and source memory; people should be wary of online paid participant databases for behavioural research.

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12:00-1:00 pm (2274)

Is Prior Knowledge Required to See (Age-Related) Benefits of Prior Knowledge in Associative Recognition? JACK M. KUHNS and DAYNA R. TOURON, *University of North Carolina at Greensboro* – There is increasing interest in understanding why older adults’ episodic memory for associations consistent with

prior knowledge is relatively spared compared to their memory for associations that are unrelated and/or inconsistent with prior knowledge. Research in this area has used associative recognition memory to support these conclusions, but recent work has raised the possibility of methodological confounds to this approach—that better performance on the associative recognition task is not necessarily due to better associative memory for pairs consistent with prior knowledge. The objection is that participants can base correct rejections of unrelated test pairs formed from related study pairs by recognizing the change in the relatedness of the test pair, without necessarily remembering the co-occurring item(s) from study. The proposed study will test this assumption. Younger and older adults will study related and unrelated item pairs, and make subsequent item, source (memory for pair relatedness), and associative recognition judgments for intact, rearranged, old-new, and new-new test pairs. The study promises to be informative to our understanding of the role of prior knowledge in older adults’ associative memory.

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12:00-1:00 pm (2275)

Memorial Effects of Agency During Learning Among Younger and Older Adults. MARIA ARRIETA and ANDRÉE-ANN CYR, *York University Glendon* – Recent works suggests that giving individuals agency over their learning experience can enhance episodic memory (Dubrow et al., 2019; Murty et al., 2015). The goal of this online study was to examine the memory benefits of agency among healthy younger and older adults. During an encoding phase, participants were told that they would be learning the meanings of traditional Chinese radicals (e.g., 善) under two conditions: fixed and choice. On Fixed trials, two Chinese characters were presented side by side on a computer screen and participants were instructed to click on the one that was outlined in red to reveal an object image (e.g., a shovel). On Choice trials, neither of the Chinese characters were outlined and participants were prompted to click on the character of their choice to reveal its meaning. Critically, participant choice did not have any effect on which object image was presented (i.e., the choice was illusory). Participants were invited to complete an Old/New object recognition task 24 hours later and rate their confidence in their memory decisions. Results are discussed in terms of age-related changes in episodic memory and curiosity-based learning.

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12:00-1:00 pm (2276)

Characteristics of Sleep Moderate Associations Between Objective and Subjective Cognition. AMY N. COSTA, CHRISTINA S. MCCRAE, NELSON COWAN, and ASHLEY F. CURTIS, *University of Missouri* – Subjective memory complaints and objective cognitive dysfunction are common in aging populations, but research investigating the association between them is inconclusive. Given the high prevalence of sleep complaints in middle-aged/older adults, this research tested whether sleep moderates the subjective/objective cognition association. Adults aged 50 and older completed the Pittsburgh Sleep Quality Index, Cognitive Failures Questionnaire (CFQ), and objective cognitive tasks: Stroop (processing speed,





attention, inhibition), Sternberg (working memory) and Posner cueing (orienting attention). Multiple regressions showed that sleep efficiency and sleep disturbances moderated associations between objective performance and CFQ-memory. Specifically, better Stroop (reaction time, RT-control trials), better Sternberg, and better Posner (RT-orienting light trials) performance were associated with more memory complaints only at worst sleep disturbances. Additionally, better Stroop performance (RT-control trials) and better Sternberg performance were associated with more memory complaints only at worst sleep efficiency. Findings suggest sleep disruption might be a mechanism underlying the objective/subjective cognition discrepant relationship.

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12:00-1:00 pm (2277)

Anxiety in Older and Younger Adults During the COVID-19 Pandemic: Implications for Cognitive Research. ANGELIQUE M. BLACKBURN and MILES PEREZ, *Texas A&M International University* – At the onset of the COVID-19 pandemic, adults over the age of 40 were more severely impacted by the virus than younger adults. We tracked a group of 279 adults in Laredo, Texas, and the surrounding region prior to the local onset of pandemic (March 2020) through the period when the region became a “hotspot” leading the nation in COVID-19 spread. Our goal was to determine if older adults reported higher levels of anxiety than younger adults during the pandemic. This is critical, as anxiety has been shown to impact cognition, and longitudinal studies measuring cognitive performance may need to control for anxiety during the pandemic. Participants completed a survey regarding anxiety, daily activities, and demographics. Contrary to our prediction, but aligned with other studies, younger adults reported higher anxiety ($M=20.3$; $SD=16.4$) on Zimmerman’s (2019) 80-point Clinically Useful Anxiety Outcome Scale during the onset of the pandemic compared to older adults ($M=13.1$; $SD=12.5$), $t(182)=3.90$, $p<.001$). We then compared changes in anxiety throughout the year and how this was modulated by age. We discuss implications for longitudinal or cross-sectional comparisons of cognition and performance.

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12:00-1:00 pm (2278)

Anxiety and Cognition in Middle-Aged and Older Adults Moderated by Smoking Status. ANTHONY SCHMIEDELER and ASHLEY F. CURTIS, *University of Missouri* – Anxiety and cognition are known to be associated, and worse anxiety has been linked to cognitive decline. The impact of smoking on cognition, particularly in aging adults, is inconsistent. We tested whether smoking moderates associations between anxiety and subjective/objective cognition. Adults aged 50 and older (74 smokers, 201 nonsmokers) completed measures of anxiety (Hospital Anxiety and Depression Scale) and subjective cognition (Cognitive Failures Questionnaire). Participants (15 smokers, 48 nonsmokers) also completed an objective cognitive task: Posner cueing (orienting attention). Multiple regressions revealed smoking status moderated associations between anxiety and subjective cognition; higher anxiety was associated with

worse forgetfulness, distractibility, and false triggering in both smokers and nonsmokers (with stronger associations observed for smokers). Smoking status also moderated associations between anxiety and objective cognition; higher anxiety was associated with worse attentional orienting only in nonsmokers (not smokers). Smoking status may exacerbate negative impact of anxiety on subjective cognition but not objective cognition in aging adults.

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12:00-1:00 pm (2279)

Self-Reported Cognitive Function and Use of the Internet: Evidence from the English Longitudinal Study of Ageing. MARIA K. WOLTERS and YICHUN SUN, *University of Edinburgh* – The COVID-19 pandemic has accelerated the move of essential services such as shopping and banking online. In this analysis of Wave 8 of the English Longitudinal Study of Ageing (ELSA), conducted pre-pandemic in 2018-19, we examine to what extent older adults with self-reported poor cognitive health were excluded from using the Internet. We created four regression models, with frequency of Internet use as dependent variable and sociodemographic variables, comorbidities, self-rated health, sight, hearing, and mental abilities, and activities of (independent) daily living (ADL/IADL) as independent variables. After access to an Internet connection, self-reported mental abilities were the second strongest predictor of Internet use: Those with poor self-rated mental ability were three times less likely to use the Internet than those with higher self-ratings. IADLs linked to reduced Internet use were difficulty making phone calls and difficulty reading maps. We suggest that those who struggle with relevant IADLs may need help using the Internet, while for those with poor self-rated mental abilities, the impact of their actual cognitive ability on their ability to go online needs to be established.

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12:00-1:00 pm (2280)

Variations in Sarcasm Use by Age and Gender. VICTORIA A. KAZMERSKI and SHARIFFAH SHEIK DAWOOD, *The Pennsylvania State University, Erie*, DAWN G. BLASKO, *The Pennsylvania State University* – Sarcasm use is prevalent in late night television and comedy. But that does not reflect its acceptance and use across situations. Prior studies have shown that males report using sarcasm more than females, but few studies have looked at aging effects. We investigated age (range=18-85 years) and sex differences in self-report of sarcasm use, likelihood of sarcasm use by situation and relationship, reasons why people report using sarcasm, and cues to using sarcasm in 434 native speakers of English. Sex differences were consistent with prior work and strongest for the older participants. Age was inversely correlated with reported likelihood of using sarcasm. On the Sarcasm Self-Report Scale, significant age-related effects were negative for general use and face saving but positive for frustration diffusion. No significant relationship was evident for embarrassment diffusion. Considering reasons to use sarcasm, all reasons showed a negative age correlation, with the strongest age-related correlations for being funny, to create a social bond, have fun with friends, and to flirt. Such age differences are complex and may





reflect changing social bonds, cognitive functions, and/or societal norms.

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12:00-1:00 pm (2281)

Negativity Bias for Memories of National Past and Positivity for National Future in 2020: Novel Patterns of Valence in Middle-Aged and Older Adults for Recent Periods. LOIS K. BURNETT, TORI PEÑA, SUPARNA RAJARAM, and LAUREN L. RICHMOND, *Stony Brook University* – The ability to recall the past and project into the future is a feat of human memory. In the year 2020, we explored how recent past memories and future projections may be linked to the age of the rememberer. Past work shows that older adults generally recall more positive events than do young adults and that adults across the lifespan exhibit more positivity for their personal future than the national future. We distributed a survey to 438 U.S. respondents (age range: 18-81 years), who reported positive and negative events for 2019 (past) and 2021 (future) in both personal and national domains. Our findings show more positivity for future than past events and more negativity for national than personal events overall. Notably, respondents recalled fewer positive national events in 2019 compared to personal events, a pattern that was pronounced for middle-aged and older adults, in contrast to the general, age-related positivity bias in memory. A positivity bias did emerge for future events, especially in middle-aged and older adults, but for national rather than personal events, again in contrast to past findings. We discuss the current findings in the context of unusual lived experiences in recent times.

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12:00-1:00 pm (2282)

Concurrent Updating, Not Maintenance, Disrupts Control During Selective Retrieval. PATRICIA ROMAN, *Universidad Loyola Andalucía*, ALMUDENA A. ORTEGA, *Marbella International University Centre*, TERESA BAJO, *University of Granada*, CARLOS J. GÓMEZ-ARIZA, *University of Jaén* – Dual-task costs are interpreted in terms of a shared pool of resources. Still, the nature of such resources is not usually conceptualized. Our hypothesis here is that behavioral costs would only result from specific cognitive operations (or different ones computed by the same neural hub) rather than unspecific cognitive capacities. We report behavioral evidence from a meta-analysis combining published and unpublished experiments from our laboratory. We used the selective retrieval practice paradigm to induce retrieval-induced forgetting and manipulated the nature of the secondary task (ST) during selective retrieval. Although the ST was always a working memory (WM) task, it relied either on information maintenance or updating WM contents. In support of a mechanism specificity hypothesis, only secondary tasks requiring updating WM contents changed the effect size of forgetting compared to single conditions. Because WM updating has been shown to recruit prefrontal regions that partially overlap those involved in retrieval-induced forgetting but differ from those recruited by WM

maintenance, our findings indicate that costs emerge when the concurrent task recruit specific (rather than general) mechanisms.

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12:00-1:00 pm (2283)

Is There an Asymmetrical Switch Cost Between the Internal and External Focus of Attention? CARO HAUTEKIET, *University of Geneva*, SAM VERSCHOOREN, *Duke University*, NAOMI LANGEROCK and EVIE VERGAUWE, *University of Geneva* – Some researchers assume that internal and external attention are the same, while others argue that they should be considered as separate constructs. One way of approaching this question is by investigating how easily one can switch between the internal and external focus of attention. A recent study examined the behavioral cost associated with switching between the internal and external focus of attention (Verschooren et al., 2020). Participants switched on a trial-by-trial basis between an internal task using stimuli represented in-memory and an external task using on-screen presented stimuli. A larger cost was found when switching from the external towards the internal focus of attention than the other way around. The authors accounted for this finding as associative interference coming from the competing attentional state. Alternative to this procedural, task-level account, we propose that these findings can be explained in terms of an asymmetry of declarative, stimulus-level interference. Before testing this alternative account, we started with a direct replication of the study by Verschooren and colleagues (2020). By doing so, we want to establish the robustness of these findings before investigating our alternative account.

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12:00-1:00 pm (2284)

Computationally Rational Strategies for Integrating Reinforcement Learning and Working Memory in Younger and Older Adults. HYESUE JANG, CINDY LUSTIG, and RICHARD L. LEWIS, *University of Michigan* – We investigate the possibility that adult age differences in a choice learning task can be explained by adaptations to age differences in the limits (“bounds”) of different components of learning and memory. Learning which choice option is most likely to lead to reward involves both conscious, effortful working memory (WM) and automatic, implicit reinforcement learning (RL) processes (Collins 2018; Collins & Frank, 2018). WM and RL have complementary strengths and weaknesses (WM: fast/accurate but capacity-limited/delay-sensitive; RL: robust but slow). Optimal performance depends on finding the right balance between these systems, based on their relative effectiveness. WM declines more than RL with age, and thus the theoretical concept of computational rationality (Lewis et al., 2014) predicts that older adults will rely more on RL than WM during the choice-learning task than will young adults. We will explore how a modified version of an existing computational model (Collins & Frank, 2018) might explain individual differences in the performance of young and older adults by deriving the optimal balance between these systems depending on their limitations.

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12:00-1:00 pm (2285)

Generalization Data Predicts Memory Errors for Symbolic Numbers. ISABELLA C. DESTEFANO and EDWARD VUL, *University of California, San Diego* – “Similarity” is often thought to dictate memory errors. However, memory errors are driven by the whole set of items in memory, and defining “similarity” relative to a joint set of all items is difficult. Furthermore, even pairwise similarity is context dependent and difficult to define for stimuli more complex than simple 1-dimensional perceptual features. These challenges of similarity may be overcome by considering it a consequence of generalization. Here we examine whether generalization, rather than similarity, can be used to understand memory errors—especially memory errors that are jointly determined by the set of exemplars. We use a “number game” generalization task to collect human judgments about set membership for symbolic numbers. We then show that memory errors for numbers are consistent with these judgments, even for cases where pairwise similarity does not explain these errors. These results demonstrate the utility of using propensity to generalize, rather than “similarity”, as the basis of memory errors and show that memory errors for abstract stimuli like numbers are jointly determined by all items held in mind.

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12:00-1:00 pm (2286)

Placebo Effects in Working Memory Training. JOCELYN PARONG and C. SHAWN GREEN, *University of Wisconsin-Madison*, AARON SEITZ, *University of California, Riverside*, SUSANNE JAEGGLI, *University of California, Irvine* – There is substantial interest in the extent to which working memory training produces general enhancements in cognitive function. Yet, because it is very difficult to blind participants to the type of training they are engaging in (e.g., a working memory or a control training paradigm), concerns have been raised that differential expectations across training groups explain most positive effects. Here we examined this possibility directly. In separate groups, participants were told that the training they would complete would either improve or diminish their performance on other cognitive tasks. Half-way through training they were also given falsified “evidence” consistent with those beliefs (i.e., that their cognitive performance was improving or getting worse). The results showed both a training and expectation effect; the working memory training group improved their cognitive performance compared to the control training group, and those given positive expectations about training improved their performance compared to those who received negative expectations (on near transfer tasks, but not far transfer tasks). The magnitude of expectation effects was also predicted by individual differences, such as growth mindset.

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12:00-1:00 pm (2287)

The Generality of Working Memory and Reasoning: Rethinking the Relationship. KEVIN P. ROSALES and HAN HAO, *Claremont Graduate University*, JEAN-PAUL SNIJDER, *Heidelberg University*, KRISTOF KOVACS, *Eötvös Loránd University (ELTE)*, MICHAEL J. KANE, *University of North Carolina at Greensboro*,

ANDREW CONWAY, *Claremont Graduate University* – Psychometric theories of intelligence typically assume a causal relationship between latent cognitive abilities and observations of performance. These assumptions are not necessary conditions of the observed covariance structure of test scores, and may have caused overinterpretations, if not misinterpretations, of the latent factors of intelligence. Process overlap theory (POT; Kovacs & Conway, 2016) proposed a computational framework of intelligence that does not rely on the latent common cause assumption and applies a sampling mechanism of cognitive processes. We re-analyzed data from Kane et al. (2004), which included tests of verbal and spatial working memory (WM) and verbal, spatial, and fluid reasoning. We tested latent variable models and network models to compare the traditional common cause approach to POT. As predicted, traditional models overestimated domain-general covariance in WM and reasoning. In contrast, network models revealed distinct patterns of domain-general and domain-specific covariance across WM and reasoning. We argue that cognitive models of WM and reasoning overemphasize domain-general mechanisms because psychometric models overestimated domain-general covariance.

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12:00-1:00 pm (2288)

Auditory- and Visual-Spatial Working Memory in an Updating Task. TOMOKI MAEZAWA and JUN-ICHIRO KAWAHARA, *Hokkaido University* – Although spatial information is perceived through separate audiovisual systems, these inputs would be maintained and updated in a common system of spatial working memory. The present study examined functional similarities in spatial working memory with respect to audiovisual modalities during updating spatial representations. Across four experiments, participants mentally maneuvered a target location in an imaginary space according to presentations of audiovisual directional cues and followed the target’s pathway to its final destination. A cost of updating accuracy under presentations of mixed-modality cues relative to unimodal cues would reflect modality-specific memory. The results indicated that task performances using visual unimodal cues correlated with those using auditory unimodal cues. Importantly, task performances and error patterns of target traces with unimodal were comparable to those with mixed-modality, indicating modality-nonspecific memory was involved during the task. The findings imply that spatial inputs are retrieved from working memory on the basis of a common system.

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12:00-1:00 pm (2289)

Functional Equivalence Between Executed and Imagined Pointing Movements in Visuospatial Working Memory. DIVYA BHATIA, *O.P. Jindal Global University*, PIETRO SPATARO, *Universitas Mercatorum*, CLELIA ROSSI-ARNAUD, *Sapienza Università di Roma* – Previous studies have shown that performing pointing movements towards to-be-remembered target locations can facilitate their later recognition (Chum, Bekkering, Dodd, & Pratt, 2007). In the present study, we investigated whether





motor imagery can benefit visuospatial working memory in a similar way as overt action does. Participants ($n = 24$) were administered a task that required the maintenance of two consecutive spatial arrays of three or four items presented sequentially where each item occupied a different location on the screen. One array was encoded only by visual observation (no-move array), whereas the other was encoded by visual observation accompanied by either overt or imagined pointing movements (move array). Results from a later recognition task showed that move arrays were recognized better than the no-move arrays, irrespective of whether the pointing movements were actually executed or only imagined. We propose that this benefit reflects active motor simulation of the pointing movements.

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12:00-1:00 pm (2290)

Withdrawn

12:00-1:00 pm (2291)

Enhancing Short-Term Storage through Cognitive Offloading by Typing. ALEXANDRA MORRISON and MEGAN E. BROWN, *California State University, Sacramento* – Prior studies have shown that offloading information by writing it down boosts memory performance. Here, we aimed to replicate Morrison and Richmond's (2020) finding of a nonsignificant relationship between frequency of offloading and individual's working memory capacity, and to investigate offloading by typing. Participants were presented lists of 2 to 10 letters to remember; on half of the trials they could offload the letters to assist at recall, and on half of the trials they could not offload. Working memory capacity was measured using the automated operation span and symmetry span tasks (Unsworth et al., 2015). Fifty-seven participants completed the study remotely on their personal computers. Results replicated Morrison and Richmond (2020) with typing instead of writing. A 2x5 within-subjects ANOVA showed significant main effects of set size and offloading condition as well as a significant interaction ($p < .001$). The correlation between working memory capacity and offloading was not significant ($p = .89$). Future studies should evaluate other predictors of variation in offloading like confidence in one's own memory.

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12:00-1:00 pm (2292)

Directed Forgetting in Working Memory. HANNAH DAMES and KLAUS OBERAUER, *University of Zurich* – Can we remove outdated information from working memory (WM)? To explore this question, in four experiments, we gauged the availability of the to-be-forgotten (TBF) information directly. Participants remembered six words presented sequentially in separate frames. After each word off-set, the frame turned either blue or orange, indicating a to-be-remembered (TBR) or TBF word, respectively. In two baselines, participants remembered six or three (± 1) words. In the set-size 6-3 condition, three (± 1) out of six words were cued TBR. In all experiments, consistently poor recognition performance for TBF words and facilitation of TBR words demonstrated removal from WM. The

observed directed forgetting effects are remarkably robust: they can be observed when testing the TBF words up to four times (Experiment 1, $n=346$), for both item and binding memory (Experiment 3, $n=124$), and even when information has to be maintained in WM up to 5s until the memory cue is presented (Experiments 2 and 4, $n=344$ and $n=329$, respectively). Thereby, our study provides further evidence for removal as a process to control the contents of WM and establishes a new method to assess the fate of removed information.

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12:00-1:00 pm (2293)

Available Long-Term Memory Predicts Reading Comprehension Differently Based on the Comprehension Measure. MAREN GREVE and DANIEL P. BYRNES, *Kent State University*, ERIN N. GRAHAM, *Gustavus Adolphus College*, CHRISTOPHER A. WAS, *Kent State University* – Disengagement, as a domain general process for detaching from no longer relevant information, is important for reading comprehension (Martin et al., 2019). Was and Woltz (2007) found that measures of available long-term memory (ALTM) are also related to comprehension. Martin and colleagues suggested in their general discussion the reason ALTM tasks account for unique variance in comprehension is because ALTM tasks also recruit disengagement. The current study reanalyzed two existing datasets to test that idea. Structural equation models produced conflicting results which can be explained by the different comprehension measures used by the different datasets. Dataset 1 taken from Was and Woltz (2007) used listening comprehension measures. Dataset 2 from Was et al. (2012) used two standardized measures of reading comprehension and one vocabulary measure. The results indicate the unique predictive ability of ALTM tasks changes depending on the modality and task demands of the comprehension measure.

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12:00-1:00 pm (2294)

Does Articulatory Suppression Have Underlying Benefits? Assessing the Role of Phonological and Semantic Resources on Immediate and Long-Term Sentence Recall. THERESA PHAM, NIVEDITA VARAGUNAN, AREEJ MALIK, and LISA ARCHIBALD, *The University of Western Ontario* – Verbal short-term memory (STM) is influenced by both phonological and semantic knowledge. One verbal STM task well-suited to investigate the integration of phonological and semantic processing is sentence recall. We hypothesized that a concurrent task would disrupt selective processes and may even shift reliance to other (available) processes. Articulatory suppression (AS) prevents phonological rehearsal but should leave semantics available. Conversely, our bespoke animacy categorization and semantic relatedness tasks were expected to act as semantic suppression tasks. Semantics was further assessed with concrete and abstract sentences. Participants heard sentences only (control) or with a concurrent AS or semantic suppression task. Immediate and long-term (1 day later) recall were tested. Immediate recall was accurate in control trials and impaired with AS, with both semantic tasks intermediate. The concreteness





effect was observed for all conditions in long-term recall but only for AS in immediate recall. Better long-term retention under AS suggest a greater reliance on semantics at initial recall with subsequent benefits. These results also demonstrate that our semantic tasks are useful for investigating semantic processing.

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12:00-1:00 pm (2295)

Being Informed of an Upcoming Delayed Recall Test Does Not Modulate the Effect of Working Memory Maintenance on Long-Term Retention. MAXIMILIEN LABARONNE and GAËN PLANCHER, *University of Lyon* – There is an increased interest in the relation between working memory and long-term memory, but little is known about the role of intentions. Long-term memory is usually evaluated with a final delayed test that is announced either at the beginning of the experiment or as a surprise test. In a recent meta-analysis, Hartshorne and Makovski (2019) observed that the effect of working memory maintenance is smaller on delayed recall in experiments where this recall was unexpected. However, this was not directly tested. In the present study, using a complex span task followed by a delayed recall, participants were informed or not that a delayed recall would occur at the end of the experiment. The cognitive load of the concurrent processing task (low vs. high vs. simple span), known as reflecting maintenance in working memory, was also manipulated. While we replicated the effect of cognitive load at both immediate and delayed recall, we found evidence against the effect of being informed and no interaction. Complementary data on maintenance strategies seem to indicate that informed participants did not adapt their maintenance strategy to promote long-term retention.

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12:00-1:00 pm (2296)

The List Length Effect in Short-Term/Working Memory. MOLLY B. MACMILLAN, IAN NEATH, and KATHLEEN L. HOURIHAN, *Memorial University of Newfoundland* – In free recall, the list length effect (LLE) refers to the finding that the proportion of correctly recalled items decreases as set-size increases but at the same time the total number of recalled items continues to increase with set-size (Murdoch, 1962). Oberauer et al. (2018) proposed that a decrease in memory accuracy as a function of increasing set-size was fundamental to conceptualizations of short-term and working memory. Evidence of a LLE in short-term/working memory would contradict this benchmark. Beaman (2006) observed a LLE in serial recall, whereas Unsworth and Engle (2006) observed no such effect in either serial recall or complex span. In the current study, we sought to reconcile these conflicting results. Six experiments were conducted, examining the relationship between the number and proportion of words recalled in both serial recall and complex span. No LLE was observed in either task. The implications of these results will be discussed.

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12:00-1:00 pm (2297)

The Motivational Role of Feedback on Working Memory. DANIELLE WILSON and DANA CHESNEY, *St. John's University* – Previous research has shown that motivation plays a vital role in what we remember. Motivation can be either extrinsic (e.g., a reward for doing well) or intrinsic (e.g., wanting to do well). Here we test if intrinsic motivation improves working memory (WM) performance. In an online study, undergraduate students (N=370, 343 after excluding noncompliant participants) completed a reverse letter span task, recalling 42 sets of 4-9 letters that were shown for one second in reverse order. We manipulate intrinsic motivation via feedback. Participants were randomly assigned to feedback and no-feedback conditions. The feedback group was informed if their answers were right or wrong, while the no-feedback group received no feedback on their answers. Preliminary analysis found that the participants who received feedback answered more items perfectly (M=15.4, SD=7.7) than participants who did not receive feedback (M=14.2, SD=8.13). While this trend was in the predicted direction, it did not reach significance ($t(341)=1.41$, $p=.16$). Nevertheless, these results suggest further investigation into the effect of feedback on WM abilities is warranted.

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12:00-1:00 pm (2298)

Towards an Integration Between Free Recall and Serial Recall: Examining a Free Recall Account of Transposition Error Gradients in Serial Recall. GEOFF WARD, *University of Essex* – In immediate serial recall (ISR), participants are presented with short sequences of items and must try to repeat them back in exactly the same order that they had been presented. Many theories of ISR assume that each item is associated with position information, whereas no such mechanism has been suggested for immediate free recall (IFR). One line of evidence supporting item-position associations is that there are error gradients in the distribution of order errors: i.e., when list items are recalled in the wrong output order, they tend to be output in neighbouring list positions, suggesting that each item is associated with more or less perfect order information. Reanalysing published ISR datasets from open and closed sets of items, the current work shows that if participants recall known runs of primacy and/or recency items of different lengths, then error gradients arise even when middle items (for which there is otherwise unknown order information) are distributed randomly between known sequences of primacy and recency items. The work suggests that error gradients in ISR can be obtained from more IFR-like outputs, a step toward theoretical integration of the two tasks.

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12:00-1:00 pm (2299)

Comparing Adults' Working Memory Search Rates in Sub-span vs. Supraspan Situations: A Novel Approach of Developmental Relevance. BEATRICE VALENTINI, *University of Geneva*, NELSON COWAN, *University of Missouri*, EVIE VERGAUWE, *University of Geneva* – Working memory (WM) is the limited-capacity system responsible for maintaining information. One of





the proposed key determinants of WM capacity is the speed needed to search information in WM, called WM search rate. This rate is typically studied with the item-recognition task (Sternberg, 1966), which requires judging as fast as possible whether a probe is present or absent from a previously-presented memory list. The slope of the reaction time function across list lengths is the WM search rate. While this search rate is typically around 40 ms/item in adults, it is typically slower in children (e.g., Hermann and Landis, 1977). We suspect that children's search rates may be slower than adults' search rates because children are typically performing the item-recognition task with lists that exceed their working memory capacity (i.e., in a supraspan condition). Accordingly, we hypothesize that adult search rates may be slower above their span on a trial. The current study compares adults' search slopes in supraspan vs. subs span conditions using a novel, trial-by-trial procedure to determine whether a given list should be considered as subs pan or supraspan. Overall, the results show evidence against our hypothesis.

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12:00-1:00 pm (2300)

The Effect of Mind-Wandering and Cognitive Load on Working Memory Performance in Online and In-Person Experiments. KELLY COTTON, *City University of New York*, TIMOTHY J. RICKER, *University of South Dakota* – The COVID-19 pandemic accelerated the shift in both learning and research to online environments. This change in contexts presents many issues for education, work, and research, particularly a potential increase in mind-wandering. In the home environment, there are increased distractors in one's environment and an overall increase in screen time, both leading to a greater potential for disengagement with the task at hand. These factors also may lead to a greater susceptibility to cognitive load, a measure of secondary task disruption in working memory. The present study aims to investigate the effect of mind-wandering and cognitive load on a working memory task in both remote and laboratory contexts. During the task, colored squares were briefly presented. Participants then completed a parity judgment task, with varied amounts of cognitive load. Finally, participants were presented with a single colored square and asked to indicate if the color of the square had changed. After each trial, participants were asked about mind-wandering during the task. We correlated mind-wandering scores with memory performance in each cognitive load condition and compared results across experiment contexts.

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12:00-1:00 pm (2301)

Switching Costs in Verbal Working Memory Complex Span Task Performance. MIRIAM DEBRAISE and FABIEN MATHY, *Université Côte d'Azur* – Switching between tasks induces a toll on the cognitive system. Following the idea that complex span tasks require to switch between maintenance and processing activities and vice-versa, we examined in two experiments if subtle variations of task structure could reveal switching costs associated to working memory performance. We expected to find reduced working memory performance as a result of a high number of to-be-executed

switches between processing and maintenance activities. The first experiment required from the participant keyboard responses to execute the concurrent task, whereas our second experiment required oral responses. The results yielded novel findings, with a partial confirmation of our hypothesis. In short, the complex span task requiring verbal responses showed effectively switching costs associated to working memory performance in low cognitive load conditions, whereas the task requiring keyboard responses did not. We discuss the discrepancies between the two experiments in terms of the potential role of verbalization, cognitive load, and task prioritization. Further investigation is needed to disentangle which factors contributed to our findings.

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12:00-1:00 pm (2302)

Saliency Determines the Integration of Contextual Information in an Event File. RUYI QIU and MALTE MÖLLER, *University of Passau*, IRING KOCH, *Rheinisch-Westfälische Technische Hochschule (RWTH) Aachen University*, SUSANNE MAYR, *University of Passau* – It is well-documented that stimulus and response features can be bound together (or integrated) into a common episodic representation called event file. A unitary binding structure between stimulus and response has been coined as binary binding. A previous finding from the negative priming paradigm shows that context, defined as a completely response-irrelevant stimulus, modulates the binding between a distractor stimulus and response instead of entering a binary binding with the response itself. This finding raises the questions whether context information can also enter a binary binding and, if so, what determines its integration. We addressed these questions by systematically varying the saliency of context in a negative priming task. Saliency of the context was manipulated by changing its intensity (Experiment 1) or emotional valence (Experiment 2). Results showed that context of low saliency was not integrated at all, while context of moderate saliency modulated the binary binding between distractor and response. Finally, a context of high saliency was bound directly with the response. Together, the findings provide the evidence that saliency determines the way context is integrated into an event file.

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12:00-1:00 pm (2303)

Spatial Memory Span Tasks: An Examination of List-Length Effects and Strategies. ALEXA K. BUSHINSKI and THOMAS S. REDICK, *Purdue University* – Recent work has re-assessed the degree to which simple versus complex span tasks measure similar or dissimilar constructs. Specifically, list-length effects have been used to help explain the working memory-fluid intelligence relationship, but they have only been assessed within the verbal domain. We conducted a re-analysis of Kane et al. (2004) to examine the list-length effects in spatial memory span tasks. The results showed that the correlations between simple spatial span tasks and fluid intelligence show a different pattern than their verbal counterpart, and an exploratory factor analysis revealed a single factor for all simple and complex spatial span list lengths. To replicate and expand





on our re-analysis of Kane et al. (2004), we conducted a study to directly compare the list-length effects between the verbal and spatial simple and complex memory span tasks. We also collected strategy reports, as recent research has indicated their potential bearing on such domain differences. Our findings provide further evidence that simple spans reflect multiple aspects of memory depending on the type of material and list length.

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12:00-1:00 pm (2304)

Determinants of Navigation Ability Poststroke. ERICA BARHORST-CATES, AARON L. WONG and LAUREL J. BUXBAUM, *Moss Rehabilitation Research Institute* – Spatial navigation is an important activity related to quality of life for individuals with chronic stroke, yet research has often been conducted with constrained, stationary-only tasks and has rarely included assessment of cognitive or sensorimotor predictors of performance. In an indoor real-world task, we assessed the effects of navigational demands on the performance of pointing in the direction of encountered targets and route-reversal. Stroke participants and neurotypical controls performed walking, wheelchair, and video navigation and a battery of sensorimotor and cognitive tasks. Preliminary results suggest that patients show poorer performance overall than controls, but unlike controls, tend to perform best as sensorimotor demands increase (walking>wheelchair>video) despite poorer locomotion, turn accuracy, mental rotation, perspective taking, and attention. These preliminary results suggest that individuals with stroke may perform best on navigation tasks when they can freely ambulate despite increased demands on sensorimotor and cognitive processing.

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12:00-1:00 pm (2305)

Spatial Coding of a City: Segmentation of a City Affects Its Cognitive Representation. MERVE TANSAN, THOMAS F. SHIPLEY, and NORA S. NEWCOMBE, *Temple University* – People tend to chunk and segment space to enhance spatial memory. Research on environmental segmentation has found that cognitive representation of spaces are more accurate within segments than between them. However, there are few studies of segmentation of a city-scale environment. In this study, we asked citizens of Istanbul, a transcontinental city with natural waterways that divide it into multiple segments, to indicate how they segment their city and perform spatial judgments between well-known landmarks in an online study. People overestimated distances, but this overestimation was larger for between segment judgments. In addition, a direction judgment task revealed that within-segment pointing was more accurate than between-segment pointing. These results support accounts of location memory that propose spaces are encoded hierarchically, up to and including at the city scale.

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12:00-1:00 pm (2306)

Assessing Cognitive Load while Navigating an Urban Immersive Virtual Environment. HUNTER C. FINNEY, RYAN J. MURDOCK, TAREN ROHOVIT, DAVID BRICKLER, SARAH H. CREEM-REGEHR, and JEANINE K. STEFANUCCI, *University of Utah* – Navigational tools are relied on every day to traverse unfamiliar grounds but their use may come at a cost to situational awareness or spatial memory due to increased cognitive load. Little is known about how the detection response task (DRT) intended to measure cognitive load is affected by complex virtual navigation tasks. We developed a new virtual-navigation paradigm that allows for concurrent measurement of head and eye movements, paths taken to search for objects, and performance on the DRT. Participants navigated using an HTC VIVE Pro Eye virtual reality headset in a large city environment. They searched for three separate target objects and then returned to the starting location. Once returned, participants pointed toward a target when prompted from the starting locations as well as from the locations of the targets. Preliminary analyses did not show a strong relationship between head movements and cognitive load, but this may have been due to the locomotion interface and wide field of view. Future analyses will focus on eye movements and the relationship between search patterns and spatial memory.

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12:00-1:00 pm (2307)

Self-Evaluations of Navigation Ability: A Big Data Approach. YOU (LILY) CHENG and CHUANXIUYUE HE, *University of California, Santa Barbara*, HUGO J. SPIERS, *University College London*, ANTOINE COUTROT, *Université de Lyon*, MICHAEL HORNBERGER, *Norwich Medical School, University of East Anglia*, MARY HEGARTY, *University of California, Santa Barbara*, ELIZABETH R. CHRASTIL, *University of California, Irvine* – Navigation is an important daily activity and navigation deficits are precursors of many neurological disorders. Self-reports of navigation ability have been found to be predictive of objective measures. To investigate how self-reported navigation ability is related to demographic information, we analyzed data from Sea Hero Quest, a mobile navigation game with over 900,000 users (ages 18–70, men N=476,102, women N=423,897). Using regression models, our results indicate that men report greater ability than women, which is consistent with previous findings based on objective measures. Interestingly, based on our analysis, older people reported greater navigation ability than younger people, although objective data show the opposite pattern. Furthermore, this trend was most evident in men, such that older men report higher navigation ability than older women. This study can help researchers identify potential estimation biases in using navigation self-reports for clinical prescreening.

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12:00-1:00 pm (2308)

The Role of Perceptual Modality on Adults' Spatial Scaling from Memory. MAGDALENA SZUBIELSKA, MARTA SZEWCZYK, PAWEŁ AUGUSTYNOWICZ, and WOJCIECH





KĘDZIORA, *The John Paul II Catholic University of Lublin*, WENKE MÖHRING, *Martin Luther University Halle-Wittenberg* – Spatial scaling is an essential spatial ability that is used frequently in daily life. Although people can scale spatial information smoothly and quickly, it seems that most of our scaling experience refers to the visual domain and to scaling up spatial information. In the present study, we aimed to compare spatial scaling across three perceptual modality conditions (haptic, visual, or haptic+visual) and across different scaling directions (up vs. down). Adults learned about a target's location in a simple map and then reproduced the same location from memory on a referent space. Sizes of maps varied whereas the referent space was constant-sized, resulting in five different scaling factors (1:3, 1:2, 1:1, 2:1, 3:1). Results yielded main effects of scaling factor and perceptual modality on participants' accuracy and response times. Effects of scaling factor were described by quadratic functions, suggesting that participants produced higher errors and longer response times with increasing scaling factor. Moreover, participants showed higher errors and slower response times in the haptic condition than both visual conditions. Results may inform us about strategy use when scaling in different perceptual modalities.

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12:00-1:00 pm (2309)

When The Wind Is Southerly: A Bayesian Model of Cue-Based Cardinal Direction Estimation. CHRISTOPHER DUDAS-THOMAS, *Tufts University*, AARON L. GARDONY and TAD T. BRUNYÉ, *U.S. Army Combat Capabilities Development Command (DEVCOM) Soldier Center*, HOLLY A. TAYLOR, *Tufts University* – When people experience spatial environments from a first-person perspective, they must rely on available environmental information to orient themselves and find directions. People often rely on a salient orienting cue to do so (Brunyé et al., 2015, Marchette et al., 2011), but the literature has rarely explicitly considered how people may use multiple cues in this manner. We considered theories from optimal cue combination to develop a generative Bayesian cognitive model, intended to emulate participants' cardinal direction estimates from a previous experiment. In particular, we expected people combined local cue information, including the adjacent street at any location, as well as the general location geometry defined mainly by the street grid. We showed it is plausible that participants optimally combined cue information, and this likely included local as well as global featural information. This model could be applied to other experiments where people likely combine directional cue information to test how they preferentially rely on various cues in different situations.

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12:00-1:00 pm (2310)

Neural Response to Symmetry Does Not Track Memory Advantage. ETHAN WASCHE, *Francis Marion University*, ERIC HENDERSON, *University of Iowa* – Visual stimuli that are symmetrical are easier to remember (symmetry effect). Symmetrical stimuli are associated with a specific neural response (sustained posterior

negativity, SPN) observed using electroencephalography (EEG). The goal of this study was to establish a relationship between the memory benefit for symmetrical patterns (symmetry effect) and the neural response associated with perceiving symmetrical patterns (SPN). Twenty one undergraduate participants performed a visuospatial working memory task on a PC while EEG data was recorded. On each trial, six yellow squares chosen from an invisible 6x6 grid lit up simultaneously for 3 seconds, after which the grid appeared and participants used a mouse to click on the squares that had been lit. On half (60) trials, the lit squares were selected randomly and on the other half the lit squares made a pattern that was symmetrical about the vertical midline. Both the symmetry effect and the SPN were observed but the size of the symmetry effect did not correlate with the size of the SPN across participants. Whatever cognitive process is involved in the memory benefit for symmetrical patterns, it may not be related to the automatic neural response to symmetry indexed by the SPN.

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12:00-1:00 pm (2311)

Location Memory for Snakes and the Group Vigilance Hypothesis of Yawning. ANDREW C. GALLUP, *SUNY Polytechnic Institute* – Snakes have been a recurrent survival threat throughout human evolutionary history, and estimates suggest that even now snake bites claim the lives of upward of 94,000 people each year. Due to this continuous selective pressure, both humans and nonhuman primates appear to possess neurological adaptations designed for detecting these dangerous animals (i.e., snake detection theory). Moreover, recent research shows that when we see others display behaviors indicative of reduced arousal and vigilance, such as yawning, our ability to detect snakes is selectively enhanced. However, limited research has investigated whether humans show a similar bias in the location memory of snakes. Building upon these lines of research, the current study used a repeated-measures design where 38 participants completed spatial recall tasks with snakes, frogs, and flowers, both after viewing videos of yawning and control behavior. Results show that location memory was highest for snakes, but seeing others yawn did not selectively enhance this effect.

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12:00-1:00 pm (2312)

Reinforcement Learning Models Provide Unique Insights in Characterizing Individual Differences in Navigation Behaviors. QILIANG HE, *Georgia Institute of Technology* – Reinforcement learning has been influential in characterizing decision making but is rarely in spatial navigation. One hundred fourteen participants were recruited to complete wayfinding tasks in a virtual environment where the starting location was fixed in one phase and random in the other phase. We found that reinforcement learning bias (the balance between model-free and model-based learning) was correlated with navigation efficiency in general but more so in the random phase than in the fixed phase. Both reinforcement learning bias and navigation efficiency predicted which phase (fixed or random) participants were in but reinforcement learning bias explained





additional variance over navigation efficiency. Mental rotation and working memory capacity were correlated with navigation efficiency across phases but they were correlated with reinforcement learning bias only in specific phases. Our results not only show that reinforcement learning bias reflects navigation tendency but also underscore the unique contributions that reinforcement learning models and conventional performance measures can make to explaining navigation behaviors and understanding individual differences in spatial navigation.

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12:00-1:00 pm (2313)

The Effect of Landmarks on Learning the Gist of Spaces.

MORGAN A. SAXON and BRIAN H. KLEMSER, *University of Utah*, PHILLIP FERNBERG, *Utah State University*, SARAH H. CREEM-REGEHR and JEANINE K. STEFANUCCI, *University of Utah*, BRENT CHAMBERLAIN, *Utah State University* – Research in navigation and wayfinding shows individuals rely on landmarks to track and remember their route through novel spaces. Traditional measures of spatial memory focus on route and survey knowledge, with assessment of accuracy of memory for location. However, the current study examines whether participants can extract the “gist” of a space, meaning whether they can distinguish different spatial categories (e.g., residential or industrial areas) while wayfinding when landmarks are present or not. Participants navigated two routes, one with landmarks and one without (order counterbalanced) through a virtual cityscape environment and were asked to draw a sketch map that illustrated the route, the location of landmarks, and the layout of districts (residential, park, urban, industrial). We tested for differences in proportional accuracy for districts based on landmark presence. Participants were able to extract the districts from the larger environment, but landmarks did not play a significant role in that process.

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12:00-1:00 pm (2314)

Structural Similarity of Local Spaces in a Multiscale Environment Overshadows Global Spatial Representations.

XUEHUI LEI, *University of Alberta & York University*, WEIMIN MOU, *University of Alberta* – This study examined how the structural similarity of local spaces interferes with updating global headings in a novel multiscale environment. In an immersive virtual environment, participants learned objects in a room and then walked without vision to a neighbouring testing room. The rooms were both rectangular but globally misaligned. Adopting actual perspectives in the testing room, participants judged relative directions (JRDs) from imagined perspectives in the learning room. Sensorimotor alignment effects (i.e., better performances if the imagined and actual perspectives were aligned) were examined when the alignment was defined by local structures or global cardinal directions. Before JRDs, participants conducted no other tasks (Experiment 1), judged relative headings between views in different rooms while seeing the testing room (Experiment 2), or while in darkness (Experiment 3). The local sensorimotor alignment effect appeared in all experiments, whereas the

global effect appeared only in Experiment 3. These results suggest that local structural similarity interferes with updating global headings in the multiscale environment and that this interference occurs during the activation of global representations.

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12:00-1:00 pm (2315)

Non-Native English Speakers Are Slower in Predicting Object-State During Real-Time Language Comprehension than Native Speakers.

XIN KANG, *The Chinese University of Hong Kong*, HAO YAN GE, *Open University of Hong Kong* – Language comprehenders actively predict what comes next in the language on the basis of both linguistic and world knowledge, but existing studies investigating predictive processing by non-native speakers exhibited mixed results. In the current study, we examined the predicting of object-states during real-time language comprehension using the visual world paradigm (VWP). Fifty-two native English speakers, 46 Cantonese-English speakers, and 31 Dutch-English speakers joined this study. They were asked to listen to English sentences while viewing visual stimuli. We found that all groups successfully directed their visual attention towards the changed-state of the target object when they heard the name of the target object. However, none of these groups showed an anticipatory bias in visual attention when they heard the verb. Only native English speakers, but not non-native speakers, showed a bias in visual attention to the changed-state of the target object during the determiner (“the”). Our results suggest that native and non-native speakers largely overlap in their time-courses of keeping track of object-state representations as language unfolds but non-native speakers may have a short delay as the noun phrase unfolds.

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12:00-1:00 pm (2316)

The Relationship Between Viewers’ Event Segmentation Ability and Eye Movement Patterns.

MAVERICK E. SMITH and LESTER C. LOSCHKY, *Kansas State University* – To understand an ongoing activity, we represent sensory information from the environment in an event model, which is used to generate predictions and guide subsequent processing. When predictions fail, processing demands increase, an event boundary is perceived and the event is segmented. Prior research has shown that older adults segment continuous actions into sub-events more idiosyncratically than do young adults. We investigated whether age-related differences in segmentation ability are due to differences in gaze patterns. Older and young adults watched a series of naturalistic videos of actors performing everyday activities while we tracked their eye-movements and then segmented the videos into sub-events. Older adults had less normative segmentation ability and less gaze similarity than young adults. Further, gaze similarity correlated positively with event segmentation ability. Finally, we found that both age groups had higher gaze similarity at event boundaries than non-boundaries, but this difference was smaller in older adults. Results suggest that differences in





event segmentation ability are due, in part, to differences in observers' eye-movement patterns.

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12:00-1:00 pm (2317)

Semantic Knowledge Attenuates Age-Related Differences in Event Segmentation and Episodic Memory. BARBARA PITTS and MAVERICK E. SMITH, *Kansas State University*, KIMBERLY NEWBERRY, *Shenandoah University*, CHEYANNE A. BRUNNER, KAMERON R. WILDEMAN, MARIA V. APEL, MOLLY HENDRICK, and SAM SCHULTZ, *Kansas State University* – Though semantic and episodic memory may be distinct memory systems, their interdependence is substantial. Here, we aim to clarify this interactive relationship by determining whether an encoding mechanism, event segmentation, provides a functional link between semantic knowledge and episodic memory. To investigate these effects, we combined data across three studies that had young and older adults segment and remember videos of everyday activities that were either familiar or unfamiliar to their age group. We found age-related differences in segmentation and episodic memory performance, but only when older adults lacked semantic knowledge for an everyday activity. Most importantly, when they had access to relevant semantic knowledge, older adults identified similar boundaries and remembered information as effectively as young adults. Our findings indicate that older adults are able to use semantic knowledge to more effectively encode and retrieve everyday information. These effects suggest that future interventions can leverage older adults' intact semantic knowledge to attenuate age-related deficits in event segmentation and episodic long-term memory.

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12:00-1:00 pm (2318)

The Psychological Present and Event Segmentation. CHRISTOPHER A. KURBY, *Grand Valley State University*, ASHLEY S. BANGERT, *The University of Texas at El Paso* – The psychological present has been characterized by a 2-3 second temporal integration window (TIW) whereby ongoing perceptual integration is pre-semantic. However, research on event processing has shown that meaning may drive how perceivers chunk, or segment, ongoing perceptual experience into events. Here we tested to what extent event segmentation guides perceptual integration within the 2-3 second TIW, supporting the formation of the psychological present. In an extension of Fairhall (2014), participants watched videos of people performing everyday activities that were scrambled in chunks of various durations, spanning 1.2-9.6 seconds, and made judgments of comprehension difficulty. Critically, scrambled spans of time were entirely within a meaningful event, or extended across events. Results supported a combined hypothesis whereby integration within the 2-3 second TIW was unaffected by event structure but integration above it was. This suggests that the smallest unit of the psychological present may be guided by pre-semantic integration but longer-timescale integration of experience is guided by event structure.

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12:00-1:00 pm (2319)

Identifying a Goldilocks Zone for Episodic Encoding. MATTHEW LOGIE, *University of Stirling*, DAVID I. DONALDSON, *University of St Andrews* – The role of working memory in long-term learning continues to be a subject of debate. One account suggests that working memory is purely activated long-term memory coupled with attentional awareness, holding information within working memory benefits long-term learning. However, it is possible for information to be maintained within working memory without subsequently being available for recall. The present research employs travelling between locations within a virtual environment to provide event boundaries to segment sequentially presented word lists. Building on previous reports, the results suggest that either over- or underloading working memory between boundaries will result in a reduced long-term memory performance. Across four experiments, the results are consistent with the view that working memory generates a copy of available information from perception and activated long-term memory. If event boundaries are not encountered, the information held within working memory may be lost. Too few or too many boundaries have a detrimental impact on memory performance suggesting that there is a “goldilocks zone” for episodic encoding, composed of multiple dimensions, dependent on working memory capacity, that is just right.

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12:00-1:00 pm (2320)

Influences of Reading Instructions and Segmentation on Memory over Time. KIMBERLY NEWBERRY, *Shenandoah University*, HEATHER BAILEY, *Kansas State University* – Reading comprehension is a complex process and successful comprehension may depend on different factors, such as situation model construction (Radvansky & Zacks, 2014) and reading goals (van den Broek et al., 2011). The current study investigated the influence of general reading instructions (read for study or read for entertainment) on people's ability to segment news stories and remember different levels of representation over long delays. Participants were randomly assigned to a reading instruction group. Then they read and segmented a series of texts and completed a recognition memory task for one of those texts at each of four delays (immediate, 1 day, 1 week, 1 month). Overall, results partially replicated and extended prior work. Different levels of representation in memory showed different patterns of forgetting, segmentation agreement predicted those different levels of memory representation, and reading instruction moderated the segmentation-memory relationship.

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12:00-1:00 pm (2321)

Binding of Event Elements in Episodic Memory: Representational Structures and the Role of Animacy. MARCEL SCHREINER, THORSTEN MEISER, and ARNDT BRÖDER, *University of Mannheim* – Experienced events consist of several constituent elements which need to be bound together to enable coherent event representations. This implies that the likelihood of retrieving one element is related to the retrieval of another element from





the same event. In three experiments we tested whether event elements are bound in an integrated representational structure, in which elements are stored in a single engram, or in a hierarchical structure, in which elements are bound to a particular element. We further tested for effects of animacy on the binding of event elements. The experiments yielded ambiguous results regarding the two representational structures but yielded evidence that the presence of animacy in an event facilitates the binding of its constituent elements. This suggests that binding processes may vary depending on moderators such as animacy and that different representational structures may be possible.

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12:00-1:00 pm (2322)

A Temporal Window for Event Perception: Small Temporal Disruptions in Inter-Event Relationships Do Not Impact Event Perception. MADISON LEE and DANIEL LEVIN, *Vanderbilt University* – Models of event perception posit that prediction is central to encoding events. According to Event Segmentation Theory, perceivers continuously generate predictions and compare them to incoming information. Mismatches produce prediction errors that in turn induce the perception of event boundaries. However, little is known about the informational basis of prediction. We tested the consequences of disrupting temporal relationships between actions in narrated screen-capture instructional videos by slipping the audio channel forward or backward either 0, 1, 3, or 7 seconds. We collected measures of learning, event segmentation, disruption awareness, segmentation uncertainty, and task load. 3- and 7-second temporal disruptions increased uncertainty and task load and produced a moderate level of disruption awareness. 7-second disruptions also decreased the number of segmentation responses. None of these effects appeared for 1-second disruptions even though most inter-event information falls within this range. Our results suggest that prediction disruption can impact event perception but that there exists a temporal window of perceptual flexibility within which specific temporal expectations are not necessarily tracked.

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12:00-1:00 pm (2323)

Better Memory for Complete Events in Russian: An Effect of Obligatory Aspect Marking. ANNA KATIKHINA, *The University of Arizona*, JULIA MISERSKY, *Max Planck Institute for Psycholinguistics*, MONIQUE FLECKEN and VICKY T. LAI, *The University of Arizona* – Language can impact event memory (e.g., Loftus & Palmer, 1974) through the mental models of events, where lexical-semantics specifies the content and grammar, such as aspect (perfective: washed, imperfective: was washing) specifies the viewpoint (Langacker, 2004). Russian differs from English in that Russian has a highly grammaticalized aspectual system with obligatory aspectual marking, whereas English does not. We asked whether obligatory marking of aspectual oppositions impacts memory for event endings. At encoding, 51 English and 48 Russian L1 speakers watched 48 event videos (24 complete, 24 incomplete) and read descriptions (half perfective, half imperfective) in English or Russian. During the

surprise memory test, participants viewed a still frame of the video and judged whether it corresponded to the last frame of the videos they saw. D-prime was calculated and analyzed. Event type interacted with language background: Russian speakers remembered the complete events better than the incomplete, whereas English speakers remembered both event types similarly. We suggest that obligatory selection of aspectual forms in L1 Russian increased saliency of event stage in memory.

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12:00-1:00 pm (2324)

Switching Task Sets Creates Event Boundaries in Memory. YUXI WANG and TOBIAS EGNER, *Duke University* – Continuous experiences are segmented into discrete events in memory. This process results in better memory for the temporal order of items within an event and expands subjective temporal distance for items encoded across event boundaries. Previous research has suggested that the creation of event boundaries is driven by changes in external stimulation, though many prior studies have confounded a change in bottom-up input with a concurrent change in task goal. This raises the question of whether event segmentation can be triggered by the endogenous cognitive control processes involved in switching task sets, independent of changes in bottom-up stimulation. We investigated this question by embedding task set changes during encoding of a series of trial-unique images, and comparing subsequent temporal order and distance memory for item pairs encoded across a change in task set vs. within the same task set. Across four experiments, we show that top-down task set changes without shifts in stimulus set or response set are sufficient to create event boundaries, and that these results cannot be explained by changes in task cues or task difficulty. Thus, top-down control processes are a key determinant of segmenting episodic memories.

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12:00-1:00 pm (2325)

Understanding Pseudoscience Beliefs: The Role of IIDD and Disproving Information. MARC BALLESTERO-ARNAU, FRANCESCA GIAIOTTI, and JOSUE GARCIA-ARCH, *University of Barcelona* – The spread of pseudoscience is a worrying problem worldwide. Although the interest in understanding and modeling these beliefs is growing, this young area of research still lacks a solid theoretical and psychometric framework. In this research (N=268) we investigated the validity and usefulness of grouping pseudoscience beliefs into supra-ordered categories (e.g., treatment-related pseudoscience). Moreover, this is the first study to combine individual differences measures (IIDD, e.g. personality traits, cognitive styles) with measures related to the information received about pseudoscientific claims: familiarity and disproving information (DI). Our results suggest that clustering pseudoscientific beliefs into supra-ordered categories is psychometrically valid and useful. These categories differ in several aspects, such as their familiarity, their average belief rating, or the predictors that explain the variability in these beliefs. Furthermore, our findings highlight the significance of having previously encountered DI, which affects pseudoscientific





claims' acceptance both by itself and, critically, by mediating IIDD's effects. The implications of our results at the social and educational level are discussed.

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12:00-1:00 pm (2326)

The Role of Self-Talk and Identity in Astrology Belief Change. WILLIAM LANGSTON and SAMAN KITTANI, *Middle Tennessee State University* – Many individuals believe that their astrological profile predicts their personality, making this belief a good candidate for belief change research. In this study there were two groups. The first read information that contradicted their position on astrology. The second group read the information and received a supposedly more accurate horoscope that was unflattering for believers or flattering for nonbelievers. We also measured personality variables that may predict participants' belief formation and belief updating. The novel feature of this design is its ability to examine willingness to either increase or decrease belief in the same study with parallel materials. We are especially focusing on the role of identity in preventing belief updating and the role of self-talk as a mechanism for belief maintenance for people whose beliefs are confronted strongly. The results will allow us to predict who will experience belief change.

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12:00-1:00 pm (2327)

The Time Difference Between Coherent Answers for Semantically Related Statements about COVID-19 Is Less than for Incoherent Answers. NIKITA LOGINOV and VLADIMIR SPIRIDONOV, *Russian Presidential Academy of National Economy and Public Administration (RANEPA)*, ARTUR AMMALAINEN, *SPBGU*, VARVARA VYAZOVKINA, VLADLEN ARDISLAMOV, and GRIGORIY ANUFRIEV, *Russian Presidential Academy of National Economy and Public Administration (RANEPA)* – A large amount of data was collected regarding the structure of mental models (in astronomy, biology, psychology, etc.). Mental models or their parts (beliefs) are usually understood as domain-specific representations of different phenomena. Common research using response time analysis includes demonstrating a set of statements that have to be evaluated as true or false. A stable experimental result is an increase of the response time to the statements that conflict with scientific and naive theories, in comparison to coherent statements. However, the researchers have only demonstrated the statements once, without taking into account the stability of the naive beliefs. The current research has tested the hypothesis of response time to be shorter for the coherent answers to semantically related statements in comparison to incoherent answers. Participants evaluated pairs of statements regarding COVID-19 in randomized order. The results from two series ($n_1=204$, $n_2=218$) of an online survey have confirmed this hypothesis. Thus, the revealed phenomenon has a certain stability, which clarifies the possible principles of the functioning of mental models. It makes the development of the research line important for the entire field.

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12:00-1:00 pm (2328)

Deterministic vs. Probabilistic: How People Understand the Absence of Predicted Effects. SANGHEE PARK and JES-SECAE K. MARSH, *Lehigh University* – An open question in causality research is how people represent what happens when a cause fails to produce its associated effect. Causal relationships can be seen as deterministic (A causes B means that whenever A occurs, B also occurs) or they can be seen as probabilistic (A causes B means the probability of B happening given A is higher than the probability of B not given A). We examined what default explanations people produce in four domains (biological, psychological, mechanical, and social), when a cause happens but it does not produce its effect some percentage of the time. Participants overwhelmingly made deterministic explanations in all domains. The most common explanation was introducing a preventive factor that prevented the cause from leading to the effect. Probabilistic explanations which argue that the effect just does not happen sometimes were produced the least often. People have a more deterministic causal view than probabilistic view, even when the causal relation is represented by probability. We discuss implications for people's understanding of causality.

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12:00-1:00 pm (2329)

Try, Try, Try Again—Repeated Attempts to Solve Word Fragments Induce Forgetting of Initial Wrong Answers. ZSOLT BEDA, HAENA KIM, JOSEPH M ORR, and STEVEN M. SMITH, *Texas A&M University* – Word fragment completion problems have been used to study fixation and incubation effects, phenomena of interest in the study of creative cognition. The relative simplicity of fragment completion makes it well-suited for imaging experiments on problem solving. In the present study participants first studied and practiced face-word pairs, the words being blockers (e.g., ANALOGY) corresponding to subsequent fragments (e.g., A _ L _ _ GY). A novel paradigm, the guess method, was used to elicit problem solving induced forgetting (PIF) with word fragments. Participants repeatedly guessed solutions to problems, and were allowed only a brief time to make (and later check the correctness of) their guesses, without time to think about problems. Over six solution attempts a gradual increase of correct solutions, and, concomitantly, a decrease of intrusions by blockers was observed. On a subsequent memory test participants had poorer memory for blocker words paired with word fragment problems, then baseline items. The findings add to the growing body of evidence about the role of retrieval inhibition of competition in problem solving tasks. Results of an imaging experiment using fMRI to examine neural correlates of PIF will also be reported.

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12:00-1:00 pm (2330)

Behavior Markers of Insight Solution. IGOR N. MAKAROV, *Yaroslavl State University*, ILYA Y. VLADIMIROV, *Institute of Psychology of Russian Academy of Sciences*, ANNA BUSHMANOVA, *Yaroslavl State University* – The work is dedicated to development of tools to research insight solution. Currently there are assumptions





which stages are included in insight solution—impasse, representational change (Ohlsson, 2011)—but they distinguished after the solution has happened (e.g., the impasse – by duration of pauses; Fedor et al., 2015). But ability to detect stages during the solution process could greatly help the investigation of underlying processes of insight. We think it is possible to find behavioral patterns for every stage of insight solution. To find patterns we selected (before conducting the research) several markers and counted their frequency during solution of insight and non-insights problems. Participants solved problems and their solutions were recorded. Afterwards, we highlighted behavior markers. We found that during insight solution the next markers that significantly more frequently happened were unblinking stare, raising eyebrows, face touch, and smile. It is possible that raising eyebrows and smile associated with the representational change and the rest with the impasse. Investigation about connection between these behavior patterns and solution stage will be done in the next studies. Supported by RFBR No. 20-013-00801.

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12:00-1:00 pm (2331)

How Cognitive Demand Influences the Incubation Effect Within Groups during an Idea Generation Task. QICHEN ZHAO and BEVERLY ROSKOS, *The University of Alabama* – Breaks provide a surprisingly boosting effect on creativity performance. Called the incubation effect, this boost attracts a lot of research interest. Much research focuses on the effect on individuals, but the current researchers are specifically interested in the effect in group settings, given the fact that creativity also is an important social activity in many aspects. To explore the underlying mechanism of the effect and the influence cognitive demand of the task during the break (i.e., interpolated task) on the effect, the current study employed groups (dyads) as participants and measured their creative task performance as a function of interpolated tasks with different cognitive demand levels: low demand, high demand, rest, and no incubation. An idea generation task, the instances task, was employed as the creativity task. We hypothesize that the cognitive demand of interpolated tasks will influence the magnitude of the group incubation effect. Specifically, we expect to see the incubation effect the most salient in low-demand condition due to the highest level of unconscious processing. This also will serve as evidence of the unconscious processing theory of the incubation effect.

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12:00-1:00 pm (2332)

Diagram Effects on Solution Strategy Choices for Probability Word Problem Solving. CHENMU XING, *Minot State University*, JAMES E. CORTER, *Teachers College, Columbia University*, DORIS ZAHNER, *Council for Aid to Education* – Diagrams are widely used as cognitive tools for mathematical reasoning and problem solving. Research has revealed that the structure of a diagrammatic representation can influence how people notice and interpret the underlying problem structure. The present study tested whether different diagram types steered people to notice different underlying problem structures for basic probability word problem solving.

Undergraduates were assigned to different diagram conditions to solve a probability word problem with multiple alternative solutions that highlight distinctive probability principles. The results revealed robust diagram effects on problem solvers' interpretation of problem structures in basic probability: participants tended to construct solution strategies that were aligned with the salient features expressed by the diagrams they saw. Diagram types also affected problem solving success, suggesting that not all diagrams are equally accessible for basic probability learners. The findings showed that the use of diagrams for math word problem solving tends to involve a structural mapping process and that diagrammatic representations should be carefully chosen based on the learning objectives and learner characteristics.

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12:00-1:00 pm (2333)

The Wikipedia Game: A Better Measure of Crystallized Intelligence? ZACHARY R. TIDLER, NIDHI PAI, ADAM SNOLL, AMIR HELMY, and RICHARD CATRAMBONE, *Georgia Institute of Technology* – In many mainstream intelligence tests, one's rote knowledge is a pivotal component of one's ultimate score. While this emphasis on knowledge is fitting and proper, there is room for innovation in the manner by which knowledge is measured. The present work aims to compare the utility of a game called The Wikipedia Game (WG) against extant measures of knowledge. The object of the WG is to navigate from an origin article to a target article quickly and efficiently using only Wikipedia hyperlinks. The WG has the potential to improve upon extant measures in two key ways. First, while extant measures tend to assess rote knowledge of a single topic (e.g., "Who is Louis Armstrong?"), the WG allows for an evaluation of the quality of one's network of knowledge (e.g., "What is the relationship between Louis Armstrong and Neil Armstrong?" A: "They both have stars on the Hollywood Walk of Fame"). Second, the items constituting extant measures tend to be fixed (i.e., the test loses integrity after one administration), whereas the WG has the potential to generate novel items at each administration while retaining reliability. Preliminary evidence of construct validity is presented.

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12:00-1:00 pm (2334)

Are Complex Verbal Tasks More Sensitive to Deficits of Mild Traumatic Brain Injury? ILEANA RATIU, ALEXANDRIA GREENE-WINEK, SANDY SIMON, HANNAH GROTH, and ARIANNA N. LACROIX, *Midwestern University* – Individuals who sustain a mild traumatic brain injury (mTBI) can suffer from deficits in higher order executive functions. These individuals typically perform well on most neuropsychological tests but often have difficulties with more complex or novel tasks, particularly when the tasks are linguistic or verbal. The current study examined performance on both simple and complex verbal and nonverbal tasks in individuals with and without a history of mTBI. Twenty-five participants with a history of mTBI and 26 neurotypical controls completed a battery of verbal and nonverbal simple and complex tasks. Significant group differences were not observed on the simple span measures





(verbal and nonverbal). However, significant group differences were observed on the novel, complex verbal tasks. Individuals with mTBI may make more errors than controls on more complex verbal tasks, suggesting these tasks may be more sensitive to subtle deficits experienced by those with mTBI.

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12:00-1:00 pm (2335)

A Case of Conjunction Bias in Rats Completing a Mental Imagery Task. VALERIA V. GONZALEZ, RAKHI RATANJEE, SOWGOL SADEGHI, and AARON P. BLAISDELL, *University of California, Los Angeles* – Prior research has shown that rats can use an associatively retrieved representation of an absent stimulus to guide action. We present an experiment that controls for a non-cognitive account of this behavior. During training, rats received A-, AX+, B+, and BY- trials, where A and B were sounds, X and Y were lights, and + and – indicate food and no food, respectively. At test, rats received A and B sounds on separate trials, with the light bulb on which X and Y had been presented during training either unoccluded and off or occluded. Rats behaved differently when the light was occluded versus unoccluded. Moreover, on occluded trials, rats acted as if they were certain the compound was present, suggesting a conjunction bias, in which the occurrence of the conjunction of the light and sound was judged as more probable than one element alone.

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12:00-1:00 pm (2336)

Effects of Prior Beliefs on Correlation-Causation Discrimination. AUDREY L. MICHAL, COLLEEN M. SEIFERT, and PRITI SHAH, *University of Michigan* – Causal error is the tendency to infer a single causal explanation from correlational data. We have previously shown that some correlational scenarios are more prone to causal error than others. Here, we tested another factor that could impact causal error: whether a finding is congruent or incongruent with prior beliefs. In a pretest, we measured participants' (N=93) level of agreement with 14 hypothetical findings. Of these, we chose the six scenarios with the strongest level of agreement and created brief media reports describing correlational findings for each scenario. Half of the scenarios were framed as belief-congruent and half were framed as belief-incongruent. Participants (N=99) were more likely to generate valid alternative explanations for belief-incongruent than belief-congruent scenarios. Correlational findings that are belief-incongruent are thus more likely to trigger analytical thinking and reduce causal error, suggesting that belief-congruency may be an effective instructional factor for discriminating between correlation and causation.

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12:00-1:00 pm (2337)

Analogical Reasoning Causes Forgetting of Superficially Related Associates. TIM GEORGE, *Union College*, and CHRISTINE CHESEBROUGH, *Drexel University* – Analogical reasoning involves extracting structural information while ignoring irrelevant

superficial information. This suggests the need to overcome retrieval competition from superficially related information during analogical thinking. Two experiments tested whether forgetting of previously learned superficial associates of word pairs would result from: 1) analogical reminding about word pairs and 2) analogical problem-solving. In Experiment 1, participants studied word pairs (flock-goose, rifle-bullet, etc.) followed by an analogical reminding task in which they were shown new pairs (army-soldier) that analogically matched some previous pairs but superficially matched others. For each new word pair, they were asked to report an analogically similar pair they had learned previously. A final recall test for all pairs indicated no forgetting of superficially related pairs vs. unrelated pairs. Experiment 2 replaced the reminding task with a problem solving task in which they had to complete an analogy (flock-goose : army-?). This time, selective forgetting of superficially related pairs was observed in the final recall test. These findings suggest a greater role of retrieval competition during analogical mapping than in analogical retrieval.

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12:00-1:00 pm (2338)

Withdrawn

12:00-1:00 pm (2339)

The Explication of Criteria of Insight Problem Solving. ALEXANDRA CHISTOPOLSKAYA and NATALIYA LAZAREVA, *P.G. Demidov Yaroslavl State University* – There are two research directions of insight: 1) based on a formally insight problems, 2) based on a self-reporting method after problem solving. But the solving of formally insight problems is not always subjectively assessed insightfully and the solution of formally non-insight problems, on the contrary, can be assessed insightfully. In this direction, there are many contradictions. The purpose of this study to elicit the insight perceptions of the solvers. We used J. Kelly's method of repertory grids. The subjects had to formulate scales for assessing various problems (five insight, three non-insight) and the subjective experience of solving them. They also had to classify the problems. As the main result, we identified such groups of criteria for problem assessment used by the subjects: 1) plot, 2) formal assessment, 3) difficulty, 4) evaluation of the solving process, 5) problem types, 6) sources of difficulty, and 7) emotions. The elements of plot and formal assessment are prevail before solving, and the emotions and the sources of difficulty – after solving. The subjects divide the problems into logical and mathematical, which is comparable to insight and non-insight problems. The work was supported by grant RSF No. 20-78-00048.

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12:00-1:00 pm (2340)

Argument Appraisal in Belief Bias and Motivated Reasoning. GIOVANNI QUARTARARO and VALERIE A. THOMPSON, *University of Saskatchewan* – Motivated reasoning and belief bias theories have seen little cross-talk or comparisons in their respective literatures. Motivated reasoning theories state that reasoning can be






goal-directed, and all future processing is allocated towards achieving an end goal or justifying a position. Theories of belief bias, on the other hand, allow for analytic thinking to discriminate between strong and weak arguments. Our goal was to investigate the interaction of argument strength, prior belief, and emotional content in argument evaluation over the course of three experiments (N=360). Participants completed questionnaires that involved reading conversation transcripts and ranking the strength of the evidence presented in the conversation, along with rating levels of belief and emotionality of content. We found that most participants were sensitive to the strength of the evidence presented in the conversations, indicating support for the belief bias theories interpretation of argument appraisal.

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12:00-1:00 pm (2341)

The Role of Language Variation in Emotion Memory.

NICOLE A. VARGAS FUENTES, JUDITH F. KROLL , and JULIO R. TORRES, *University of California, Irvine* – Emotional words are more likely to be recalled than neutral words. However, most past research has considered only the experience monolingual speakers. Studies that have examined the consequences of emotion for language and memory in bilingual speakers have shown that bilinguals reveal greater sensitivity to emotion in their native language, L1, than in the second language, L2. In the present study, we exploited the experience of Spanish-heritage bilinguals to ask whether the language of emotion is tied to their home language, Spanish, or to the more dominant societal language, English. We report data using a paradigm that examined carryover effects in memory that assessed the way that emotional words affect memory for adjacent neutral words (Schmidt & Schmidt, 2016). Initial results suggest that for bilinguals who have become dominant in the societal language, the emotion-memory effect is determined by language dominance rather than the language that was acquired first.

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12:00-1:00 pm (2342)

Linguistic Prediction Across the Lifespan. RACHEL A. RYSKIN and VERA NICOLETTE-SANCHEZ, *University of California, Merced* – Prediction of upcoming input based on preceding context appears ubiquitous in everyday language comprehension. Yet, prior work shows that indices of prediction (e.g., differences in ERPs to predictable vs. unpredictable words) are less robust in older (OA) than younger adults (YA). These age-related differences may reflect a reduced tendency to predict (e.g., if prediction relies on executive resources known to be diminished in OA) or a mismatch in the content of predictions due to different language experience. We collected sentence completion data from YA (ages 18-31, n=166) and OA (ages 50-77, n=171) native English speakers on MTurk. Contextual probabilities (% of people who provided a given continuation) were more correlated within than across age groups. Using half the data per age group to “norm” sentence completions (select predictable and unpredictable items) and the other half as the measure of prediction shows that effects in OA appear smaller than those of YA when data from

YA are used to generate norms, and, critically, prediction effects in YA appear smaller than in OA when data from OA are used to generate norms. Observed differences in prediction across the lifespan may be explained in part by language experience.

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12:00-1:00 pm (2343)

Is There a Foreign Accent Effect on Moral Judgment?

SUSANNE BROUWER, *Radboud University*, and ALICE FOU-CART, *Universidad Nebrija* – Recent studies have shown that people make more utilitarian decisions when dealing with a moral dilemma in a foreign language than in their native language. The role of emotion and cognitive load have been put forward as explanations for this so-called foreign language effect. The question that arises is whether a similar effect would be observed when processing a dilemma in one’s own language that is spoken by a foreign-accented speaker. Indeed, foreign-accented speech has been shown to modulate emotion processing and to disrupt processing fluency. We tested this by presenting 435 participants with two moral dilemmas, the Trolley dilemma and the Footbridge dilemma, online, either in a native accent or a foreign accent. In Experiment 1, 184 native Spanish speakers listened to the dilemmas in Spanish recorded by a native speaker or a British or African native speaker. In Experiment 2, 251 Dutch native speakers listened to the dilemmas in Dutch in their native accent or in a British, Turkish, or French accent. Results showed an increase in utilitarian decisions for the African and French accented-speech compared to the native accent. Possible explanations for this foreign accent effect are accent strength and comprehensibility.

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12:00-1:00 pm (2344)

Tamil Children’s Comprehension of Recursive Locatives and Relativized Sentences.

USHA LAKSHMANAN, *Southern Illinois University Carbondale* – The current research investigated Tamil children’s comprehension of recursive locatives and relativized sentences using a picture-cum-story and a sentence-picture matching task in order to determine whether the evidence supports a two-step acquisition path leading toward adultlike understanding of indirect-recursion (as observed for Child English, Japanese, and other languages) or whether the evidence supports early emergence of indirect recursion as has been recently reported for recursive-possessives in Child Tamil. The results indicated early emergence of indirect-recursion in locatives (<5 years), which may stem from the fact that Tamil requires relativization for embedding in locative phrases. As for the relativized sentences, children (< and > 5 years) performed similarly, sometimes interpreting them accurately and sometimes misinterpreting them as coordinatives. The children’s misinterpretations may be due to their having been garden-pathed because of the nonscrambled (SOV) word-order used. While further research involving relativized sentences with the scrambled OSV order is needed, the children’s success on recursive locatives, involving relativization, supports early emergence of indirect-recursion in relative clauses.

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12:00-1:00 pm (2345)

What Irony Reveals about a Speaker's Mental State: Impact of Timing and Context Emotion. VALERIA A. PFEIFER, SOPHIA R. MAYTORENA, and VICKY T. TZUYIN, *The University of Arizona* – What does irony tell us about the speaker's mental state? While some suggest that irony makes the speaker seem more positive, regardless of context emotion (Pfeifer & Lai, 2021), others suggest that irony mutes emotion (Dews & Winner, 1995). We asked if timing (when irony was used following an event) and context emotion matter. Sixty-five participants read 132 positive/negative vignettes, where a protagonist made an ironic/literal statement immediately following an event or with some delay. We found that timing matters for speaker arousal. Speakers who made a statement immediately following an event were rated as being more aroused than those who made a statement after a delay, regardless of context emotion. By contrast, for speaker valence, context emotion interacted with literality. In negative context, ironic speakers appeared more positive than literal speakers, but in positive context, the pattern reversed, such that ironic speakers appeared more negative than literal ones. These indicate that irony mutes emotion overall (i.e., less negative in negative context and less positive in positive context), regardless of timing. In conclusion, context emotion, not ironic statement timing, determines speaker mental state.

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12:00-1:00 pm (2346)

Effects of Social and Traditional Media on Sentence Comprehension. BENJAMIN SWETS, *Grand Valley State University*, DOMINIC BONANNI, *University of North Carolina at Greensboro*, JESSICA A. MALINOWSKI, *Grand Valley State University* – Despite the common sense notion that social media use has detrimental effects on cognitive function, there is little research to support that idea. This is particularly true of its effect on language processing. To investigate that relationship, we conducted a study in which participants answered a series of questions measuring social media usage and consumption of traditional written media (e.g., magazines and novels). Participants then read both a social media excerpt (presumably more linguistically superficial) and a newspaper excerpt (presumably fostering deeper language comprehension). After each reading, to measure depth of language comprehension, participants answered questions that occasionally contained semantic anomalies (e.g., “How many animals did Moses bring on the ark?”, which is anomalous because it was Noah who was on the ark). Preliminary results suggest that exposure to social media has no effect on anomaly detection. On the other hand, we find that participants with high exposure to traditional written media are more likely to detect semantic anomalies.

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12:00-1:00 pm (2347)

Comprehenders Reduce their Reliance on Subject-Verb Agreement when Interpreting a Less-Familiar Dialect. ZACHARY K. MAHER, JAN EDWARDS, and JARED NOVICK, *University of Maryland* – Grammatical variation is common throughout

languages, but little is known about how individuals adjust their interpretations based on the perceived grammar of their interlocutor. Since subject-verb agreement is a common area of dialect variation (“they were/was”), it is possible that comprehenders adjust their usage of the verb form to guide interpretation when listening to a less familiar dialect. Participants (n=100) who speak mainstream American English (MAE) read sentences like “The deer was warming themselves.” In MAE, the verb “was” favors a singular interpretation of “deer,” while the reflexive pronoun “themselves” favors a plural. Following each sentence, participants selected an image corresponding to either a singular or plural interpretation (one or multiple deer). Filler sentences, manipulated between-subjects, were associated with either a nonmainstream dialect of English (NMAE) or with MAE. When fillers were in NMAE, the less familiar dialect, participants were reliably more likely to select an image consistent with the reflexive rather than the verb, relative to when fillers were in MAE. This suggests a reduced reliance on subject-verb agreement cues when interpreting sentences in a grammatically uncertain context.

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12:00-1:00 pm (2348)

Recall of Ambiguous Homographs is Shaped by Context and Language Goals. MELISSA EVANS and SARAH BROWN-SCHMIDT, *Vanderbilt University* – The context a word is experienced in influences its interpretation and subsequent recall. In language production the relevant context includes the immediate physical context and also communication specific factors. Prior work biased interpretation of ambiguous homographs with a preceding cue word; when cue and homograph were presented in the same physical context, cueing and recall were enhanced (Tullis et al., 2013). Here we ask if communicative goals act as a type of context that enhance cueing and recall. Participants viewed a series of words superimposed on scenic images and for each word wrote a question or statement. Cues (e.g., river) preceded ambiguous homographs (e.g. bank) by three words. Image context and goal (statement or question) were manipulated so that for each cue-homograph pair, both, one, or neither context and goal were the same. Homograph interpretation did not differ by condition; recall was highest when context and goals were the same. Recall organization was affected by cue-homograph pairs: lag ± 3 transitions were the most common, suggesting word pairs interrupted contiguity. While production was not affected by goals or context, associations between semantic word pairs shaped recall.

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12:00-1:00 pm (2349)

Structural Priming in Question-Answer Dialogues. KATHERINE CHIA and MICHAEL P. KASCHAK, *Florida State University* – We explored whether speakers self-prime when responding to questions. Experimenters called restaurants and asked two questions. The first was about the timing of different menu options ((At) What time do you stop serving breakfast?), and the second was about the closing time of the restaurant ((At)What time do you close?). Participants were more likely to use a preposition in their responses





(At 7 vs. 7) when experimenters used a preposition in their question. However, the participants' use of a preposition (or not) in their first response did not prime the use of a preposition in their second response (i.e., no self-priming). We also reanalyzed data from a question-answer dialogue reported by Chia et al. (2019). Here, experimenters asked participants a series of questions about their daily routines (e.g., What time did you get up this morning?). We found evidence for self-priming. Taken together, our results suggest that self-priming effects can be observed in short dialogues, though the nature of the questions that are asked may affect whether self-priming is observed.

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12:00-1:00 pm (2350)

How Do Communal Common Ground and Category Nameability Affect Speech Production? NICOLE CALMA-RODDIN, *New York Institute of Technology*, RICHARD J. GERRIG and SUSAN E. BRENNAN, *Stony Brook University* – We investigated how communal common ground and how nameable referents are in a category may influence speech production. For instance, a speaker who is looking at pictures of the characters Superman and Spawn may refer to these pictures differently based on who their addressee is (e.g., a comic enthusiast vs. someone who is not knowledgeable about comics) and which image they are speaking about (e.g., because Superman is well-known, while Spawn is not as well-known). Pairs of participants completed a referential communication task using pairs of images that varied with regard to how nameable they were. Our goal was to examine to what extent speakers' own expertise, the match of expertise between a speaker and addressee, and the nameability of the images affected the way in which speakers referred to the image pairs (e.g., with respect to the use of names vs. descriptions, order of references to images, and reference initiation times).

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12:00-1:00 pm (2351)

But What Can I Do With It? Speakers Name Interactable Objects Earlier in Scene Descriptions. MADISON BARKER, GWENDOLYN REHRIG, and FERNANDA FERREIRA, *University of California, Davis* – Visual cognition research suggests that semantic, rather than perceptual, features guide visual attention during scene viewing tasks. The current study investigates whether semantic features also predict linearization decisions in language production when speakers describe real-world scenes—specifically, the order in which objects are mentioned. Our model's predictors include meaning (defined as informativeness or recognizability), as well as two specific object affordances, graspability (how easily an object can be picked up), and interactability (extent to which a person would interact with the object). These features were assessed at two scales: using ratings of small, contextualized patches, and with ratings of whole objects. Center distance and word frequency were also accounted for in the generalized linear model. Consistent with previous results, we observed that semantic features predict the ordering of objects, and that interactability specifically best captures

linearization decisions. These findings provide evidence for the role of object affordance information in language production.

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12:00-1:00 pm (2352)

The Use of Direct and Indirect Speech Across Psychological Distance. JIANAN LI, KATINKA DIJKSTRA, and ROLF A ZWAAN, *Erasmus University Rotterdam* – The current study investigated how psychological distance affects people's preference for direct and indirect speech in a narrative task. Participants were instructed to first watch a video and then retell what happened in the video to an imagined/anticipated listener. We manipulated social distance (Experiment 1), temporal distance (Experiment 2), and spatial distance (Experiment 3) between participants and the listener. We compared the proportions of direct speech in the narrations from psychologically proximal versus distal conditions. Experiments 1 and 2 showed that social and temporal proximity increased the rates of direct speech. Social and temporal distance, conversely, increased the rates of indirect speech. Experiment 3 did not yield a significant difference in the use of direct and indirect speech between spatially proximal and distal conditions. Taken together, our results indicate that different psychological dimensions might have discrepant effects on people's choices between these direct and indirect speech. Possible explanations for the discrepancy among different psychological distance dimensions are discussed.

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12:00-1:00 pm (2353)

Comparing Effects of Semantic Variables in Speeded Deadline and Standard Picture Naming. LEONIE F. LAMPE, SOLÈNE HAMEAU, and LYNDSEY NICKELS, *Macquarie University* – Effects of word-related semantic variables on picture naming have often shown inconsistencies across studies. One hypothesis is that this is because some previous studies used a speeded naming task, asking participants to prioritise naming speed over accuracy. This has been suggested to enhance effects of word characteristics due to disrupted cognitive control and resulting modulations of responsiveness to input. Effects of six semantic variables (number of semantic features, number of near semantic neighbours, intercorrelational density, semantic similarity, typicality, distinctiveness) were compared in speeded versus standard picture naming of 297 items by 83 participants. Analysis showed distinctiveness had significantly stronger effects in speeded naming for latency, while, for accuracy, number of semantic features had stronger effects in standard naming. These findings cannot be accounted for by increased responsiveness to input in speeded naming, and we discuss possible mechanisms. While some differences in effects of semantic variables across previous studies may have been caused by the specific naming task used, we suggest they are more likely due to differences in statistical power and in control of influential variables.

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12:00-1:00 pm (2354)

Can Sentence Generation Eliminate the Translation-Ambiguity Disadvantage? ANDREA TOVAR and NATASHA TOKOWICZ, *University of Pittsburgh* – When learning a new language, one challenge that individuals face is learning translation-ambiguous words, or words that have more than one translation (Tokowicz, 2014). For example, the Dutch word “jas” has two English translations: coat and jacket. Translation-ambiguous words are processed more slowly and less accurately than translation-unambiguous words (i.e., words with a single translation; Degani & Tokowicz, 2010). This is known as the translation-ambiguity disadvantage. Translation-ambiguous words are prevalent across languages (between 24%-55%; Tokowicz, 2014). We attempt to diminish the translation-ambiguity disadvantage using sentence generation. We compared a generation group to a yoked reading group. Native English speakers with no prior exposure to Dutch were taught novel Dutch words. In a translation recognition task, participants identified if the Dutch-English pairs were translations. Accuracy results indicated a translation-ambiguity advantage in both groups; the advantage was twice as big in the generation group. This suggests that sentence generation is not only helpful in diminishing the translation-ambiguity advantage, but completely reversing it.

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12:00-1:00 pm (2355)

COVIDisgust: Language Processing at the Intersection of COVID-19, Politics, and Individual Differences. VERANIKA PUHACHEUSKAYA and JUHANI JÄRVIKIVI, *University of Alberta* – In a series of studies, we investigated the effect of the COVID-19 pandemic on single word processing. After being exposed to news headlines either portraying COVID-19 as a serious disease or downplaying it, the participants rated single words for valence and disgust (Experiment 1; N=83) or made a lexical decision (Experiment 2; N=86). The headline type affected both behavioral measures and interacted with the listener’s disgust sensitivity and political ideology. Reminding low disgust-prone participants about the severity of COVID-19 made them give exaggerated disgust ratings: lower for low disgust words and higher for high disgust words. Further, we found tentative evidence that the politicization of the COVID-19 pandemic might have overridden the stronger conservative instinct to avoid pathogens found in prior research. In our study, liberals, but not conservatives, were more disgusted by the headlines discounting the threat of COVID-19 rather than those highlighting it, resulting in exaggerated disgust and valence ratings. The results suggest that the media’s stance on the pandemic and the framing of the issue by major politicians may affect the public response by increasing or decreasing our disgust levels.

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12:00-1:00 pm (2356)

Do Listeners Care About the Speaker or the Input? Evidence from Structural Priming. DOUGLAS GETTY and SCOTT H. FRAUNDORF, *University of Pittsburgh* – Past findings suggest that the representation of non-native (NN) speech may be

underspecified relative to native (Nat) speech during comprehension. This could occur for two main reasons: rational expectation for reduced speaker proficiency or resource-driven adaptation to noisy speech input. To probe these explanations, we examined structural processing of Nat and NN speech. In Experiment 1, we show that participants exposed to NN speech first show reduced priming in both the NN and Nat blocks, while those exposed to Nat speech first show increased priming in both blocks. In a pre-registered Experiment 2, we replicate the same pattern of results, despite each participant only being exposed to a single speaker type in both blocks. This suggests the Experiment 1 results are not a speaker carry-over effect but are an interaction between participants’ allocation of processing resources and accent adaptation. In Experiment 3, we show that a less proficient NN speaker elicits more priming than a more proficient NN speaker, inconsistent with the rational expectation explanation. We suggest that listeners’ comprehension of NN speech reflects contextually optimized processing strategies rather than global reliance on speaker information when processing NN speech.

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12:00-1:00 pm (2357)

Revisiting Working Memory’s Impact on Syntactic Ambiguity Resolution. BEVERLY T. COTTER and FERNANDA FERREIRA, *University of California, Davis* – Working memory (WM) capacity has been shown to influence how readers make decisions about syntactic ambiguity. In the present study, we conducted a conceptual replication of Swets et al. (2007) across three samples (L1 English monolinguals, N=115; L1-L2 Spanish-English bilinguals, N=105; and L1-L2 Mandarin-English bilinguals, N=118) to further investigate this relationship and answer questions related to language experience. Participants completed two WM span tasks (reading span and spatial span), an offline attachment task, and Language History Questionnaire 3.0. Consistent with the 2007 results, structural equation modeling (SEM) analyses demonstrated that low WM span is associated with a preference to attach ambiguous RCs higher in the syntactic structure (counterintuitive to recency strategies). Additionally, as expected, we found cross-linguistic differences in RC attachment decisions across our three samples. In contrast, language experience did not appear to influence attachment preferences, consistent with recent work on heritage bilinguals. Overall, this research highlights the importance of further studying WM’s impact on language processing and syntactic ambiguity resolution among different language groups.

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12:00-1:00 pm (2358)

Statistical Learning of Second-Order Transitional Probabilities in Humans. LAURA LAZARTIGUES, FABIEN MATHY, and FRÉDÉRIC LAVIGNE, *Université Côte d’Azur* – The order of stimuli within sequences and the transitional probabilities (TPs) these orders generate are central information in language acquisition, but less is known about how this type of information is extracted by general learning mechanisms. The present study focused on the statistical learning of second-order TPs (i.e., only the combination of





two stimuli allowing to predict the third) of visual sequences. Eight three-item sequences exclusively governed by second-order TPs were presented. The response times were measured with oculometry. The task included a learning phase and a switch phase which reset the second-order TPs (e.g., the sequences ABC and BAF became respectively ABF and BAC). Results indicated a sole decrease of RTs between the second and the third stimulus and an increase of RTs during the switch phase that suggested the learnability of second-order TPs. We discuss this result in light of language acquisition.

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12:00-1:00 pm (1245)

Are You Beeping Kidding Me? Questioning How Profanity Is Censored. KAYLA Y. TSUTSUSE, JAY S. STOUT, and SCOTT C. SINNETT, *University of Hawai'i at Mānoa* – Commonly, the 1000 Hz tone is used to censor profane or inappropriate language from public broadcasts (Bustillos, 2013). Previous studies found decreased perceptions of offensiveness towards programs incorporating the tone as a censor (Kremar & Sohn, 2004). Other studies report that individuals with perfect pitch recognize and associate the 1000 Hz tone as the censor sound used in media (Van Hedger et al., 2016). However, further investigation of the beep and profanity is needed to see if individuals perceptually interchange the tone and censored words, arguably nullifying the intended effect of the beep. The current study utilizes a lexical decision task to determine if participants respond faster to profane words that are primed with a censor sound or with other words. It is hypothesized that participants will be faster at identifying profane words when primed by the beep if a symbolic association exists between the two.

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12:00-1:00 pm (2359)

Feasibility of Remote Performance Assessment Using the Free Research Executive Evaluation Test Battery in Adolescents. ISIS A. SEGURA and SABINE S. POMPEIA, *Universidade Federal de São Paulo* – Preventive measures to curb the spread of COVID-19 and consequential social distancing limit face-to-face cognitive assessment. Remote testing is an alternative, but to be implemented it must be comparable to in-person assessment. Our aim was to evaluate the suitability of online administration of an open-access battery of executive function tests that is adaptable so it potentially can be used in diverse populations worldwide. Forty-eight 9- to 15-year-olds (21 girls) were tested online, and their performance was compared to other 48 individuals tested in-person who were matched in terms of age, pubertal status, sex, and parental schooling. The battery consists of two tests of each executive domain: updating, inhibition, and switching. Answers were vocal and self-paced, and the examiner recorded accuracy and time taken to complete tasks in person or online at very low costs (only free software was involved). Executive performance (e.g., executive costs, discounting time for vocal/psychomotor responses) did not differ between online and in-person participants. This lack of difference indicates that the battery holds

promise for online cognitive assessment, pending confirmation with different samples and further validation studies.

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12:00-1:00 pm (2360)

Metaphors about the COVID-19 pandemic. JUANA PARK, TALA AL OTAIBI, HESSA ALRAQBANI, and FARAH ALMOHAMMED, *American University of Sharjah* – Metaphors are figures of speech that describe something using words whose literal definitions are not related to the intended meanings (e.g., My husband is a gem). We investigated the type of metaphors that people use to describe the COVID-19 pandemic (e.g., This pandemic is a hell) and its relationship with their mental health. We expect people who agree with metaphors rating high in helplessness (e.g., This pandemic is a prison) to show more signs of anxiety and depression, compared to people who agree with metaphors rating low in helplessness (e.g., This pandemic is a blessing in disguise).

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12:00-1:00 pm (2361)

Withdrawn

12:00-1:00 pm (2362)

Learning in Two Languages: The influence of Code-Switching on Vocabulary Learning in Adult Second-Language Learners. MACKENSIE BLAIR and GIOVANNA MORINI, *University of Delaware* – In many foreign-language classrooms, both the native and the second-language (L2) are used in instruction, often by intermixing languages within the same sentences. This is referred to as code-switching (CS). Little is known about the impact of CS on L2 learning, particularly when it comes to vocabulary acquisition. The present study addresses this question by testing college-aged students in a U.S. institution acquiring Spanish as their L2. Using a within-subjects design, participants (n=40) were taught novel word-object pairings in sentences with and without CS. They were asked to identify the objects shortly after training and returned 1-3 days later to repeat testing. These sessions examined immediate learning and retention, respectively. The data suggests that CS is more beneficial for word learning and retention than teaching in the L2 alone. This work has important implications for theories of second-language acquisition and for instruction practices in L2 classrooms.

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12:00-1:00 pm (2363)

Withdrawn

12:00-1:00 pm (2364)

Where Word and World Meet: Intuitive Correspondence Between Visual and Linguistic Symmetry. ALON HAFRI, *Johns Hopkins University*, LILA R. GLEITMAN, *University of Pennsylvania*, BARBARA LANDAU, *Johns Hopkins University*, JOHN C. TRUESWELL, *University of Pennsylvania* – Symmetry





is ubiquitous in nature; in logic and mathematics; and in perception, language, and thought. Although humans are exquisitely sensitive to visual symmetry (e.g., of a butterfly), symmetry goes beyond visuospatial properties: Many words refer to abstract symmetrical concepts (e.g., equal, marry). This raises a question: Do representations of symmetry correspond across language and vision? We addressed this with a crossmodal matching paradigm. On each trial, adult subjects viewed a visual stimulus (symmetrical or nonsymmetrical) and had to choose between a symmetrical and nonsymmetrical English predicate unrelated to the stimulus (e.g., “negotiate” vs. “propose”). In Study 1 with visual events (symmetrical collision or asymmetrical launch), subjects reliably chose the predicate matching the event’s symmetry. Study 2 showed that this matching generalized to static objects and was weakened when the symmetry was a property of a single object rather than of a binary relation between two objects. Our results support the existence of an abstract relational concept of symmetry which humans access via both perception and language. More broadly, this work illuminates the rich, structured nature of the language-cognition interface.

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12:00-1:00 pm (2365)

Task Demands Constrain Body-Object Interaction Effects: Evidence from N400s and Response Latencies. HAMAD AL-AZARY, *Lawrence Technological University*, KEN MCRAE, *The University of Western Ontario* – In embodied theories of semantics, it is argued that concepts are represented in sensorimotor systems. Consistent with this position, words denoting referents that are easy to physically interact with, such as “bicycle,” are typically processed faster than words denoting referents that are difficult to interact with, such as “butterfly,” a finding known as the body-object interaction (BOI) effect. Here, we explored the boundary conditions and time course of the BOI effect by using the same stimulus list in two semantic tasks while measuring N400s and response latencies. In a touchable/untouchable task, low-BOI words (e.g., butterfly) elicited larger N400s than high-BOI words (e.g., bicycle), but there was no difference in response latencies. Conversely, in a concrete/abstract task, high and low-BOI words evoked similar N400s, but response latencies were shorter for high-BOI than low-BOI words. These results suggest the influence of BOI is task dependent, raising questions about its generalizability.

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12:00-1:00 pm (2366)

Withdrawn

12:00-1:00 pm (2367)

Effects of Gaming Experience on Ambiguous Word Interpretation. RACHEL B. ELIGIO and MICHAEL P. KASCHAK, *Florida State University* – We examined how exposure to one sense of an ambiguous word during sentence reading affected subsequent interpretations of that word. Video gamers and nongamers read sentences containing ambiguous words that were disambiguated toward

a gaming-related meaning (e.g., camp). Participants then completed a word association task that included the gaming-related words. Gamers produced more gaming-related meanings for the ambiguous words than nongamers. The tendency to produce gaming-related meanings was greater for gamers who had been playing video games for longer periods of time, and who reported using gaming-related slang. The effect size associated with the contrast between gamers and nongamers was similar in this study and in an earlier word association task involving gaming-related terms (Eligio & Kaschak, 2020), suggesting that the single exposure to a gaming-related meaning in this experiment may not have greatly affected the odds of a participant producing a gaming-related meaning in the word association task.

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12:00-1:00 pm (2368)

Modeling Distributional Structure and Retrieval Processes in Semantic Retrieval Tasks. ABHILASHA ASHOK KUMAR and DAVID A. BALOTA, *Washington University in St. Louis* – We evaluated the extent to which state-of-the-art distributional semantic models (DSMs) combined with computational algorithmic/process models account for performance in two familiarity-based tasks (relatedness and similarity judgments) and two production-based tasks (free association and sentence completion). While a process-based model based on the spreading activation mechanism successfully accounted for relatedness/similarity judgments, an interactive model based on word frequency and semantic similarity, combined with a competitor function best accounted for free association responses. Additionally, we provide the first computational account of secondary free associations via a chaining-based model. In predicting Cloze sentence completion performance, a contextual “attention”-based DSM outperformed other models, but showed limited commonsense inference capabilities and did not adequately mirror modal human responses. Collectively, there was little evidence for a task-independent model of semantic memory retrieval or representation, underscoring the importance of coupling retrieval mechanisms with representational formats in accounting for semantic memory-based task performance.

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12:00-1:00 pm (2369)

Examining Verbs in Symbolic and Embodied Language Processing. JOHN HOLLANDER and ANDREW M. OLNEY, *University of Memphis* – Investigations into how people derive meaning from language have spawned two families of theory: symbolic (i.e., statistical, amodal), and embodied (i.e., perceptual, modal). These may be thought of as incompatible, but recent research suggests that these theories describe two systems that may be integrated and interdependent. Such integrated theories have been empirically supported by laboratory experiments which typically employ nouns and adjectives as stimuli for various semantic judgment tasks, but verbs are conspicuously neglected in the literature. We adapted an integrated language processing task and manipulation to include up-down motion verbs as stimuli. Participants were presented with





a moving cue either before or after a verb and were asked to judge the congruency between the word meanings and the cue movements. Participants were significantly faster to respond when the word and movement were congruent, and when the words were presented before the movement cue. Mixed models show that reaction times were predicted by both language statistics (via the 1T 5-gram corpus) and subjective ratings of word-motion correspondence. These results represent a successful extension of symbolic-embodied findings which includes verbs.

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12:00-1:00 pm (2370)

Factors Predicting the Metaphoricity of Compound Words. KEVIN J. HOLMES, MAYA STAR-LACK, and NAN L. ELPERS, *Reed College*, STEPHEN J. FLUSBERG, *Purchase College SUNY*, PAUL H. THIBODEAU, *Oberlin College* – Many compound words are used metaphorically, like when we call someone a spitfire or a busybody. Across two studies, we identified properties of compound words that predict their metaphoricity. In Study 1, we collected metaphoricity ratings for 805 English compounds and obtained measures of the semantic transparency and relatedness of the compounds and their constituent morphemes from the Large Database of English Compounds (Gagné et al., 2019). More metaphorical compounds were less likely to retain the literal meanings of their constituents or to have a noun as their first constituent, among several other properties. In Study 2, we used these properties to predict the metaphoricity of 245 additional compounds and found that predicted metaphoricity aligned closely with human-judged metaphoricity. In both studies, the meanings of the most metaphorical compounds were less predictable from noun constituents than constituents from other word classes—suggesting that nouns change their meanings when used in compounds, unlike in metaphoric sentences (e.g., *The bell suffered*; King & Gentner, 2019). Our findings point to possible differences in the processing of lexical and sentential metaphors.

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12:00-1:00 pm (2371)

Context Availability and Sentence Availability Ratings for 3,000 English Words and their Association with Lexical Processing. ELLEN TAYLOR, *University of Oxford*, KATE NATION, *University of Oxford*, YALING HSIAO, *University of Oxford* – Context availability is an important predictor of lexical processing, yet the norms available for this variable are limited. Here, participants rated 3,000 words for context availability and sentence availability, a new measure designed to capture information relating to textual variation. Both types of availability were investigated alongside other word-level characteristics to explore lexical-semantic space. Analyses demonstrated that context availability and sentence availability are distinct. Context availability covaries with concreteness and imageability, while sentence availability captures information relating to contextual variation, frequency and ambiguity. Both context availability and sentence availability captured unique variance in lexical decision (using data from the British Lexicon Project and

English Lexicon Project) with high availability words showing faster decision times.

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12:00-1:00 pm (2372)

Automatic Processing of Feature-Listing Data. NICK REID and ALBERT N. KATZ, *Western University* – Feature-listing tasks provide a rich source of data on how people conceptualize words, categories, and metaphors. However, scoring these data is costly and time-consuming and involves subjective judgments from the researcher. To save researchers time and improve consistency of scoring across labs, we developed a Python program to automate the analysis. The program uses tools from natural language processing to tokenize the words in participants' responses, remove suffixes from these words (i.e., stemming), and remove high-frequency words that hold little semantic content (i.e., stop words). The program also includes multiple analysis options, such as several alternatives for suffix removal (e.g., Snowball stemming, lemmatization), automatic spellchecking, and commands for calculating cosine similarity and interpretive diversity. In our analyses, we show that data extracted by this processor generally align with previous feature-listing studies in which data are scored manually, and that features extracted for metaphor cues replicate major findings from the metaphor literature.

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12:00-1:00 pm (2500)

Withdrawn

12:00-1:00 pm (2501)

Withdrawn

12:00-1:00 pm (2373)

Bridging Disruptive Memory Paradigms: The Part-List Cuing Impairment and the Collaborative Inhibition Effect. NICHOLAS W. PEPE and SUPARNA RAJARAM, *Stony Brook University* – Two counterintuitive phenomena—both related to retrieval cues—occur during collaborative recall and individual recall. In collaborative recall, people work together to recall studied information where one group member's recall can serve as cues for the other members. In part-list cued recall, people work alone to recall studied information where the experimenter provides some studied items as cues to “assist” the recall of noncued items. However, both procedures disrupt memory—the “cues” hurt recall of the noncued items compared to when there are no cues (free recall). This project evaluates the typical features of collaborative and part-list cued recall procedures to identify the sources of disruption in each. We used the part-list cue paradigm to compare these features, namely, order of cue delivery (all at once or intermittent throughout recall) and modality of cue presentation (visual or auditory). All four part-list cuing conditions impaired recall. The cue modality did not modulate the impairment but cues presented all at once produced a significantly larger impairment than those presented intermittently. We discuss the





implications for the nature of disruption in collaborative versus individual recall.

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12:00-1:00 pm (2374)

Collective Memory for U.S. Cities: A Striking Stability in Recall Through a Period of Upheaval. SUPARNA RAJARAM, GARRETT D. GREELEY, TORI PEÑA, NICHOLAS W. PEPE, and HAE-YOON CHOI, *Stony Brook University* – Memory is sensitive to context. A large and diverse literature has investigated how context shapes memory at different levels, from classrooms to culture. Less is known, however, about how highly dynamic contexts shape and reshape long-standing collective memory. In this study, we compiled and analyzed data from five studies conducted over a period of 10 years (2011 to 2021; $N=713$). Across studies, as part of a distractor task within experiments, Stony Brook University undergraduates were asked to recall as many U.S. cities as possible, in any order, within 7 minutes. We found that collective memory for cities remained largely stable through time, even as prominent events involving cities dominated news cycles during the last 1.5 years. Not only did certain cities remain popular (or unpopular), they were also recalled in similar output positions across time. These results suggest that collective memory for concrete, semantic content such as cities is robust and may be insensitive to dynamic historic contexts in lived times. We consider several factors that may contextualize the stability of such collective memory.

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12:00-1:00 pm (2375)

Exploring the Limits of Production in Elementary-Age Children. STACY LIPOWSKI, HANNAH TAMELING, and CAITIE BROOK, *Highpoint University*, MARY PYC, ANGELA M CANDA, *John Carroll University* – Research has consistently shown that memory is better for items that are studied aloud than items that are studied silently (the production effect; MacLeod et al., 2010). Although research with undergraduates demonstrates the benefit of production extends to items that are written (though typically to a lesser extent than verbal production), the effect of written production has not been examined in children. Thus, the goal of the current study was to examine whether or not written production leads to a benefit in first-, third-, and fifth-graders' memory—and to replicate the basic production effect (better memory for items studied aloud than silently) in this age group. Children studied 15 images of one-syllable words in one of the three conditions: look (silent), say, or write. After a 3-minute distractor task, they completed a free recall test. Findings regarding the developmental trends of the production effect (verbal and written) will be discussed.

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12:00-1:00 pm (2376)

Are Emojis Processed Visuospatially or Verbally? Evidence for Dual Codes. BRADY R. ROBERTS, LAUREN A. HOMANN, SARA AHMED, and MYRA A. FERNANDES, *University of*

Waterloo – Emojis have undoubtedly become a pervasive aspect of modern communication in digital mediums. Some argue that emojis are languagelike, while others claim emojis lack essential linguistic traits and are instead ideograms. Currently, it remains uncertain whether emojis rely on verbal or visuospatial processing. To address this gap, we used a divided-attention technique to infer similarities and differences in how words and emojis are cognitively represented. We compared the magnitude of interference (decline in memory accuracy) when participants freely recalled a list of target words or emojis under dual-task conditions during retrieval. Recall of words and emojis were similarly disrupted when the concurrent task required processing of words. When the concurrent task involved visuospatial processing, recall of words was unaffected while, importantly, recall of emojis was hampered. Our results suggest that memory for emojis relies on both visuospatial and verbal-based processing, whereas memory for words primarily relies on the latter.

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12:00-1:00 pm (2377)

Agency Enhances Temporal Order Memory in an Interactive Exploration Game. TROY M. HOUSER, *Temple University*, ALEXA L. TOMPARTY, *University of Pennsylvania*, VISHNU P. MURTY, *Temple University* – Agency has been shown to facilitate episodic memory. However, most paradigms use simple list learning tasks precluding tests of associative memory, such as item-context binding and temporal chaining. Here, participants completed a behavioral study that characterizes agency's influences on memory. We delineate agentive from non-agentive participants by 1) allowing agentive participants to play an online text-based game meant to simulate free exploration through a series of rooms, each equipped with random items, and 2) yoking each agentive participant's trajectory to passive partners that must follow the same trajectory. To assess memory differences, we gathered measures along three dimensions: item descriptions, spatial location, and temporal order. We found that temporal order memory was enhanced in the agentive group over the non-agentive group ($n=120$, $p<0.001$), while memory for spatial location and item description did not differ between groups. These findings support a model of self-directed learning, in which agency sequentially binds information into a coherent narrative.

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12:00-1:00 pm (2378)

Reminders Cause Interference in Memory for Related Trivia Facts. JONATHAN G. TULLIS, *The University of Arizona* – Encoding new information often causes us to retrieve related memories. Reminders, retrievals of specific past episodes that are prompted by encoding new related stimuli, can allow us to efficiently use prior knowledge in novel situations. Reminders can retroactively boost memory for earlier words when studying later related words (e.g., Tullis, Benjamin, & Ross, 2014) and proactively benefit memory for later words when learners notice and recall relations between items (e.g., Wahlheim & Jacoby, 2013). Here, I tested how reminders influence memory for individual facts within related trivia pairs. Learners studied a list of trivia facts one at a time that





included related and unrelated pairs of facts. With no instructions to recall earlier related facts during study, memory for related facts suffered compared to unrelated facts. With instructions to recall earlier related facts during study, memory for earlier facts improved but memory for later related facts suffered. The results show that reminders can cause interference and confusions among answers to related trivia facts. Reminders may not prompt integration of cognitive representations across two related items, as suggested by some theories of reminding.


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12:00-1:00 pm (2379)

Category Typicality Alters the Effect of Animacy on Paired-Associates Recall. MICHAEL J. SERRA and CARLEE M DEYOUNG, *Texas Tech University* – People are more likely to remember animate (i.e., living) things than inanimate (i.e., nonliving) things on free-recall and recognition tests. The effect of animacy on paired-associates recall, however, is inconsistent: some studies have found an advantage for animate-animate pairs over inanimate-inanimate pairs, some an advantage for inanimate-inanimate pairs over both animate-animate pairs and mixed pairs, and others have found no difference. In the present experiments, we used a common exemplar from various animate and inanimate categories as the stimulus word of each animate-animate and inanimate-inanimate pair. We varied the category typicality (common, uncommon, unrelated) of the response words. Participants recalled more inanimate than animate pairs with a common categorical response (e.g., drum-guitar), recalled more animate than inanimate pairs with an uncommon categorical response (e.g., drum-banjo), and did not differ in the recall of animate and inanimate pairs with a categorically unrelated response (e.g., drum-bus). These results suggest that aspects of the word pairs such as relatedness, category typicality, and feature overlap can alter whether animacy aids, impairs, or does not affect paired-associates recall.

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12:00-1:00 pm (2380)


How Social Is Social Memory? Isolating the Disruptive Influences of Social Versus Nonsocial Cues on Recall. TORI PEÑA , NICHOLAS W. PEPE, and SUPARNA RAJARAM, *Stony Brook University* – It is intuitive to think that retrieval cues aid recall but, surprisingly, cues also disrupt recall. This counterintuitive disruption occurs regardless of whether the cues come from a social or a nonsocial source. However, we do not know whether this disruptive effect on recall differs across social versus nonsocial sources of the cues. To address this question, we developed a novel methodology to compare memory disruption effects between social (the collaborative recall paradigm) versus nonsocial cues (the part-list cuing paradigm). We modified the part-list cue condition and aligned it with the collaborative recall procedure in all respects except the source (e.g., matched cue words and their presentation sequence). We also devised a group-level computational index for the recall of part-list cuing participants who were yoked to the collaborative groups. Experiment 1 replicated both the collaborative inhibition and the part-list cuing

effects and—novel to the hypothesis—revealed that the collaborative groups recalled significantly more than their part-list cuing counterparts. Experiment 2 replicated these findings. Cross-cueing during collaborative recall emerged as a key mechanism for the advantage of social cues.

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12:00-1:00 pm (2381)

How Long Can You Remember? Temporal Trends of Delayed Recall in Low- and High-Performing Children.

NIDHI SINHA , *Indian Institute of Technology Hyderabad*, PRATIBHA KUMARI, *Magadh University* – Delayed recall (DR) is one of the significant aspects of our everyday life. Even children engage in DR as much as their adult counterparts, if not more, as most of their learning assessment requires them to perform tasks involving DR. In this repeated-measures study, children (formerly categorized into low-performing group [LPG] and high-performing group [HPG] using a standardized intelligence scale) performed a novel visual paired-associate task and a story recall task (SRT) in three sessions (blocks-delay, 1-week delay, and 1-month delay). Children were also allowed to seek cues in situations where they felt the need to seek one. A split-plot ANOVA analysis indicated that LPG overall performed poorly than HPG. However, after a considerable amount of time had elapsed (1-month), both LPG and HPG performed equally worse with more error rates, longer RTs, and seeking more cues than the first and second sessions, with a peak rise in cue-seeking and RTs. Additionally, a longer block completion time of the SRT also suggested that there exist group differences even at the level of encoding/decoding; and thus, educational programs should incorporate strategies that improve recall skills among children with learning or memory disabilities.

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12:00-1:00 pm (2382)

Accumulative Process Model of Human Memory Recall.

SATORU NISHIYAMA and SATORU SAITO, *Kyoto University* – Memory recall is one of the most common human behaviours in everyday life. However, memory research has not captured an essential characteristic of recall processes: the accumulative nature of memory activation. To facilitate the understanding of memory recall, we measured recall latency from oral recall data in two think/no-think experiments in which participants first learned a set of cue-target word pairs, then retrieved (think) or stopped retrieving (no-think) some targets repeatedly, and finally recalled all targets in response to cue presentations. Consistent with the accumulative process model of human memory recall, more items were recalled as a function of time elapsed across the conditions. Moreover, fitting the shifted Wald distribution (SWD) to the recall latency data revealed that memory enhancement and impairment by repeated think and no-think attempts were differently associated with three parameters of the SWD, alpha, theta, and gamma, which can represent major factors that determine memory performance (i.e., inhibition, interference, and association strength, respectively). The findings as well as





a novel chronometric methodology promote further understanding of human memory.

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12:00-1:00 pm (2383)

The Impact of Music and Exercise on Learning and Memory. REBECCA BRIGGS, W. MATTHEW COLLINS, STEPHANIE D. WALKER, JADALEE EYMA, QUINN M. TOMPKINS, ERIN GOONAN, and ALEXIS B. TOLA, *Nova Southeastern University* – Research has demonstrated the benefits of moderate aerobic exercise on cognitive function (Coles & Tomporowski, 2008; Skriver et al., 2014). One explanation for why exercise improves cognition is arousal. Davey (1973) saw exercise as a stressor which would induce increases in arousal as intensity rose and moderate intensity exercise would induce a level of arousal related to optimal cognitive performance relative to high and low intensity activity. The present study compared the arousal effects of music and exercise on cognitive abilities. In the study, participants were placed in one of four conditions: listen to arousing music for 6 minutes; listen to arousing music for 20 minutes; run on a treadmill for 6 minutes; or run on a treadmill for 20 minutes. Participants' level of arousal was assessed before and after completing their condition. Following each condition, participants performed a paired-associates learning (PAL) task. In the task, participants were presented with 40 word pairs to learn and later recall. Our results compare learning rate on the PAL task and long-term recall between the four conditions.

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12:00-1:00 pm (2384)

How Participant Sex and Stimulus Selection Influence Memory Biases Toward High-Calorie Food Images. BENJAMIN M. SEITZ, *University of California, Los Angeles*, JOSEFA EQUITA, *Dartmouth College*, JOON SOO KIM, A. JANET TOMIYAMA, and AARON BLAISDELL, *University of California, Los Angeles* – It is unclear if, and to what extent, the human memory system is biased toward food and food-relevant stimuli. Drawing upon existing demonstrations of attentional biases to high-calorie food images, and findings that evolutionarily relevant stimuli are preferentially remembered, we hypothesized that images of high-calorie foods would be better remembered than images of either low-calorie foods or of nonfood items. We tested this in three preregistered studies using a variety of subject pools (e.g., UCLA undergrads, MTurk, and Prolific). We find no evidence of a general memory bias for high-calorie food images relative to low-calorie food or nonfood images, but do find that females are better at remembering high-calorie and low-calorie food images relative to males. We explore several factors (e.g., dietary restraint, food skills, selective pressures) that might explain this sex difference and the importance of stringent stimulus selection procedures in exploring categorical biases in memory.

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12:00-1:00 pm (2385)

Saved But Not Forgotten? Comparing the Effects of Instructions to Offload versus to Forget. XINYI LU, MEGAN O. KELLY, and EVAN F. RISKO, *University of Waterloo* – When we can rely on an external memory store to retrieve information, our ability to recall from internal memory in the absence of that external store is often diminished. The mechanism behind this memory cost has been proposed to be the reduction of top-down efforts during encoding, which has also been proposed to be driving the directed forgetting effect. In the present investigation, we directly compared the effect of offloading instructions (that some words would be saved, and therefore available during test, and some words would not) with the effect of directed forgetting instructions (that some words were to be forgotten and some words were to be remembered for the test). When participants studied uncategorized word lists, offloading (vs. no-offloading) and directed forgetting (vs. remember) instructions led to a similar sized cost to performance; however, with semantically categorized word lists, offloading instructions led to a smaller memory cost than forgetting instructions. We propose that the opportunity to rely on an external store (that is, to offload) may serve as a weaker directive to “forget” information, whether through reduced top-down efforts or otherwise, that would otherwise be remembered.

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12:00-1:00 pm (2386)

The Attentional Boost Effect Increases Inaccurate Responses to General Knowledge Questions. MATTHEW W. PRULL, KALLI DICKEY, BLANCA JARAMILLO, and KELLY KRONEMEYER, *Whitman College* – Encoding-phase detection of targets in a divided attention procedure counterintuitively enhances recall and recognition of copresented words, a phenomenon known as the attentional boost effect (ABE). We asked whether the ABE extends beyond episodic memory to influence semantic memory retrieval. Participants encoded words (e.g., Atlantic) that were plausible but incorrect responses to general knowledge questions (What is the largest ocean in the world?) under a divided-attention condition in which participants simultaneously detected targets (green circles) and rejected distractors (red circles). Relative to distractor-paired words, target-paired words were correctly recalled more often in an episodic cued recall test (e.g., What is the name of an ocean that you saw earlier?), but incorrectly recalled more often in a general knowledge test. No such effects were observed in the full-attention condition in which participants ignored targets and distractors during encoding. The ABE can influence semantic memory retrieval by increasing erroneous responses.

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12:00-1:00 pm (2387)

Let's Talk about Cassowaries, Kookaburras, and Exciting Destinations: Narrative Dialogue Structure Increases Memory Savings for Facts about Unfamiliar Bird Species and Locales. JESSICA E. ALEXANDER and REGINALD A. PORTER, *Centenary College of Louisiana* – Extensive research has demonstrated ways in which context increases memory for information





through retrieval cues. The current study examined the role of the context of narrative monologue and dialogue in memory for facts in a free recall task. In experiment 1, participants were presented with facts about an unfamiliar exotic bird species through one of three written presentation types: direct fact list, narrative monologue, or narrative dialogue. Participants completed an immediate free recall test and a follow-up free recall test after 3-4 days. All three groups performed similarly at the immediate test, but participants who learned the information through the narrative dialogue showed greater memory savings over the other two groups at the follow-up recall test. Participants who learned through narrative dialogue may have engaged more elaborative rehearsal methods using both episodic and semantic memory processes. Experiment 2 investigated how written presentation of information about a fictional destination compared to auditory presentation of information.

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12:00-1:00 pm (2388)

Semantic Representations May Help Explain the Animacy Effect on Memory. HEATHER C. RAWLINSON and COLLEEN M. KELLEY, *Florida State University* – People recall and recognize animate words better than inanimate words, perhaps because memory systems were shaped by evolution to prioritize memory for predators, people, and food sources. Despite the replicability of this effect, the proximal cause of the animacy advantage remains largely unknown. Prior studies from the present authors have explored attentional resource allocation as a possible proximal cause for this effect, however, results from those experiments demonstrated null results. In the present project, we consider the role of semantic representations in the animacy effect within several preexisting data sets. Specifically, we examined whether number of semantic features differs between animate and inanimate items and whether or not that difference is meaningful as qualified by a mediation analysis. During our meeting we will share the results of this project and discuss the implications of the findings.

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12:00-1:00 pm (2389)

The Role of Feedback on Value-Directed Remembering. MICHELLE M. SHIELDS and MORGAN MCGINNIS, *University of Colorado Colorado Springs* – We are often tasked with strategically remembering information based on its importance or value. Research demonstrates adults can selectively remember high-value compared to low-value information, but the mechanisms supporting improvements in this process are largely unknown. In the current experiments, we examined how different types of feedback (memory accuracy feedback, points earned feedback, or no feedback) provided either block-wise during cued recall (Experiment 1) or trial-wise during source recognition (Experiment 2) impacted value-based selectivity. Results revealed that feedback type did not impact selectivity during cued recall. However, during source recognition, trial-wise point feedback improved selectivity compared to memory accuracy and no feedback conditions. Furthermore, selectivity was only observed when point feedback was provided. These

results suggest that under certain contexts value-based feedback may play a critical role in selective learning strategies.

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12:00-1:00 pm (2390)

Why Are Semantically Ambiguous Words Remembered Better? Can Latency in Semantic Ratings Help Explain the Pattern? DANIEL M. BIALER, CHARLES J. BRAINERD, and MINYU CHANG, *Cornell University* – Traditionally, when researchers study the memory effects of a word's semantic attributes, they manipulate the intensity of the attribute. The standard deviation of the intensity ratings, or semantic ambiguity, is assumed to be noise. Recent studies have challenged this, finding that words with greater valence ambiguity (Brainerd et al., in press) and greater ambiguity in other semantic attributes (Chang & Brainerd, 2020) are better recalled than less ambiguous words. In such studies, ambiguity has only been manipulated for individual semantic attributes (e.g., concreteness, meaningfulness). Therefore, it is unclear whether this effect would be more robust for words that are ambiguous on multiple semantic attributes. Further, the cause of ambiguity's beneficial effect on memory is unclear. One possibility is that it triggers additional processing during encoding, which could be observed in latency data for semantic ratings. In two sets of studies, we examined these questions. First, we tested memory for words that were ambiguous on multiple attributes. Second, we measured latency for various semantic ratings of words. The data provided support for our hypothesis that ambiguity triggers additional processing.

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12:00-1:00 pm (2391)

Distraction-Driven Memory Boost. KRZYSZTOF PIĄTKOWSKI, *SWPS University*, CLAUDIA C. VON BASTIAN, *University of Sheffield*, KATARZYNA ZAWADZKA and MACIEJ HANCZAKOWSKI, *SWPS University* – When memoranda are encoded in the presence of distractors, they usually interfere with each other, which often leads to decreased memory performance. However, in certain cases targets and distractors might interact in a way that benefits rather than harms memory. In our experiments, we investigated whether distractors semantically related to the targets might elaborate targets' representations leading to improved short-term and long-term memory performance. Using a complex-span task with semantically related and unrelated target-distractors sets, we found the relatedness benefit in immediate serial recall and in delayed cued-recall tests (Experiment 1) which was not due to the testing effect (Experiment 2). Next, we established that when the relatedness effect in the immediate test is alleviated, delayed-test results follow in the same direction (Experiment 3). Finally, we showed that the impact of related and unrelated distraction on memory performance compared to the baseline no-distraction condition depends on whether the test is immediate or delayed (Experiment 4). Together, the results indicate that if memoranda are followed by semantically related distractors, the negative impact of distraction on memory is reversed.

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12:00-1:00 pm (2392)

Variation in Verbal-Fluency Retrieval: Influence of Cues, Maintenance Ability, and Disengagement Ability. RACHEL BOOTH and MATTHEW S. WELHAF, *University of North Carolina at Greensboro* – The current study attempted conceptual replications of three findings: (a) working memory (WM) span correlates with verbal-fluency recall (Rosen & Engle, 1997); (b) WM associations with fluency decrease when given subcategory recall cues (Unsworth et al., 2013); and (c) fluency correlates with general fluid intelligence (Gf; which reflects disengagement more than maintenance), beyond its association with WM span (which reflects maintenance more than disengagement; Shipstead et al., 2016). Three hundred forty undergraduates recalled animals for 3 minutes; half the subjects recalled from subcategories that were cued every 20 seconds (e.g., farm animals, birds). Subjects also completed a WM span, a WM updating, and a Gf task. All three ability measures correlated with fluency; cues did not affect fluency or its ability correlations. In regression and commonality analyses, WM updating and Gf measures both predicted significant unique variance in fluency; given that both WM updating and Gf ostensibly require disengagement, their unique contributions to fluency raise questions.

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12:00-1:00 pm (2393)

Impact of Performing a Secondary Task on Recall and Recall Dynamics. RUOCHONG ZHANG and CHRISTOPHER R. MADAN, *University of Nottingham* – In a memory task, focusing on to-be-remembered words while concurrently engaging in a secondary task may result in impaired memory, possibly due to decreased cognitive resources allocated to remembering the words. However, previous research has demonstrated circumstances where interleaving a secondary task can enhance long-term retention, suggesting that the cognitive load of the secondary task affects memory. Here we examine how varying the load of the secondary task affects recall and recall dynamics. Participants saw four lists of to-be-remembered words interleaved with four blocks of a complex secondary task, consisting of an alternating letter-one-back and number-parity judgments. Stimuli were presented at a faster pace under high, compared to under low, task load. Participants recalled the words under either a free recall or a serial recall instruction. The results have implications on the impact of performing a secondary task on the availability of cognitive resources, and how this influences recall strategies.

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12:00-1:00 pm (2394)

Withdrawn

12:00-1:00 pm (2395)

Inside a Room With a View: Combining Global and Local Context to Produce Context Reinstatement Effects. DUSTIN D. FINCH and DEBORAH EAKIN, *Mississippi State University* – The context reinstatement effect (CRE; Smith, Glenberg, & Bjork, 1978)—higher recall when study context is reinstated at test than

when it is not—has been shown both for global environmental context, in which the subject is part of the context, and local environmental context, in which participants observe stimuli embedded in a unique context. We wondered what effect the combination of being immersed in a global context and an observer of local context had on CRE. We overlaid words on window views borrowed from www.window-swap.com. “Looking” out the window simulated global context; using a unique window for each word emulated local context. We also collected delayed judgments of learning (dJOLs). Using a free recall test, a significant CRE was obtained in free recall; memory was better when context was reinstated than when it was not. dJOL magnitude was slightly higher for the reinstated context, and dJOL accuracy was similar for both conditions.

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12:00-1:00 pm (2396)

How Much Should You Learn in Order to Recall as Much as Possible Later? The Role of Test Delay in Metamemory Decisions to Stop Learning. ALEKSANDRA KROGULSKA, *Warwick University*, SARAH L. ALLEN, *National Health Service*, RACHEL BAILEY, *Warwick University*, ELIZABETH A. MAYLOR, *Warwick University* – We investigated how people decide to terminate learning if they expect that their memory will be examined after a delay. In Experiment 1, participants studied word lists. In the control group, three lists were displayed in their entirety, whereas participants in the remaining groups were allowed to stop each list early. In the stop group, if participants terminated learning, they proceeded straight to a filler task and free-recall memory test. However, in the stop-wait group, the filler and memory tests were delayed for the amount of time needed to display the entire list of words. In Experiment 2, there were two experimental groups, control-24h and stop-24h, in which a free-recall test took place after one day. In both experiments, participants who terminated learning recalled fewer words than those who saw all to-be-remembered materials. When the memory test immediately followed the learning phase, more than half of the participants decided to stop learning. However, when there was a time delay between learning and testing, only around a quarter of them decided to terminate word presentation. Therefore, delayed testing can effectively discourage some people from a maladaptive learning strategy of learning termination.

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12:00-1:00 pm (2397)

The Effect of Production on Background Context Memory. VICTORIA KAVANAGH and KATHLEEN L. HOURIHAN, *Memorial University of Newfoundland*, WILLIAM E. HOCKLEY, *Wilfrid Laurier University* – Whether production influences memory for an item’s context has yet to be examined. In the current study, participants studied a list of words presented on background images. Half of the words were read aloud, and half were read silently. In Experiment 1, half of the studied items were tested on their studied background context image and half were tested on a new image. Although a production effect in word recognition was observed, context reinstatement had only a marginally significant influence on hit rates and





did not affect the production effect. However, false alarms to new words tested on studied background images differed based on production condition. In Experiment 2, recognition of studied words and background images were tested separately to rule out the possibility of the pictures being overshadowed. Again, a production effect was found. Surprisingly, no difference was found in picture recognition, nor was there a difference in false alarm rate. Experiment 3 tested word recall when participants were cued with the pictures seen during study. Results are discussed in terms of how production influences encoding of context.

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12:00-1:00 pm (2398)

Binge-Watching and Memory: Is Retention of Show Content Diminished When Shows are Viewed in Mass?

MICHAEL AUSTIN and KETHERA FOGLER, *James Madison University* – “Binge watching” is loosely defined as consuming a large quantity of video media in rapid succession with few to no breaks. With the increasing prevalence of streaming services (e.g., Netflix, Hulu, HBO) making content much more accessible for bingeing (i.e., massed viewing), an important question remains: Does binge watching impair memory for what was watched? Research on the spacing effect suggests an advantage for spaced viewing, as compared to massed viewing; however, there is scant research addressing these questions. In this study we address the following questions: 1) Does spacing out episodes of a show improve memory relative to binge-watching? and 2) Do any differences persist across varied retention delays? Participants watched three episodes of a Netflix show, either in a single 3-hour session (massed) or in three separate 1-hour sessions spanning 3 weeks (spaced), then were quizzed on show content either one week or one month later. Results show no group differences in memory performance after 1 week; however, memory performance was significantly better for the binge-watching group after a 1-month delay, suggesting better retention for massed viewing.

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12:00-1:00 pm (2399)

Context Variability Improves Source Memory. MENGTING ZHANG, *Lehigh University* – The competitive trace theory (CTT; Yassa & Reagh, 2013) posits that repeated encoding of the same item leads to loss of episodic detail, due to competition among non-overlapping contextual traces. However, our previous studies showed that repeated encoding, either under identical context or variable context conditions, improves memory for item details. The present study assessed how repeated encoding affects source memory. Based on CTT, we assumed that experiencing the same item in different contexts induces competition among these contextual traces thereby impairing source memory. Participants saw images of common objects either once, three times in the same or three times in different contexts, followed by an item recognition and source memory test. In contrast to CTT, we found that repetition across varied color backgrounds (Experiment 1) and varied encoding tasks (Experiment 2)

benefitted instead of hindered source memory. Our findings inform and are discussed in relation to systems consolidation theories.

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12:00-1:00 pm (2400)

Let Me Give You Something to Think About: Does Needing to Remember Something New Make It Easier to Forget Something Old?

ANJALI PANDEY, *Dalhousie University*, NICHOLE MICHAUD and JASON IVANOFF, *Saint Mary's University*, TRACY TAYLOR, *Dalhousie University* – In an item-method directed forgetting task, memory cues presumably operate by promoting further rehearsal of to-be-remembered (TBR) items and limiting encoding of to-be-forgotten (TBF) items. Subsequent memory for TBF items is worse than for TBR items but may be better than for uncued items, implying that attempts to intentionally forget are not always successful. We asked whether forgetting could be improved by immediately diverting limited-capacity attentional resources away from TBF items and towards a new item that needed to be committed to memory. To this purpose, study words in our experiments were followed either by an instruction to remember (TBR-single), an instruction to forget (TBF-single), or by a new word to be remembered (TBR-replace) in place of the original study word (TBF-replace). A typical directed forgetting effect was observed across single and replace trials. However, there was no compelling evidence that forgetting was better for TBF-replace compared to TBF-single words.

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12:00-1:00 pm (2401)

The Role of Attention in the Emergence of the Evaluative and Incidental Self-Reference Effects.

KYUNGMI KIM, ANAYA NAVANGUL, STEPHEN C. PHILIPPS, and CHRISTY WONG, *Wesleyan University* – The self-reference effect (SRE) refers to a memory advantage arising from relating to-be-learned information to the self at encoding. There exist two types of SREs: The evaluate SRE occurs when people process information with reference to their self-knowledge. The incidental SRE occurs when a self-referential cue (e.g., one's own name) is co-presented with information but is incidental to a given task. In the present study, we examined the role of attention in the emergence of the two types of SREs. During encoding, trait words were co-presented with a name (the participant's own or a celebrity's). Participant were asked either to evaluate whether each word described themselves or the celebrity (evaluative condition) or to judge the location of each word (incidental condition), in the presence or absence of a secondary task. In a subsequent recognition test, we found better memory for words presented with one's own name vs. another name, with this SRE being larger in the evaluative than incidental condition. Critically, divided attention at encoding reduced the magnitudes of both evaluative and incidental SREs to a comparable degree. Our findings suggest that both types of SREs are resource-demanding, effortful mnemonic benefits.

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12:00-1:00 pm (2402)

Temporal Dynamics of Item and Source Memory: A Mouse-Tracking Study. HILAL TANYAS and BEATRICE G KUHLMANN, *University of Mannheim* – Do we first remember an item (e.g., a word itself) and then its source (e.g., position on the screen) or can the retrieval of both (partially) overlap? We manipulated different source-monitoring test formats by presenting the source test either in immediate sequence to item recognition (as typical in source-monitoring research) or the source test followed as a separate block after full completion of the item recognition test to separate these processes in time, serving as our baseline. To understand how item and source decisions evolve qualitatively over time, we tracked mouse movements during the item and source tests from N=60 participants. Although the aggregated mouse trajectories indicated no significant difference across tests, more fine-grained analyses based on the individual trajectories revealed that, contrary to the blocked format, trajectories were less curved (i.e., less experienced conflict) in the source test of standard sequential format relative to its item test. This implies that part of the conflict shown in the blocked source test was outsourced to the item test in the sequential format, suggesting partially overlapping parallel retrieval of item and source from memory.

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12:00-1:00 pm (2403)

Dream Lucidity and Reality Monitoring. MOO-RUNG LOO, *National Central University* – This study investigated the relationship between dream lucidity and source memory by considering lucidity as a trait and examined the ways in which dream lucidity correlates with the reality monitoring. Thirty-one participants rated the lucidity of their dreams over 7 consecutive days. Each morning, they filled out the LuCiD scale within 15 minutes of waking up. In addition to completing the LuCiD scale, participants indicated whether they had dreamt the night before and if they remembered the dream contents. Trait lucidity was indexed using the combination of LuCiD scores and self-reported frequency of lucid dreams. After 7 days of completing the lucid dream survey, each participant visited the laboratory to complete a reality monitoring task, in which they were asked to differentiate among memories for object names presented with pictures (external source), self-generated mental image (internal source), and new items. The results showed a positive correlation between trait lucidity and reality monitoring. People of high trait lucidity made fewer internalization errors than people with low trait lucidity, very likely because the greater a person's trait lucidity, the more vivid sensory information they retain in their memories.

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12:00-1:00 pm (2404)

The Between-Subjects Production Effect: Examining the Effect of the Distinctiveness Heuristic. CHRIS CLARK, KATHLEEN L HOURIHAN, MADDISON M. BALDWIN, and JONATHAN FAWCETT, *Memorial University of Newfoundland* – Prominent theorists have suggested that the between-subjects production effect is smaller than the within-subjects production effect

partly due to participants failing to use the distinctiveness heuristic when attempting to remember the studied words. In a preregistered production experiment, participants learned words by either reading them silently or reading them aloud; some of the aloud participants further received instructions at test encouraging them to think about words they remembered having said recently as a strategy to improve performance (i.e., a distinctiveness heuristic). Although we replicated a typical between-subject production effect for recognition (but not recall) in the standard conditions, participants instructed to use a distinctiveness heuristic demonstrated no benefit for recognition and impaired recall relative to the silent condition. The present results suggest that the between-subjects production effect is not smaller due to the inconsistent application of a distinctiveness heuristic.

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12:00-1:00 pm (2405)

Influence of the Ventromedial Prefrontal Cortex on Mnemonic Discrimination. CLAIRE LAUZON, STEVENSON BAKER, and R. S. ROSENBAUM, *York University* – Pattern separation, the neurobiological process of making overlapping mnemonic information more distinct, has been shown to depend on the hippocampus. The Mnemonic Similarity Task (MST; Stark et al., 2015) is a behavioural estimate of this process wherein participants must distinguish previously learned images of everyday objects from novel, highly similar images (lures) and dissimilar images (foils). Several studies have validated the use of the MST to infer hippocampal integrity, but the extent to which this task relies on other brain regions is unclear. The ventromedial prefrontal cortex (vmPFC) is involved in strategic aspects of memory encoding and retrieval, including “feelings of rightness” and contextual memory organization, which may be essential for accurate discrimination of similar memory representations. We examine if performance on the MST critically depends on the vmPFC by testing individuals with selective lesions to this region. Relative to controls, individuals with vmPFC lesions were selectively impaired in discriminating studied items from lures but not foils, similar to individuals with hippocampal compromise. These findings provide novel insight into nonhippocampal contributions to mnemonic discrimination.

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12:00-1:00 pm (2406)

Can the Relative Speeds of Remember/Know Responses in Recognition Be Reversed by an Instruction Manipulation? JERWEN JOU, *The University of Texas Rio Grande Valley*, MARK HWANG, *Central Michigan University* – According to the dual-process theories of memory, the recollection-based process is effortful, conscious, and slower than the familiarity-based process which is fast and automatic. However, remember (R)-based recognition was consistently found faster than know (K)-based recognition in the literature. One hypothesis suggests that subjects consider R before K experiences and make a K response only after they negate an R response, thus resulting in R responses faster than K responses. In this experiment, we did not use the words “remember” or “know.” We presented the K before the R case in instruction, and labelled K





as “1” and R as “2” choice in hopes to reverse subjects’ decision priority. Results showed that R-based recognition was still faster than K-based recognition. Thus, the relative speeds of R and K responses probably cannot be changed by manipulating the instruction.

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12:00-1:00 pm (2407)

Multisensory Enhancement of Recollection-Based Recognition Memory. SHEA E. DUARTE and JOY J. GENG, *University of California, Davis* – Research has shown that hearing a task-irrelevant sound during encoding can improve visual recognition memory when the sound is object-congruent (e.g., a dog and a bark; Matusz et al., 2017). However, these studies used binary old/new memory tests which indicate a general improvement in recognition memory, but do not distinguish between recognition based on the recollection of details about the studied event or stimulus familiarity. These two processes both contribute to recognition memory, but are neurally and behaviorally dissociable and play functionally different roles in memory and other aspects of cognition. In three experiments, we tested recollection and familiarity-based recognition for visual objects paired with task-irrelevant sounds during encoding. Results showed higher recollection rates for items initially presented with congruent sounds than meaningless or incongruent sounds, but no effect of sound congruency on familiarity-based recognition. Subjects also more accurately recalled congruent sounds at retrieval. These results suggest that even when congruent sounds are task-irrelevant, they produce a qualitative change in memory formation by binding to the visual stimulus to support recollection-based recognition.

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12:00-1:00 pm (2408)

How to Teach Naïve Observers to Recognize the Gist of Cancer in Mammograms. EMMA M. RAAT, ISABEL R. FARR, and KARLA K. EVANS, *University of York* – Gist extraction processes global image statistic from scenes, allowing us rapid categorization into “kitchens” or “forests,” or, for medical experts, from medical images into those with or without cancer. We investigated whether and how naïve observers learn a novel gist category (medical abnormality) through nine sessions of perceptual training with only categorical feedback (cancer present/developing or absent) on 6,480 unilateral mammograms with 500 ms exposure. Majority of participants (7 of 8) improved their detection of abnormality in mammograms acquired years prior to onset of visible cancer, while four improved for obvious, six for subtle lesions, and five for normal contralateral to abnormality. D prime robustly increased ($\eta^2p=.54$) by $.15 \pm .051SE$ across image type after training. Findings show that training with categorical feedback is sufficient to induce learning of a novel gist category, likely through statistical learning of global image statistics since it is most evident in mammograms without localizable abnormalities.

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12:00-1:00 pm (2409)

The Whole or the Sum of Its Parts: Individual Differences in Holistic and Featural Processing During Face Recognition. BRYAN A. LEONG and AHAMED MIFLAH H. ISMAIL, *University of Nottingham Malaysia*, ALEJANDRO ESTUDILLO, *Bournemouth University*, HOO KEAT WONG, *University of Nottingham Malaysia* – While it is generally assumed that holistic processing facilitates face recognition ability (FRA), recent studies have suggested that poor recognition might arise from imprecise perceptual representations of local features of faces. Using a moving aperture paradigm, this experiment aims to further examine the role of holistic and featural processing on individual differences in FRA. The experiment involved two tasks: 1. the Cambridge Face Memory Test–Hong Kong (CFMT–HK) to measure participants’ face recognition abilities and 2. an old/new recognition memory test (RMT) to measure the effect of different viewing methods (whole faces or faces viewed through an aperture). Participants recognised faces more accurately with whole faces than faces viewed through an aperture, suggesting the importance of holistic processing. The strength of this aperture effect and recognition accuracy for the whole face condition positively correlated with CFMT–HK scores, suggesting that expertise in holistic but not featural processing is related to FRA. Accuracy between both conditions of the RMT also positively correlated, showing that feature-based analysis facilitates holistic processing expertise.

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12:00-1:00 pm (2410)

Reliability and Validity of Recognition Memory Models. KYLE G. FEATHERSTON, *Washington University in St. Louis* – Although recognition memory models have been compared in various recognition memory paradigms, the relative reliability and validity of their parameters have not been thoroughly assessed. In two studies, we evaluated three models: the dual-process signal detection (DPSD) model, the continuous dual process (CDP) model, and the unequal variance signal detection (UVSD) model. In Study 1, participants performed a remember-know procedure that also included confidence ratings. When model parameters were estimated twice in the same individual, both key parameters from the DPSD were reliable within an individual, whereas the CDP version of familiarity was not reliable. Fitting the UVSD also produced reliable parameters, although the variance parameter was only moderately so. In Study 2, participants performed tests of cognitive ability and processing speed along with the same recognition procedure. Structural equation modeling comparing the models’ ability to predict cognitive variables suggested that the DPSD parameters accounted for more variance in fluid intelligence than the parameters of the other two models. Together, the results from these studies suggest that the DPSD is the most reliable model and exhibits convergent validity.

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12:00-1:00 pm (2411)

Context Matters: How Environmental Context Impacts Memory and Metacognition of Younger and Older





Adults. LILIANE WULFF, *University of Mannheim*, OLIWIA ZABOROWSKA, MACIEJ HANCZAKOWSKI, and KATARZYNA ZAWADZKA, *SWPS University*, BEATRICE G. KUHLMANN, *University of Mannheim* – Memory and its metacognitive monitoring are governed by (mis-)match of contextual information between study and test. But is this also true when we age? To investigate this, younger (20–30 years old) and older adults (60–83 years old) studied word pairs (cue-target) imposed on background photographs (context). Cues in a subsequent cued-recall test were either imposed on the same photograph as at study (i.e., reinstated), on a different photograph familiar from study (i.e., re-paired), or on a novel photograph. Whenever participants' target retrieval failed, they gave a feeling-of-knowing (FOK) judgment for future target recognition. Across two experiments and both age groups, retrieval success was elevated by context reinstatement but impaired by context familiarity. In contrast, FOK judgments were consistently elevated for context familiar from the study phase, whether re-instated or re-paired, with only little predictive value for target recognition. This context familiarity effect on metamemory was comparably high in older and younger adults regardless of whether recall and context effects thereon were impaired in older adults (Experiment 1) or matched to the level of younger adults (Experiment 2).


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12:00-1:00 pm (2412)

'Emotional, Therefore Memorable': Immediate and Delayed Judgments of Learning for Emotional Word Pairs. PINAR KURDOGLU-ERSOY and AYCAN KAPUCU, *Ege University* – Although previous work showed that emotional materials received higher judgments of learning (JOLs) than neutral materials, these studies only focused on the immediate JOLs. Considering that JOLs can be based on different cues depending on when the judgments are made, we examined the immediate and delayed JOLs for negative, neutral, and positive word pairs in a series of experiments. JOL magnitude was found to be higher for both negative and positive pairs than neutral ones, indicating that people use emotionality as a cue for both their immediate and delayed JOLs, albeit to a lesser extent in the delayed trials. Importantly, the delayed judgments were more accurate for all pairs but the metacognitive bias decreased for emotional pairs more than it decreased for the neutral pairs, possibly indicating the decreased utilization of beliefs when more diagnostic mnemonic cues were available. We also conducted a questionnaire-based study to further examine the contribution of beliefs and found that the theory-based estimations reflected a very similar pattern to immediate JOLs. The results are in line with the heuristics accounts of metamemory and will be discussed in relation to belief-based and experience-based factors affecting JOLs.

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12:00-1:00 pm (2413)

A Meta-Analysis for The Font Size Effect: Judgments of Learning and Memory Are Not Always Dissociated. MINYU CHANG  and CHARLES J. BRAINERD, *Cornell University* – The font size effect is a metamemory illusion in which larger-font items

produce higher judgments of learning (JOLs) but not better memory, as compared to smaller-font items. Our meta-analysis revealed a small-to-moderate effect of font size on JOLs. Surprisingly, there was also a small but highly reliable effect of font size on memory. This suggests that JOLs and memory accuracy both increase with font size, rather than being completely dissociated, as conventionally assumed. Moreover, JOLs and memory were both affected when font size ranged from intermediate to large, but only JOLs were affected when font size ranged from small to intermediate. Thus, it appears that memory is simply less sensitive to font size than JOLs are. Further, we found that the font size effect on JOLs was robust even when larger fonts were less fluent than smaller fonts, whereas it disappeared when participants were led to believe in a memory or fluency advantage for smaller fonts. This finding favors a belief-based explanation for JOLs over a fluency-based explanation. Last, we identified multiple factors that moderate the effects of font size on JOLs and on memory. The theoretical and empirical implications of these moderators are discussed.

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12:00-1:00 pm (2414)

Are Metamemory Processes Universal?. SARA CADAVID, *Universidad del Rosario*, KARLOS LUNA, *Universidad Nacional de Colombia*, INÉS BOTÍA, *Universidad del Rosario* – Monitoring and control are two basic processes that underlie metamemory. Monitoring examines memories and evaluates their quality, and control uses that evaluation to decide on the course of action. Monitoring and control processes have been studied mostly in WEIRD (Western, educated, industrialized, rich, and democratic) countries or university students, raising concerns about their universality. In this research, we tested the ability of three groups of participants from a non-WEIRD country (Colombia) to monitor and control their memories. Two groups of low-educated adults from urban or rural areas and a group of Colombian university students watched a bank robbery video, answered cued recall questions, rated the confidence in their answer (monitoring), and indicated whether they would report or withhold their answer (control). Results showed that the three groups were able to monitor their memories and control their behaviour. University students had better memory and metamemory performance than the two low educational groups. The results support that the basic metamemory processes are present in different groups of individuals, but the differences between groups highlight the need to test further the generalisability of cognitive processes and phenomena across individuals.

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12:00-1:00 pm (2415)

Predicting the Memorability of Scene Pictures: The Benefit of Learning Experiences. SOFIA NAVARRO-BAEZ, MONIKA UNDORF, and ARNDT BRÖDER, *University of Mannheim* – Memory for scene pictures is amazingly good. Regarding metamemory, a study found that memorability judgments for scene pictures were unpredictable of actual memorability (Isola et al., 2014). However, another study found that people's predictions of recognizing





scene pictures at a later test (judgments of learning [JOLs]) are relatively accurate (Undorf & Bröder, 2021). We hypothesized that JOLs show higher accuracy due to pictures being studied and predictions being made for one's own memory. We tested this hypothesis in two online experiments (total N=100). In each experiment, participants completed two metamemory tasks in counterbalanced order. In the memorability task, participants predicted other people's chances of recognizing each scene picture (memorability judgments). In the JOL task, participants studied pictures, made JOLs, and completed a recognition memory test. In both experiments, memorability judgments were similarly predictive of recognition memory as JOLs, but only when participants had previously completed the JOL task. In summary, experience with learning pictures in a recognition memory task with JOLs was beneficial for accurately predicting general memorability of scene pictures.

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12:00-1:00 pm (2416)

Perceptually Fluent Features of Study Words Do Not Inflate Judgments of Learning: Evidence from Font Size, Highlights, and Sans Forgetica Font Type. NICHOLAS P. MAXWELL, TREVOR PERRY, and MARK J. HUFF, *University of Southern Mississippi* – The judgment of learning task (JOL) is often used to assess monitoring at encoding. Previous research has shown that JOL accuracy is sensitive to perceptual cues and can induce metacognitive illusions. For example, the font-size effect (Rhodes & Castel, 2008) occurs when participants inflate JOLs for pairs presented in large font versus small font. The present study provides an additional test of the font-size effect and tests whether other perceptual manipulations affect the correspondence between JOLs and recall. Experiment 1 was designed to replicate the font-size effect and test whether the effect extended to highlighting using a set of related and unrelated word pairs. Next, Experiment 2 provided an additional test of these effects on JOLs using only unrelated pairs. Finally, Experiment 3 tested whether Sans Forgetica—a perceptually distinctive font designed to improve memory—would result in inflated JOLs. Overall, the perceptually distinctive conditions did not result in an overestimation of later recall relative to nondistinctive conditions, and Sans Forgetica font in Experiment 3 yielded a memory cost (though no effect on JOLs). Collectively, perceptually distinctive study items do not appear to inflate JOLs at study.

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12:00-1:00 pm (2417)

Increased Metamemorial Accuracy with Practice Does Not Require Practice with Metamemory. JOHN T. WEST, *University of North Carolina at Chapel Hill*, JACK M. KUHN, *University of North Carolina at Greensboro*, NEIL W. MULLIGAN, *University of North Carolina at Chapel Hill*, DAYNA R. TOURON, *University of North Carolina at Greensboro* – Given that learners do not always predict their future memory performance accurately, there is a need to better understand how metamemorial accuracy can be improved. Prior research suggests that one way to improve metamemorial accuracy is with practice, as participants tend to become better at

predicting their future memory performance over the course of multi-trial learning experiments. However, it is currently unknown whether such improvements result from participants having practiced making metamemorial judgments or whether comparable improvements occur even in their absence. This issue was investigated in three multi-trial, cued recall experiments wherein participants either did or did not receive practice making judgments of learning. Despite observing increased metamemorial accuracy across study blocks, final metamemorial accuracy was consistently unaffected by whether participants practiced making judgments of learning. These results suggest that increased metamemorial accuracy with practice is not due to participants having practiced explicit metamemorial monitoring, but instead due to other factors associated with multi-trial learning such as retrieval practice.

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12:00-1:00 pm (2418)

Do Rememberers Control Recall Order Effectively?. PNINA STERN and VERED HALAMISH, *Bar-Ilan University* – Often when recalling information, some items are more valuable to remember than others. Rememberers might start recall by attempting to retrieve the valuable items or by attempting to retrieve the less valuable items. Do rememberers control recall order effectively to maximize recall performance? In two experiments, participants studied information that included more valuable items (targets) and less valuable items (nontargets). At test, they were either tested on the targets first, tested the nontargets first, tested on targets and nontargets in a mixed order, or allowed to choose the order of targets and nontargets on the test and their choices were respected. Results revealed that targets were better recalled than nontargets. Recall order did not affect target recall, but it did affect nontarget recall: recalling the targets first impaired recall of nontargets, especially compared to the mixed retrieval order. Interestingly, the majority of participants preferred to be tested on the targets first. Therefore, control over recall order might impair recall performance.

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12:00-1:00 pm (2419)

Retrospective Versus Simultaneous Confidence Judgments of Recognition Memory Decisions. SARA LESLIE, EVAN LAYHER, and MICHAEL B. MILLER, *University of California, Santa Barbara* – Recognition memory experiments frequently ask participants to report both their decision and their confidence. Here we investigated whether reporting confidence immediately after the decision (retrospectively) as opposed to reporting confidence at the time of the decision (simultaneously) produced different decision-making or confidence-reporting behavior. Participants (N=126) completed recognition memory tasks that included both types of confidence reports, along with manipulations of stimulus strength and decision criteria. Participants reported high confidence more frequently when reporting confidence retrospectively as opposed to simultaneously, for both strong and weak stimuli. Discrimination performance was lower on the recognition task when confidence was reported retrospectively versus simultaneously, while criterion shifting remained





the same. Metacognitive efficiency was higher when people reported confidence retrospectively as opposed to simultaneously, for both weak and strong stimuli. The observed pattern of dissociations suggests that confidence immediately following a decision is calculated differently than confidence reported at the time of the decision, and that confidence reports may impact decision behavior.

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12:00-1:00 pm (2420)

Spontaneous Monitoring of Recognition Test Performance Shapes Subsequent Judgments of Learning. EVAN E. MITTON and CHRIS FIACCONI, *University of Guelph* – Much previous research on metamemory has focused on the factors that guide learners' monitoring judgments (judgments of learning; JOLs) during encoding. In contrast, there has been relatively less focus on how monitoring of test performance can impact such judgments. Here, we report two experiments that investigate how spontaneous monitoring of test performance can inform subsequent JOLs for novel visual images across multiple study-test cycles. In Experiment 1, we demonstrate that spontaneous monitoring during old/new tests promotes an increase in JOLs that reflects participants' metacognitive sensitivity to their memory performance in the absence of any feedback given. Further experimentation demonstrates that this effect extends beyond old/new recognition paradigms where memory performance is near ceiling by manipulating lure similarity in a 2-alternative forced choice procedure. These findings suggest that learners do spontaneously monitor their test performance, and that such monitoring can shape subsequent metacognitive judgments.

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12:00-1:00 pm (2421)

The Relationship Between Memory Self-Efficacy, Task Engagement, and Memory Performance During a Source Memory Task. KYLE R. KRAEMER, *Birmingham Southern College*, SHEILA R. BLACK and IAN M. MCDONOUGH, *The University of Alabama* – The correlation between memory self-efficacy (MSE) and memory performance has been well-documented. However, few studies have investigated the source of this relationship. Self-efficacy theory would suggest that MSE increases motivated engagement in memory tasks, leading to a more richly detailed memory trace. Alternatively, MSE may lead memory traces to be categorized to different sources at retrieval without changes to the memory trace itself. Another possibility is that MSE may correlate with memory performance due to personal calibration of self-efficacy with feedback from memory use in everyday life. The current study investigated the relationship between MSE and memory performance in a source memory task, and confirmed the general correlation seen in prior literature. However, little to no relationship was found between MSE and engagement, nor was a significant relationship found between MSE and richness of memory detail, suggesting that an alternative mechanism may be responsible for the MSE/performance relationship in source memory. Implications are considered regarding the relationship between MSE and source memory, and we

consider the value of a broader investigation of MSE's relationship with recognition and/or recall.

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12:00-1:00 pm (2422)

Task Manipulations Demonstrate No Underconfidence-With-Practice Effect: Using a Free Recall Metamemory Paradigm. RACHEL SMITH-PEIRCE, *University of California, Irvine*, GRACE C. LIN, *Massachusetts Institute of Technology*, SUSANNE JAEGGI, *University of California, Irvine* – This study investigates whether people become underconfident in their memory abilities when assessing their metamemory or awareness of their memory capabilities. Previous research has investigated the underconfidence-with-practice (UWP) effect in the context of various manipulations of metamemory tasks, where participants demonstrate underconfidence in their memory abilities with task experience. We examined the UWP effect in a novel, free recall metamemory task. The task displayed one word at a time and participants placed a judgment of learning (JOL) on how likely they thought they were to remember the word. After being shown 30 words, participants freely recalled the words. In the first experiment, we induced a betting paradigm with feedback. We compared the JOLs and accuracy for each block of words and did not see evidence for the UWP effect in our novel paradigm. In the second experiment, JOLs were named as confidence ratings and no feedback was given to participants to replicate previous research. The UWP effect was not present either, as participants never became underconfident throughout the blocks of words. Future work will include a cued-recall metamemory task, as the UWP effect might be specific to the paradigm used.

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12:00-1:00 pm (2423)

Making Idiosyncratic Influences on Metamemory Judgments Visible. MONIKA UNDORF, SOFIA NAVARRO-BAEZ, and ARNDT BRÖDER, *University of Mannheim* – Numerous studies showed that people base assessments of their own learning and memory—metamemory judgments—on general cues pertaining to study materials (e.g., word frequency) and learning conditions (e.g., number of study opportunities). In contrast, it has not been investigated how idiosyncratic information such as the personal significance of items affects memory and metamemory. We propose that such hitherto elusive idiosyncratic influences on metamemory can be measured by the nonlinear component C of Egon Brunswik's (1952) lens model. In two experiments, we made randomly chosen items personally significant (Experiment 1) or assessed the personal significance of items (Experiment 2). Personal significance increased both metamemory judgments and memory performance. Including personal significance as a predictor in the lens model reduced C, whereas including mere priming did not. Hence, the lens model's C parameter captures idiosyncratic influences on metamemory and may serve as a useful tool for future research.

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12:00-1:00 pm (2424)

The Effects of Word Frequency and Context Variability on Judgments of Learning. YOONHEE JANG, *University of Montana* – It has been known that word frequency and context variability affect recognition memory and free and cued recall, but there is no prior research to examine whether these factors influence judgments of learning (JOLs; predictions about the likelihood of recall). The current study independently manipulated the word frequency and context variability of the cues and targets, using paired associate learning with JOLs. In Experiment 1 in which context variability was held constant, recall performance was better for high (vs. low) frequency targets. JOLs were higher for high (vs. low) frequency cues and high (vs. low) frequency targets. In Experiment 2 in which word frequency was held constant, low (vs. high) context variability cues were effective in recall particularly when a pair consisted of high frequency cue and target. However, JOLs were not affected by context variability. Discussions include possible accounts of the dissociations between JOLs and recall.

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12:00-1:00 pm (2425)

Warnings Do Not Impact the Hindsight Bias on Judgments of Learning. MALTE F. ZIMDAHL and MONIKA UNDORF, *University of Mannheim* – People who receive knowledge about the outcome of an event typically overestimate in hindsight what they knew in foresight. This hindsight bias was recently demonstrated with metacognitive judgments: Compared to original judgments of learning (JOLs) made during study, recollected JOLs that were retrieved after the memory test were closer to the actual test outcomes. This study focused on the contributions of automatic and controlled processes to this effect by investigating whether warnings are capable of reducing the hindsight bias on JOLs. To achieve this, one group (n=41) of participants received detailed information about the hindsight bias immediately before recollecting the JOLs and was instructed to avoid this bias. Another group of participants (n=41) did not receive any information about the hindsight bias. Results revealed a strong hindsight bias in either group that did not differ in size. This finding suggests that the hindsight bias on JOLs is mainly driven by automatic processes, as was previously found for other judgments.

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12:00-1:00 pm (2426)

Effect of Cognitive Task Exposure on Global Metacognition in Younger and Older Adults. TESNIM I. ARAR, NICOLE E. MILLER, COEN D. NEEDELL, and DAVID A. GALLO, *University of Chicago* – Prior research shows that taking a cognitive task and merely expecting to take a cognitive task can both influence older adults' subjective judgments about age (Hughes et al., 2013). Building on this finding, we assessed whether exposure to a difficult cognitive battery or the relatively easier practice trials of said battery would influence one's global assessments of their cognitive abilities. Results showed that regardless of whether they performed the difficult battery or only the practice trials, older adults were less confident in their cognitive abilities following task exposure. Moreover,

because older adults were initially overconfident in their cognitive abilities, compared to actual performance, this reduction in confidence increased the accuracy of their global metacognitive assessments. This effect was not obtained for younger adults. These findings suggest that even being primed to think about cognitive tasks may serve to enhance older adults' global metacognition by way of reducing their overconfidence.

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12:00-1:00 pm (2427)

The Psychology and Neuroscience of Confidence in Memory and Perception. ANNE S. YILMAZ and JOHN T. WIXTED, *University of California, San Diego* – The solution to real-world problems often requires a deep, basic-science understanding of the problem at hand. Confidence and decision time are issues that matter in the real-world and have been intensively investigated in the past 20 years in both psychological science and neuroscience. In cognitive psychology, confidence is usually conceptualized in terms of signal detection theory while speeded decision-making is conceptualized in terms of evidence accumulation modeling. However, no singular model of confidence for a perceptual decision dominates. In mathematical psychology, accounts of speeded decision-making in terms of a balance-of-evidence decision variable has gained currency in recent years. In neuroscience, the field tends to approach evidence accumulation and confidence in relation to lateral intraparietal cortex (the role of which is debated) and reaction time, with some research indicating a balance-of-evidence decision variable. A review of these largely independent lines of research suggests a potentially fruitful way to naturally integrate signal detection theory and evidence accumulation models in a way that comports with the relevant neuroscience evidence.

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12:00-1:00 pm (2428)

Misplaced Underconfidence: Gender, Math Anxiety, and Metacognitive Monitoring Accuracy. MARTA K. MIELICKI, CHARLES J. FITZSIMMONS, DANIEL SCHEIBE, and CLARISSA THOMPSON, *Kent State University* – Individual differences, including gender and math anxiety, predict people's confidence in their performance on mathematical tasks. Higher self-reported math anxiety has been associated with lower item-level confidence judgments (Scheibe et al., under review). Males report higher confidence judgments than females on mathematical tasks, even when accounting for actual task performance (Rivers et al., 2020). Additionally, math anxiety is negatively related to math achievement (Barroso et al., 2020), and females tend to report higher levels of math anxiety than males (Dowker et al., 2016). However, it is unclear whether gender and math anxiety also relate to the accuracy of confidence judgments—the extent to which the judgments are predictive of actual performance. In a large Qualtrics panel of adults (N=647), gender and math anxiety moderated the accuracy of retrospective item-level confidence judgments on health-related math problems even when





controlling for other relevant factors. The findings have implications for understanding how people make health-related decisions.

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12:00-1:00 pm (2429)

Cues Influence the Accuracy of Teachers' Judgments of Student Learning. KYLE LYONS and KEITH THIEDE, *Boise State University*, RICHARD D. OSGUTHORPE, *Brigham Young University* – The cue-utilization framework of metacognitive monitoring (Koriat, 1997) suggests that judgment accuracy is influenced by the cues used to make judgments. Although cue utilization has been shown to influence the relative accuracy of metacognitive judgments (e.g., Thiede et al., 2010), the influence of cue utilization on the accuracy of teachers' judgments of student learning has yet to be examined. The present research showed that the relative accuracy of teachers' judgments of student learning are also influenced by the cues teacher used to judge their students' learning. Judgment accuracy was greater for teachers who reported using cues related to class performance than for those who did not. Judgment accuracy was greater for those who did not report using personal attributes as a cue than for those who did.

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12:00-1:00 pm (2430)

Withdrawn

12:00-1:00 pm (2431)

Caffeine's Effects on Metacomprehension. ERIN MADISON, ERIKA K. FULTON, DANIEL GRAY, CALVIN DIRICKSON, and BRYAN FREGOSO, *Idaho State University* – Many individuals use caffeine to boost their cognitive abilities, but beyond its attentional benefits, caffeine's cognitive effects are unclear. Preliminary evidence suggests null effects of caffeine on metacognition, but there are only two published studies, both of metamemory. Moreover, in the metamemory studies, judgments and test were made a full day apart, potentially inducing people to discount caffeine's effects. The larger attentional demands of metacomprehension suggest a potential benefit of caffeine to this metacognition type. We administered caffeine (4mg/kg) or placebo to 67 participants and hypothesized that caffeine would increase prediction magnitude and metacomprehension accuracy. They completed questionnaires about caffeine's effects and subjective arousal, read six texts, made comprehension predictions after each, and completed a comprehension test. Unexpectedly, the caffeine condition had lower judgments and similar metacomprehension accuracy to the placebo condition. Results were not explained by subjective arousal but may be due to effort compensation in the placebo condition.

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12:00-1:00 pm (2432)

I Thought I was Smart Until You Asked Me All Those Hard Questions: Difficult General Knowledge Questions Decrease

Perceived Intelligence. SHARDA UMANATH, *Claremont McKenna College*, JOHN CIPOLLINI, *Colby College*, JULIANNA SONG and CHARLOTTE BEAULIEU, *Colby College*, MEGAN C. ITAGAKI and MARIA IZABELLA SAKODA, *Claremont McKenna College* – Memory, intelligence, and knowledge are treated as somewhat distinct constructs. To understand lay perceptions, we examined how taking a general knowledge (GK) test affected self-ratings of these constructs. In Study 1, participants completed an easy GK test, a hard GK test, or a filler task. Pre- and post-task, participants rated their overall knowledge, intelligence, and memory. They also rated to what extent a GK test reflects intelligence, a good memory makes one knowledgeable, and a good memory makes one intelligent. Both GK conditions were told that 50% of people answered the questions correctly. After taking a hard-GK test, self-rated intelligence, knowledge, and memory decreased. In the absence of information regarding others' performance (Study 2), the self-ratings decreased again, suggesting that absolute, not relative difficulty, underlies this effect. However, participants' perceived relationship between intelligence and GK only decreased in Study 1, suggesting that when their self-perception is threatened they judge these constructs as less interdependent. Thus, these constructs are not only interrelated but also malleable. A full understanding of knowledge needs to incorporate both intelligence and memory.

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12:00-1:00 pm (2433)

What Influences College Students' Answer-Changing Behaviors? AMANDA R. LIPKO-SPEED, ADEOLA AKINYEMI, CHANYA EARLE, TIMOTHY M. HORAN, MOHIT MEHTA, SHARELIX RIVERA, and LAUREN SODA, *SUNY Brockport* – We investigated the influence of confidence judgments and the presence of a study guide on students' answer-changing behaviors. Eighty participants completed a 20-question multiple choice test during an individual virtual meeting. Half of the participants were given 15 minutes to study the material that would be tested. Half of the participants also rated their confidence in their selected answers. At the end of the test, participants could change any answers they wished. Results showed that neither presence of confidence judgment nor presence of study guide significantly affected the number of answers changed nor the number of correct answers on the test—confidence judgments were not reactive. However, lower initial scores were associated with more answer changes and more beneficial answer changes. Lower final scores were also associated with more answer changes though, suggesting that participants were not using an effective cue to select which answers to change.

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12:00-1:00 pm (2434)

Instilling Curiosity—Raising Interest: Zoological Trivia Uncertainty Drives Curiosity, and Surprising Trivia Learning Predicts the Likelihood of Investing Time in Acquiring Animal Information. LINUS HOLM, ASTRID VENELL, and EMMA OLSSON, *Umeå University*, PAUL SCHRATER, *University of Minnesota* – What makes you desire for more information





in a knowledge domain? We investigated what factors in a learning situation might spur further topical interest in an online test where 96 participants rated their experience of 100 two-alternative forced choice zoology trivia questions before and after receiving the correct answer. We found that pre-answer curiosity, post-answer surprise, and valence reliably increased the likelihood of requesting unrelated extra animal information at the cost of a time delay. Our findings show how covered knowledge gaps may actually act to raise the desire for knowledge instead of saturating it.

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12:00-1:00 pm (2435)

Metacognitive Insight into Artificial Intelligence Knowledge Predicts AI Risk/Opportunity Perception. NADIA SAID, *University of Tübingen*, IRINA BRICH, JÜRGEN BUDER, and MARKUS HUFF, *Leibniz-Institut für Wissensmedien* – Artificial intelligence (AI) applications are increasingly used in everyday life. Whereas some of them are widely accepted (e.g., automatically compiled playlists), others are highly controversial (e.g., use of AI in the classroom). While public discourse is dominated by perceptions of the risks associated with AI, we take the fundamentally different approach of measuring the perceived risks and opportunities of AI applications with respondents' knowledge and confidence in their own knowledge. To this end, we assessed 394 participants to determine whether insight into the accuracy of knowledge (metacognition) is related to perception of risks and opportunities in nine AI scenarios from three domains: media, medical, and autonomous driving. Results showed that higher metacognitive sensitivity is related to higher opportunity perception, while lower metacognitive sensitivity is related to lower risk perception. Moreover, results showed that for participants with higher metacognitive sensitivity the perceived opportunities of the scenarios outweighed the perceived risks.

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12:00-1:00 pm (2436)

I Remember It Now, So I'll Remember It Later: Working Memory Representations Guide Inaccurate Predictions of Future Memory Performance. JULIA KRASNOFF, *University of Zurich*, ALESSANDRA SOUZA, *University of Porto* – Predictions for future retrieval success (Judgements of Learning; JOLs) are more accurate when solicited after a delay rather than immediately after studying. A possible reason is that people base their immediate JOL on the quality of working memory (WM) representations. We tested this hypothesis by implementing a manipulation that affects WM but not delayed performance: Participants memorized colored objects in sequences of 2 or 4. After each sequence, they provided JOLs for a delayed test. They were then cued to reproduce the color of each object on a color wheel (WM test). After learning 200 objects, participants performed a delayed test. Sequence length affected WM, but not delayed performance. JOLs, however, were higher for sequences of two vs. four objects, and they correlated with WM but not delayed performance. In Experiment 2, we replicated the finding that sequence length influenced JOL even if WM was not assessed. Results of a sequence 8 condition revealed an improvement

of immediate JOLs when number of studied objects exceeded WM span. We conclude that current quality of memory representation is used to predict future performance even if it is misleading, and discuss why this challenges current theories on metacognition.

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12:00-1:00 pm (2437)

Withdrawn

12:00-1:00 pm (2438)

Reframing Effort to Improve Learners' Study Strategy Choices. CONNIE FRALICK and VERONICA X. YAN, *The University of Texas at Austin* – Even though the study strategy of mixing study topics (“interleaving”) is better for learning than studying one topic at a time (“blocking”), people consistently underestimate the former and favor the latter. A barrier to interleaving is that it feels more difficult than blocking. People gauge the efficacy of study strategies by how easy they feel, inaccurately viewing lower levels of mental effort as a signal of good learning (Kirk-Johnson et al., 2019; Koriat, 2008). However, studies have also shown that reframing effort as something a student chooses to invest versus something that is required can reverse the effort-learning association (Koriat et al., 2014). In our study, participants (N=173) experienced blocked and interleaved learning. We examined whether effort framing (effort as voluntary vs. requirement; between-subjects manipulation) affected their judgments of strategy efficacy and strategy choice. In the effort-as-requirement condition, the more effortful participants thought interleaving was compared to blocking, the less effective and less likely they were to choose to interleave in the future. However, this pattern was reversed in the effort-as-voluntary condition.

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12:00-1:00 pm (2439)

Monitoring and Control of Study in Generation-Potentiated Learning. DURNA ALAKBAROVA, PHILIP PEPPER, and B. HUNTER BALL, *The University of Texas at Arlington* – The generation effect refers to the finding that self-generated material (e.g., horse) is better remembered than material that is passively read (e.g., horse). Previous research has shown that generation advantage in the first study block potentiates learning improvement for read words in the second block. In the present study, we used immediate and delayed metacognitive measures (judgments of learning, restudy decisions, and study time) to examine how learners monitor and control their studying across two blocks. The results show that generally, in the delayed conditions participants rely on retrievability when monitoring their study, but in the immediate conditions they do not. However, the improved monitoring in the delayed condition does not necessarily eliminate the generation advantage in the second block.

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12:00-1:00 pm (2440)

Withdrawn

12:00-1:00 pm (2441)

Manipulating Environmental Context and Illusory Familiarity in a False Recognition Task: Implications for Lab Analogues of Déjà Vu. COURTNEY AITKEN, INES JENTZSCH, and AKIRA R O'CONNOR, *University of St Andrews* – The déjà vu as conflict hypothesis purports that both a familiarity and novelty evaluation are required to elicit déjà vu. However, most lab analogues of déjà vu do not include a novelty cue for participants to disambiguate the familiarity as false. Moreover, if analogues do include novelty cues, the study design does not permit the assessment of conflict adjustments in memory performance to further explore the hypothesis. We adapted the Jacoby and Whitehouse (1989) false recognition task to generate illusory familiarity and incorporate environmental context as a novelty cue. We also asked participants to indicate when they experienced déjà vu throughout the experiment. Results demonstrate that participants report experiencing déjà vu throughout the task. Finally, we suggest ways in which these findings can improve our understanding of memory retrieval control with a focus on how people interpret instances of memory conflict.

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12:00-1:00 pm (2442)

Talking about the Past to Improve Metacognition: Influence of Parental Reminiscing on Preschoolers' Confidence Judgment and Memorability-Based Heuristic. CHRISTINA LÉONARD, WILLEMS SYLVIE, and MAUD BILLET, *University of Liège* – Parental reminiscing style (PRS) (i.e., the way parents discuss past events with their child) has been shown to influence children's memory performance, possibly through its impact on metacognitive abilities. To date, this influence of PRS on children's metacognition remains unexplored. In this study, 49 parent-child dyads were recruited, and PRS about a prior standardized event was analyzed. Children's metacognitive skills were assessed through the memorability-based heuristic. Children had to make recognition memory decisions for both memorable and less memorable events and rate their level of confidence on an item-by-item basis. A cluster analysis conducted on PRS scores revealed that our sample was composed of two classes of parents (elaborative vs. less elaborative) whose reminiscing style differed in terms of both the content (e.g., episodic richness and metamemory speech) and the structure (e.g., open-ended questions). Results indicated that children of elaborative parents showed better accuracy in their confidence judgments and more frequently use the level of memorability of the events to guide their memory decisions.

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12:00-1:00 pm (2443)

Investigating Metacognitive Sensitivity of Tip-of-the-Tongue States and Feeling-of-Knowing Judgments with General Recognition Theory. ALI POURNAGHDALI, BEN-

NETT L SCHWARTZ, and FABIAN A. SOTO, *Florida International University* – We used general recognition theory (GRT) to provide bias-free assessments of metacognitive sensitivity for tip-of-the-tongue states (TOT) and feeling-of-knowing judgments (FOK). We asked participants to answer general-knowledge questions. If recall failed, participants provided TOT and FOK judgments, memory recognition responses, and metacognitive judgments of confidence on those recognition responses. To assess metacognitive sensitivity of TOT and FOK, we fit two GRT models to the data and used estimated parameters of the models to construct two sensitivity vs. metacognition (SvM) curves, which represent sensitivity in the recognition task, as a function of strength of metacognitive experiences: an SvM curve for TOT and an SvM curve for FOK. According to both SvM analyses, the highest level of recognition sensitivity was accompanied with highest strength of the TOT and FOK experiences, and as the magnitude of experiences dropped, so did recognition sensitivity. However, the recognition sensitivity was higher than chance level when people did not experience a TOT or FOK. These results are the first bias-free indication of metacognitive sensitivity of TOT and FOK judgments.

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12:00-1:00 pm (2444)

Effects of Acute Exercise Intensity on Source Episodic Memory and Metamemory Accuracy: Considerations by Cardiorespiratory Fitness. WILLIAM KELEMEN, *Texas State University*, PAUL LOPRINZI and BRANDON RIGDON, *University of Mississippi*, AMIR-HOMAYOUN JAVADI, *University of Kent* – Despite a growing body of research on exercise and cognition, very limited research has evaluated whether acute exercise can influence source episodic memory. The primary objective of this study was to evaluate whether there is an intensity-specific effect of acute aerobic exercise on source episodic memory and metamemory accuracy. A secondary objective was to evaluate if cardiorespiratory fitness moderates this potential relationship. Thirty young adults participated in a three condition (Control/Moderate/Vigorous-Intensity Exercise), within-subject counterbalanced experimental study. After each intervention, participants completed source episodic memory and metamemory tasks. Results demonstrated that acute exercise, relative to control, was effective in enhancing source episodic memory, but not metamemory accuracy. Vigorous-intensity acute exercise was the most optimal intensity to enhance source episodic memory and this effect was not influenced by cardiorespiratory fitness. Overall, our findings suggest that there is an intensity-specific effect of acute exercise on source episodic memory. Further, when exercise-related improvements in memory occur, young adults may be unaware of these memory benefits from exercise.

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12:00-1:00 pm (2445)

Retrospective Confidence Judgments Are Reflected in Theta-Band Oscillatory Activity: Magnetoencephalography (MEG) Evidence. BEATRIZ MARTIN-LUENGO and DIMITRY ALTUHOV, *National Research University Higher School of*





Economics (HSE University), ALINA LEMINEN, *Laurea University of Applied Sciences*, MARIA ALEKSEEVA, *National Research University Higher School of Economics (HSE University)*, YURY SHTYROV, *Aarhus University* – Memory monitoring processes are online assessments of the quality of our retrieval. Despite their importance for cognition, few studies on perceptual discrimination studied their neural dynamics and reported diverse results. Also, research showed increased theta in correct lexical identifications, but its monitoring was not investigated. We used magnetoencephalography (MEG) to study the brain activity underpinning memory monitoring of retrospective confidence judgments. Twenty-nine participants answered multiple-choice general knowledge questions and rated the confidence of their choice, while MEG was recorded. Mixed-effect linear models in the averaged single-trial responses showed a marginal difference for high versus low confidence answers in left dorso-parietal and occipital sensors at 260-320 ms after the presentation of alternatives. Signal power analysis in the 400-800 ms time window showed differences in theta band for low versus high confidence hits and miss trials. However, no differences were found for high hits and misses, which may reflect that in terms of monitoring, both answers are equal for participants. These results support the findings of increased theta power for correct semantic identification extending them to the monitoring processes. Supported by RSF grant 19 18 00534.

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12:00-1:00 pm (2446)

The Effect of Feedback Information on Metacognitive Regulation. MARTA SIEDLECKA and BORYSŁAW PAULEWICZ, *Jagiellonian University* – External and internal feedback information affects regulatory processes but is it also used to regulate metacognitive processing? In this preregistered study we tested the immediate effects of accuracy feedback on metacognitive regulation. Participants made a series of perceptual decisions followed by confidence judgments. In Experiment 1, accurate feedback was given in half of the trials. In Experiment 2, fake feedback information was given randomly. These procedures allowed us to disentangle the influence of feedback and other processes related to decision accuracy on the regulatory processes in the following trial. We expected lower confidence thresholds and increased response times in both decision and confidence rating tasks following negative compared to positive feedback, independently of previous decision accuracy. Moreover we expected increased response times following “metacognitive surprise” which is the discrepancy between perceived accuracy and feedback information. The results supported most of our hypotheses suggesting that feedback information is used not only to adjust lower-order processing but also to regulate metacognitive processes.

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12:00-1:00 pm (2447)

Examining Why Students Are Poor Predictors of Exam Performance: Heart Rate and Self-Assessment as Measures of Success. KEITH M. GORA, TRAVIS RICKS, and LI ZHOU, *Bemidji State University* – Krueger and Dunning suggest we are poor predictors of exam performance. They also suggest that we cling to our

prediction despite feedback contradicting it. This can be a detriment within the classroom, where the ability to predict performance could allow us to prepare more or less as needed. The present study explores some factors that make us poor predictors. Ninety-four students were given a screen-based mental rotation task (Shepard & Metzler). Trials were divided into three levels of difficulty (easy, medium, and hard). They were asked to predict performance before and after the task and to provide confidence ratings throughout (self-assessment data). Heart rate measures of attention were recorded as a measure of information processing (physiological data). A midtask intervention (either a distractor card-sort task or eight trials of the virtual mental rotation task in progress, but using physical objects held in hand) was given to see the effect of feedback. Students were divided into quartiles by the number of trials correct. Results suggest that performance is tied to the ability to intake and process visual information (physiological data), and the accuracy of prediction to the strategy employed (self-assessment data).

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12:00-1:00 pm (2499)

Impostors: Worth the Responsibility But Not Worth the Credit. LISA K. SON, *Barnard College*, JUNHEE KIM – Is the Impostor Phenomenon (IP) merely a constellation of internal feelings or are there observable, and more long-lasting, consequences? In the current study, participants were tested in pairs on a Pictionary-like task, and took turns being Drawer or Guesser – the former intended as a role higher in responsibility. After each successful trial, participants divided 3 points, however they wanted, between themselves and their partner. We found that while IP was more common in female participants, all participants displayed some degree of IP. Critically, we discovered that High Impostors gave fewer points to themselves than to their partners, particularly when Drawing. This was not so for Low Impostors, who allocated points equally. Moreover, if anything, High Impostors probably deserved more credit, as they performed slightly better than Low Impostors. Our data suggest that IP is more consequential than once thought, and that “due credit” should be re-examined.

12:00-1:00 pm (1347)

Dissociating Between Interruption and Awareness Effects of Thought Probes. LENA STEINDORF and JAN RUMMEL, *Heidelberg University* – Thought probes allow researchers to catch wandering minds in real time. As such probes interrupt participants’ trains of thought and make current mental processes (more) aware, we considered both interruption and thought awareness as factors which might influence thought reports. In two experiments, participants worked on various creative tasks including an incubation interval in which the experimental manipulation took place. In the thought-probe condition, participants’ thoughts were repeatedly probed, inducing interruption as well as awareness. In the pure-awareness condition, participants were asked to monitor their thoughts without any experimenter-induced interruptions. In the pure-interruption condition, participants were interrupted by trivia questions without the mention of thought processes. Participants in the thought-probe





and the pure-awareness condition retrospectively reported less wandering creativity thoughts than the pure-interruption and a baseline condition. The mere existence of thought probes thus changed later thought reports, and we consider increased thought awareness as the driving factor behind this effect.

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12:00-1:00 pm (2448)

Social Attention Is Modulated by Reciprocal Looking Behaviours During Social Interactions. FLORENCE MAYRAND, FRANCESCA CAPOZZI, and JELENA RISTIC, *McGill University* – Social interactions have a direct impact on our cognitive function. However, it remains unclear which mechanisms of nonverbal communication carry these influences. Here we investigated the role of dynamic nonverbal interactive behaviours. Participants first engaged in dyadic interactions where their eye movements were recorded. Then, each participant completed a gaze cuing task in which gaze cues of their interactive partner served as the stimuli. The amounts of interactive dyadic attentional behaviours – mutual engagement, social referencing, and participation—were extracted from the eye movements and were examined in relation with individual gaze following performance. When dyads engaged in more mutual engagement, gaze following increased on the gaze cuing task, with the amount of eye-to-eye mutual gaze being especially predictive of this behaviour. These results show that gaze behaviours during live interactions connect meaningfully with individual social behaviour and provide new insights into the role of gaze in real-life social interactions.

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12:00-1:00 pm (2449)

The Relations between Teacher-Child Closeness and Conflict in Preschool and Children's Outcomes in Kindergarten. TANYA M. PAES, ROBERT J. DUNCAN, DAVID J. PURPURA, and SARA A. SCHMITT, *Purdue University* – This study examined relations between teacher-child closeness and conflict in preschool and children's behavior problems, social skills, and executive function (EF) in kindergarten, and investigated whether these relations are moderated by parental education. The study also explored associations between teacher-child closeness and conflict and the subscales of children's behavior problems and social skills. The sample consisted of 126 preschool children ($M=56.70$ months, $SD=3.89$). Monthly family income ranged from \$0 to \$6,258 ($M=\$1,678.29$, $SD=965.06$). Thirty-nine percent of the children were African American, 29% were Caucasian, 18% were Hispanic, 11% were multiracial, and 2% were Asian. Regression analyses revealed that teacher-child conflict was related to poorer social skills in children, specifically lower assertion, lower engagement, and lower cooperation. Additionally, as conflict in the teacher-child relationship increased, EF decreased for children whose parents have a lower level of education. There was also a marginally significant moderator of the relation between teacher-child closeness and behavior problems where

high parent education served as a protective factor for low levels of teacher-child closeness.

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12:00-1:00 pm (2450)

The Effects of Social Exclusion on Task-Unrelated Thought. CAITLIN S. MILLS, AARON L. WONG, and MICHAEL P. PASCALE, *University of New Hampshire* – We conducted a set of two experiments to investigate how social exclusion impacts rates of task-unrelated thought (TUT) using the Cyberball paradigm. In experiment 1, participants ($N=282$) were randomly assigned to an inclusion (involved in 33% of throws) or exclusion condition (only 15% of throws) for roughly five minutes and were probed four times about their attentional states (off-task or on-task). In addition, half of the participants were informed that they were playing with other humans, whereas the other half were not. Regardless of social context, participants in the inclusion conditions had significantly lower rates of TUT than those in the exclusion conditions. In experiment 2, participants ($N=231$) were randomly assigned to either inclusion or exclusion while task demands were balanced by having participants press a button every time a throw was made by another player. Participants were again probed four times during the roughly five-minute session and reported whether they were off-task, having task-related interference, or on-task. Replicating experiment 1, participants in the inclusion condition reported being on-task significantly more often compared to participants in the exclusion condition.

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12:00-1:00 pm (2451)

Withdrawn

12:00-1:00 pm (2452)

Does Socioeconomic Background Influence the Prevalence of a Foreign Language Effect? ASALAH OBAID, RITA GROSS, and JEANETTE ALTARRIBA, *University at Albany, SUNY*, DINA EL-DAKHS, *Prince Sultan University* – Humans are faced with having to make decisions every day. Prior research (Cote et al., 2012) asserted that participants with a higher socioeconomic status (SES) favored utilitarian decisions in dilemmas. Further, Costa et al. (2014) suggested that emotions are reduced in a foreign language, thus, participants choose decisions that are more utilitarian when the dilemma is presented in a foreign language. The current study examined the effects of language and SES on judgment and decision-making. One hundred eighty Arabic-English bilinguals were surveyed via Qualtrics. Participants responded to either English, Arabic, or language-switching versions of the trolley and dootbridge dilemmas. SES, language background, and affect were assessed. It was hypothesized that Arabic-English bilinguals with a higher SES are more likely to make utilitarian judgments than participants with a lower SES, regardless of the language of the dilemma. Findings are discussed with reference to linguistic and cultural influences on decision-making.

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12:00-1:00 pm (2453)

The Effects of Belief Activation on Implicit Attitudes. DAVID A. WASHBURN and JENNA R. DONET, *Covenant College* – Associations between mental representations of categories facilitate performance, but also result in heuristic errors like stereotypes and prejudice. Successful interventions for reducing implicit bias have been reported, but such biases are more commonly resistant to elimination. We tested volunteers from an evangelical Christian college on a race-based Implicit Association Test (IAT) before and after an intervention. Between IAT tests, one group read and answered questions about denominational and scriptural beliefs on racial equality, social justice, and diversity. One control group read a similar passage, but about sexual identity rather than race. The second control group read an intervening passage about mesh wireless networks. Significantly ($p < .05$) faster responses were found for all three groups post- vs. pre-test. However, this change did not interact significantly with intervention condition or trial type. That is, the implicit-bias effect (longer black-good responses than white-good responses) was not affected by intervention. Activating positive race-category associations by making religious beliefs and values salient failed significantly to attenuate implicit negative associations regarding racial categories.

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12:00-1:00 pm (2454)

Prospective Cognitions of Chinese Immigrants in Canada: The Self, Country of Origin, and Country of Residence. CAS-SANDRA SKROTZKI, KARL K. SZPUNAR, and LIXIA YANG, *Ryerson University* – Prospective cognition is the ability to anticipate what may happen in the future. North Americans display a robust positivity bias when thinking about their own personal future (i.e., personal future thinking) but a negativity bias when thinking about the future of their country (i.e., collective future thinking; Shrikanth et al., 2018). A recent study found that Chinese university students instead report more positive than negative events in both personal and collective future thinking, likely due to differences between Chinese collective and Canadian individualistic cultures (Rosenblatt et al., 2019). The current study aimed to examine prospective cognitions for one's own future, and that of their country of origin (i.e., China) and host country of current residence (i.e., Canada). A sample of 357 Chinese immigrants in Canada completed a modified online future fluency task (Shrikanth et al., 2018). The results replicated the positivity bias in personal future thinking but did not find a negativity bias in collective future thinking for either country of origin or country of residence. The results shed important light on how acculturation may affect the prospective cognition of immigrants.

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12:00-1:00 pm (2455)

The Influence of Racial Indicators in the Media on Person Perception: An Unconscious vs. Conscious Bias Comparison. IBRAHIM DANIA, EMILY C. GLEATON, and RICHARD CATRAMBONE, *Georgia Institute of Technology* – Media is a powerful influencer of self and social perception, and irresponsible news reporting can lead to racial bias (Gottfried & Barthel, 2020; Sonnett

et. al., 2015). This study examined how the presence of racial indicators in news articles influences person perception by comparing people's unconscious bias with their conscious bias. We measured conscious bias by presenting 18 randomized excerpts of modified written news text about Black, White, and unidentified individuals to 277 college students. After each excerpt, participants rated whether and to what degree their perception of the presented group changed. To measure unconscious bias, participants took an implicit associations test (IAT), the scores of which presumably represent the intrinsic level of bias participants have toward Black and White people. Based on the results of the conscious bias Likert data, we found a significant change in person perception when including racial identifiers of Black and White individuals compared to the racially unidentified individuals.

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12:00-1:00 pm (2456)

The Role of Dyadic Interactions in Personal and Collective Future Thinking. YUCHEN LI, *University of Illinois Chicago*, KARL K. SZPUNAR, *Ryerson University* – Research on future thinking has focused on both personal future thinking about one's own life and collective future thinking about the fate of the world. A recent study has revealed a dissociation between the two types of future thoughts, specifically a positivity bias in personal future thoughts and a negativity bias in collective future thoughts (Shrikanth et al., 2018). The current study aimed to explore processes that can facilitate this dissociation, specifically the role of dyadic interactions. One hundred eight participants were asked to talk about their personal future and the collective future of the United States, either with a partner or on their own. The results supported that paired participants demonstrated an exaggerated negative bias in their collective future thoughts compared to individuals, possibly driven by more negative topics that paired participants came up with compared to individual participants. Contrary to past studies on collaborative recall of autobiographical memory, impression management, discomfort of sharing negatives, and mutual reinforcement, we did not find a positive bias in the personal future thoughts of pairs or individuals.

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12:00-1:00 pm (2457)

The Differential Effects of Manipulating Avatar Age and Gender in Level-1 and Level-2 Visual Perspective Taking. BEN FORD, ADAM W. QURESHI, REBECCA MONK, and DAMIEN LITCHFIELD, *Edge Hill University* – Level-1 visual perspective taking relates to whether something is visible to another, while level-2 denotes how the world visually/spatially appears, from another's position. A growing corpus of work suggests that the characteristics of the other person can affect performance on perspective taking tasks. For example, adults do not appear to spontaneously represent the level-1 perspective of children. Building on this research, this presentation reports our recent findings that explore the impact of avatar gender and age using level-1 and level-2 tasks. Results suggest that whilst such characteristics appear to modulate level-1 perspective taking, level-2 visuospatial task performance is only affected by





avatar gender/age at low angular disparity. This may suggest that the mental self-rotation required in level-2 perspective taking may reorient attention to spatial information, overshadowing any influence of avatar characteristics. These findings contribute to the debate on the spatial-versus-social nature of level-2 visuospatial processes and suggest limits to effect of avatar-characteristics.

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12:00-1:00 pm (2458)

Predictors and Implications of the Seductive Allure Effect on Gendered Findings. SARAH T. IRONS and SIMON FISCHER-BAUM, *Rice University* – Including neuroscience jargon in explanations of psychological findings makes findings more believable (Weisberg et al., 2008). This effect, known as the seductive allure effect, is exacerbated in gendered findings, and inclusion neuroscience jargon makes these findings more believable, more attributable to essential biology and less attributable to social factors, as compared to gendered findings without neuroscience jargon (Irons et al., 2020). While the seductive allure effect is consistently observed across individuals with a wide range of expertise in psychology, other factors that predict the size of an individuals seductive allure effect have yet to be fully explored. In this work, we evaluate how a number of social psychological factors (e.g., socioeconomic status, trait essentialism, social dominance orientation) interact with the seductive allure effect in gendered findings. Understanding the factors that result in a larger seductive allure effect might ultimately help mitigate seductive allure effect and reduce the consequences of interpreting gender differences in the brain as attributable to essential biology rather than the product of social factors.

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12:00-1:00 pm (2459)

Accepting the Positive or Rejecting the Negative? How Do We Maintain a Coherent and Positively Biased Self-View. JOSUE GARCIA-ARCH, MARC SABIO ALBERT, and LLUÍS G. FUENTEMILLA GARRIGA, *University of Barcelona* – Social feedback can shape one's trait self-knowledge, but little is known about how we regulate the impact of others' feedback to maintain a relatively coherent and positive self-view over time. Here, we asked if receiving positive and negative feedback changed one's beliefs for congruent or incongruent traits to self-concept and how these changes were weighted to positive (e.g., fair) and negative (e.g., selfish) traits. We found that participants updated their self-concept more toward desirable feedback about positive traits if it was congruent to one's self-view. However, we found that participants tended to update their trait evaluation against undesired feedback for congruent but negative traits. These results suggest that people preserve a stable and positive self-view by integrating social feedback asymmetrically—accepting favourable but repulsing unfavourable feedback from others.

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12:00-1:00 pm (2460)

Cultural Differences in Analogical Reasoning. AMRITPAL SINGH, SHIKUN SU, LUYANG JIANG, and DANIEL CASASANTO, *Cornell University* – According to a long-standing dogma, Westerners are more capable of thinking abstractly than East Asians. Here, we challenge this generalization by comparing U.S. and Chinese adults in a paradigm case of abstract thinking: analogy. Chinese and American participants completed the most difficult set of Raven's (2003) Standard Progressive Matrices (SPM), a widely used test of analogical reasoning. For each item, participants attempted to discern the analogical relationships between parts of an incomplete matrix to identify the correct way to complete it. Chinese participants produced significantly more correct answers on the SPM, indicating more successful analogical reasoning. We replicated this result with a second sample of Chinese participants. This crosscultural difference remained significant when demographic factors were controlled. We predicted this difference, reasoning that East Asians' sensitivity to context gives them an advantage over Westerners in various kinds of abstract thinking.

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12:00-1:00 pm (2461)

The Influence of Monetary Rewards on the Social Inhibition of Return Effect. ORIT NAFCHA, ERAN E. DORFMAN, SIMONE SHAMAY-TSOORY, and SHAI GABAY, *University of Haifa* – Aggregated literature explores the influence of reward on inhibition of return (the delayed response to previously attended locations); however, its effect on the social inhibition of return (SIOR; e.g., slower reaction times toward locations already acted upon by another agent) is yet to be determined. In two experiments, we have explored the influence of monetary reward on the SIOR effect. Would a reward following an action toward a specific location, acted upon by another agent, influence the performance of the participants? In particular, would the magnitude of reward (high vs. low reward feedback) influence the social effect? The results indicated that the co-actor's previous reward modulated the SIOR effect such that the SIOR was larger when acting after the co-actor earned a high reward in the previous trial. This finding provides a novel indication of the influence of reward on social inhibition through basic reflexive cognitive processes.

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12:00-1:00 pm (2462)

Causal Attributions Are Influenced by Perceived Ethnicity. NAFISEH FAGHIHI and AUSTIN BIEHLE, *Texas A&M University*, CECILIA G MELO, *MedCare Pediatric Group, LP*, OMAR GARCIA, *Texas A&M University* – People construe events based on implicit meanings conveyed by the verb's type and valence as who is likely to have caused an event: the subject or the object role. The role that possesses greater social power is also more likely to be attributed causality. Moreover, different names identifying different ethnicities were shown to affect evaluations of competence and success. We investigated whether participants perceived names that implied different ethnicities (White vs. Hispanic) as equally able





to cause outcomes in interpersonal interactions. After reading sentences (X verbs Y) with subject and object names implying different ethnicities (White vs. Hispanic), participants assigned causality to either the subject or the object. In addition to the main effects of verbs' type and valence, we found a main effect of perceived ethnicity. Attributed causality to the subject role was significantly greater when the subject of a sentence was a White rather than a Hispanic name.

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12:00-1:00 pm (2463)

The Influence of Culture on Boundary Extension Across Semantic Consistency and Scene Perspective. WANCHEN ZHAO, *Brandeis University & Yale University*, AYSECAN BODUROGLU, *Boğaziçi University*, ANGELA GUTCHESS, *Brandeis University* – Boundary extension (BE) occurs when people remember a scene as more extended (Intraub & Richardson, 1989). Semantic incongruency attenuates this error (Mamus & Boduroglu, 2018). We examined cultural difference in BE across semantic consistency and viewing conditions, based on findings that East Asians pay more attention to the relationship between the background context and object whereas Westerners focus more on individual objects. In Experiment 1, American and Chinese participants viewed and rated the perspective of scenes with semantically consistent or inconsistent contextual information. To further test the contribution of semantic contextual information, background information was removed in Experiment 2. Results indicated that Chinese, compared to Americans, exhibited attenuated BE when they rated close-up scenes that had been either close-up or wide-angle in the encoding phase. In addition, Chinese showed more BE when they would be expected to exhibit boundary contraction. Semantic consistency did not account for these cultural differences. The results indicate that culture can influence boundary extension, although this does not seem to reflect cultural differences in sensitivity to semantic consistency.

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12:00-1:00 pm (2464)

Strong Functional Connections from the Cingulate Cortex to the Intuitive Physics Network in Autism Spectrum Disorder. ANA NAVARRO-CEBRIAN, *University of Maryland, College Park*, TASKINUDDIN FORKAN, ELLIE PEARSON, KRISTIN RALSTON, and JASON FISCHER, *Johns Hopkins University* – Previous studies have suggested that some people with autism spectrum disorder (ASD) have a superior understanding of physical causality (intuitive physics). Recent work has identified a set of brain regions that are active when people perform intuitive physics tasks. Additionally, we have found that a part of the dorsal anterior cingulate cortex (dACC) is richly interconnected with this intuitive physics network. Due to the role of the dACC in task switching, we believe that this connectivity could be associated with the engagement of the physics network when, based on the context and a person's goals, the system prioritizes a physics task over other possibilities. In the present experiment, we compared the connectivity of the dACC and the

intuitive physics network in a group of 22 children with ASD and 33 controls. We found that the dACC is more connected to two parietal areas within the physics network ($p=0.005$, corrected) in individuals with ASD. The stronger connections between dACC and physics brain areas in ASD may indicate a prioritization of physics vs. other types of actions. Future studies may investigate whether the interactions of dACC and physics are driven by salience, motivation, and other factors regulated in the ACC.

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12:00-1:00 pm (2465)

Withdrawn

12:00-1:00 pm (2466)

Congruency and Restudy Impact Memory and Monitoring During Map Learning. LAUREN A. MASON, KISHANDRA A. PATRON, and AYANNA THOMAS, *Tufts University*, GEORGE L. WOLFORD II, *Dartmouth College*, HOLLY A. TAYLOR, *Tufts University* – The present study examined how metacognitive monitoring and context congruency impact landmark memory. In Experiment 1, participants studied landmark word pairs in isolation or in the context of maps. After each pair, participants either provided a judgment of learning (JOL) or made an unrelated response (RNG). In Experiment 2, participants studied landmark pairs once or three times. After studying all pairs, participants made cue-only JOLs or RNGs. All participants took a standard cued-recall test without maps. Data from both experiments suggests congruency between study and test contexts aids memory and JOL groups trend toward higher memory accuracy. In Experiment 2, repeated studied yielded higher average JOLs than single study. Together these data replicate classic transfer appropriate processing findings with more complex spatial stimuli, suggest that monitoring learning may support memory for landmark names, and propose that participants rate themselves more likely to remember these materials following repeated exposure.

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12:00-1:00 pm (2467)

Reference Frames for Spatial and Social Cognition. SUNG-JOON PARK, BRANDON WATANABE, and HEATHER BURTE, *Texas A&M University* – People use perspectives, or reference frames, when solving both spatial and social problems. For spatial problems, we can take an egocentric perspective to understand how objects relate to ourselves, or we can take an allocentric perspective to understand how objects relate to each other. Similarly, people use perspectives when thinking about other people. We are sometimes egocentric and assume that other people will think and act the same way as we would. Other times, we are more allocentric and we can account for the fact that other people might think and act differently. While perspectives are used in both spatial and social situations, it is not clear whether their cognitive functions are related. To study this, we recruited 250 participants for an online study where they performed a perspective taking task, a false-belief task, and a series of questionnaires probing their personality, anxiety, and visualization





ability. We found that different personality facets contribute to spatial versus social cognitive abilities. This suggests that perspective taking in a spatial and social settings is influenced by factors related to different personality facets.

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12:00-1:00 pm (2468)

Strategy Differences in Spatial Visualization Assessments. HEATHER BURTE, VICTORIA ARISMENDI, CHLOE FACKLER, and HALEY E. JIRCIK, *Texas A&M University* – Spatial visualization—the skill of mentally imagining and manipulating objects—has been frequently measured using the Paper Folding Test (PFT; Ekstrom, French, & Harman, 1976). PFT problems are composed of a series of images where a paper is folded and a hole is punched through it. The objective is to identify the correct spatial arrangements of hole punches after the paper is unfolded. A recent article identified four strategies that people could use to solve the PFT and found that people do not solely use a spatial visualization strategy when completing the PFT (Burte, Gardony, Hutton, & Taylor, 2018). Could people be using strategies other than spatial visualization on similar assessments? Using the strategies identified in the PFT, the current research examines if the use of alternative strategies is related to performance on other spatial visualization and mental rotation tests: Surface Development, Card Rotations, Cube Comparisons, and Foam Board. This research provides recommendations for updating assessments to identify cognitive strategies and to better assess spatial visualization skills.

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12:00-1:00 pm (2469)

Does GPS Use Impair Navigation Skills? Insights from a Cohort Analysis. CHUANXIUYUE HE, JOHN PROTZKO, ALEXIS KUNZ, JONATHAN SCHOOLER, and MARY HEGARTY, *University of California, Santa Barbara* – With the prevalence of global positioning systems (GPS), there is a growing concern that we may be losing our navigation abilities by relying too much on GPS technologies. Overreliance on GPS also may be related to increased spatial anxiety. One way to investigate these issues is via cohort effects. In this study, we examine navigation ability and spatial anxiety of those who learned to drive before and after GPS technologies were widely used by the public. We surveyed 873 adults (age: 18-70; male: N=358) on measures of GPS use, spatial anxiety, and self-reported sense of direction. Results indicated that, even after controlling for personality traits and intelligence, GPS use and spatial anxiety decrease with age, while self-reported sense of direction increases with age. Moreover, for participants under 35 (who had GPS available in their early driving years), GPS use was negatively related to sense of direction (-.28). However, this correlation was significantly weaker (-.06) for participants in the 35-70 age range. These results are consistent with the concern that younger adults may be negatively impacted by GPS in developing their navigation abilities and consequently experience more spatial anxiety due to reliance on GPS.

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12:00-1:00 pm (2470)

Different Perspectives: How Spatial Dispositions and Navigation Scenarios Affect Use of GPS Functionalities. ALEXIS KUNZ, CHUANXIUYUE HE, JOHN PROTZKO, JONATHAN SCHOOLER, and MARY HEGARTY, *University of California, Santa Barbara* – There is increasing concern that using a global [ositioning system (GPS) while navigating may impede the development of navigation ability. Previous research indicates that GPS dependency is positively correlated with spatial anxiety and negatively correlated with self-reported sense of direction (SOD; He & Hegarty, 2020). Here, we investigate this relationship further by examining how individuals differing in spatial anxiety and SOD use GPS for different purposes (e.g., turn-by-turn directions while traveling, route planning, and traffic estimates). We also examine whether people modulate their use of GPS based on familiarity with the route they are navigating. We replicate the correlations of GPS dependency with spatial anxiety and SOD found previously. Preliminary novel results indicate that spatial anxiety and SOD correlations exist for multiple GPS uses, including turn-by-turn navigation and traffic estimates, and that people of all spatial ability and anxiety levels reduce their use of GPS in more familiar environments.

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12:00-1:00 pm (2471)

Boundary Extension Replicates in Samples from South Korea and China. MARGARET P. MUNGER, SERENA XINYU HU, and SEUNG GON YOO and KRISTI S. MULTHAUP, *Davidson College* – Boundary extension (BE) is a small anticipation about the edges of a scene. When shown and asked to remember a photograph, including the background, individuals later inaccurately evaluate the exact same photograph to be a closer angle than earlier. BE is extremely robust and not influenced by top-down manipulations like imagining more or less of the presented scene (Munger & Multhaup, 2016). An open question, however, is whether the phenomenon is culturally bound. As East Asian individuals are shown to be more sensitive to the context of a scene than Western individuals (Masuda & Nisbett, 2006), we predicted less BE (higher accuracy) in East Asian compared with Western participants (more BE errors). To our knowledge, we are the first to assess BE in non-Westerners, specifically adults recruited from coffee shops around Busan and Seoul, South Korea (n=36) and around Beijing, China (n=36), with Westerner comparison samples recruited on our campus outside Charlotte, NC (n=36 for each). All four groups showed significant BE, with no differences between cultures. The reliable pattern of performance across three cultural contexts is consistent with the idea that boundary extension is a human cognitive universal.

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12:00-1:00 pm (2472)

Visual Perspective Taking Without Visual Perspective Taking. STEVEN SAMUEL, *University of Plymouth*, MADELINE J. EACOTT and GEOFF G. COLE, *University of Essex* – Visual perspective taking (VPT) is the ability to make judgments about the viewpoint of another person. We examined how people solve VPT





problems, specifically whether they did so using an agent-centred or stimulus-centred approach. We consider that, minimally, a representation of another agent's visual experience should be agent-centred, which means considering the stimuli in terms of the perception of them. This contrasts with a stimulus-centred approach, in which an operation is performed on the stimuli in the belief that this might then lead to a correct judgment about a perspective. We showed adults images of a woman looking at a number upside down and then asked them what number she had seen. Between 12%-21% of the time participants responded that the agent had seen "96" when both the agent and participant had seen "69." No-one saw "96." This error is explainable in terms of a stimulus-centred strategy of inverting each digit one at a time. Coupled with low overall accuracy and the difficulty in ascertaining whether correct responses are necessarily from agent agent-centred approaches, these results suggest adults are content to apply stimulus-centred strategies to problems ostensibly about visual experience.

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12:00-1:00 pm (2473)

The Temple Tour: Relating Episodic Memory and Spatial Navigation in Children and Adults. KIM V. NGUYEN and NORA S. NEWCOMBE, *Temple University* – Navigation and episodic memory are two fundamental cognitive processes that guide mature decision-making. Conceptually, they are linked by reliance on accurate retrieval of spatial and temporal context and accurate integration of different types of information. However, the extent and nature of interdependence at behavioral and neural levels are unclear, with some recent evidence suggesting they are mechanistically distinct. In this study, we investigate how spatial navigation and episodic memory relate to each other behaviorally, both in young adults and in children. We developed a real-world tour task in which children (8-9 years) and young adults take a guided walk through a novel environment and encode sixteen distinct events. We assess their knowledge of the environment and episodic recollection of the events. Linear modeling and group-level comparisons will shed light on how these two systems are related and how spatial abilities map onto episodic memory. We will present results in a full adult sample and a partial child sample. Our work teases apart how these two systems relate overall and componentially.

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12:00-1:00 pm (2474)

Superadditive Integration of Information on Distances to Landmarks in Spatial Memory. GORDON G. MCINTIRE and STEPHEN C. DOPKINS, *The George Washington University* – Does spatial memory for a target location work the same relative to multiple landmarks as relative to only one landmark? This study looked at whether a participant remembering a target's distance from two landmarks processes information neither landmark provides by itself and whether the absolute or relative distances to the landmarks form the basis of spatial memory. Experiment 1 placed one landmark, two landmarks separately, or two landmarks together alongside the target. If the landmarks were together, but not if they were separate, spatial

memory efficacy exceeded the union of the efficacy levels with each landmark by itself. Experiment 2 placed two landmarks left of the target and moved them apart in the testing phase. Participants placed the target where the relative distances, but not the absolute distances, to the landmarks implied it was.

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12:00-1:00 pm (2475)

Withdrawn

12:00-1:00 pm (2476)

The SNARC Effect in the Presence of Avatars. CHRISTIAN BÖFFEL and CLARA HERBST, *Rheinisch-Westfälische Technische Hochschule (RWTH) Aachen University*, OLIVER LINDEMANN, *Erasmus University Rotterdam*, JOCHEN MÜSSELER, *Rheinisch-Westfälische Technische Hochschule (RWTH) Aachen University* – Avatars often provide spatial reference frames that are known to influence information processing. Previous studies demonstrated compatibility effects from the avatar's point of view. However, it remains unknown whether these effects are influenced by changes in response codes. In two experiments we combined a spatial numerical association of response codes (SNARC) task and a spontaneous visual perspective taking task to quantify the influence of response coding on avatar-related compatibility effects. Participants performed parity judgments in the presence of an avatar similar to classic studies of SNARC effects. In Experiment 1, we added avatar hand movements as action effects that could be regarded from the avatars point of view, and we observed a SNARC effect based on the avatar's perspective. Because number magnitude was independent of the avatar's point of view, the observed pattern of compatibility effects indicated changes in response coding. In Experiment 2, the action effects were absent, and we did not observe a significant SNARC effect relative to the avatar's position. The study is one of the first to demonstrate that the spatial mapping of numbers can be influenced by reference frames of avatars. However, the presence of action effects appears to be crucial.

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12:00-1:00 pm (2477)

Examining Effort in 1D Uncertainty Communication Using Individual Differences in Working Memory and NASA-TLX. HELIA HOSSEINPOUR and LACE PADILLAA, *University of California, Merced*, SAM QUINAN, *University of Utah* – Prior work demonstrates mixed performance outcomes with respect to how individuals make decisions using various visual and textual depictions of uncertainty. In this work, we advance the debate surrounding the efficacy of modern 1D uncertainty visualizations by conducting converging quantitative and qualitative analyses of both the effort and strategies used by individuals when provided with quantile dotplots, density plots, interval plots, mean plots, and textual descriptions of uncertainty. We utilize a measure of individual differences in working-memory capacity (OSPAN task) and self-reports of perceived workload (NASA-TLX). The results reveal that both visualization





methods and working-memory capacity impact participants' decisions. Specifically, quantile dotplots and density plots (i.e., distributional annotations) result in more accurate judgments than interval plots, textual descriptions of uncertainty, and mean plots (i.e., summary annotations). When comparing quantile dotplots to density plots, this work finds that both methods are equally effective for low-working-memory individuals. However, for individuals with high-working-memory capacity, quantile dotplots evoke more accurate responses with less perceived effort.

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12:00-1:00 pm (2478)

Negative Aftereffect for Distance But Not for Time Estimation in an Egocentric Navigation Task. TAKU OTSUKA and YUKO YOTSUMOTO, *The University of Tokyo* – While accurately estimating the distance and time is crucial for navigation, whether they are processed by shared or separate mechanisms remains to be clarified. Here, we investigated the adaptation effect on distance estimation and on time estimation. In the experiments, the participants observed the forward motion in a VR environment. In Experiment 1, the participants were exposed to the distance-adaptation stimuli and reproduced the target distance, or were exposed to the time-adaptation stimuli and reproduced the target time. We found the negative aftereffect for the distance reproduction; after the exposure to a shorter distance, the test distance was overestimated, and after the exposure to a longer distance, the test distance was underestimated. However, no such aftereffect was found for the time reproduction. In Experiment 2, to examine whether the aftereffect in the distance reproduction could partially result from the adaptation to the time that covaried with the distance, we separately manipulated the time and distance. The results suggested that the aftereffect was in fact induced by the adaptation to the distance. These results indicate that distance and time are processed separately in virtual navigation.

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12:00-1:00 pm (2479)

Withdrawn

12:00-1:00 pm (2480)

No Evidence for Unconscious Perceptual Processing When the Experimental Conditions Are Equivalent. GARY D. FISK, *Georgia Southwestern State University*, STEVEN J. HAASE, *Shippensburg University* – Unconscious perception studies typically compare sensitivity from an awareness condition (e.g., masked prime stimulus judgments) to a perceptual processing condition (e.g., priming effects on target judgments). Although popular, minor methodological differences between the conditions can create interpretation problems. The present experiment equalized the awareness and priming condition characteristics to the highest possible degree. Lexical decisions (words vs. nonwords) of prime and target stimuli were collected for pattern-masked prime stimuli presented at short (16 ms), medium (51 ms), and long (103 ms) durations. The short prime duration had very little prime awareness (Cohen's $d=.06$), as well as very

little categorical priming (Cohen's $d=.02$). In contrast, the long duration had huge prime awareness (Cohen's $d=2.42$; Sawilowsky, 2009) and a small to medium priming effect (Cohen's $d=.38$). Altogether, the findings do not support an unconscious processing interpretation. The necessity of equivalent conditions is discussed.


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12:00-1:00 pm (2481)

Attentional Allocation and the Pan-Field Color Illusion. LANA OKUBO, *The University of Tokyo*, TAKAHIRO KAWABE, *NTT Communication Science Laboratories*, KAZUHIKO YOKOSAWA, *The University of Tokyo* – People subjectively experience the entire visual field in rich colors despite the limited color sensitivity of the peripheral retina (pan-field color illusion). Balas and Sinha (2007) reported that observers frequently failed to detect the achromatized region in peripheral vision. We hypothesized that the pan-field color illusion results from response bias caused by insufficient visual attention to peripheral vision. We manipulated the observer's attention allocated to peripheral vision by changing the attentional load of a central RSVP task using a dual-task paradigm. Observers were shown full-color or chimera images in which only the central region was colored as the secondary peripheral task and were asked to respond with the image type. Analysis using signal detection theory indicated that the higher attentional load of the central task led to lower sensitivity to the peripheral task, suggesting the successful manipulation of attentional load in this experiment. However, the attentional load did not consistently modulate response biases. We concluded that attention plays only a minor role in the pan-field color illusion.

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12:00-1:00 pm (2482)

Biasing the Average: Exploring the Role of Attention in Ensemble Processing. KRISTINA S. KNOX and JAY PRATT , *University of Toronto*, JONATHAN S. CANT, *University of Toronto Scarborough* – Ensemble processing allows the visual system to condense visual information into useful summary statistics (e.g., average size), thereby overcoming capacity limitations to visual working memory and attention. To examine the role of attention in ensemble processing, we conducted two experiments. In Experiment 1, we created a novel paradigm that merged the action effect (a manipulation of attention) and ensemble processing. Participants were instructed to make a simple action if a cue word (i.e., "Large" or "Small") corresponded to the size of a subsequent shape. Immediately after, they were shown an ensemble display of eight ovals of varying sizes and were asked to report either the average size of all ovals (ensemble task) or the size of a single oval from the set (single task). In Experiment 2, we controlled for any response bias in Experiment 1 by cueing participants with colour words rather than size (e.g., "Yellow" or "Blue") and having them make an action if the colour of a subsequent shape matched the cue. Overall, the cues that elicited an action biased reports of average size in the ensemble task more than the cues that





were passively viewed. This suggests that attention is involved in ensemble processing.

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12:00-1:00 pm (2483)

Grouping by Proximity and Brightness: Evidence for Sequential Processing. ROBERT C. JOHANSSON and ROLF ULRICH, *University of Tübingen* – Gestalt grouping impels simple elements of visual scenes to aggregate into meaningful wholes. In this study, the coaction of grouping by proximity and similar brightness level was investigated with a speeded filtering task. People indicated with a button press whether an array of visual targets was parsed into rows or columns. Proximity and brightness could indicate either the same (cooperation trials) or the opposite (conflict trials) response. Performance on baseline trials served as an empirical benchmark against which to assess conflict and cooperation effects. We found that judgments of grouping by common brightness level were both facilitated by cooperation and impeded by conflict. Proximity judgments were on the other hand largely unaffected by the brightness configuration of the array—except for a quite unexpected baseline facilitation effect. These results are presented in relation to possible latent cognitive architecture and stopping-rule for perceptual grouping. In particular, we discuss implications for current theoretical accounts of visual grouping, which suggests two sequentially organized stages of processing: an initial spatial analysis stage, followed by a subsequent feature analysis stage.

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12:00-1:00 pm (2484)

Characterizing and Dissecting Human Perception of Scene Complexity. CAMERON KYLE-DAVIDSON, SOPHIE SKELTON, ADRIAN G. BORS, and KARLA K. EVANS, *University of York* – Human perception of everyday scene complexity is not well characterized. To this end we assemble and evaluate new scene datasets based on human complexity ratings and two-dimensional complexity maps for 800 upright and 800 inverted real scene images. Inverting scene images, associated with degradation of semantic scene characteristics, allows examination of the impact of semantics on perceptual complexity. We assess a set of perceptual features (clutter, symmetry, entropy, and openness) previously associated with complexity, finding only clutter and symmetry sufficiently characterize human perception of scene complexity. By employing deep neural networks (DNNs), we capture semantics and through a combination of our isolated features and DNNs we can explain all human variance in our complexity dataset. Finally, we develop a deep neural model for 2D complexity prediction and dissect our prediction network to determine which semantic properties are encoded by “black-box” deep neural features when predicting human perception of complexity.

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12:00-1:00 pm (2485)

The Dark-Is-More Bias under Semantic and Numeric Conflicts in Colormap Data Visualizations. MELISSA A. SCHOENLEIN, ALEXIS SOTO, and KAREN B. SCHLOSS, *University of Wisconsin-Madison* – When interpreting colormap data visualizations, people infer that darker colors map to larger quantities (dark-is-more bias). However, conflicts can arise in congruency between numeric and conceptual magnitude (i.e., larger numeric magnitude corresponds to smaller concept magnitude). For example, if number of seconds is used to represent the concept speed, larger numbers correspond to less speed. Under such conflicts, does the dark-is-more bias operate at the conceptual or numeric level? In a series of experiments, participants interpreted colormaps with conflicts between numeric and conceptual magnitude. If conceptual magnitude was labeled in the visualization, response times to correctly interpret the colormaps were faster when darker colors were mapped to more of the concept, suggesting the dark-is-more bias operated at the conceptual level. However, if concept labels were not labeled in the visualization, the dark-is-more bias operated at the numeric level. Thus, to understand people’s inferences about lightness quantity mappings when interpreting numeric values in data visualizations, it is necessary to consider what concepts those numbers represent and the saliency of those concepts in the visualization.

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12:00-1:00 pm (2486)

Covert Recognition of Familiar Faces in an Interocular Suppression Task. MANUEL MEJIA RAMIREZ, *Centro de Enseñanza Técnica y Superior (CETYS) University*, MITCHELL J. VALDES-SOSA and ANTONIETA BOBES-LEON, *Cuban Neurosciences Center* – Brain lesions that impair face perception may leave some residual face identity processing, known as covert recognition, which has been studied via psychophysiological measures (EDA, ERP, and fMRI). In prosopagnosic patients with this residual processing, these measures show differential responses to familiar and unfamiliar faces. Covert recognition has been proposed to rely upon a dorsal route in neural models of face perception. To study if this dorsal route functions similarly in people without brain lesions, in this study we re-created covert recognition in healthy participants. Participants discriminated between images of faces and buildings, then recognized if they were familiar or unfamiliar. Stimuli was visible or suppressed with continuous flash suppression. Comparing participants’ accuracy, confidence and pupil responses across visibility conditions, we show that even when participants’ sensitivity to recognize familiar faces is lowered in suppressed stimuli, pupil dilation differentially responds to familiar faces but not familiar buildings. This familiarity effect only to faces is interpreted as a model of covert recognition in healthy participants to be used in further studies of the dorsal route of face perception.

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12:00-1:00 pm (2487)

Using Visual (Un)Crowding to Study Surface Completion in Peripheral Vision. QINGZI ZHENG and CATHLEEN M.





MOORE, *University of Iowa* – Compared to central vision, peripheral vision is vulnerable to clutter. This means that when stimuli are presented in peripheral vision, it is difficult to identify a target that is flanked by additional clutter (i.e., visual crowding). Recent studies have shown that when additional flankers were added such that they could be perceived as grouping with the flankers immediately adjacent to the target, the extent of visual crowding was reduced (i.e., uncrowding). In the present study, we used uncrowding to test whether surface completion occurs in the periphery. We defined surfaces with illusory edges that if completed would support uncrowding. Across three experiments, however, we observed no uncrowding from surfaces that required perceptual completion. These results suggest that surface completion does not occur in peripheral vision.

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12:00-1:00 pm (2488)

Temporal Crowding at the Fovea: Online and Lab Studies. TOMER SAHAR, *The Open University of Israel & University of Haifa*, YAFFA YESHURUN, *University of Haifa*, TAL MAKOVSKI, *Open University of Israel* – Target identification is impaired when distractors appear before- and after the target but at the same location. The stream of stimuli creates “crowding” in the temporal domain, which cannot be explained by masking. Here we examined which aspect(s) of visual processing is impaired by temporal crowding using mixture-model analysis. Participants saw a sequence of three orientated lines at the center of the screen with varying intervals between the stimuli (200–400 ms). Their task was to adjust the probe to match the target’s (the second line) orientation. The experiments were conducted online and validated at the lab. Both settings extended previous temporal crowding findings to foveal presentation: Temporal-crowding impaired the precision of target report and increased substitution errors, even with the longest interval. These findings challenge the common belief that crowding is unique to the periphery and demonstrate that temporal crowding can be studied reliably with online experiments.

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12:00-1:00 pm (2489)

Misperception of Length Caused by a Symmetric Contextual Distractor. VILIUS MARMA, ALEKSANDR BULATOV, NATALIJA BULATOVA, and EDGARAS DIRŽIUS, *Lithuanian University of Health Sciences* – The aim of the current study was to further develop a quantitative model of the filled-space illusion and test it to account for the effects caused by stimuli containing an unconventional form of contextual distractor. Illusion was measured as a function of the radius of the distracting circle positioned symmetrically with respect to lateral terminator of the three-dot stimulus. Data obtained in two different series were fitted with relevant functions of the model. It was shown that the model satisfactorily describes all changes in the illusion magnitude for stimulus with the outlined circles and the uniformly filled circles. In addition, it has been demonstrated that the illusion magnitude varies predictably with the size of the circle, and there is no significant difference between the data obtained for stimuli with the outline and filled

distractors. A good correspondence between the experimental and theoretical results supports the suggestion that the context-evoked augmentation of neural excitation can determine the occurrence of the filled-space illusion.

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12:00-1:00 pm (2490)

Limited Evidence for Individual Differences in Low-Level Visual Perceptual Processing Preferences. NICOLAS ROTHEN, ALODIE REY-MERMET, REBECCA OVALLE-FRESA, and THOMAS P. REBER, *UniDistance Suisse* – According to one of the most influential models of visual processing, two distinct pathways originate from the primary visual cortex: the ventral visual pathway and the dorsal visual pathway. The ventral visual pathway is related to processing information associated with object recognition. By contrast, the dorsal visual pathway is related to processing information associated with spatial information. Despite the seminal impact of the two-pathways model, empirical evidence for individual differences in low-level visual processing preferences (i.e., ventral vs. dorsal) is scarce. Hence, the goal of the present research was the creation of a reliable and valid questionnaire assessing individual differences in ventral vs. dorsal visual processing. Therefore, we tested approximately 400 adults from the general population who rated a set of statements on basic visual processing preferences and performed verbal and spatial memory tasks. Preliminary results show limited reliability and validity of the measurement scale, highlighting the difficulty in assessing low-level visual processing with questionnaires.

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12:00-1:00 pm (2491)

Effects of Aging and Hearing Loss on Identity and Emotion Perception and Stimulus Interference in Faces. MO CUI, EUGENIE ROUDAIA, BJÖRN HERRMANN, and ALLISON B SEKULER, *Rotman Research Institute, Baycrest* – Successful recognition of facial identity relies primarily on information in the top-half of a face. The identification of some emotions (e.g., happiness and disgust) relies more on the lower-half. Whereas younger adults (YAs) can flexibly extract information from relevant regions depending on the task, older adults (OAs) are less consistent in this ability. One reason may be that OAs attend more to visual information from the lips to aid speech perception due to hearing loss. We evaluated hearing abilities and both identity and emotion perception of faces in 94 YAs and 200 OAs, when identity and/or emotion could be either consistent or different across comparator faces. OAs outperformed YAs for emotion perception, while the opposite trend was found for identity. Identity changes didn’t interfere with either group’s emotion perception, but OAs’ identity perception was more interfered by emotion changes than YAs. Both suggest OAs extract more information from the lower-half of a face regardless of the task. In OAs, worse hearing was related to lower face perception performance, but not to the interference. Hearing ability and age predict facial identity and





emotion perception, but only age predicts the interference between the two.

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12:00-1:00 pm (2492)

Figure-Ground Perception with Color in Monocular and Binocular Vision. JAESEON SONG and JAMES M. BROWN, *University of Georgia* – It is debatable whether optical chromatic aberrations (i.e., longitudinal and transverse chromatic aberrations) are the primary determinant of the phenomenon of red images tending to be perceived as figure/nearer. If the impact of chromatic aberrations were additive and critical in figure-ground (f/g) perception, the experience produced by the defocus (particularly blue-behind-green and red-in-front-of-green, if any) would be more prominent under binocular than monocular viewing conditions. We explored f/g perception under binocular and monocular viewing, testing every possible pairing of red, blue, green, and gray. Red regions were perceived as figure longer than any color in all experiments consistent with previous findings and the prediction from chromatic aberrations. Blue regions were perceived as ground longer than green and gray under monocular but not binocular viewing, inconsistent with the prediction from chromatic aberrations. With binocular vision, colored regions tended to be seen in front of gray sectors, which also cannot be fully explained by chromatic aberrations. Our results suggest the brain may be adapted to chromatic aberrations from both eyes and diminish their impact on perception.

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12:00-1:00 pm (2493)

Bear Rock: Tom Thomson’s “Islands, Canoe Lake, 1916”; N. Wade and J. J. Gibson. JOHN M. KENNEDY, *University of Toronto* – Tom Thomson is a doyen of Canadian arts. He was also idiosyncratic. In his *Islands, Canoe Lake, 1916*, a rock resembles the head of a bear. The bear-rock is in keeping with nature’s stones. They can only offer low-fidelity representation (Gibson, 1979) e.g. St. Kilda’s cliff profile (Scotland), Snowdonia’s Pitts’s Head (Wales), Cave Hill’s profile of Napoleon (Belfast), Italy’s Elephant Rock, and perhaps Iceland’s Elephant-Head Rock. Like burnt toast and clouds, and whether boulders, cliffs, or hills, rocks are low-fidelity representations, and, recent in evolution, deliberate high-fidelity depiction is artificial. In Thomson’s era, ambiguous figures were in wide circulation (Wade, 2017), but, in a Scottish verdict, one can’t be sure the bear was meant, though the resemblance, overlooked for a century, is unmissable once pointed out.

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12:00-1:00 pm (2494)

Cognitive Control in Location—and Arrow-Based Simon Tasks. NAHYUN LEE, *Korea University*, YANG SEOK CHO, *Korea University* – The present study investigated whether conflict

caused by different modes of task-irrelevant spatial information are controlled in a common mechanism in Simon tasks. Participants were to perform horizontal arrow-based and vertical location-based Simon tasks alternately in a trial-by-trial manner with unimanual aimed movement responses in Experiment 1 and horizontal location-based and vertical arrow-based Simon tasks in Experiment 2. Significant congruency sequence effects (CSE), which refer to a smaller congruency effect after incongruent trials than after congruent trials, were found between the arrow- and location-based Simon tasks regardless of their orientations, indicating a shared control mechanism involved in resolving conflicts caused by different modes of spatial information. Distributional analyses demonstrate decreasing delta functions in the location-based Simon tasks and increasing or constant delta functions in the arrow-based Simon tasks. These findings reveal that although arrow- and location-based Simon effects are based on spatial codes with different dynamic functions, response conflicts elicited by arrow and location are controlled in a shared mechanism.

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12:00-1:00 pm (2496)

Withdrawn

12:00-1:00 pm (2497)

Generating Memory Cues for Others: Effects of Aging, Theory of Mind, and Language Ability. BEATRICE G KUHLMANN, *University of Mannheim*, M. KYLE MATSUBA, *Kwantlen Polytechnic University*, SHIH-CHIEH CHEN, *Simon Fraser University*, DANIEL M. BERNSTEIN, *Kwantlen Polytechnic University* – Tullis and Benjamin found younger adults increase the normative cue-to-target associative strength when asked to generate memory cues for someone else (versus themselves). Adopting their paradigm, we examined effects of aging, theory of mind (ToM), and language ability. In a German laboratory study with native speakers, older adults (M=72 years) did not increase associative strength of cues for others and generally generated lower strength cues than younger adults. In an English online study, there were no such age differences when comparing older adults (M=66 years) with high language proficiency to less proficient younger adults (despite controlling for language ability in all analyses). In the older online sample, self-other cue differentiation in associative strength positively correlated with affective, but not cognitive, ToM and there was a trend for a negative correlation with age. Overall, the results suggest small age-related declines in generating normative cues for others that are offset by older adults’ affective ToM and language proficiency.

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12:00-1:00 pm (2498)

Withdrawn





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