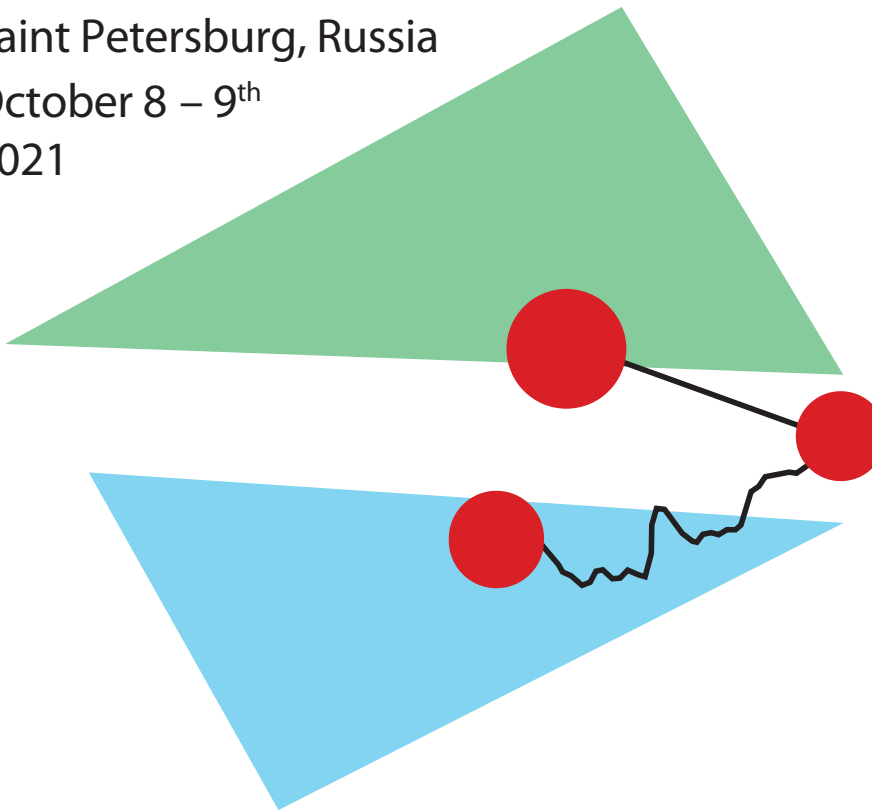
Proceedings of the 5th International Conference on

NEUROBIOLOGY OF SPEECH AND LANGUAGE

Saint Petersburg, Russia
October 8 – 9th
2021



Organised by the Laboratory of
Behavioural Neurodynamics,
Saint Petersburg State University

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October, 2021

Edited by Olga Shcherbakova

СКИФИЯ
ПРИНТ

Saint Petersburg, Russia

Neurobiology of Speech and Language. Proceedings of the 5th International Conference on Neurobiology of Speech and Language / Ed. by O. Shcherbakova.— St. Petersburg: Skifiya-print, 2021.— 78 p.

ISBN 978-5-98620-560-1

Front cover by Alexander Kirsanov

Abstracts' compilation and verification
by Varvara Averyanova, Ekaterina Blinova

Management and coordination by Ekaterina Perikova

Web page: http://cogneuro.spbu.ru

Supported by the grant of the Government of the Russian Federation
№ 14.W03.31.0010 (P.I. Y. Shtyrov)

ISBN 978-5-98620-560-1

FLASH TALKS SESSION 1

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Let's imagine: The abstractness of an iconic text and processing of semantic mismatch

There is some evidence that the role of pictures in comprehension of iconic texts may depend on the abstractness of the ideas described in a text. Although this process is mostly verbally-oriented (Hochpöchler et al., 2013), concrete and detailed pictures can distort reader's representation of a text's content (Schüler et al., 2019) due to their high imagery potential. In this study, we used semantic mismatch paradigm (by adding some mismatch between verbal and iconic parts of a text) to investigate the role of pictures in processing of iconic texts. We hypothesized that it may be influenced by the degree of text's abstractness.

During the experiment, participants (N = 26; 65% — females; aged 18 – 29, M = 21.1) read 2 texts that differed in (1) abstractness (concrete/ abstract) and (2) word-picture matching (with/ without semantic mismatch in the last slide out of 8 stimuli ones). Eye-movement data was collected with EyeLink 1000+ (500 Hz). Eye movements during reading the last slides of the texts were analyzed using Welch's t-test and ANOVA.

There were no differences in reading time (RT) for abstract text related to the semantic mismatch ($t = 1.982$, $df = 21.048$, $p = .060$), but RT for concrete text was significantly longer ($t = -2.348$, $df = 20.961$, $p = .029$) in case its verbal and iconic parts were mismatched ($M_m = 17.16$, $M_{mism} = 25.83$). Significant interaction was observed between two factors: text's abstractness and word-picture matching for the number of fixations on verbal parts of the texts ($F(1, 47) = 6.907$, $p = .012$). Participants made much more fixations on matched version of the abstract text ($M_m = 60.57$, $M_{mism} = 45.69$) and on mismatched version of the concrete one ($M_m = 53.42$, $M_{mism} = 71.36$). The same effect was found for the number of word-picture transitions ($F(1, 47) = 7.831$, $p = .007$). Participants switched more often between words and pictures when working with matched version of the abstract text ($M_m = 5.07$, $M_{mism} = 3.83$), but for the concrete text this pattern was reversed ($M_m = 4.25$, $M_{mism} = 7.29$).

Thus, we conclude that text-picture semantic mismatch is identified better in texts describing concrete ideas. It may be explained by specifics of mental imagery processes. Presumably, while working with concrete texts, participants rely on the in-text pictures, whereas their own mental representations are preferable in case of reading abstract texts.

Supported by the grant of the Government of the Russian Federation №14.W03.31.0010.

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Understanding of a text: Digital vs. printed format

Digital environment challenges a reader's cognitive patterns involved in information processing, and, particularly, imposes new requirements on the reading process. For instance, hyperlinked materials increase the cognitive 'cost' of reading in digital environment (Kerr et al., 2006), and the lack of familiar physical (paper) environment makes it difficult to build up a cognitive map of the text (Shi et al., 2020). We hypothesized that the level of understanding of a text presented in digital environment may differ from that of a text presented in traditional printed environment. In particular, we expected lower levels of understanding of a digital text as compared to its printed analogue.

60 volunteers (native Russian speakers, 39 females, mean age 20±0.6) participated in the study. They were randomly assigned into one of three groups, which were presented with stimulus text (short popular article) in either (1) digital, (2) hybrid (e-document with no hyperlinks), or (3) printed format.

The task was to read the text and then answer questions of a written test aimed at assessing the level of text's understanding. Following that, we conducted a semi-structured interview to assess the amount of cognitive efforts invested by each participant into understanding of the text's meaning. Additionally, we used Raven's Standard Progressive Matrices