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# Speech features and communication skills of children with autism spectrum disorders

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# The study aims

- The goal of the study is to find out the data about the correlation between psychophysiological characteristics and neurological state of children, typically developing (TD) and children with autism spectrum disorders (ASD), and speech features and verbal communications with adults

# Method

## Participants of this study:

1. Children with **ASD** (ICD - F84), aged 5 - 12 years (n= 30)
2. Typically developing children (**TD**), aged 5 -12 years (n=140)

# Childhood Autism Rating Scale - CARS

(Shopler et al., 1986)

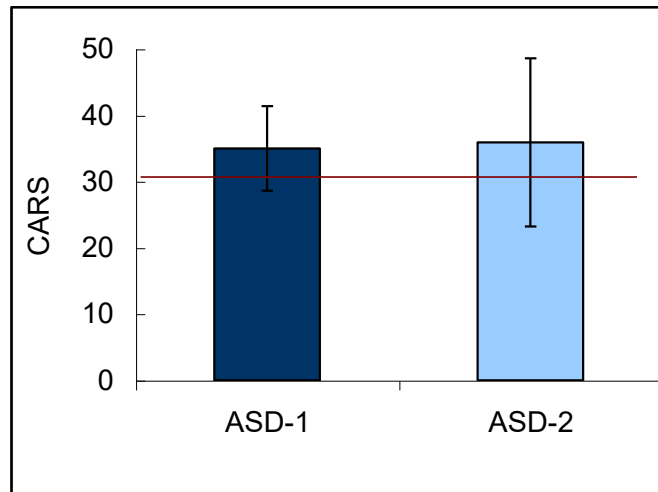
## ASD

### Group -1 (ASD-1)

presence of  
development  
reversals at the age  
1.5-3.0 years

### Group - 2 (ASD-2)

the developmental risk diagnosed at  
birth: ASD – is a symptom of  
neurological diseases associated with  
brain disturbed



**31-37 – mild form**  
**38-60 - severe form of  
autism**

The ASD group don't differ significantly on the base of CARS scores and psychophysiological tests on the stage divided child into groups

# Recording situation

1. Dialogue with the experimenter;
2. Playing with a standard set of toys
3. Watching a cartoon "Masha and bear" and the retelling of the story
4. The pictures description and answers to questions on the pictures

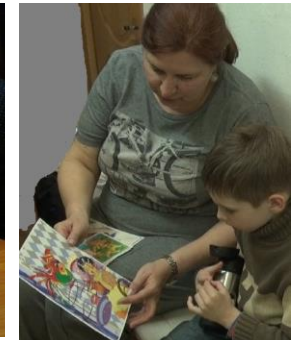
TD children



ASD children

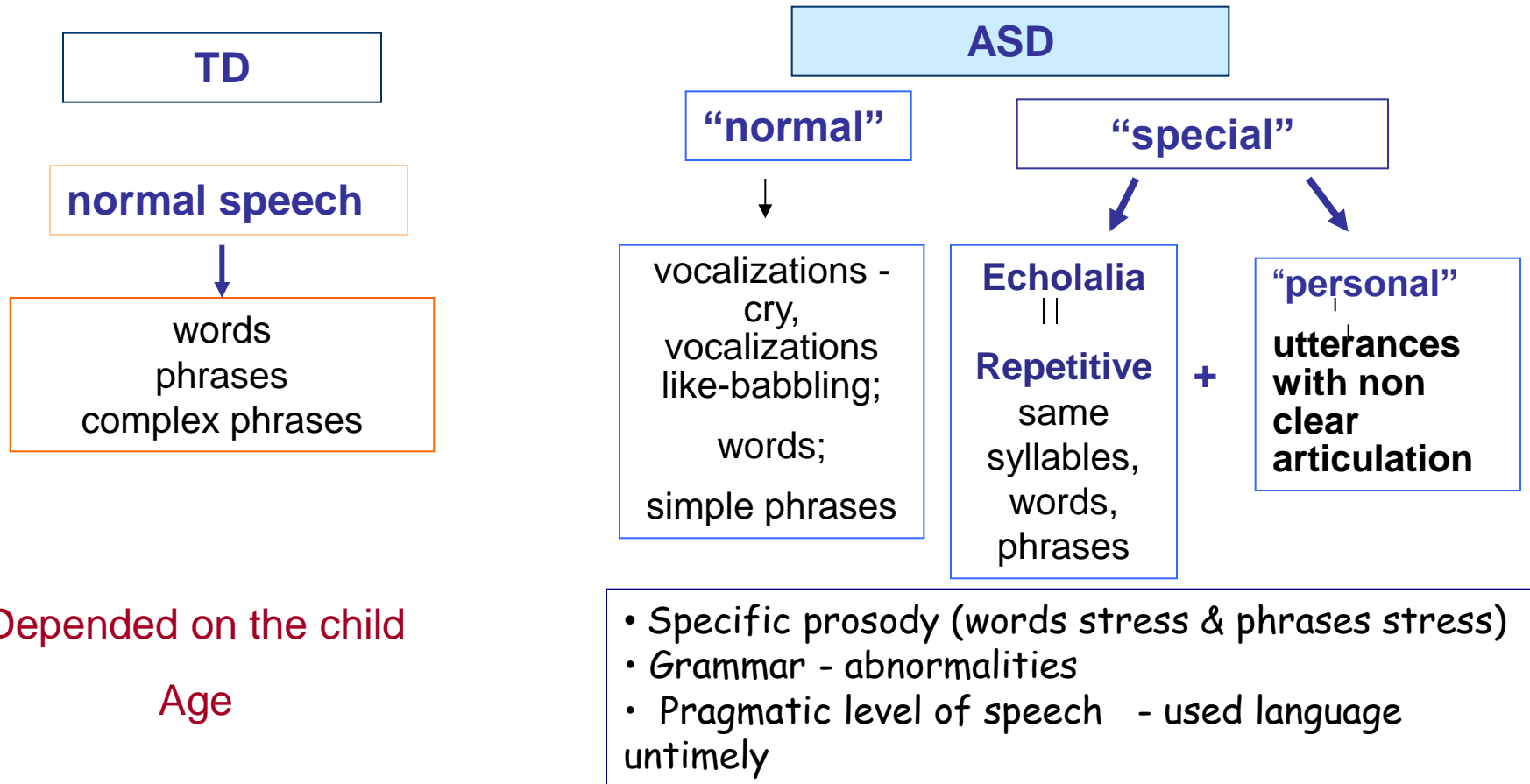


ASD –swimming  
in the pool –  
removal of  
stress



places of recording were: at home, laboratory, kindergarten, school, & swimming pool

# Speech & language



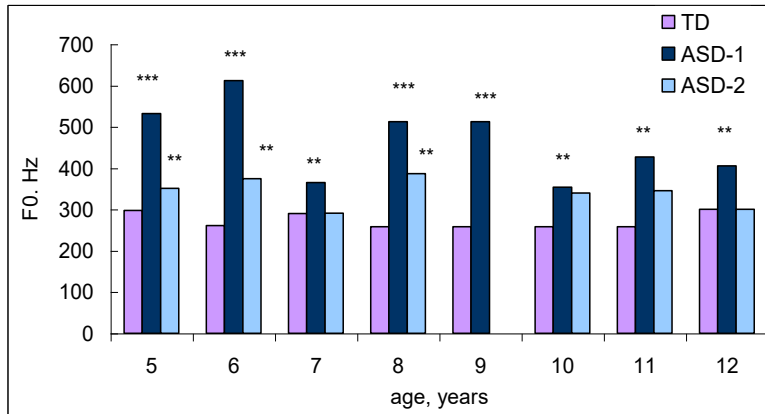
Depended on the child

Age

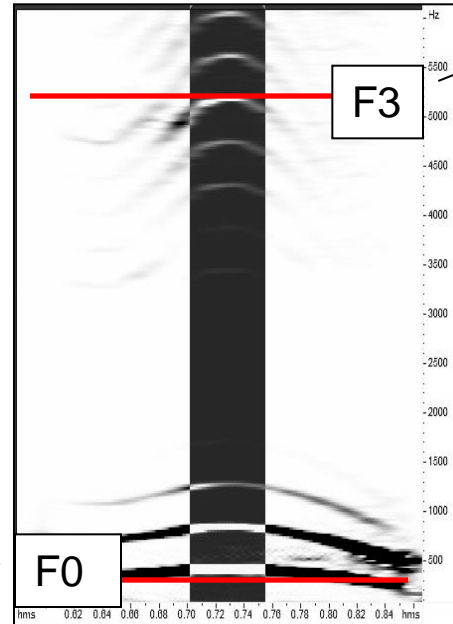
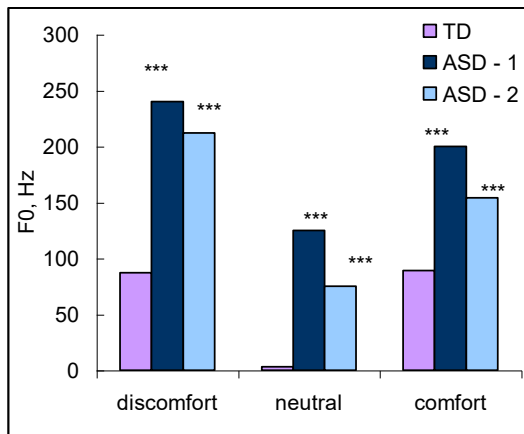
Correlation between CARS scores and level of speech  
(vocalizations, syllables, simple words and phrases)  
 $F(1,35)=10,634$   $p<0.002$ —Multiple regression

# Acoustic features specific for ASD child speech

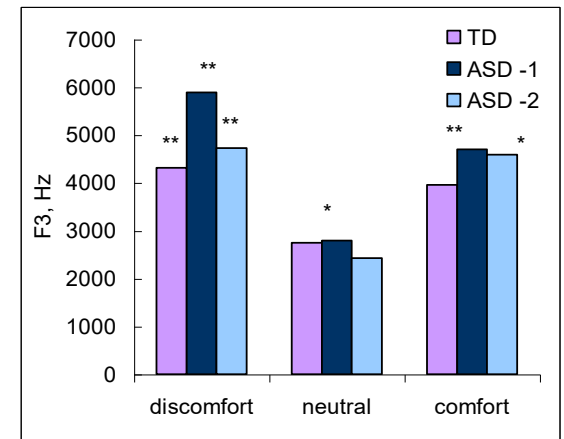
## 1. High values of pitch



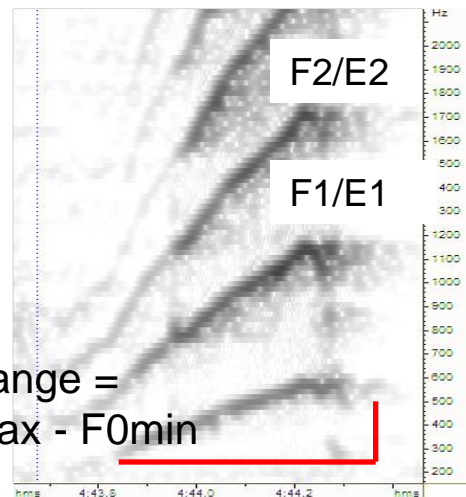
## 2. Pitch variability [F0max-F0min]



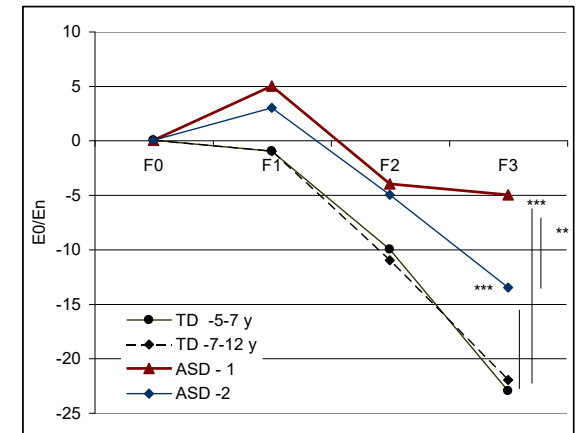
## 3. High values of F3



## 4. Well-marked the intensity of the third formant (E3)

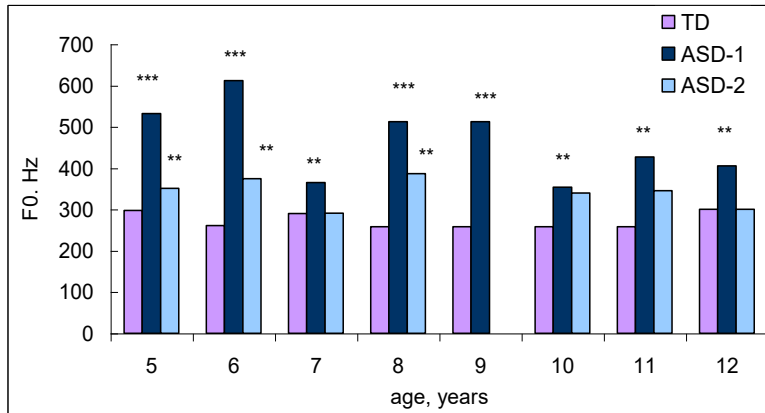


F0 range =  
F0max - F0min

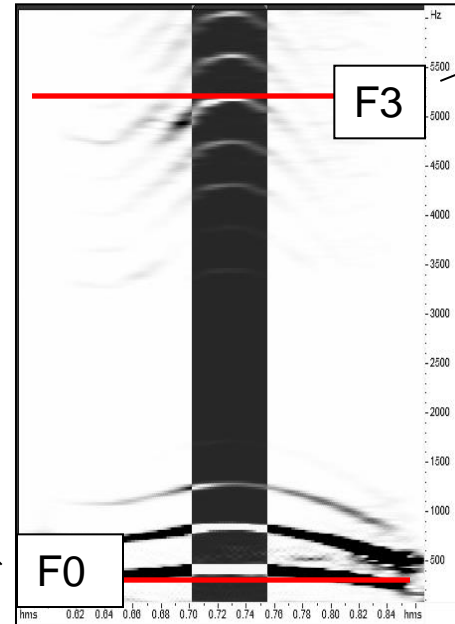
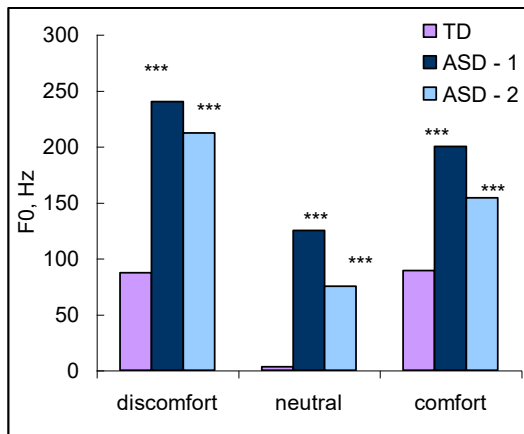


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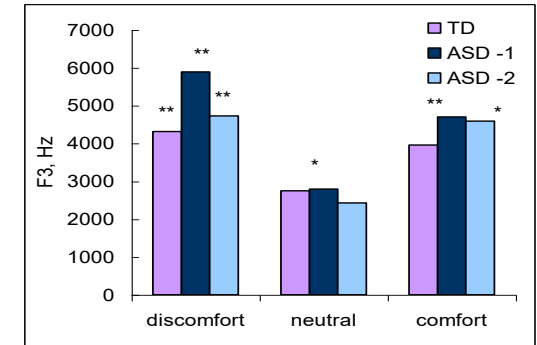
## 1. High values of pitch



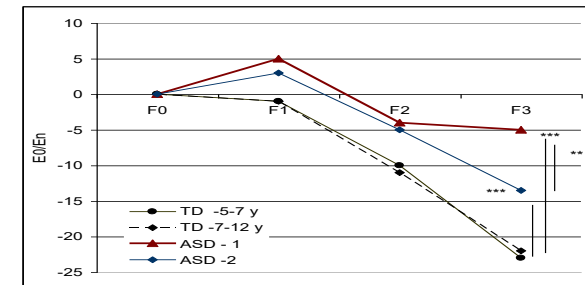
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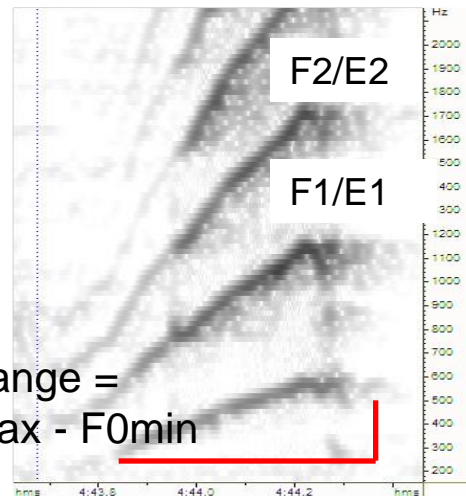
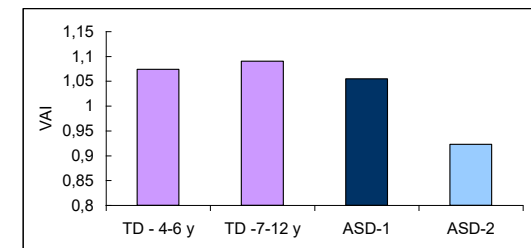
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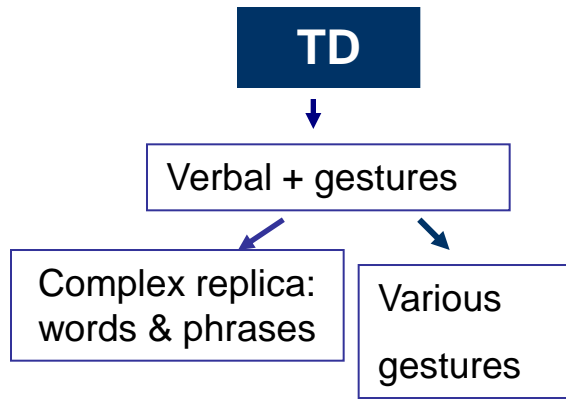
## 5. Vowel articulation index (VAI)



F0 range =  
F0max - F0min



# ASD child communication vs. TD

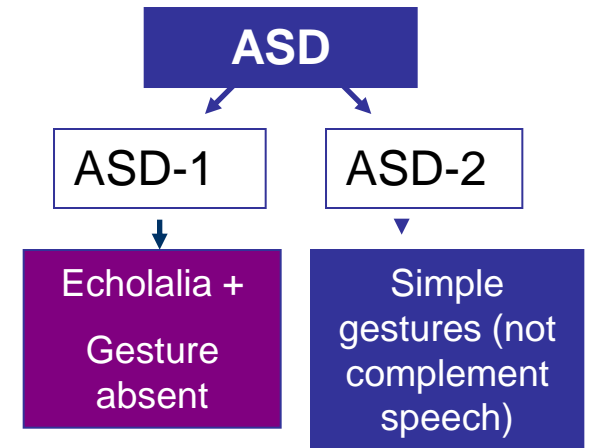


Depended on the child age:

Correlation (Spearman  $p < 0.05$ ) between the TD child's age and ability to retell the story (0.583);

ability to retell story with complex phrases  $F(1,14) = 6,593$   $p < 0,02$  (Beta = 0,565  $R^2 = 0,320$ ) - Regression analysis

- Limited communication
- Echolalia
- Non-functional language
- Concrete language
- Pronoun confusion
- Gestures do not complement speech
- Limited repertoire of emotions
- Absent/unusual eye contact



Correlation between CARS scores, and child ability to describe the picture / show images  $F(1,35) = 13,265$   $p < 0.000$  - Multiple regression

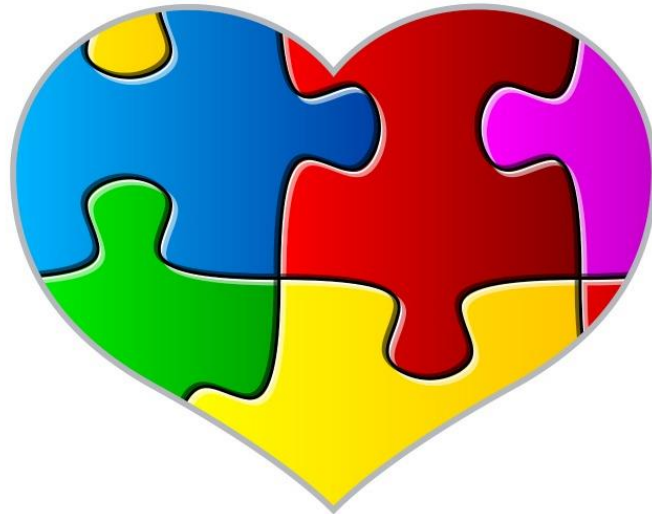
# Core characteristics of ASD

- Correlations between physiological indicators at the birth (gestation and Apgar scores) and at the current state, scores on the CARS, phonemics hearing, and ASD groups and speech features are revealed.

# Conclusion

- The study results could be used in the construction of adult - ASD child interaction with considering the psychophysiological and neurological state of a child.

Thank for yours attention!



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