Proceedings of the 4<sup>th</sup> International Conference on

# NEUROBIOLOGY OF SPEECH AND LANGUAGE

Saint Petersburg, Russia November 13–14<sup>th</sup> 2020

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

### Proceedings of the 4<sup>th</sup> International Conference on Neurobiology of Speech and Language

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

November, 2020

Edited by Olga Shcherbakova



Saint Petersburg, Russia

**Neurobiology of Speech and Language**. Proceedings of the 4<sup>th</sup> International Conference on Neurobiology of Speech and Language / Ed. by O. Shcherbakova.— St. Petersburg: Skifiya-print, 2020.— 76 p.

ISBN 978-5-98620-483-3

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. Yu. Yu. Shtyrov)

ISBN 978-5-98620-483-3

© Authors, 2020

Svetlana Alexeeva, Vladislav Zubov
First dyslexic font in Russian: Evidence of efficiency and new questions 20
Anna Chrabaszcz, Dengyu Wang, Witold J. Lipski, Alan Bush,
Julie A. Fiez, R. Mark Richardson
Processing of words and pseudowords in the thalamus and the
subthalamic nucleus
Hannah Marlatte, Jed Meltzer, Malcolm Binns, Asaf Gilboa
Individual differences in prior knowledge application during word
learning: A mechanistic Bayesian model
SLIDE SESSION 3
Marta Vergara-Martínez, María Fernández-López,

mana vergana mantinez, mana i emanaez hopez,
Montserrat Comesaña, Manuel Perea
Can we identify a word by its upper half? ERP correlates of letter
degradation during word recognition25
Daria Gnedykh, Diana Kurmakaeva, Nadezhda Mkrtychian,
Evgeny Blagovechtchenski, Svetlana Kostromina, Yury Shtyrov
Differential effects of tDCS of Wernicke's area and its right hemisphere
homologue on contextual acquisition of novel words
Sofya Goldina, Anastasiya Lopukhina, Anna Laurinavichyute, Olga Dragoy
Eye movements during reading in Russian-speaking children with dyslexia 28
Nina Zdorova, Anastasiya Lopukhina, Olga Vedenina, Sofya Goldina,
Anastasiia Kaprielova, Vladislava Staroverova, Ksenia Bartseva, Olga Dragoy
Phonological and orthographic processing affect reading fluency in
Russian children

#### **SLIDE SESSION 4**

Sergei Oganov, Alexandr Kornev
Different types of regressions as a text processing skills indicator:
Eye-tracking study of reading in 9–11 years old dyslexics
Melanie Labusch, Manuel Perea, Sonja Kotz
The impact of capitalization of German nouns on semantic processing32
Elizaveta Sokolenko, Svetlana Malyutina
The effect of different types of semantic cues on word retrieval success in
tip-of-the-tongue states
Hana Jee, Monica Tamariz, Richard Shillcock
Systematicity in language35

#### **FLASH TALKS SESSION 1**

*Elizaveta Galperina, Olga Kruchinina, Ekaterina Stankova, Natalia Shemyakina, Zhanna Nagornova, Alexandr Kornev* Maturational changes of ERP N400 and P600 components elicited by repeated written words in children, adolescents, and adults ......37 Sofya Goldina<sup>1</sup>, Anastasiya Lopukhina<sup>1</sup>, Anna Laurinavichyute<sup>1</sup>, Olga Dragoy<sup>1</sup> <sup>1</sup>National Research University Higher School of Economics

## Eye movements during reading in Russian-speaking children with dyslexia

Dyslexia is a developmental reading disability that impedes reading fluency and text comprehension (Benfatto et al., 2016) and is believed to stem from phonological deficit, visual attention span deficit or a combination of both (Zoubrinetsky et al., 2014). This study aimed to investigate the influence of phonological skills and word properties on eye movements during reading in Russian children with phonological dyslexia compared to the control group of typically developing children.

Primary school students with diagnosed phonological dyslexia (N = 29, mean age = 9.5) and typically developing controls (N = 47, mean age = 8.5) participated in our study. We ensured that all controls read normally according to the Standardized Assessment of Reading Skills in Russian (Kornev, 1997). Phonological processing skills were assessed using the Russian Test of Phonological Processing (RuToPP; Dorofeeva et al., 2019). In the eye-tracking experiment, all children silently read 30 sentences comprising the child version of the Russian Sentence Corpus (Laurinavichyute et al., 2019) while their eye movements were recorded.

Overall children with dyslexia read slower than controls, and were more likely to skip a word (p = .003). Older children read faster, however, this effect was less prominent in children with dyslexia (p = .02). Children with dyslexia spent more time on longer words compared to controls (p = .01). We also found that greater amplitude of the incoming saccade correlated with shorter reading time, which was amplified for children with dyslexia (p < .001). Difficulties with the most complex phonological task in RuToPP correlated with longer fixations, which was more prominent in children with dyslexia (p = .05).

Difficulty with the complex phonological task and the effect of the amplitude of the incoming saccade in children with dyslexia could indicate that impaired phonological processing as well as problems with targeting the optimal landing position in a word prevented them from reading effectively. We also found that only the effect of word length was strongly distinguished between children with dyslexia and controls, whereas the effect of the other word properties needs to be investigated further.

This work was supported by the Russian Foundation for Basic Research (research grant № 17-29-09122).

Nina Zdorova<sup>1</sup>, Anastasiya Lopukhina<sup>1</sup>, Olga Vedenina<sup>1</sup>, Sofya Goldina<sup>1</sup>, Anastasiia Kaprielova<sup>1</sup>, Vladislava Staroverova<sup>1</sup>, Ksenia Bartseva<sup>2</sup>, Olga Dragoy<sup>1</sup> <sup>1</sup>National Research University Higher School of Economics <sup>2</sup> Sirius University of Science and Technology

### Phonological and orthographic processing affect reading fluency in Russian children

Reading, as a complex cognitive skill, implies processing of visual and linguistic information. At early stages of learning to read children rely more on the phonological information, whereas more advanced readers tend to rely more on the orthographic information (Grainger et al., 2012; Ziegler et al., 2014). The aim of the present study is to investigate how phonological and orthographic processing skills as well as age influence reading fluency in Russian-speaking children.

81 Russian monolingual children at the age of 7–12 years (grades 1–5) performed three behavioral tests. First, reading fluency (i.e. the number of words read in one minute) was assessed by the Standardized Assessment of Reading Skills (Kornev, 1997). Second, the level of phonological processing was evaluated by the Changing Sound in a pseudoword test (Dorofeeva et al., 2019), in which the participants were asked to replace a specific phoneme in an auditorily presented pseudoword with another given phoneme. Third, orthographic processing was assessed by the Rapid Automatized Naming of Digits task (RAN; Denckla, Rudel, 1974), in which we recorded the amount of time spent on naming 50 digits.

Linear regression analysis of the data was performed in R (version 4.0.2). We discovered a significant correlation between reading fluency and