GOVERNMENT OF THE RUSSIAN FEDERATION
SAINT PETERSBURG STATE UNIVERSITY

Neurobiology of Speech and Language

Proceedings of the 2nd International Workshop

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

September, 2018

Edited by Olga Shcherbakova, Yury Shtyrov

СКИФИЯ
ПРИНТ

Saint Petersburg, Russia

Neurobiology of Speech and Language. Proceedings of the 2nd International Workshop "Neurobiology of Speech and Language".— St. Petersburg.: Skifiya-print, 2018.— 76 p.

ISBN 978-5-98620-323-2

Front cover by Alexander Kirsanov
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.

ISBN 978-5-98620-323-2

Approved for printing 25.10.2018.
Printers sheets — 4,75. Offset paper.
Order 5569. Number of copies printed — 40.
Printed by «Skifiya-print» printing office

197198 St. Petersburg, B. Pushkarskaya str.,.10, build.A., room 32-H

Contents

Morphological Processing Across the Lifespan: Evidence from an Illusory Conjunctions Paradigm

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The major question in morphological processing is the mechanism of recognition of multi-morphemic words, i.e. whether they are accessed as a single unit (full-listing models; Butterworth, 1983), via decomposition into morphemes (full decomposition models; Taft, Forster, 1975), or via a combination thereof (dual-route models; Schreuder, Baayen, 1995). Recent research suggests that the mechanisms of morphological processing change across the lifespan, namely, reliance on direct access increases with age (Reifegerste et al., 2016). The goal of our study is to track these changes across three age groups.

The participants were 20 adolescents (11-14 y.o.), 36 younger (19-30 y.o.) and 16 older (60-80 y.o.) native speakers of Russian. An illusory conjunctions paradigm (Prinzmetal et al., 1991) was used: a word printed in 2 colors shortly appeared on the screen, then reappeared in black font and participants indicated the color of the underlined letter. Accuracy rates were analyzed. The stimuli included 120 adjectives, divided into 6 conditions: errors were expected when there was a mismatch of the morphemic and color boundary: i.e. the target letter differed in color from the rest of the morpheme. There were also control mono-morphemic nouns and fillers.

The experiment revealed a main effect of age ($F(2,69)=9.69$, $p<.001$; younger adults were more accurate than older people or adolescents), condition ($F(5,65)=15.92$, $p<.001$) and a significant Age x Condition interaction ($F(10,132)=2.06$, $p=.032$): conditions had different effects across age groups. Paired t-tests in adolescents ($t(19)=2.31$, $p=.032$), younger ($t(35=3.43$, $p=.002$) and older ($t(15)=3.00$, $p=.009$) people revealed lower accuracy in case of color-morphemic mismatch only when the color boundary was after (younger, older) or before (adolescents) the morphemic boundary. However, the pattern held for equivalent conditions in control nouns, showing that the effects in adjectives were not due to morphological decomposition. Also, significantly more errors occurred with violation of the syllabic, rather than morphemic boundary ($p<.005$ in all age groups).

No crucial differences in processing of multi-morphemic words were revealed across the age groups. Moreover, morphological effects were obscured by syllabic effects, suggesting that morphemes are not the most prominent sublexical processing units and that decomposition into morphemes is not obligatory in recognizing multi-morphemic words in a single-word task.

Grant number: 18-312-00101 (RFBR)

Neural Correlates of Fast Mapping of Novel Words Through a Single Exposure: An ERP Study

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Rapid new word acquisition could be mediated by general learning mechanism known as *fast mapping* (FM). FM refers to a process of incidental exclusion-based learning which promotes rapid integration of newly learned items into cortical memory networks. Recent neuroimaging research in adults emphasized that FM may induce rapid neocortical plasticity to create novel word-object associations, largely supported by the left temporal lobe (Atir-Sharon et al., 2015). While several ERP studies suggested an increase of early activity in fronto-temporal cortical networks as an index of rapid learning of novel word forms after a mass exposure (Shtyrov, 2011; Kimppa et al., 2015), the neurophysiological mechanisms of FM still remain poorly understood. The objective of the present study was to identify ERP correlates of FM in adults.

Ten right-handed native Russian speakers were presented with four acoustically and phonetically similar CVC triphones: 2 familiar words (*k'it* - whale; *kot* - cat) and 2 phonologically legal novel word forms (*kat; k'et*). In a passive trial, the stimuli were binaurally presented through the headphones in pseudo-random order. In FM condition the subject was asked to identify one object among pictures of 5 animals presented on the screen. This could either be a familiar word-object pair (e.g., goose, horse, cat), or, critically, a new word paired with a novel item displayed beside 4 pictures of familiar animals; following this, passive EEG recording was repeated. 32-channel EEG was recorded and ERPs were calculated relative to stimulus onsets.

Amplitudes analysis was carried out for fronto-central electrode cluster. A significant increase in the ERP amplitude over the 192-460 ms window was found for the novel word used when comparing the response before and after the FM condition ($F(1, 9) = 6.737$; $p = 0.029$). Furthermore, ERP amplitude was significantly increased over the left hemisphere in the late (368-460 ms) segment ($F(1, 9) = 7.540$; $p = 0.023$).

We propose that FM promotes incidental rapid integration of new associations into existing neocortical semantic networks as has been indicated by the rapid changes in ERPs present after a single exposure to a novel item. Future studies are needed to generalize the current result to larger stimulus groups and to clarify the neuroanatomical underpinnings of this mechanism and its implementation in children.

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