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NON-WORDS REPETITION IN RUSSIAN-SPEAKING CHILDREN WITH LANGUAGE IMPAIRMENT: REACTION TIMES PATTERNS

Повторение псевдослов у русскоязычных детей с отклонениями в развитии речи: время реакции

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Abstract

The abstract aims to provide additional information on the performance of two groups of children on non-words repetition task previously described in Ruhl et al., (2018) study. The task is a parallel (Russian) version of the original (Italian) subscale from the battery of tests aiming to assess language development in children from 4 to 11.11 y.o. (Marini et al., 2015). The abstract adds to the description of participants' performance and analyses some of the most common patters demonstrated both by children from experimental and control group. Several examples discussed in terms of reaction times. Some of potential reasons underlying such performance are also explored.

Key words: *language assessment, Russian, children, non-word repetition task, language impairment.*

Introduction

Speech and language skills play crucial role in an overall development of a person. Their assessment and proper intervention planning are especially important during childhood when the basis of communication skills is built. Modern societies require a solid refreshment of the tools available for speech and language development assessment in children. There is no "golden standard" for speech and language assessment procedures in Russian language, as there is no agreement among specialists in child language research and speech therapists on the common

assessment practices and tools for diagnostic purposes (Eliseeva, 2017; Astaeva & Berebin, 2012; Polinsky, 2006).

The focus of the present abstract is on the Non-words repetition (NWR) task. The abstract adds to the presentation of the results of a pilot study exploring the validity of the Russian version of the task partially described in (Ruhl (Eliseeva), Gorobets & Rezvina, 2018). Non-word repetition is one of the tasks included to the Batteria per la Valutazione del Linguaggio in Bambini dai 4 ai 12 anni (BVL_4-12; Marini, Marotta, Bulgheroni, Fabbro, 2015) originally developed in Italian. The purposes of the Battery are to identify the signs of atypical language development, to describe the nature of a disorder if spotted, and to give an insight with regards to the abilities that underlie language development, such as working memory (WM) and phonological awareness. It is a norm-referenced standardized battery with proven validity characteristics. The BVL_4-12 consists of tasks assessing oral production, comprehension and repetition across a number of linguistic skills. As the new (Russian) version of the Battery was intended to be used outside of its initial context, many tasks undergo not only a literal translation but also a rigorous adaptation process that took linguistic difference and cultural context into consideration (Eliseeva, 2018; ITC guidelines; Borsa, Damásio & Bandeira, 2012; Acquadro, Conway, Hareendran, Aaronson & European Regulatory Issues and Quality of Life Assessment (ERIQA) Group. (2008). The application of both Italian and Russian versions of the instrument with the Italian/Russian monolingual participants and their bilingual (Italian-Russian) peers are described elsewhere (Ruhl, Polkina, Ozbič, Marini, under review; Eliseeva, Guts & Marini, 2017).

Methods and Techniques of the Research

Ruhl et al.'s study (2018) aimed at exploration of the role played by phonological short-term and WM in LI and children with typical language development (TLD). It was predicted that NWR would correlate with Digit Span forward and that children with difficulties on this task would have more difficulties with 3-4 syllables long non-words than with 1_2 syllables items. The study aimed to determine whether a difficulty in inhibiting lexical items would correspond to higher production of "Errors with Real Words" in children with LI. The study only discusses the results of accuracy analysis. The performance is described in terms of overall

amount of correct repetitions, real words instead of the non-words, errors caused by articulatory problems, absence of any response, and correct repetitions for shorter (1 or 2 syllables long non-words) versus longer non-words (consist of 3 or 4 syllables). The authors demonstrated that 5 out of 6 measures revealed the differences in the performance of 2 groups. Children with LI produced more real words instead of non-words, which might reflect the process of automatic triggering and the failure to inhibit real word form activated in mental lexicon.

Results

Table 1 reflects the reaction times obtained during the NWR task performed by 2 groups of children from Ruhl et al.'s study (2018):

Table 1. *Reaction times on the NWR task*

RTs at the NWR	TLDs	PLIs
Total RTs	.34 (.12)	-1.01 (3.43)
RTs 1_2Syllables	.35 (.10)	.06 (.85)
RTs 3_4Syllables	.32 (.15)	-2.08 (6/69)

RTs of children with TLD are consistent across the task. It usually took those around 340 milliseconds in order to process the stimuli and produce the response. Unlike TLDs, children with LI often could not maintain the sequence of the phonemes in WM and tried to say it back faster. In case of 3-4 syllables long non-words, they failed to let the tester to finish a sequence and resulted in immediate recall. That is why here we observe negative RTs. It seems children were afraid to lose the track and it led them to start repeating each sound right after hearing it. Often, due to the length of the stimuli, they failed to remember the end of the non-word and, thus, failed to finish the repetition anyway.

RTs are reflections of cognitive load level. Longer RTs reflect higher cognitive load level. Below we discuss some of the performance patterns demonstrated by LI children during the experiment:

- Immediate recall. RT less than 340 ms, for example,

Stimulus duration	RT	Response duration
0.982	0.103	0.709

- Short RT and long response duration – immediate recall and repetition of the syllables of the target non-word, for example

Stimulus duration	RT	Response duration
0.847	0.042	1.576

- On the other hand, when response deration is significantly shorter, it might be a sign of the omission of 1 or more syllables - [loˊkəjə]->[loˊkə] or faster speech rate, for example

Stimulus duration	RT	Response duration
0.582	0.241	0.312

- RTs longer than 500 ms might reflect the process of a real word activation and inhibition of inappropriate response, for example, target nonword – [ləzʾ ɛ̲ˊl]-> activation of a real word with similar phonetic structure – [kəzʾ ɛ̲ˊl] – a goat (козёл), its inhibition and, finally, a correct response [ləzʾ ɛ̲ˊl]. See example below:

Stimulus duration	RT	Response duration
0.706	0.551	0.703

- Non-word processing might end up with failure to inhibit inappropriate real word activation, for example, [ənaˊpuʃkə] -> [n̄baˊbuʃkə].

Stimulus duration	RT	Response duration
0.751	0.748	1.242

Here long response duration might be explained by several reasons. First, a target non-word contains 8 sounds and it requires working memory to buffer unfamiliar sound sequence and then recall it. In the given above example, a child started to recall a sequence with a sound [n], omitting first unstressed vowel, and failed to end it up. Secondly, during the next stage of non-word processing, a child filled out target phonological structure (3 syllables, the first one is stressed) with a similar real word – [b^ˊbuʃkə] – a grandmother (бабушка). Such chain of operations took a child much longer RT and response time.

- Following example illustrates normal RT and long response duration due to inhibition failure – [voˊkrə]->[voˊ]->[moˊkrə] – wet (мокро).

Stimulus duration	RT	Response duration
0.65	0.428	1.145

- Long RTs and cropped response duration (as compared to tester's stimulus pronunciation) might be a reflection of working memory deficit as well, for example, [zəuv^ˊz'it'] -> [zəuv^ˊ]. A target non-word contains 8 sounds, long RT reflects long processing time. A child ends up by recalling 5 sounds including a stressed vowel and omits unstressed syllable.

Stimulus duration	RT	Response duration
0.967	0.611	0.727

Following examples illustrates similar pattern – [n'ikuz'^ˊvə] -> [kuz'^] and [kakarb^ˊnkə]->[kab^ˊ] 4 sounds recalled out of 8 and 10 respectively. Unstressed syllables are omitted which is reflected in cropped response duration.

- Normal RTs and long response duration also reflect cognitive overload. In such cases, children start to repeat overtly parts of long non-words, for example, [**st**ərʃoˊnəč'kə]-> [**stə̄**] pause [**st**ərʃoˊnəč'kə].

Stimulus duration	RT	Response duration
1.25	0.39	3.124

These selected examples illustrate some of the behavioural patterns demonstrated by LI children during the experiment. Short RTs and long response durations along with failure to repeat given stimuli correctly reflect overall working memory overload and might be a sign of its deficit.

Conclusions

All in all, the study be Ruhl and colleagues (2018) confirmed that NWR might be a reliable tool for short-term memory assessment in the Russian language as well, and provided evidence for a link between a difficulty in inhibiting lexical items triggered by the NWR stimuli and a higher rate of production of "errors with real

words" in children with LI (see also Schwartz, Scheffler & Lopez, 2013, for the effect of lexical knowledge, and Schwartz, 2017, p.15 for a discussion of similar results). This abstract provides addition characteristics of children's performance on the NWR task in terms of RTs.

The adaptation of NWR task was created for research purposes only. The Russian version of the Battery cannot be currently obtained for commercial use. Further investigation of the reliability of the scales should be conducted on the basis of a bigger sample size (for a discussion see Starkweather, 2012; Sousa & Rojjanasrirat, 2011).

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