DEVELOPMENT OF PHONOLOGICAL AND ORTHOGRAPHIC PARAFOVEAL PROCESSING DURING READING IN RUSSIAN

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Many studies have shown that skilled adult readers are able to extract phonological and orthographic information from upcoming words in a sentence and this parafoveal processing facilitates reading (Hyönä, 2011; Rayner, 1975; Schotter et al., 2012), although the degree of phonological processing depends on the orthographic transparency of a language (Ziegler et al., 2010). However, children who are learning to read initially rely more on phonological information as compared to adults, whereas reliance on orthographic information develops later (Ziegler et al., 2014). In parafoveal processing, this developmental pattern was found for German-speaking children and adults (Tiffin-Richards & Schroeder, 2015): 8-year-old children used phonological information in the parafovea to facilitate word recognition while adults did not; at the same time, children did not rely much on the orthographic information in the parafovea, while adults actively used it. What we do not know yet is the age when the shift from greater reliance on phonological information to greater reliance on orthographic information takes place. Studies that investigated reading in children agreed that many eye movement parameters reached the adult level by the age of 11 years (Blythe & Joseph, 2011). One could hypothesize that children should show the adult-like pattern and move from greater reliance on phonological to greater reliance on orthographic information during parafoveal processing by 11 years of age.

In the present study, we investigate the developmental pattern of phonological and orthographic parafoveal processing in Russian speaking 8- and 11-year-old children (to compare with previous studies) as well as adults. We suppose that for 8-year-olds, phonological but not orthographic information in the parafovea will facilitate foveal word processing, whereas for 11-year-olds and adults, orthographic but not phonological information in the parafovea will facilitate processing. We will use the invisible boundary eye tracking method (Rayner, 1975).

We plan to test 150 Russian speaking monolinguals: 50 adults (18-40 years old), 50 children at the age of 8, and 50 children at the age of 11. Prior to the experiment, we will assess children's IQ with Raven's Progressive Matrices and their reading skills with the Standardized Assessment of Reading Skills (Kornev & Ishimova, 2010). As materials, we will use sixty target nouns embedded in simple sentences. All nouns have the length of 5 letters and their average frequency is 32 ipm (range 10-100). Half of the nouns are feminine and the other half are masculine. For each target noun, five preview conditions are generated: identical (ID); pseudohomophone (PsH); control condition for pseudohomophone (Control.PsH); transposed-letter (TL); control condition for transposed-letter (Control.TL). Target nouns are preceded by adjectives with an average length of 6.96 letters. An invisible boundary is placed behind the last letter of an adjective. Previews are displayed until the boundary is crossed by a saccade, and then immediately changed to the target noun.

To estimate the phonological preview benefit, we will contrast ID and PsH conditions. The benefit will manifest in the comparable gaze duration on the target noun in the two conditions. We expect to find the phonological preview benefit in 8-year-olds, but not in 11-year-olds and adults. Similarly, to estimate the orthographic preview benefit, we will contrast ID and TL conditions. We expect to find the orthographic preview benefit in 11-year-olds and adults, but not in 8-year-olds. We will also measure the preview benefit of PsH over Control.PsH conditions and of the TL over Control.TL conditions. We expect to find both the phonological and the orthographic preview benefits in all age groups.

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Table 1. Preview conditions for the word *пирог* ‘pie’.

Condition	**Stimulus**	**Description**
Identical (ID)	пирог pirog	Preview is identical to the target word.
Pseudohomophone (PsH)	пиро**к** piro**k**	Preview differs in spelling but preserves the phonology of the target. One letter is changed.
Control for pseudohomophone (Control.PsH)	пиро**б** piro**b**	Preview differs both in spelling and in phonology. One letter is changed.
Transposed-letter (TL)	п**ри**ог p**ri**og	Two letters of the target are swapped (either 2-3, or 3-4).
Control for transposed-letter (Control.TL)	п**ле**ог p**le**og	Two letters of the target are substituted (either 2-3, or 3-4).

Example 1

There was a sweet raspberry pie on the kitchen table.

(1) На кухонном столе стоял сладкий| *пирог* (ID) *с малиной.*
(2) На кухонном столе стоял сладкий| *пирок* (PsH) *с малиной.*
(3) На кухонном столе стоял сладкий| *пироб* (Control.PsH) *с малиной.*
(4) На кухонном столе стоял сладкий| *приог* (TL) *с малиной.*
(5) На кухонном столе стоял сладкий| *плеог* (Control.TL) *с малиной.*

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