

### Background

- Phoneme detection is associated with reading acquisition and is one of the phonological awareness tasks which are better predictors of early reading skills than onset-rime awareness. (Bryant et al., 1990; Hulme et al., 2002).

### Participants

- Typically developing Russian-speaking children (N=90, 48 girls, Mean<sub>age</sub> = 8.7, SD = 1.13)
- Children with developmental dyslexia diagnosed through comprehensive neuropsychological assessment in Center for Speech Pathology and Neurorehabilitation (N=50, 17 girls, Mean<sub>age</sub> = 8.9, SD=1.2)
- 1-to-4 grade (primary school)

### Inclusion criteria

- No history of diagnosed neurological and/or psychiatric disorders
  - Normal or corrected-to-normal vision
  - Normal or corrected-to-normal hearing
- Screening for primary auditory impairments (using the program Audiogramm version 4.6.1.3, Professional Audiometric System; Sennheiser HDA 280 audiometry headphones).
- Normal or higher non-verbal intelligence
- Screening with the Raven's Colored Progressive Matrices (Raven, 2004)

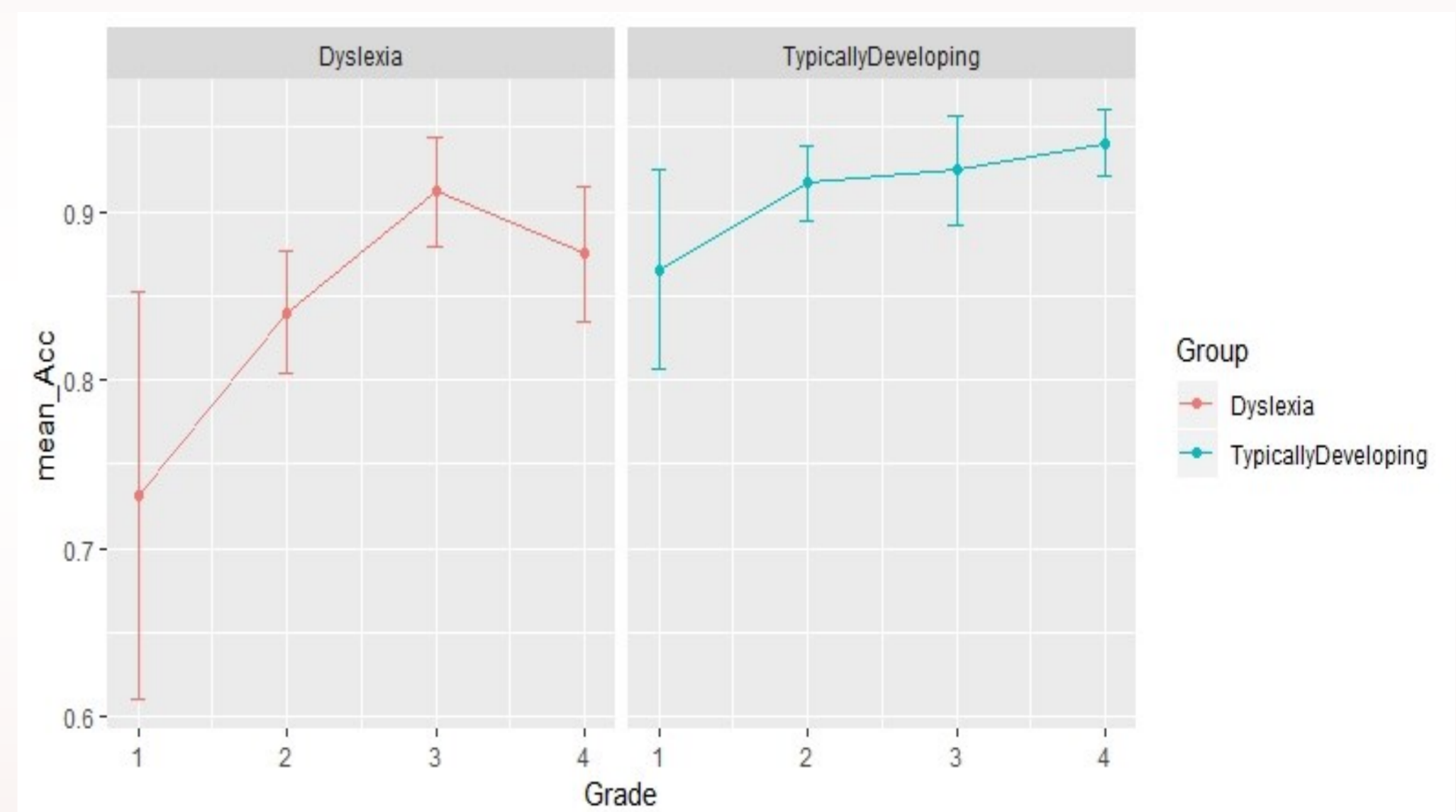
### Materials and Methods

- Participants heard a phoneme followed by a word and had to press the "Yes" button if the phoneme was present in the word, and "No" otherwise:  
e.g., *m' ... m'ach* (a ball)  
*sh ... loshad'* (a horse)  
*k ... podarok* (a present)
- g... k'it* (a whale)  
*o... m'etla* (a broom)  
*l... kor'idor* (a corridor)
- The test contained 24 1-to-3-syllable items, with the position of the target phoneme balanced between the beginning, the middle, or the end of the word
- The test was programmed in Java and administered using a Samsung Galaxy Tab A SM-T585 (2016), screen size 10.1". Audio stimuli were recorded by a professional speaker.

Written informed consent forms were signed by parents or legal representatives of the children. The study was approved by the Committee on Interuniversity Surveys and Ethical Assessment of Empirical Research, National Research University Higher School of Economics (Russia).

### Results

- Data were analyzed using (generalized) linear mixed models estimated in a Bayesian framework using the 'brms' package for R (Bürkner, 2017).
- Predictors: Group (TD, Dyslexic), Gender (f, m), Grade (1,2,3,4), Position (beginning, middle, end), FreqType (high, middle, low)
- Our analysis showed significant differences between groups: typically developing and dyslexic children ( $\beta=0,07$ ,  $SE=0,016$ ,  $t=4,3$ ,  $Pr(>|t|) <0,001$ ) in phoneme detection.
- We did not find systematic gender differences, but we revealed, that the performance reliably increased with grade ( $\beta=0,03$ ,  $SE=0,007$   $t=4,26$ ,  $Pr(>|t|) <0,001$ ).
- This model did not find significant impact of the position of target phoneme in a word or of the frequency type of used words.



### Discussion

- Our findings suggest that Phoneme detection task is an appropriate instrument for discriminating between dyslexic and non-dyslexic groups for Russian
- Our results cannot automatically be generalized to other languages
- We believe that our approach can be easily extended to other alphabetic languages

### References

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