

Efficient reading skills enable us to learn, develop our interests and communicate with others. Thus the ability to read is one of the most important skills that children must master at the beginning of school. In languages based on alphabetic scripts, one of the first and critical steps in acquiring reading skills is learning the connection between letters and corresponding speech sounds by creating their neural representation in the brain. However, for some children, the acquisition of this association is difficult and lasts much longer than usual. These children will read more slowly and less accurately than their peers; as knowledge of letters is an important predictor of later reading skills. About 10 % of school age children have reading difficulties, which are classified as developmental dyslexia.

So far, little is known about how much time the children need to acquire letter-speech sound (LS) association, when we can talk about the full automatization of this skills and how this process undergoes in children who have problems with learning to read. In our project, we would like to answer the question at what age most of the children acquire the ability to correctly combine letters and speech sounds and how long it takes to fully master and automatize this process. For this purpose, we plan to conduct a study on a group of 390 children at various stages of schooling - from the last class of kindergarten to 8th grade of primary school, when this process should be fully automatized. We hope that this project will allow us to answer the question of when the acquisition of LS association occurs in typical reading development and at which moment in development deficiency in this skill may be an indicator of later reading problems.

In the second part of the study, we would like to check how the LS representation changes at the neuronal level, from the stage of acquiring associations to the stage of its automatization, in children with typical readers skills and in children diagnosed with developmental dyslexia. We want to re-invite a group of children, who participated in our previous project on LS association at the beginning of their formal education. The longitudinal nature of this study and the large time span of the compared developmental stages should allow us to find out which of the observed changes in brain activation over time are due to the structure of the language (specifically its orthographic transparency), and which due to level of reading skills. Additionally, it allows us to verify the stability of differences in brain activity characteristic for children with dyslexia. So far, studies examining LS integration on the neural level were conducted in the Netherlands, Switzerland and United Kingdom. Languages of these countries can be ordered on the scale of orthographic transparency. Orthographic transparency tells us how each letter of the alphabet corresponds to a speech-sound, so how much the connection of letter and phoneme is consistent. Differences between these languages in brain activity during LS integration were already reported. One of the hypotheses explaining these differences indicates their cause in the differences in language transparency. Another one concerns developmental changes related to reading skills, as the examined children differed in age and the stage of education.

We hope that thanks to our research we will be able to answer which hypothesis is valid. The obtained results will significantly improve our knowledge about the acquisition of the LS association, also on the brain level. In the long run, our research may help in early diagnosis of the risk of developmental dyslexia and in development of therapeutic activities, which should be helpful in effective support of children in learning to read.