

Stable, yet incorrect? Studying the orthographic representations in children with isolated spelling deficit

Research goals

In this project we want to focus on children with isolated spelling deficit, who are fast and accurate readers but poor spellers. Despite high prevalence in the population (estimated 4% in Poland; Bogdanowicz et al., 2011), isolated spelling deficit is often confused with developmental dyslexia which hinders the proper diagnosis and treatment. We are especially interested in potential differences in building orthographic representations by children with isolated spelling deficit and their typical developing peers. Orthographic representations are the abstract mental representations of spelling, i.e. the knowledge of how to write words. Stable orthographic representations are assumed when a person always writes a word in the same way (either correct, e.g. chłopiec [pol]/nurse [eng], or incorrect but with the same type of error, e.g. hłopiec [pol]/nerse [eng]). Unstable representations reflect the uncertainty in spelling (out of a few trials, there are at least two different kinds of errors, e.g. hłopiec, chłobiec [pol]/nerse, nurs [eng]). It was previously shown that reading speed is strongly related to the stability of orthographic representations – the more stable the representation, the faster reading. Hence, we assume that the source of the isolated spelling deficit might be stable, yet incorrect orthographic representations. They are processed fast, despite the fact that incorrect word forms are stored in the mental lexicon. This subject was not investigated before even though it gives a plausible explanation for isolated spelling deficit. Therefore, our main goal is to test this hypothesis and provide empirical evidence for acknowledged theories of spelling deficit. Apart from the research on reading speed and stability, we will also test brain activations in the fMRI. We are especially interested in detecting differences in Visual Word Form Area (VWFA) - a brain storage for orthographic representations. It was shown that the more familiar word, the lower activations in VWFA (i.e. familiarity effect). Therefore we assume that the more stable the representation, the lower the VWFA activations. We will also address previous findings reporting neural differences in activations in other brain regions regarding children with isolated spelling deficit and their typical developing peers.

Research plan

We will ask children with isolated spelling deficit and their typical developing peers to repeatedly spell and read lexical items. Later, the same word items will be presented to the participants in the fMRI to test their brain activations regarding the stability of orthographic representations. As a consequence, we will gather an informative dataset of behavioral and brain responses to the same stimuli. In order to produce unstable orthographic representations, we will vary the difficulty within words in a list of lexical items.

Expected results

We expect that children with isolated spelling deficit will have mostly stable, yet incorrect orthographic representations, while typical developing children will have mostly stable and correct orthographic representations. In the area of difficult words, both groups are expected to often show unstable orthographic representations. Together, we want to expose different patterns of stability in tested groups. We will examine which brain regions are used by children with isolated spelling deficit to preserve fluent reading despite having incorrect orthographic representations in the mental lexicon. Results obtained in the project will be beneficial for both researchers who develop theories of language deficits and practitioners, because they will provide a basis for effective therapies focusing on stabilizing the correct word forms.