

Original article

Brain activation in teenagers with isolated spelling disorder during tasks involving spelling assessment and comparison of pseudowords. fMRI study

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Abstract

Methods: The present study aimed at defining the specific traits of brain activation in teenagers with isolated spelling disorder in comparison with good spellers. fMRI examination was performed where the subject's task involved taking a decision 1/whether the visually presented words were spelled correctly or not (the orthographic decision task), and 2/whether the two presented letters strings (pseudowords) were identical or not (the visual decision task). Half of the displays showing meaningful words with an orthographic difficulty contained pairs with both words spelled correctly, and half of them contained one misspelled word. Half of the pseudowords were identical, half of them were not. The participants of the study included 15 individuals with isolated spelling disorder and 14 good spellers, aged 13–15. **Results:** The results demonstrated that the essential differences in brain activation between teenagers with isolated spelling disorder and good spellers were found in the left inferior frontal gyrus, left medial frontal gyrus and right cerebellum posterior lobe, i.e. structures important for language processes, working memory and automaticity of behaviour. **Conclusion:** Spelling disorder is not only an effect of language dysfunction, it could be a symptom of difficulties in learning and automaticity of motor and visual shapes of written words, rapid information processing as well as automating use of orthographic lexicon.

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1. Introduction

Spelling disorder is a neurodevelopmental problem manifested in difficulties connected with learning the correct spelling in a given language. It belongs to the

category of specific reading and writing disorders. Spelling disorder is a primary condition, i.e. it is not a consequence of sensory deficits, acquired impairments or CNS disorders, poor cognitive capacities or low socio-economic background [1,2]. Spelling disorder most frequently coexists with reading disorder, i.e. developmental dyslexia, yet it can also be found as an isolated disability. It is a serious problem for children and teenagers since it hinders their school performance and effective education [3]. Therefore, studies investigating this issue continue to be of significance in terms of both theory and application.

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