

Project 1.15: Verification of the neural noise hypothesis of dyslexia – a study using functional magnetic resonance spectroscopy

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Background:

Neural noise hypothesis of dyslexia suggests that reading disorder is a consequence of deficits in neurotransmission. Glutamate, the main excitatory neurotransmitter in the human brain, is supposed to have elevated concentration in dyslexic individuals, which may contribute to impaired reading through excessive excitatory activity (hyperexcitability) resulting in heightened noise and instability in information processing. Heightened noise affects encoding of sensory information and produces impairments in multisensory integration and phonological awareness, key components of reading development.

Aim:

The proposed project aims at providing a direct test of the neural noise hypothesis by adopting an interdisciplinary approach of studying hyperexcitability and neural noise, cognitive skills and behavior in typical and dyslexic readers.

PhD student in close cooperation with other team members will design and optimize sequence for functional magnetic resonance spectroscopy on 7T scanner, to examine concentration of glutamate during reading. Next, on the sample of young dyslexic and typically reading participants, she/he will test if the effect is dependent on stimulation (measurement will be performed at rest, during false font and print stimulation) and brain region (we expect difference in regions belonging to the reading network).

Requirements:

- Master's degree in electronics, informatics, bioinformatics, biomedical engineering, biomedical physics or similar
- experience in studies using magnetic resonance spectroscopy (MRS) or magnetic resonance imaging (MRI)
- knowledge of high-level, general-purpose programming language (Python, C, Java)
- knowledge of statistical software (SPSS, R, AMOS)
- fluent spoken and written English