Project 1.16: Verification of the neural noise hypothesis of dyslexia – a study using fMRI and EEG

Supervisor: dr hab. Katarzyna Jednoróg, prof. Nencki Institute Laboratory of Language Neurobiology WWW: https://lln.nencki.gov.pl/

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 studding hyperexcitability and neural noise, cognitive skills and behavior in typical and dyslexic readers.

PhD student in close cooperation with other team members will design an EEG experiment to examine neuronal (1/f) noise and an fMRI experiment localizing important structures in the reading network – visual word form area and multimodal superior temporal sulcus. Next, she/he will recruit a sample of young dyslexic and typically reading participants using and perform behavioral tests, as well as EEG and fMRI experiments.

Requirements:

- Master's degree in psychology, cognitive neuroscience or similar
- experience in studies using functional magnetic resonance imaging and/or EEG
- knowledge of high-level, general-purpose programming language (Python, C, Java)
- knowledge of software for presentation of experimental stimuli (Presentation, E-Prime, Psychopy)
- knowledge of statistical software (SPSS, R, AMOS)
- fluent spoken and written English