**Neural correlates of individual difference in cognitive abilities: a network approach**

Ilya Zakharov, Psychological Institute of Russian academy of education.

The search for psychophysiological correlates of individual differences in the cognitive sphere is one of the tasks that are of interest not only from a fundamental but also from an applied point of view. So, in recent years, there have been a growing number of studies that investigate possible early diagnosis tools to identify characteristics of high significance for education (dysgraphia, dyscalculia, etc.) with neuroscience methods. This report focuses on the experience of using the network neuroscience approach to find neurophysiological characteristics that are related to individual differences in cognition. The network approach relies on the mathematical graph theory for the assessment of important characteristics of brain activity. In the reports we will show the results of several studies investigating the relationship between individual differences in non-verbal intelligence, working memory and cognitive control and EEG network characteristics in the resting state and during tasks. The study was conducted on one sample of 98 people aged 18 to 30 years (56% - women). Resting state and task-reltated EEG were recorded using a 64-channel BrainProducts ActiChamp. We used the classic “Standard Progressive Matrices” test of J. Raven to assess non-verbal intelligence. The characteristics of working memory were assessed with Sternberg numerical “Item Recognition Task” the Sternberg task. Cognitive control characteristics were assessed by the Stroop task. Local and global network metrics (average and characteristic path length, clustering coefficient, "close world" index, etc.) were calculated using the igraph and networkx libraries. We also calculated the spectral network entropy characteristics of the graphs. Significant associations between cognitive characteristics were found for local and global graph characteristics of EEG at rest, and the spectral network entropy during the task. The obtained results indicate that the network approach is promising for the search for psychophysiological correlates in cognition. The report discusses future directions for research and potential pitfalls associated with the network approach.