EEG-correlates of various verbal tasks solving

Olga V. Sherbakova, Ivan A. Gorbunov, Irina V. Golovanova
Saint Petersburg State University, Department of Psychology

We studied functional brain state dynamics as indicators of mental effort while solving various verbal tasks: "Combining 3 concrete concepts into 1 generalized" (CC), "Metagrams solving" (MS), "Giving reasons for opposite statements" (OS). We supposed that functional state patterns are different in performing various types of verbal tasks requiring various kinds of mental operations. 34 volunteers participated after informed consent, male and female, aged 17 – 33. EEG activity while verbal tasks solving were monitored over 19 scalp locations. The 19 EEG traces were digitized online at 250 Hz, 2244 EEG tests, 1122 responses to intellectual tasks were registered. Statistically significant dynamics of the EEG power were revealed in 3 types of verbal tasks solving. Alfa-activity decreases while CC performing compared to MS perfoming. Alfa-activity increases in OS compared to MS. OS requires more intensive beta1-activity than MS, as well as CC compared to MS. Beta2-activity is more intensive in OS than in MS and CC. MS goes with the significant increase of theta-activity. We explain these results by the difference in the mental operations underlying the processing of various verbal stimuli. OS and CC are more similar than MS. MS requires simultaneously building up and keeping in mind several mental spaces. CC and OS are more "logical" and formal.