

# How can one study experimentally unpredictable brain activity of humans

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## Abstract

Statement of the Problem: Neuroscience reached the frontier where it aggressively intrudes into basic human faculties such as volition, mind wandering and language. Sophisticated tools for studies in this domain are now available, including fMRI, MEG, ECoG, BCI with computer support using deep learning neural network software. However, the organization of neurophysiological experiments is hardly consistent with this powerful aggregate of the research tools. As the rule of thumb a group of subjects is preselected and a standard protocol of measurements is applied. Big data are accumulated and processed using statistical software. This approach is possible for a number of tasks, though hardly suitable for the study of high cognitive functions. Methodology & Theoretical Orientation: At high level of brain activity the same task can be performed in many different ways, individual for each subject. These irregularities should not be considered as uncorrelated noise. Just the opposite, the experimental data should be analyzed bearing in mind the possibility of several processes occurring simultaneously, though represented differently in each next occurrence of the cognitive task (trial). Each process produces its own set of brain signals. Measurable parameters of brain responses (amplitude, shape, delay) vary considerably from trial to trial. The data from individual trials need special processing tools taking into account this variability. The personality of each subject has also to be considered, since different people in particular cognitive task tend to be linearly ordered by their ability to perform properly. An obvious example is the ranking of chess players. Conclusion & Significance: We suggest approach which differs considerably from the usually adopted praxis of neurophysiological experiments. It is specially designed for the study of volition, speech and deliberate actions.



## Biography

V.L.Vvedensky took part in the early development of magnetic encephalography in 1980-ies. Later on he participated in numerous experiments with multi-channel MEG devices. The main focus of research was the study of spontaneous brain activity, which later on was extended to the study of volition and language.

## Publications

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