

Project 1.7. Individual differences in subjective experience of time: neuropsychological, EEG and fMRI markers

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Background:

As time is omnipresent in our life, it is observed an increasing interest of researchers to learn how we experience and perceive time. Psychological time does not correspond to the 'clock time' which flow objectively in environment. Nowadays, it has been an explosion of research into the neural underpinnings of time, because Temporal Information Processing (TIP) constitutes an essential component of human cognition. Extensive research (including studies conducted in our Laboratory) has clearly shown that many cognitive functions, like language, attention, memory, motor control or decision making are characterized by the specific temporal intervals, indicating that the brain incorporates dimension 'time' into its computation.

Previous studies indicated that TIP is not monolithic and several time ranges are controlled by neural mechanisms. This project focuses on milli- and supra-second TIP, as these two ranges reflect the complex TIP fundamental for human cognition. To date, neural mechanisms that would account for the representation of time constitute still an open question. Despite evidenced temporal dynamics of cognitive functions, only few literature studies linked directly the subjective time to other cognitive processes, but the nature of such relations remains unclear. Furthermore, existing evidence indicated that healthy individuals differ importantly in the efficiency of TIP. The relations between these differences and existing individual differences in the efficiency of cognitive functions, as well as the neural basis of these complex relations have not been identified. Moreover, different time ranges seem to control various cognitive processes. Thus, complex interactions between TIP ranges seem important for controlling the human behaviour. It is another neglected area in timing research, as previous studies concentrated only on separate time ranges (either milli- or supra-seconds), whereas, between-ranges relations were studied very rarely. These complex relations will be studied using interdisciplinary methods comprising cognitive psychology, neuropsychology, electrophysiology and neuroimaging.

Aim:

The objective of this interdisciplinary project is to investigate the neuropsychological and electrophysiological mechanisms underlying individual differences in our subjective experience of time. The basic question in this project is: how and where in our brains time is processed.

In parallel, using fMRI, neuroanatomical basis of these processes will be studied in frames of the other PHD thesis. There is a possibility of cooperation also in this part of the project.

Requirements:

- MSc completed till March 1 2021 in cognitive sciences, neuroinformatics, psychology, biology, physics, or similar; fluent English and Polish, both written and spoken; interest in the project topic; knowledge of statistical methods and software (e.g. SPSS, R), team player capable of working in the interdisciplinary research group, full availability throughout the project realization.
- we will also look at: documented participation in research projects, experience in electrophysiological research, knowledge of electrophysiological and /or neuroimaging data analysis software (e.g. EEGLab, Brain Analyzer, SPM), experience in working with large datasets, high grades from academic courses.