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## **The role of stimulant use in auditory perceptual abnormalities in a non-clinical population - EEG study.**

The way we analyze information about the world reflects how we understand reality and the world around us. The data we receive through our senses is countless, so our bodies have learned to distinguish between the most important ones. This skill makes it easier for us, for example, to quickly find our favorite product, among many similar ones, on a supermarket shelf. However, sometimes our perception stops working as it should. Then we deal with perceptual anomalies. The most common perceptual anomalies are related to hearing, and include difficulty in distinguishing spoken words when another sound is heard in the background. Even healthy people can experience such troubles, for example at parties or in the streets during rush hours. Perceptual anomalies can worsen and turn into hallucinations that occur without an external stimulus and are a symptom of numerous mental disorders. According to the predictive coding model, the formation of hallucinations is associated with an imbalance of previous attitudes and expectations ("top-down" processes) and the processing of stimuli coming from the outside world. It is hypothesized that this imbalance may worsen with the consumption of drugs, especially drugs with a stimulating effect (e.g. cocaine and amphetamines). However, this mechanism is not fully confirmed and understood. Therefore, in this project, we will study healthy individuals who experience perceptual anomalies to understand the early stage of perceptual anomalies. Additionally, people who consume stimulants will be tested to confirm their influence on the development of perceptual anomalies.

The development of electrophysiological methods allows for a broader understanding of psychological experiences from the biological point of view. Thanks to the method of electroencephalography, it is possible to analyze the activity of the brain during the appearance of a stimulus or as a result of some mental task. What's more, the brain's activity can be analysed at a specific time before the stimulus appears. This allows for analysing how attitude can affect the appearance of, for example, a signal stimulus and whether it positively influences its correct interpretation.

The study consists of two parts. In the first part, we want to use a diary in a mobile application to check whether the experience of perceptual anomalies is related to the consumption of stimulants in everyday life. In the second part, the subjects will be invited to the laboratory, where we will analyze the formation of auditory perceptual anomalies in a specially designed test. During the test, we will examine brain activity to see how attitudes can influence the formation of perceptual anomalies.

Thanks to this study, knowledge about the influence of consumption of stimulants on the development of perceptual anomalies in healthy people will be broadened, which may help in the future to better understand this mechanism in people with mental disorders. Electrophysiological analysis will allow a better understanding of the top-down processes (including the consumption of stimulants) affecting perceptual anomalies and the perception itself.