

Metacognition and Cognitive Control: The Influence of Preparatory Motor Activity on Metacognitive Judgments

"Metacognition" and "cognitive control" are cognitive processes that monitor and control other cognitive processes. Cognitive control allows us to effectively achieve our goals despite the disruption of activity by stimuli coming from the environment or conflicting tendencies to react. Metacognitive processes, on the other hand, are responsible for actively constructing judgments about our cognitive processes, which allows us to think and say "*I'm sure my decision is correct*" or "*I made a mistake*". It is well known that the control exercised over action takes place through basic motor mechanisms, which consist in triggering correct responses and inhibiting erroneous reactions. However, it is not clear how this kind of motor "conflict" affects metacognitive judgments (such as decision confidence or error awareness).

As part of this project, two psychophysiological studies will be carried out, in which participants will make a number of decisions in conditions of conflict associated with the activation of conflicting motor tendencies. In addition, after each decision, participants will assess the subjective sense of confidence accompanying their actions or awareness of incorrect hand activity. During the studies, muscle activity will be recorded using electromyographic equipment (EMG) and brain activity will be recorded using an electroencephalograph (EEG). EEG recording in combination with EMG will allow for effective measurement of electrophysiological markers of motor control. This project will answer the question of how pre-decision motor activity influences subjective judgments about confidence. The project will investigate cortical activities that can lead to the conscious detection of incorrect hand activation and the neural correlates of decision confidence.

The project will significantly contribute to the development of cognitive psychology, deepening the understanding of the importance of conscious experience in the process of adaptation to conflict and motor control. The importance of research for society will be realized by deepening knowledge about the key human capacities of metacognition and cognitive control.