# Unveiling the Neurophysiological Mechanisms of Self-Cognition and Its Impact on Working Memory: A Comprehensive Mobile EEG Investigation Into Cognitive Engagement and Attention in Task-Oriented Processing

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elf-cognition, or the perception of one’s thoughts and identity, plays a fundamental role in cognitive processes such as memory, attention, and decision-making. Psychological and neuroscientific research has demonstrated that self-referential thinking engages distinct neural networks, particularly the medial prefrontal cortex (MPFC) and posterior cingulate cortex (PCC), which are also involved in working memory processing (Denny et al., 2012; Northoff et al., 2006). However, the direct impact of self-cognition on working memory function remains unclear, particularly in terms of neural dynamics during cognitive tasks. This study examines the neurophysiological effects of self-cognition on working memory using mobile EEG analysis. Participants completed an N-back test and a number sequence recall task before and after exposure to a deterrent phrase designed to reduce self-cognition. EEG data collected via a mobile EEG headset revealed a significant increase in alpha band power ($p < 0.05$) and a decrease in average amplitude ($p < 0.05$) post-exposure. These neural changes suggest a shift toward attentional disengagement and reduced cognitive processing. Furthermore, behavioral performance declined, with an 15% decrease in N-back accuracy and an average reduction of two recalled digits in the number sequence task, indicating that self-cognition influences working memory and attentional focus. These findings provide empirical evidence that self-referential thought affects cognitive function at both behavioral and neural levels. By demonstrating how self-cognition can impair working memory through altered brain activity, this study contributes to the understanding of cognitive control, attentional regulation, and potential implications for mental health interventions.

**Awards Won:**