The role of posterior parietal cortex in episodic memory retrieval: transcranial Direct Current Stimulation studies (tDCS)

**Abstract**

Neuroimaging studies of recognition memory have shown that greater activity in the lateral posterior parietal cortex (PPC) correlates with successful recognition in a variety of paradigms, but experimental techniques that manipulate brain activity are important for determining the specific contribution of the PPC in episodic memory retrieval. Transcranial Direct Current Stimulation (tDCS) is a non-invasive technique that can be used to manipulate cortical excitability. The collection of experiments that comprise this dissertation use tDCS to determine: 1) whether or not the lateral PPC is causally involved in episodic retrieval, and 2) whether the lateral PPC has a direct role in memory accuracy for studied information or an indirect role that can influence retrieval judgments during episodic memory retrieval. We applied tDCS during three different memory paradigms that have shown correlated activity in the parietal cortex. Experiments in Chapter 1 used a “false memory” paradigm to test whether the parietal cortex contributes to the “perceived oldness” of a memory and showed increased false recognition with tDCS over the PPC compared to sham tDCS. In contrast, the experiment in Chapter 2 tested whether the parietal cortex is involved in item and source accuracy and showed decreased false recognition with tDCS over the parietal cortex compared to sham tDCS. Lastly, to resolve these discrepant findings, the experiment in Chapter 3 tested whether the parietal cortex is important for integration of contextual cues and mnemonic information, and showed greater utilization of cues predicting
memoranda as “new” with tDCS over the parietal cortex compared to sham tDCS. Across these experiments, we showed that manipulating activity in the parietal cortex with tDCS led to alterations in memory retrieval responses compared to sham stimulation. Collectively, our results causally link the PPC to aspects of memory retrieval, and are consistent with the idea that the parietal cortex indirectly influences retrieval judgments, particularly for “new” items.