**Analysis of Directed Information Flow During Episodic Memory Retrieval at Theta Frequency**

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Episodic memory retrieval is a process by which humans use an extensive network of brain regions to recall details of situational memories. Little is known, however, about the effective connectivity in the brain during this episodic memory retrieval. Previous research conducted by Professor Erika Nyhus has shown the importance of theta oscillations, or brain activity occurring at 4-8 Hz, during episodic memory retrieval. Specifically, they investigated how these oscillations modulate interactions between the frontal cortex, parietal cortex, and hippocampus (frontal-parietal-hippocampal network) during these cognitive processes of memory (Nyhus & Curran, 2010). Based on previous work (Nyhus & Curran, 2010; Anderson et al., 2010), we expect that at theta frequency, there is directed information flow from the left inferior parietal cortex to the right dorsolateral prefrontal cortex.

To test this hypothesis, we applied Granger causality analysis to measure the directional flow of information in previously recorded electroencephalography (EEG) data during a source memory retrieval task. Granger causality analysis, essentially, assumes that if a linear model created using data from factors $X$ and $Y$ is better at predicting the future of $Y$