A Functional Near Infrared Spectroscopy Study of Executive Functions and the Prefrontal Cortex

Gabe Stine

The University of Vermont

Abstract

The human pre-frontal cortex is involved in high-level complex communication and cognition, including an integral role in support of executive functions. Through the use of fMRI, networks in the prefrontal cortex have been identified that support executive abilities, including the processing of large scale units of language such as discourse (e.g., stories, event recasts, etc.) and many other non-linguistic functions. However, the limitations of fMRI force the brain to be in an unnatural state when it is being imaged. With the development of functional Near Infrared Spectroscopy or fNIR, frontal lobe activity can be monitored without interference from extraneous movement and hopefully conquer any limitations associated with fMRI. The current study aims to use the fNIR to explore the differences in processes between language associated tasks and spatial tasks in the prefrontal cortex. Subjects wore the fNIR headband while presented with a stimulus that prompted them to perform language based tasks, spatial tasks, or to close their eyes and rest. Each task lasted one minute in length. Currently, analysis of all the data collected is ongoing. It is expected that significant differences in prefrontal cortical activation will be seen among all three conditions.