

## Norris Mini Grant Summary Report

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### Summary

In the Spring of 2013, we submitted a grant proposal to the CSU Dominguez Hills College of Natural and Behavioral Sciences to receive financial support for the establishment and maintenance of a brain imaging laboratory at our campus. The application, boldly titled, "The 'Summer of Neuroscience Research': A Paradigm Shift in the GMAC Lab," requested funds in the amount of \$2,500 to supplement our existing funds to establish the GMAC Brain Imaging Lab on campus. Functional near-infrared spectroscopy (fNIR) is the technique being used to provide real-time data about brain activity (Figure 1). The requested funds were intended to be used to provide additional salary to an fNIR laboratory technician—and thus increase the total number of hours of technical help available—and to pay participants to come to the laboratory and allow us to use the fNIR device to collect data related to their brain activity.



Figure 1. An fNIR laboratory technician affixing the fNIR device to a participant's head in the GMAC Brain Imaging Lab at CSU Dominguez Hills. Image from the George Marsh Applied Cognition Laboratory.

Thanks to the Norris Foundation and to the administration of the Office of the Dean, College of Natural and Behavioral Sciences, we received an award of \$1675 based on our original proposal. The award money was spent on providing salary to the fNIR laboratory technician. The work accomplished during the period of the award including fNIR training of the fNIR laboratory primary investigators and staff (Figure 2), set up and initial testing of the fNIR equipment, and set up and configuration of the fNIR laboratory (Figure 3).



Figure 2. Dr. Kurtulus Izzetoglu (consultant from Drexel University) and Alex Lim (fNIR Laboratory Technician) participate in fNIR training at CSU Dominguez Hills, Summer 2013. Image from the George Marsh Applied Cognition Laboratory.





Figure 3. The fNIR laboratory technician was able to configure the brain imaging laboratory with two substations: a data collection station (left of panel) at which the participant sits and a data monitoring and analysis station (right) at which the technician sits. Image from the GMAC Brain Imaging Lab.

### **Benefits Derived from the Norris Grant**

Data collection has begun using the fNIR device. Figure 4 shows how the fNIR device is placed on the participant during an experiment. In a typical fNIR study, the participants spends 30 minutes to 1 hour with the device placed on the head, while a computerized data collection system records information from the sensors. The sensor information is used to compute estimates of neural activity using well-established and scientifically-accepted formulas (Figure 5).



Figure 4. The fNIR device placed on the forehead of a participant. The gray flexible band contains light sources and light sensors used to infer neural activity in prefrontal cortex. Image from the GMAC Brain Imaging Lab.

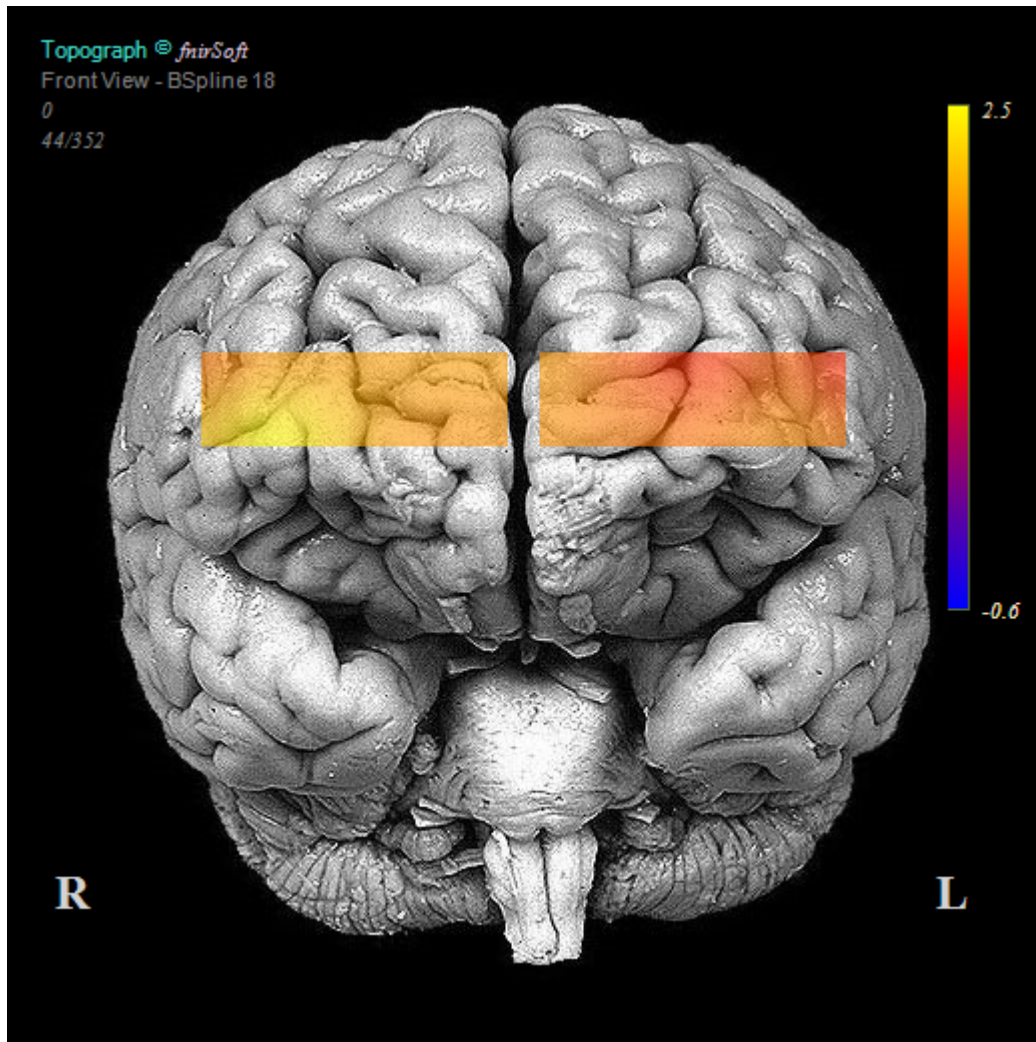


Figure 5. Neural activity in prefrontal cortex during performance of a cognitive flexibility task. Warmer colors indicate high relative activity and cooler colors indicate low relative activity. Image from the GMAC Brain Imaging Lab.

Cognitive neuroscience is an academic field that concerns the scientific study of the neural mechanisms underlying cognition. Cognitive neuroscience overlaps with cognitive psychology, and cognitive neuroscientists tend to have a background in one of several fields, including experimental psychology and neuroscience. Drs. Carrier, Cheever, and Rosen are all trained in experimental psychology. Dr. Wolcott is trained in neuropsychology. The Norris grant funds have helped to put together a set of resources that will allow members of the GMAC Lab to move into this important and exciting field. Providing salary for an fNIR laboratory technician has been a critical element in this set of resources.





The members of the George Marsh Applied Cognition Laboratory at CSU Dominguez Hills. A subset of the faculty members and students in the Lab also are part of the GMAC Brain Imaging Lab. Starting from the fifth from the left in the back row are Dr. Cheryl Wolcott, Dr. Nancy Cheever, Dr. Mark Carrier, and Dr. Larry Rosen, Norris grant recipients. Image from GMACLab.org.