Announcing the Final Examination of Ben D Sawyer for the degree of Master of Science

Time & Location: July 3, 2014 at 9:30 AM in Engineering II 312
Title: Applied Error Related Negativity: Single Electrode Electroencephelography in Complex Visual Stimuli

Error related negativity (ERN) is a pronounced negative evoked response potential (ERP) that follows a known error. This neural pattern has the potential to communicate user awareness of incorrect actions within milliseconds. While the implications for human-machine interface and augmented cognition are exciting, the ERN has historically been evoked only in the laboratory using complex equipment while presenting simple visual stimuli such as letters and symbols. To effectively harness the applied potential of the ERN, detection must be accomplished in complex environments using simple, preferably single-electrode, EEG systems feasible for integration into field and workplace-ready equipment.

The present project attempted to use static photographs to evoke and successfully detect the ERN in a complex visual search task: motorcycle conspicuity. Drivers regularly fail to see motorcycles, with tragic results. To reproduce the issue in the lab, we presented static pictures of traffic including or not including motorcycles. A standard letter flanker task replicated from a classic ERN study (Gehring, 1993) was run alongside, with both studies requiring a binary response. Results showed that the ERN could be clearly detected in both tasks, even when limiting data to a single electrode in the absence of artifact correction. These results support the feasibility of applied ERN detection in complex visual search in static images. Implications and opportunities will be explored, limitations of the study explained, and future directions explored.

Major: Industrial Engineering

Educational Career:
Bachelor’s of Psychology, BS, 2010, Colorado State University

Committee in Charge:
Dr. Waldemar Karwowski, Chair, Industrial Engineering & Management Systems
Dr. Peter A. Hancock, Department of Psychology, University of Central Florida
Dr. Petros Xanthopoulos, Industrial Engineering & Management Systems, University of Central Florida

Approved for distribution by Dr. Waldemar Karwowski, Committee Chair, on January 1, 2016.

The public is welcome to attend.