

## Interpreting Electroencephalography Output for Error-Related Negativity

Jenny A. Walker

*University of Central Florida, jennywalk92@knights.ucf.edu*

Peter A. Hancock

*University of Central Florida*

Petros Xanthopoulos

*University of Central Florida*

Waldemar Karwowski

*University of Central Florida*

Ben D. Sawyer

*University of Central Florida*

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## Interpreting Electroencephalography Output for Error-Related Negativity

While individuals complete cognitively demanding tasks under time pressure, the physical action of reporting a mistake may be difficult. It is possible to curtail this issue using error recognition signals in the brain, known as error-related negativity (ERN). When an individual is aware of his or her mistake, an electroencephalography (EEG) system can recognize the event in as few as 150ms (Vi & Subramanian, 2012). One issue is that ERN information is traditionally collected using cumbersome equipment and complex analysis. The goal of this study is to examine if the process can be simplified for use in applied settings. We examined ERN EEG output using three methods, 1) raw data, 2) peak-to-peak moving window (P2PW) filtration, and 3) independent component analysis (ICA) filtration. It was hypothesized that, P2PW would be the best method because it is computationally inexpensive, and ICA would serve as an alternative if examined using the output from multiple leads. The participants were first fitted with a wireless B-Alert X10 EEG system. They then completed a brief training session followed by 4 blocks of a 64-trial letter task at their own pace. Between each trial, an asterisk appeared on the screen for 1 second. After each block, the experimenter entered the room, instructed the participants to get up and walk around, and advised them to beat their previous speed. Upon completion of the trials each participant filled out a demographics questionnaire as the EEG was removed. Surprisingly, results indicate that the ERN pattern is easily detected in raw EEG data from a simple, cheap, one-lead method of collection. P2PW and ICA filters have definitive benefits. However, these methods incorporate artifactual noise into the baseline (Gehring et al., 2012), are time consuming, and require additional resources. These findings are helpful in the development of performance feedback systems and better methods of error correction.