

Public Abstract

First Name:Xi

Middle Name:

Last Name:Ren

Adviser's First Name:Steven

Adviser's Last Name:Hackley

Co-Adviser's First Name:Fernando

Co-Adviser's Last Name:Valle-Incan

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Title:EVENT-RELATED POTENTIAL CORRELATES OF FEEDBACK ANTICIPATION DURING MOTOR LEARNING

Stimulus-preceding negativity (SPN), an ERP component that reflects the anticipation of feedback and other motivationally salient stimuli, has been proposed to play an important role in reinforcement learning. However, the relationship between the amplitude of SPN and learning is unclear. The current study aims to address the two competing theories in this topic. Mattox et al. (2006, *Clinical Neurophysiology*, 117, 2144-2153.) found that the amplitude of SPN gets larger with learning, which is congruent with the theory raised by Brunia et al. (2011, *Clinical Neurophysiology*, 122, 858-868.) that the SPN is a pure reflection of expectancy. By contrast, Moris et al. (2013, *Psychophysiology*, 50, 931-939.) found the opposite pattern of SPN, that is to say, that the SPN gets smaller with learning. They theorized that SPN reflects the amount of information the participant anticipates extracting from the feedback. The current study attempted to address this controversy.

On each trial of the present study, 60 young adult subjects were required to make four precisely timed key-press responses with a designated hand. Instructions for this timing were indicated by a pattern composed of four dots and line segments shown on the computer screen. After a brief (2.5 s) or long (8 s) delay, feedback was given. The instructed temporal pattern and delay were constant within blocks of 30 trials. The key point concerns the timing of the feedback. When feedback was provided after a short delay, SPN conformed to predictions of the feedback informativeness account and declined across trials. While in the long delay condition, SPN increased across trials consistent with the expectancy theory. This dramatic difference provides supportive evidence for the conclusion of Forde and Shohamy (2011, *The Journal of Neuroscience*, 31, 13157-13167.) that a change from short to long feedback delay causes a shift from procedural to declarative memory system.