
The influence of value and task-difficulty prediction on ERP components related to different stages of a cued visual discrimination task

Hanne Schevernels*^{†1}, Ruth Krebs¹, and Carsten Boehler¹

¹Department of Experimental Psychology, Ghent University – 9000 Ghent, Belgium

Abstract

Reward-related processes have moved into the center of much research recently, which partly relates to its crucial role in improving human performance in various task contexts. However, an important question that remains to be clarified is in how far this reward influence is distinct of reward-independent effort-related processes. By using a factorial design that systematically crossed these two factors, we could recently demonstrate with fMRI that predicting the possibility to earn monetary reward vs. predicting higher task difficulty on a given trial invoked largely overlapping neural circuits (Krebs et al., 2012, Cerebral Cortex), with only few areas exhibiting an interaction between the two factors. With the present EEG study we sought to investigate the temporal dynamics of these processes, which cannot be dissociated with fMRI due to its low temporal resolution, while additionally separating activity related to the different phases of the task, i.e., the cue, target, and feedback phase. The results indicate that during the cue-phase prominent markers of attentional orienting and response preparation are primarily dominated by reward prediction (e.g., larger contingent-negative-variation amplitudes for reward vs. no-reward cues), while evaluative processes during the feedback phase display a more multifaceted pattern of results, showing robust influences by both factors. Taken together, the present results display a complex interplay of reward-based and reward-independent processes, with the prospect of reward triggering increased attentional control at an early stage, which may in turn lead to an effective resource allocation and execution in the light of the level of task demands at hand.

*Speaker

[†]Corresponding author: h.schevernels@gmail.com