
Reward increases early attentional control in the Stroop task and modulates interference-related ERP components

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Abstract

Associating cognitive tasks with the prospect of reward is known to increase attention to the respective stimuli and to facilitate human performance. In situations in which attentional-control mechanisms are challenged, such as in traditional conflict tasks, such reward-based effects can be especially helpful in overcoming interference from irrelevant stimulus input. Here, we investigated the neural dynamics of such reward-based attentional facilitation in a Stroop task using scalp-recorded event-related potentials (ERPs). Compared to unrewarded trials, reward trials were associated with enhanced early fronto-central and occipital ERP components, potentially reflecting increased attention to the reward-predictive stimulus, which paralleled the facilitated behavioral performance on such trials. This notion was further supported by the observation that hallmark interference-related ERP components, i.e., the interference-related negativity (Ninc) and the late positivity component (LPC), seemed to occur much earlier in the context of reward, suggesting that focusing more strongly on the relevant dimension – due to the prospect of reward – may help to resolve interference at an earlier processing stage. In addition, although the semantic meaning of reward-predictive colors was always irrelevant, incongruent reward-related words appeared to interfere with the required behavior more strongly than it is usually observed, and were associated with early centro-parietal ERP modulations. This latter observation suggests that the saliency of a reward-related semantic representation can trigger an automatic “response capture”, which competes with the voluntary goal-directed action selection, thereby delaying the response.

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