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Neuromodulation of electrophysiological correlates of reinforcement learning in humans

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Abstract

The feedback-related negativity (FRN) is an event-related potential that differentiates between positive and negative feedback, occurring most prominently at frontocentral electrodes 200-300ms after delivery of feedback. The FRN seems to be reflective of a reward prediction error, as the magnitude of the ERP component has been related to the magnitude of prediction error estimated through reinforcement learning (RL) models. We aim to further understanding of the FRN and its relationship to behavior by replicating the study of Reinhart & Woodman (2014), replacing tDCS with focal, targeted transcranial magnetic stimulation (TMS) over the frontocentral region. Preliminary data shows that our participants reliably generate a FRN when presented with incorrect feedback, and that single-trial estimates of theta power are significantly correlated with RL-derived single-trial estimates of prediction error for correct trials. We will examine the effect of stimulation both on participant behavior as well as on RL parameter estimates.