

Reward positivity biases interval production in a continuous timing task

Yan Yan¹, Laurence Hunt², and Cameron Hassall²

¹Stanford University

²University of Oxford

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Abstract

The neural circuits of reward processing and interval timing (including perception and production) are functionally intertwined, suggesting that it might be possible for momentary reward processing to influence subsequent timing behavior. Previous animal and human studies have mainly focused on the effect of reward on interval perception, whereas its impact on interval production is less clear. In this study, we examined whether feedback, as an example of performance-contingent reward, biases interval production. We recorded EEG from 20 participants while they engaged in a continuous drumming task with different realistic tempos (1728 trials per participant). Participants received color-coded feedback after each beat about whether they were correct (on time) or incorrect (early or late). Regression-based EEG analysis was used to unmix the rapid occurrence of a feedback response called the reward positivity (RewP), which is traditionally observed in more slow-paced tasks. Using linear mixed modelling, we found that RewP amplitude predicted timing behavior for the upcoming beat. This performance-biasing effect of the RewP was interpreted as reflecting the impact of fluctuations in dopaminergic activities on timing, and the necessity of continuous paradigms to make such observations was highlighted.

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