

Feedback-Related ERPs Predict Learning Speed

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The efficiency with which a learner processes external feedback has implications for both learning speed and performance. A growing body of literature suggests that the feedback-related negativity (FRN) event-related potential (ERP) and the fronto-central positivity (FCP) ERP reflect the extent to which feedback is used by a learner to improve performance. To determine whether the FRN and FCP predict learning speed, 82 participants aged 7:6 - 11:0 learned the non-word names of 20 novel objects in a two-choice feedback-based declarative learning task. Participants continued the task until reaching the learning criterion of 2 consecutive training blocks with accuracy greater than 90%, or until 10 blocks were completed. Learning speed was determined by the total number of incorrect responses before reaching the learning criterion. Using linear regression models, the FRN amplitude in response to positive feedback was found to be a significant predictor of learning speed when controlling for age. The FCP amplitude in response to negative feedback was significantly negatively associated with learning speed, meaning that large FCP amplitudes in response to negative feedback predicted faster learning. An interaction between FCP and age suggested that for older children in this sample, smaller FCP amplitude in response to positive feedback was associated with increased speed, while for younger children, larger FCP amplitude predicted faster learning. These results suggest that the feedback related ERP components are associated with learning speed and can reflect developmental changes in feedback-based learning.