Abstract

When it comes to learning factual information, students may benefit from having opportunities where they can learn from their mistakes as opposed to only being asked to study that information. However, the achievement goals that instructors set for their students may influence how students engage with these learning opportunities. Although some instructors may focus students on learning (i.e. mastery goals), others may seek to motivate students by focusing them on doing better than others (i.e. performance goals), which is thought promote greater sensitivity to errors and impair learning. Across two studies, the present dissertation examined the roles of dorsolateral frontal and lateral temporal regions in learning from errors as a function of goals that were hypothesized to underlie different mechanisms and examined whether goals differentially influence learning from errors. Participants were instructed to adopt a mastery or performance goal and answered challenging general knowledge questions. Following their response, they were then presented with accuracy feedback indicating whether their response was correct or incorrected followed by the subsequent learning feedback (i.e. the correct answer). The first study used Event-Related Potentials (ERPs) to examine processing of the correct answer, and it was expected that ERPs indicative of attention and deeper elaborative processing (i.e. superior frontal positivity) would be more enhanced for mastery compared to performance goals during the learning feedback. Differences over inferior temporal regions were not expected between goals since this region was only thought to index bottom-up semantic processing of the correct answer. The second study employed High-Definition transcranial Direct Current Stimulation (HD-tDCS), where during the same instructions and task, HD-tDCS was applied to either left dorsolateral prefrontal (DLPFC) or lateral temporal regions in order to examine the causal influence of each region on learning as a function of goals. As in the first study, stimulation was expected to benefit learning across both regions, but DLPFC stimulation was expected to primarily benefit learning under mastery compared to performance goals. Learning was examined using immediate and/or week later delayed surprise retests. Both studies showed that learning from errors engaged both dorsolateral frontal and lateral temporal regions, but only in the ERP study was superior fontal positivity modulated by goals. Here, mastery goals led to early and late enhancements and also benefited learning across both retests compared to performance goals. In the second study, differences in learning between goals were not shown at the delayed retest. When it comes to learning from errors, mastery compared to performance goals may promote enhanced attention and elaborative processing of the learning information and benefit learning outcomes. However, behavioral benefits may not be always evident. Factors that may have contributed to these behavioral inconsistencies between the two studies are discussed along with educational implications.