Abstract

Title of Document: HIGH-DEFINITION tDCS REVEALS A CRUCIAL ROLE FOR POSTERIOR PARIETAL CORTEX IN IMPLICIT VISUOMOTOR LEARNING

Gaurav Panthi, M.Tech Biological Engineering, 2016-18

Directed By: Dr Pratik Mutha, Biological Engineering, and Cognitive Sciences.

Adapting to gradually changing body and environment states is a remarkable feature of the human brain. Adaptation is driven by the mismatch between expected and actual states. In the visuomotor adaptation, this mismatch is produced by introducing a perturbation in visual feedback. The brain learns to encounter or adapt to this mismatch gradually trial-to-trial basis. Consistent findings on the involvement of cerebellum in visuomotor adaptation have led to ignoring the possibility of involvement of other brain areas. Here, we tried to identify cortical brain area that is involved in visuomotor adaptation, i.e. posterior parietal cortex (PPC). Sixty young, healthy, right-handed human subject adapted to a 30-degree visuomotor perturbation while receiving high definition

cathodal tDCS or Sham stimulation over left or right posterior parietal cortex. We found that inhibition of the activity of left, but not right, parietal cortex resulted in a clear deficit in adaptation with contralateral arms. On the top of that, we used a computational framework which uses multiple error-sensitive processes to model adaptation and found parietal inhibition affected only slow, implicit component of learning. Our results confirm a crucial role for posterior parietal cortex in visuomotor learning and caution against ignoring of cortical areas because of the dominance of cerebellum literature.