

Abstract

To be able to engage in social interaction with peers, we need to predict their movements and their action goals. Several studies have already shown that, when observing someone else move to act on an object, the observers show anticipatory eye-movements towards the goal object before the hand of the actor arrives. Moreover, it has been shown that these anticipatory fixations become faster as the action sequence evolves. Furthermore, it has been found that one's own motor cortex becomes active not only when performing-, but also when observing someone else perform an action. For the current study we combined eye-tracking (ET) and electroencephalography (EEG) to study the behavioural and neurophysiological basis of how one predicts complex multi-step actions of others. Our study was based on a study by Poljac, Dahlsätt, and Bekkering (2013) and in addition assesses the neurophysiological responses. In contrast to the previous studies, the eye-tracking data did not show a significant pattern of anticipatory fixations; there was no significant difference between the action steps and thus no indication of accumulation of evidence visible in the data. However, the EEG data, demonstrated a significant increase of suppression over the motor cortex in both the mu (8-13 Hz) and beta (16-25 Hz) band and a significant difference between action steps. This suggests the presence of a neural predictive mechanism, aiding understanding in complex actions, whereas the behavioural evidence for anticipation of action end-goal seems not so well established yet.

Keywords

mu, beta, prediction, anticipation, eye-movement