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Conférence le Jeudi 11 avril 2019 à 10h30

IMPACT 16 avenue Doyen Lépine 69500 Bron.

" Uncovering the drivers of human sensorimotor learning: EEG manifestations of error and reward processing "

To ensure optimal accuracy of motor behaviour across development and ageing, the relationship between sensory input and motor output must be calibrated, a process called sensorimotor adaptation. It has long been thought that sensorimotor adaptation is driven by cerebellar-based sensory prediction errors (i.e., mismatch between predicted and actual sensory consequences of movement). More recently, there has been increasing support for the possibility that target errors (i.e., missing the intended target) also contribute to adaptation. In spite of considerable behavioural and modeling work, the neural mechanisms involved in the processing of these different types of errors remain unclear. In this light, a recent focus of our lab has been to characterize the neocortical manifestations of prediction errors and target errors in the context of reach adaptation using electroencephalography (EEG). I will first present data showing that the parietal response to visual reafferent feedback from the moving limb is increased when the timing or direction of feedback is experimentally manipulated, suggesting that parietal areas contribute to the processing of prediction errors. I will then present results showing that oscillatory power in the theta-band (4-7 Hz) over mid-frontal regions is increased following target errors, and more so when they are associated with monetary punishments. Overall, this work identifies distinct markers of prediction errors and target errors during sensorimotor adaptation, providing possible targets for neurostimulation approaches destined to optimize human motor learning and performance.