Brain Wave Signatures Associated with Vection

by

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Abstract
Primary visual cortex (V1) in human has been the subject of many studies. However, little is known about its activity associated with visually induced self-motion illusion (vection). Literature suggests a reciprocal inhibition (RI) interaction between visual and vestibular system during vection. However, how activities in V1 will respond during the RI process is unclear. The current thesis tries to answer this question with the noninvasive electroencephalograph (EEG) measurement on human subjects. In particular, high-resolution event related potential (ERP) data was recorded from V1 to determine how V1’s activities will change when an optical flow stimulation in the periphery induces different feelings: vection or no vection.

Two experiments were conducted. In Experiment 1, V1 ERP responses under two circular vection (CV) and one linear vection (LV) conditions (with similar vection intensity) were studied while Experiment 2 studied V1 ERP responses in two LV conditions (with different vection intensity). Result showed a positive correlation between vection intensity/duration and the ERP component amplitude difference (component in no vection condition minus component in vection condition) for LV induced by stimuli moving from left to right at 45°/s. For participants reporting high vection intensity, the presence of vection reduced the N1 and N2 ERP components amplitude. This thesis discusses how this finding is related to existing literature on ERP in V1. In particular, the ‘feedback regulation’ mechanism from extrastriate cortex may explain our finding in a linear way while the ‘attention control’ mechanism may also play a part non-linearly. Detailed discussion is reported in the thesis.

Date : 7 Nov 2016 (Monday)
Time : 10:00am-1:00pm
Venue : Room 1504 (Lift 25-26)

Examination Committee:
Prof. Bertram Shi (Chair)
Prof. Richard So (Supervisor)
Prof. Michael Wong

All are welcome!