

Automatic response selection - functional imaging of practice effects

Katja Osswald^{*}, John Duncan^{*}, Gordon.D. Logan[†] and Matthew Brett^{*}

^{*}*Cognition and Brain Sciences Unit, Medical Research Council, Cambridge, United Kingdom*

[†]*Department of Psychology, Vanderbilt University, Vanderbilt, TN, USA*

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Humans are able to learn and select responses to sensory inputs according to arbitrary rules. Previous studies show that specific visuomotor learning-related activity is found over a distributed cortical network, centered on a prefrontal-temporoparietal circuit. This study investigates the changes occurring with practice of stimulus-response (S-R) mappings, isolating specific learning-related changes in the basal ganglia, SMA and parietal lobes. Subjects performed an S-R mapping task for eight days. They learned to respond with four button presses to four abstract shapes. The task was practiced daily for 30 minutes. We studied brain activation during this task using functional MRI on the first and last day. At the end of each scanning session subjects also performed a reversed version of the practiced S-R task, so that stimuli previously signaling a right response now indicated a left response. In addition to the S-R learning tasks, we gave subjects a localizer task, where they pressed right or left buttons according to the direction of an arrow on the screen. fMRI data from the localizer task allowed us to identify motor regions of each subject individually, and perform a region of interest analysis on the data from the S-R learning experiment. We collected whole-brain fMRI data on a 3T Bruker scanner. Analyses in individual subjects show changes in activation over learning and reversal in the basal ganglia, SMA and parietal cortex

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