

Regional Heterogeneity of the Effects of Attentional Prioritization

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A recent study applying multivariate analysis to whole-brain fMRI showed that attention increased the strength of stimulus representations in many regions, including occipital, intraparietal sulcus (IPS), and precentral sulcus (PCS; Ester et al., 2016). These results were interpreted as blurring the distinction between “sources” and “sites” of attention. To explore this idea further, we used a visual search task to study the effects of attention on the neural representation of two simultaneously presented items, one in each visual hemifield. After the brief presentation of a search target (drawn from one of three stimuli: a face, doughnut, or abacus), then a delay, the search array comprised the target and a distractor (different category), both flickering at 1 Hz and unpredictably changing state. With the offset of the search array, subjects reported the number of state changes the target had undergone. Finally, the search array reappeared, with a cue indicating which of the two items was to be attended during a second presentation of the search array. Multivariate pattern analysis (MVPA) performed on three predefined regions of interests (ROIs; frontal, parietal, and occipital) revealed differences between regions in the effect of attention on the decoded representations. In the occipital ROI, the onset of the first search array was associated with an increase in classifier evidence for the cued item, and a decrease in evidence for the uncued, even in the occipital hemisphere contralateral to the uncued item, consistent with a “site” of attentional action. In contrast, both frontal and parietal ROIs contained above-baseline evidence only for the attended item, regardless of hemifield, consistent with a more “source-like” pattern of attention.