

Neuroimaging Evidence on the Role of the Prefrontal Cortex in Dynamic Object Categorization for Goal-Achievement

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Abstract: Work in neuroscience has revealed the role of the frontal lobes in higher-order, close-ended cognitive tasks that require cognitive control (e.g., working memory, task switching, interference resolution). However, previous studies have not explored the involvement and function of the frontal lobes in open-ended, ecologically-valid, goal-oriented tasks. In this study we combined a close-ended task (i.e., generating the common use for everyday objects) and an open-ended task (i.e., generating an uncommon use for objects) in an event-related fMRI paradigm. The results of subject-wise and item-wise analyses reveal a tradeoff between regions that specialize in rule-based processing (i.e., the left lateral prefrontal cortex) and regions involved in high-level perceptual processing (i.e., the lateral occipital complex) in open-ended tasks. Furthermore, the novelty and plausibility of participants' responses differentially predicted activity in these regions. We discuss possible implications of these findings for accounts of semantic memory organization and prefrontal cortex function.