

## Functional imaging of prefrontal cortex in the human and monkey

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The prefrontal cortex enables us to adapt to changing environments by permitting shifts from one mental state, directed toward a particular reaction tendency, to another (cognitive shifts). The Wisconsin Card Sorting Test (WCST) is the most common paradigm to detect disorders of prefrontal function involving the cognitive shifts. However, the exact relationship of this test to prefrontal function and the precise anatomical localization of the cognitive shifts involved are controversial. By isolating shift-related signals using the event-related functional magnetic resonance imaging (fMRI), we reproducibly found transient activation of the posterior part of the bilateral inferior frontal sulci of the human. This activation became larger as the number of dimensions (relevant stimulus attributes that had to be recognized) were increased. Furthermore, this event-related fMRI approach to the cognitive shifts was extended along this line to explore brain activation of non-human primates. While monkeys performed the WCST, we applied the event-related fMRI and found shift-related activation in the prefrontal cortex including bilateral lower limb of the arcuate sulci. These results suggest that the inferior frontal areas play an important role in the flexible shifting of cognitive sets both in humans and monkeys.