

## **fMRI in systems neuroscience**

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fMRI amongst other functional imaging techniques has revolutionized the study of the human brain by making the mind visible. Initially functional imaging has concentrated on a mapping approach, but recently the technique has also proven to be able to help revealing mechanisms of brain function. I will review fMRI experiments of visual perception and learning and try to emphasise their immediate benefit for psychological research. These examples will also include the combination of fMRI with high temporal resolution recording techniques (EEG).

Importantly, one should keep in mind the limitations of the method. Like all other recording techniques, functional imaging with fMRI is correlative. In principle it is possible that activations can be unspecific co-activations and are not necessary for the task in question. Therefore, functional lesion technique or classical lesion approach can help to understand fMRI results.

Although functional neuroimaging data has mainly been analysed on a voxel-by-voxel basis new approaches also investigate interregional interactions (effective connectivity) using fMRI. I will review these new approaches and show several examples.

Effective connectivity is based on anatomical connections. These connections form the white matter of the brain. The ultrastructure of white matter, i.e. the connectivity between cortical and subcortical areas can be assessed with Diffusion Tensor Imaging (DTI). Although the spatial resolution is far from that required to map individual axons, it is still possible to track fibre bundles. I will therefore show examples of this technique and discuss their possible impact on psychological studies.