

The evolution of spatial abstraction and categorization



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Research topic and methods

By comparing brain activity patterns in monkeys and humans during spatial cognitive tasks (see Fig.1), we study how spatial cognition processes are implemented in the brain and how they may have developed during evolution.

Both monkeys and humans perform similar tasks. During these experiments, behaviour and brain activation are measured with different techniques that vary in their spatial and temporal resolution (see Fig. 2).

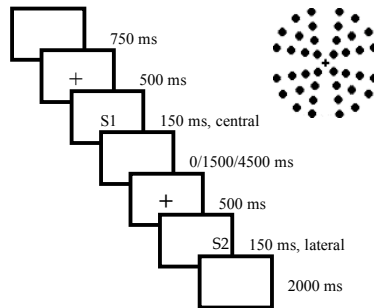


Fig.1. Task design example.

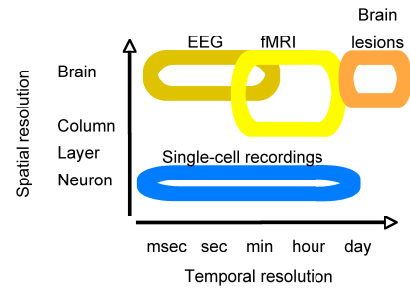


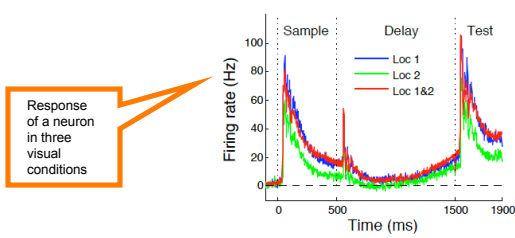
Fig.2. The techniques used according to their temporal and spatial resolution.

Spatial Cognition

Neuronal activity

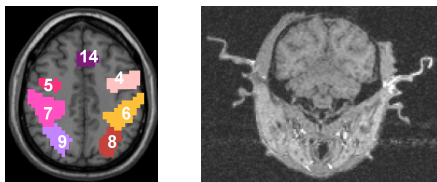


Behaviour



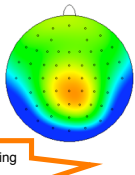
Response of a neuron in three visual conditions

Single-cell recording



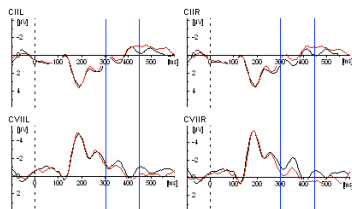
Functional (structural) MRI

Areas active during spatial relations processing



Brain waves during first stimulus presentation
black=categorical, red=coordinate

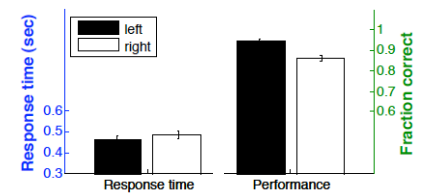
EEG



Human



Also neurological patients



Psychophysics

Research team

Functional Neurobiology:

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This multi-disciplinary approach allows us to learn and understand more about the implementation of spatial cognition in the brain at different levels of processing.

Moreover, such inter-species comparisons advance the knowledge of primate brain evolution (hemispheric lateralization of spatial functions).