Functional MRI - II

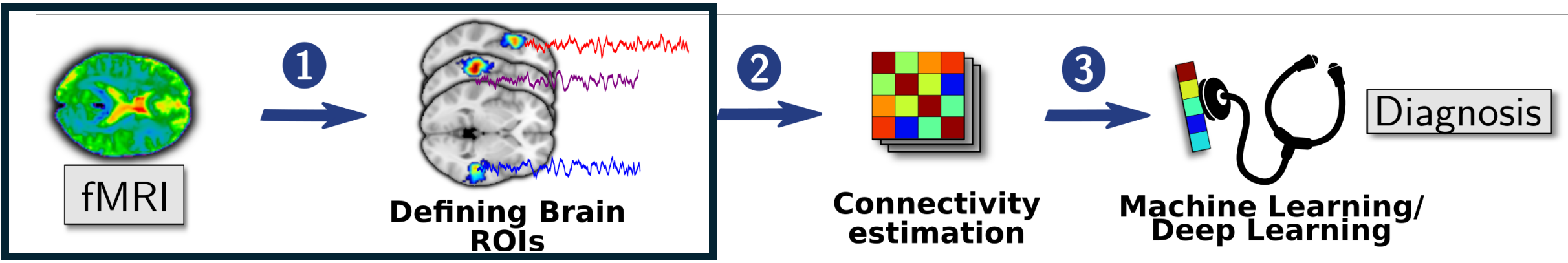
Neuroimaging Workshop – session #7

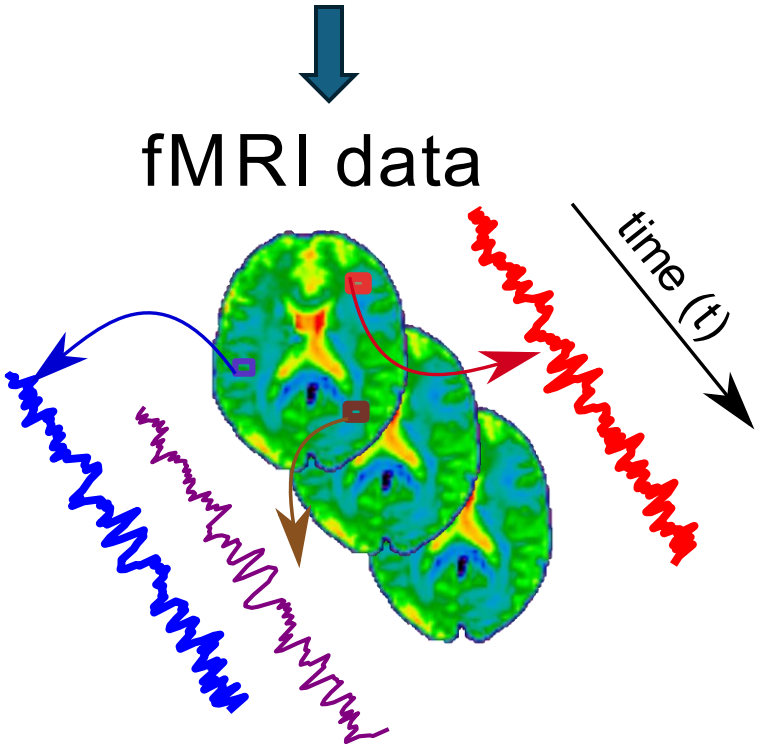
05/10/2024

Remaining sessions in this workshop

- Today i.e., 5th October
- 12th October – Dussehra
- 19th October – Quiz week
- 26th October – EEG signal analysis
- 2nd or 9th November – EEG signal analysis

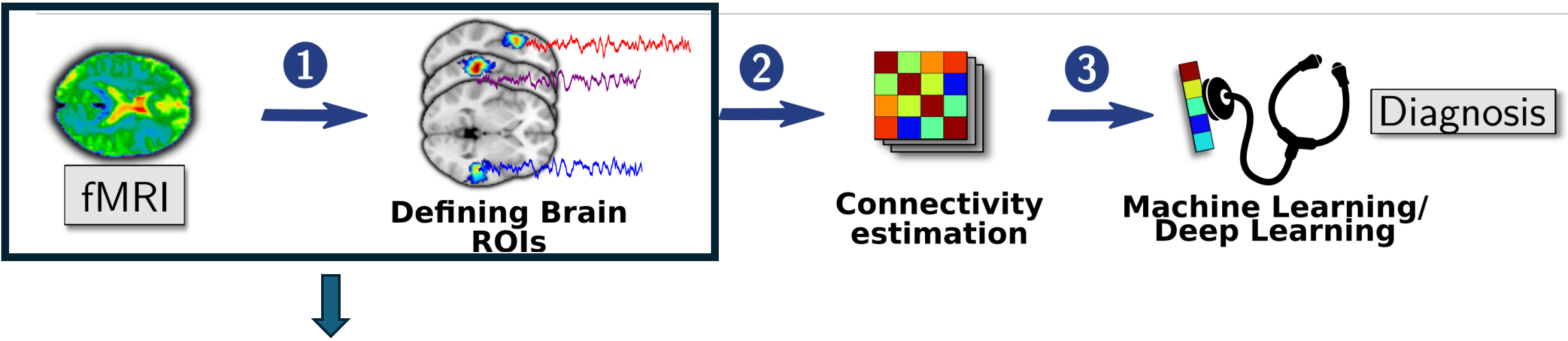
Recap: Extraction of timeseries signals from fMRI

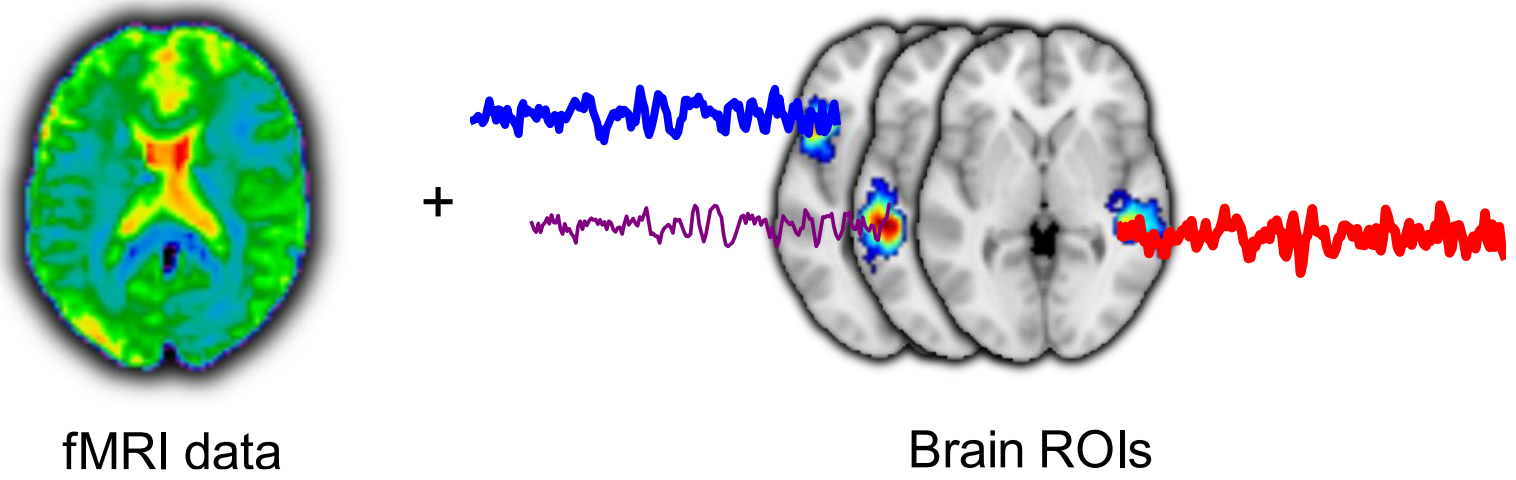




1. Voxel-level timeseries

Recap: Extraction of timeseries signals from fMRI





fMRI data

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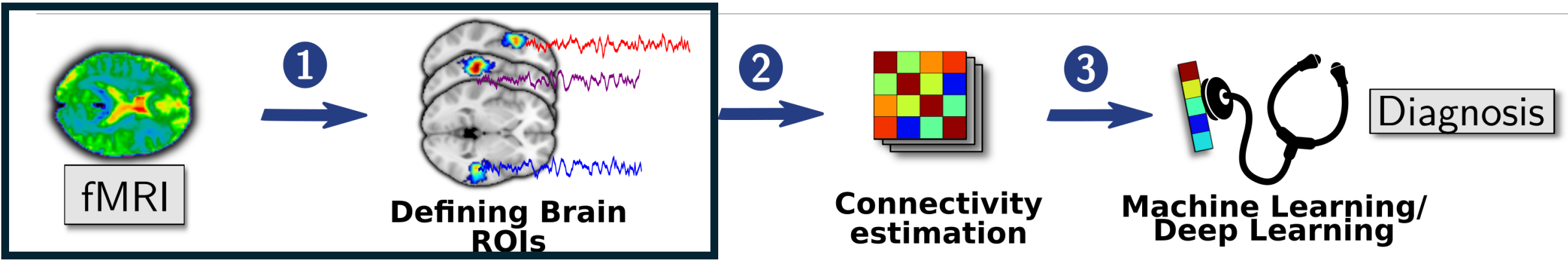
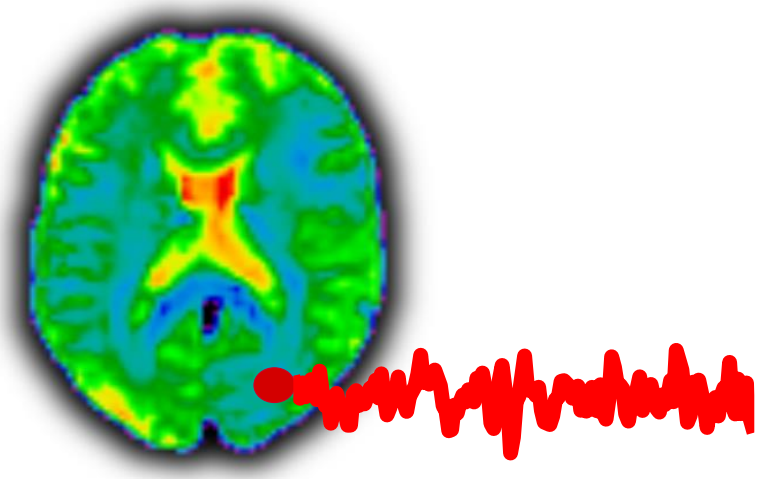
Brain ROIs

2. ROI-level timeseries

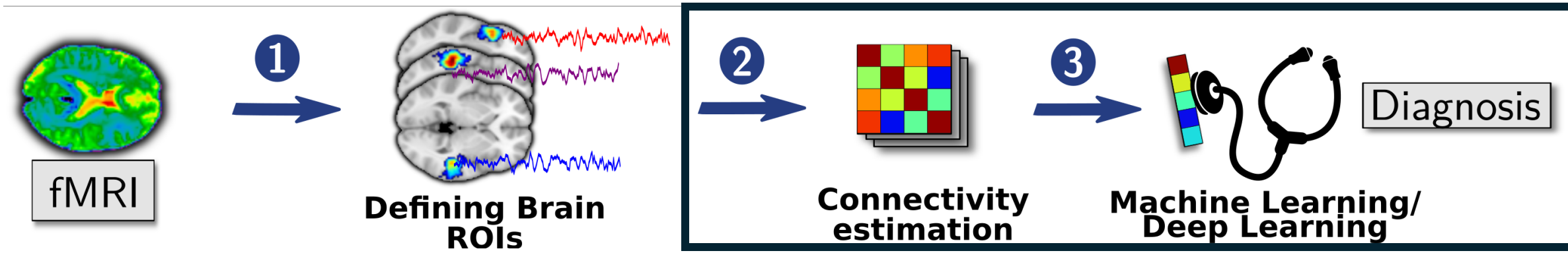
Recap: Extraction of timeseries signals from fMRI





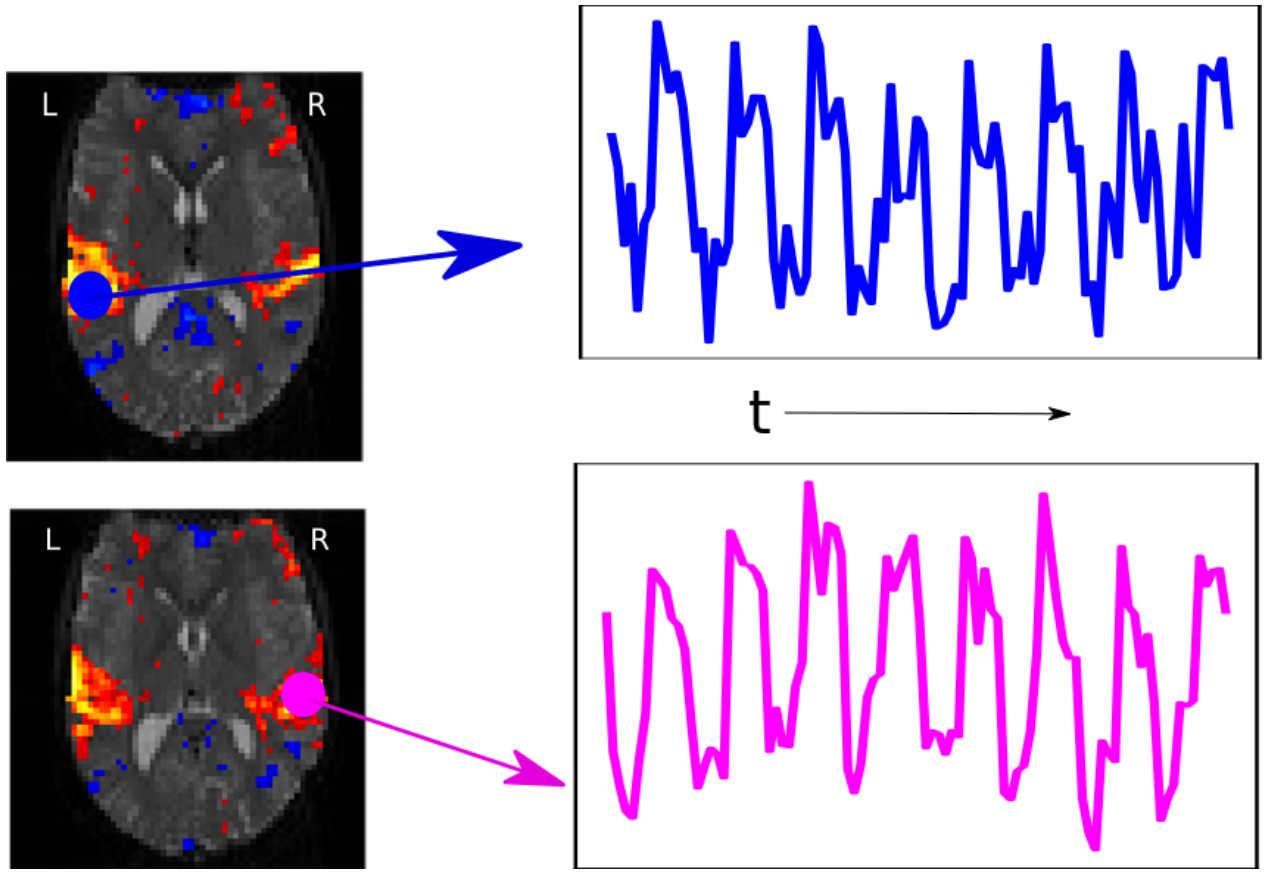
2. Seed-level timeseries

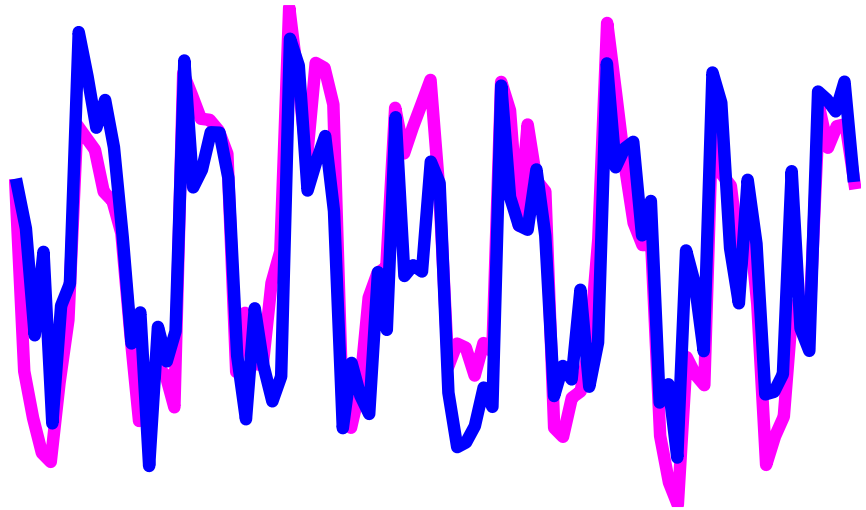
Agenda



- Extraction of functional connectivity i.e., ROI-ROI and Seed-Voxel
- Functional connectivity-based Brain-Age prediction
- Statistical comparisons between two groups

Functional connectivity



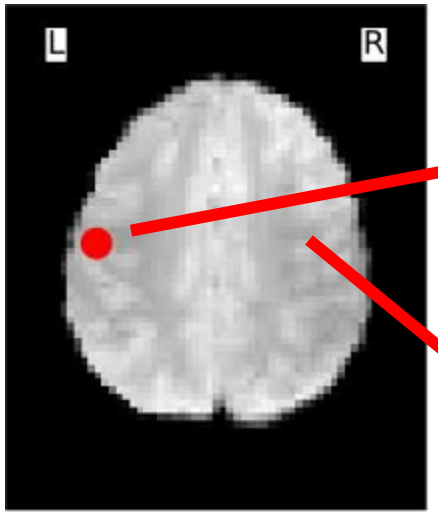


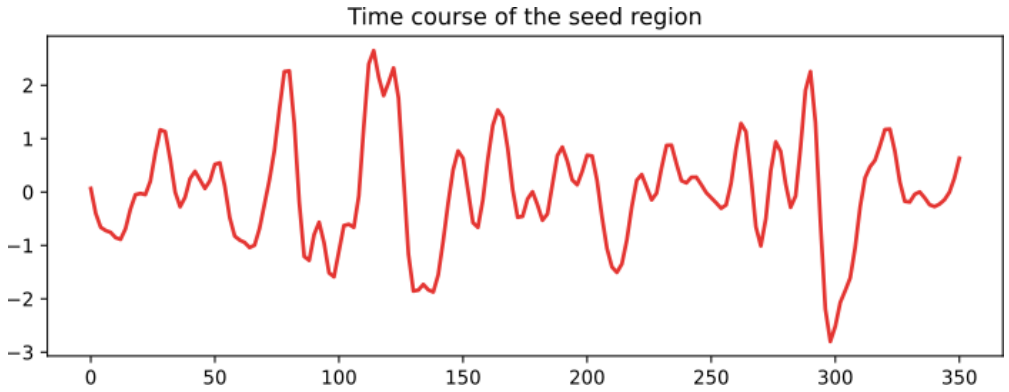
Functional Connectivity – **temporal correlations between remote neurophysiological events**

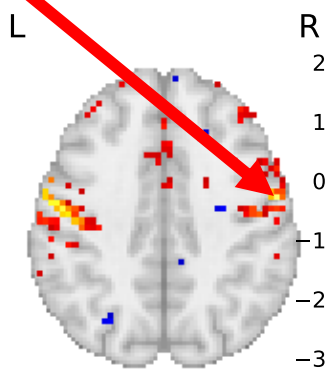
- Karl Friston

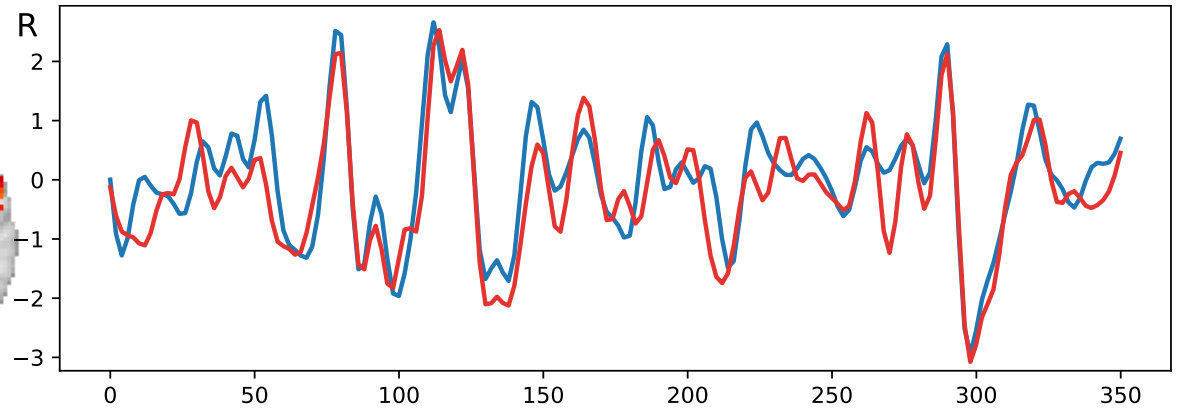
Demo on functional connectivity

Functional connectivity at rest





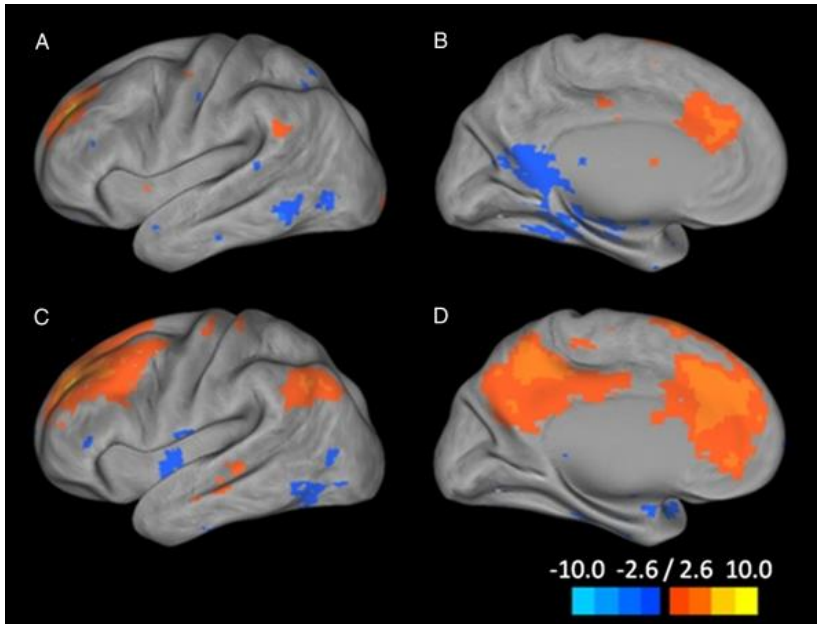


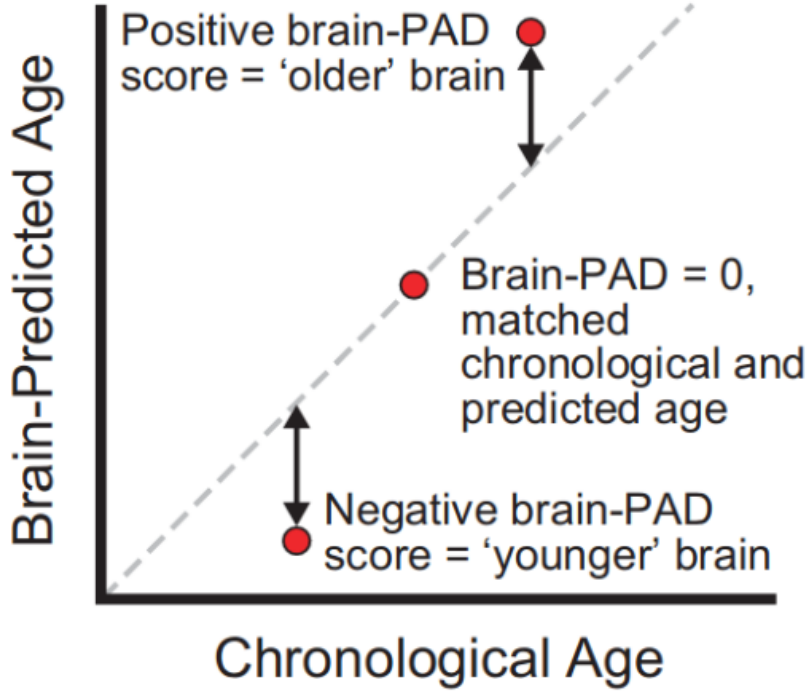


Biswal, B., et al., (1995), Functional connectivity in the motor cortex of resting human brain using echo-planar mri. Magn. Reson. Med.

Why studying FC at rest ?

- Understand the inherent functional organization of the brain
- Clinical biomarker

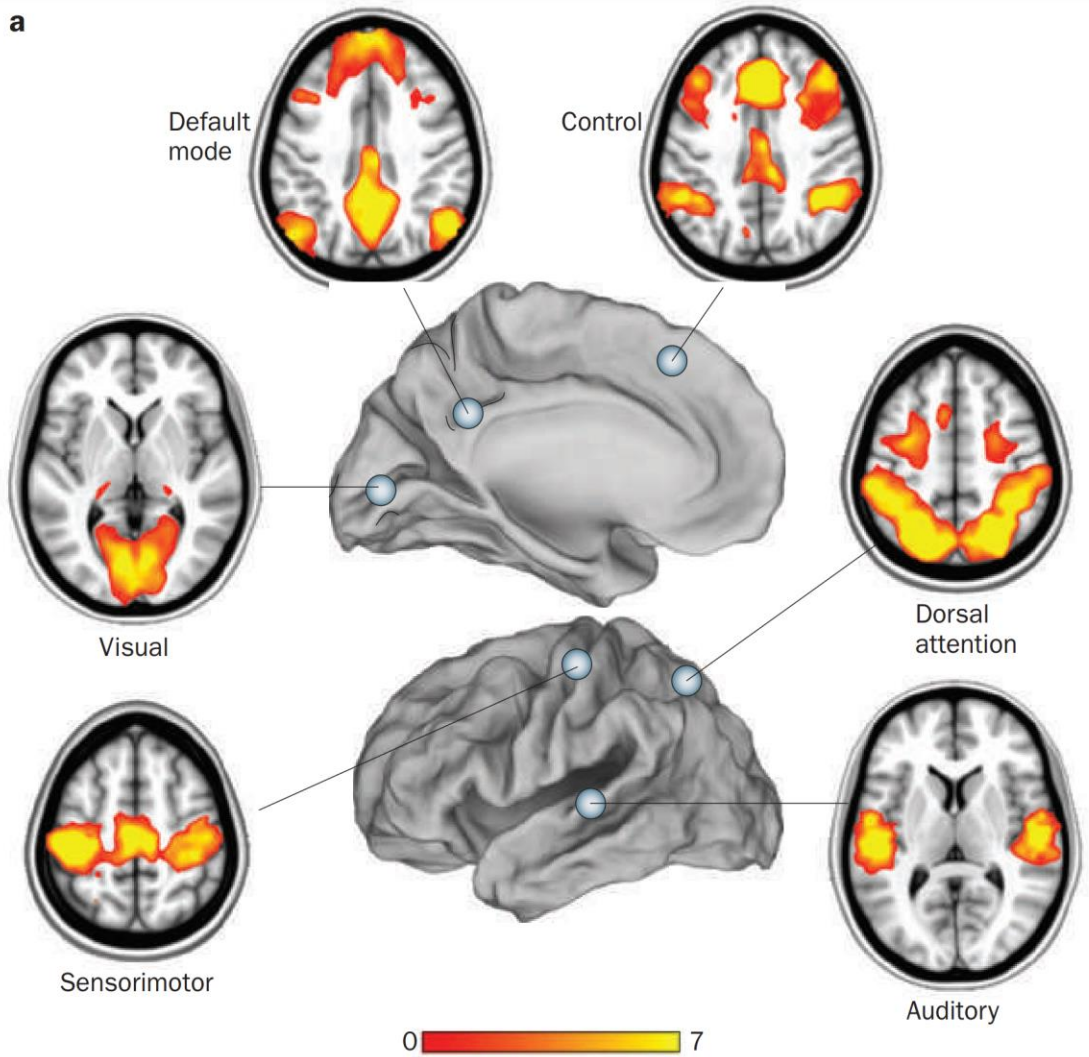




Cole et al. 2018. Mol.Psychiatry

Sheline YI, et al. Resting-state functional MRI in depression unmasks increased connectivity between networks via the dorsal nexus. Proc Natl Acad Sci U S A. 2010 .

Resting State Networks



Zhang D, Raichle ME. Disease and the brain's dark energy. Nat Rev Neurol. 2010.

Types of connectivity

- Static and Dynamic