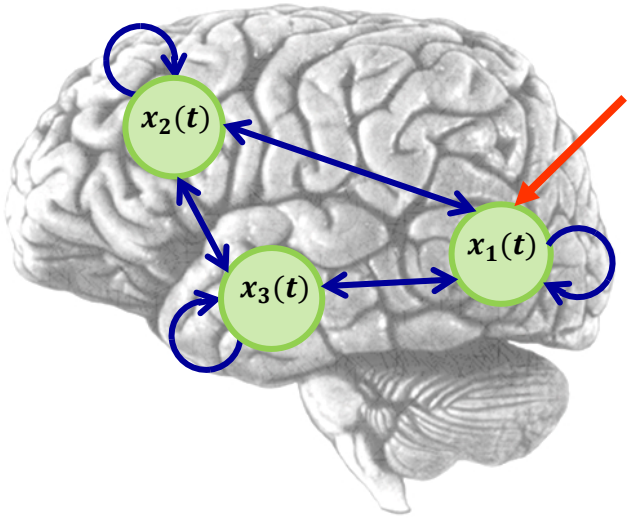

Tutorial: Dynamic causal modelling for fMRI

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CP Course 2019, Zürich, Switzerland

Our plan for today

- Introduction
- Inverting our own DCM
  - Extracting the data
  - Setting up the model
  - Inversion
  - Model comparison
  - Looking at the results (parameters)
- Looking at group data
  - Setting up a group analysis in SPM (PEB)
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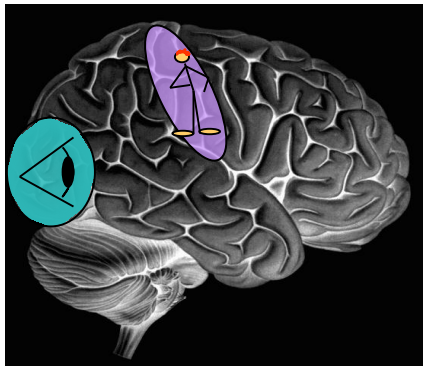
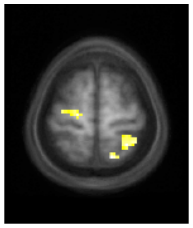
Your questions …

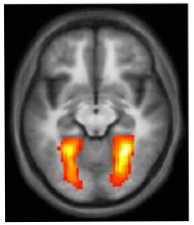
Specialisation vs. Integration

Functional Specialisation





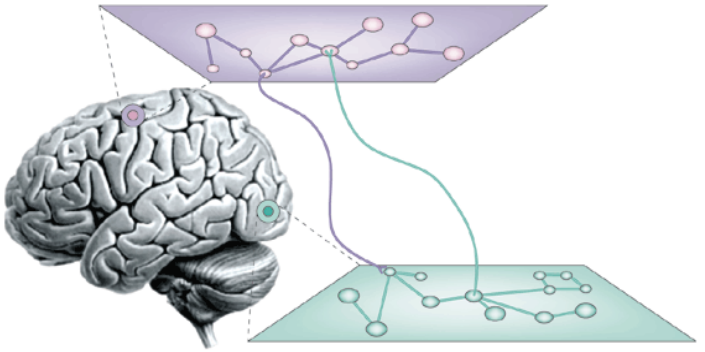
u_1

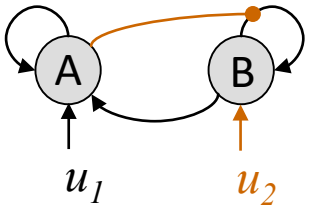


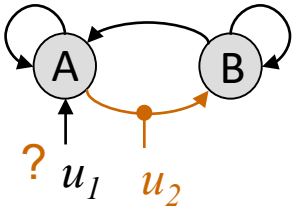
$u_1 X u_2$

*«**Where**, in the brain, did my experimental manipulation have **an effect**?»*

Functional Integration

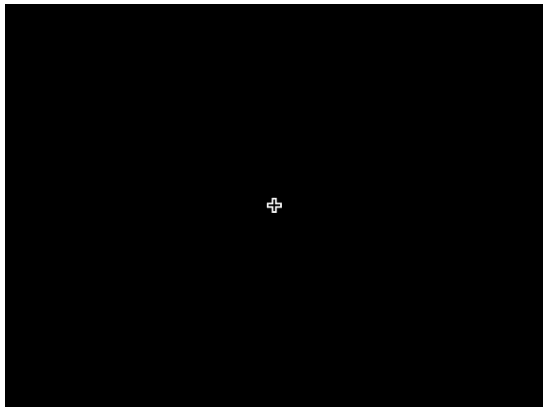




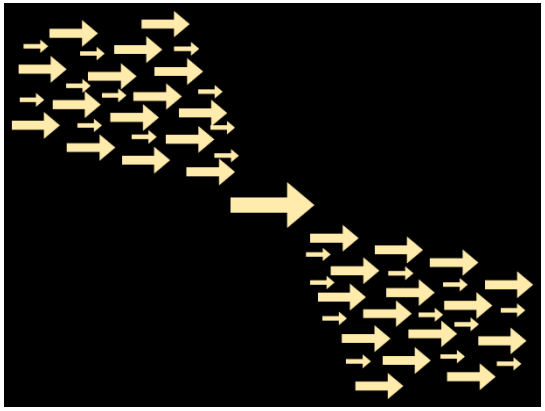


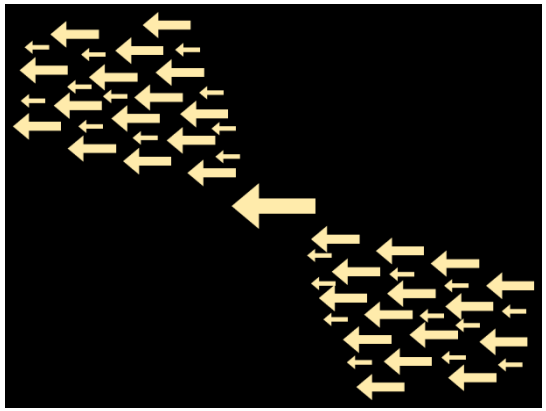
*«**How** did my experimental manipulation **propagate through the network**?»*

The experiment

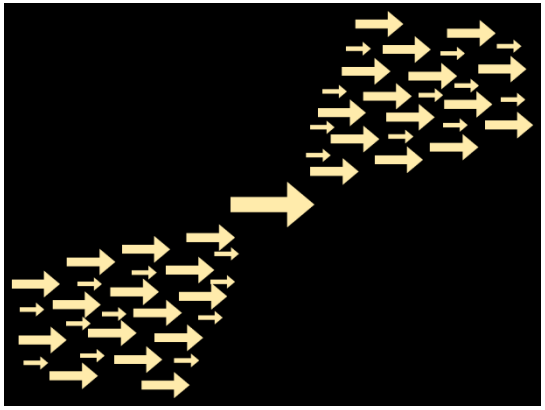


Fixation

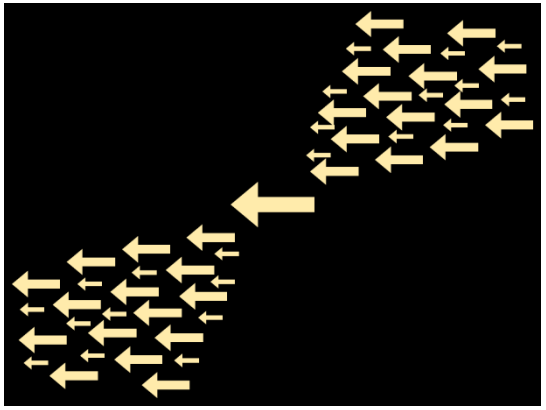




Top left wedge
Wedge1



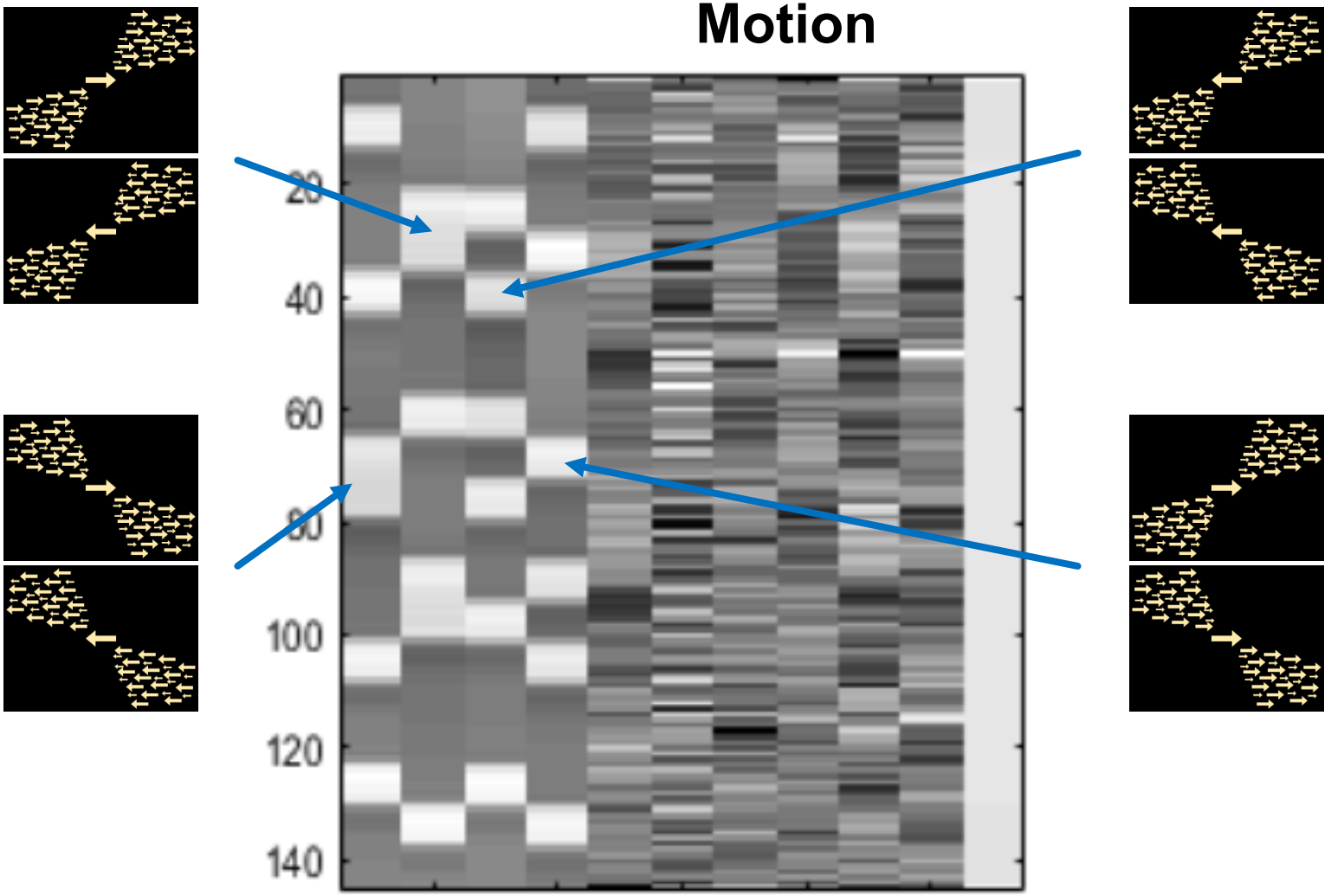
Press right



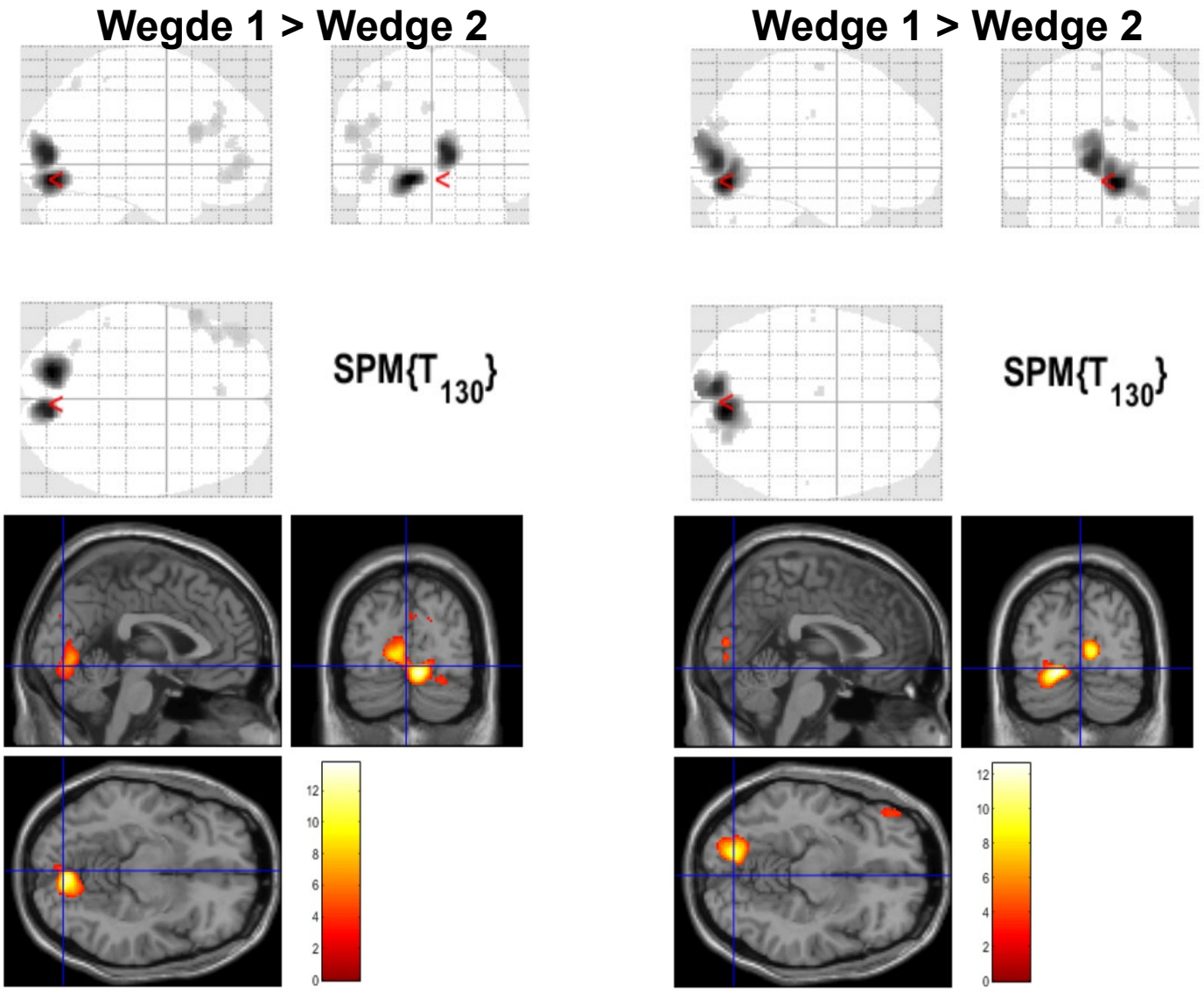
Press left

Top right wedge
Wedge2

Modeling the design

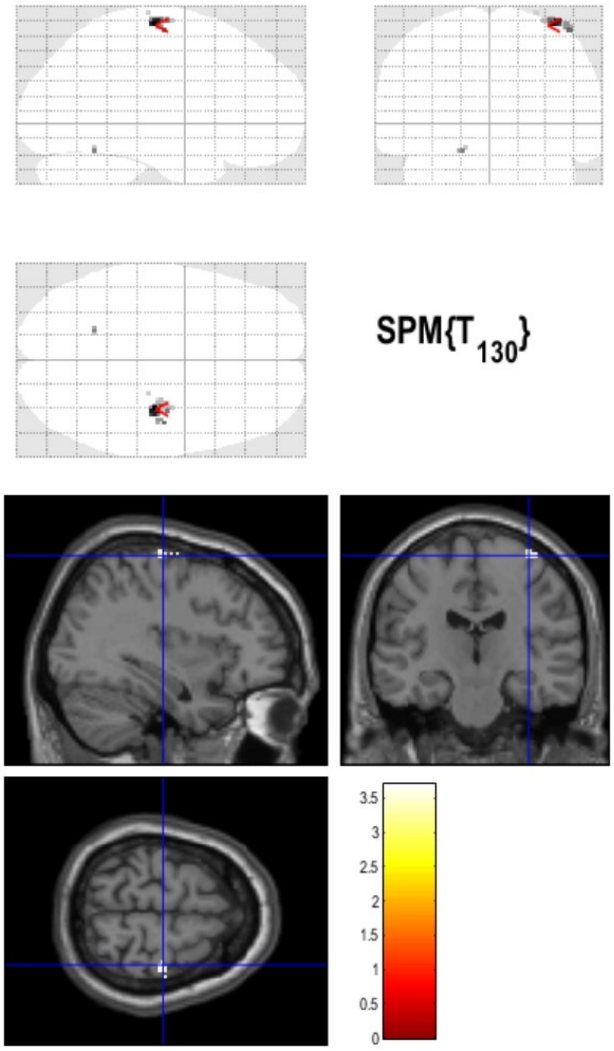


Visual responses

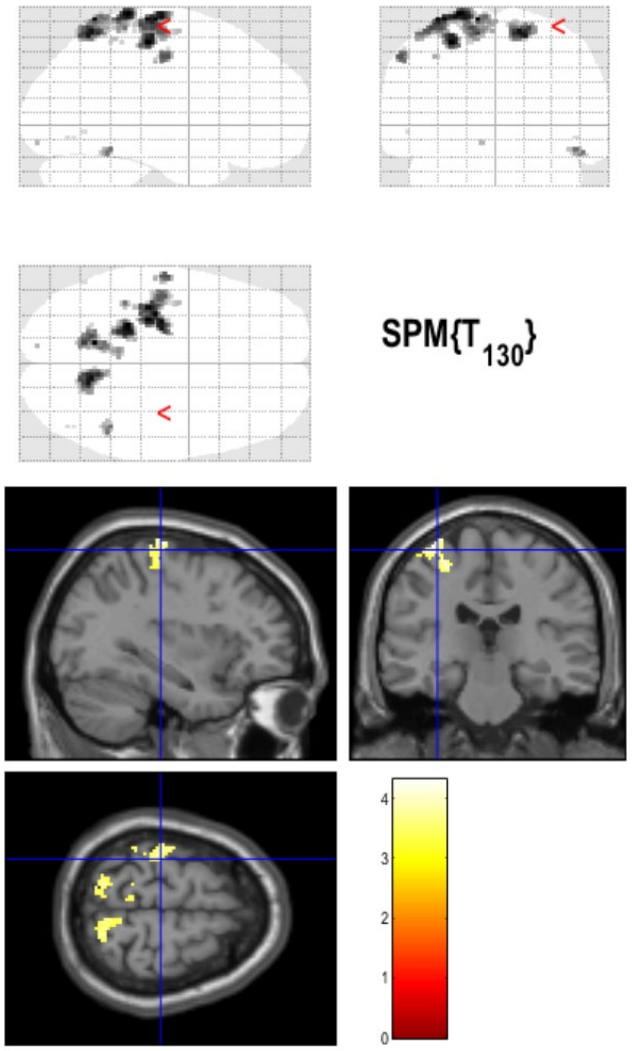


Motor responses

Left > Right

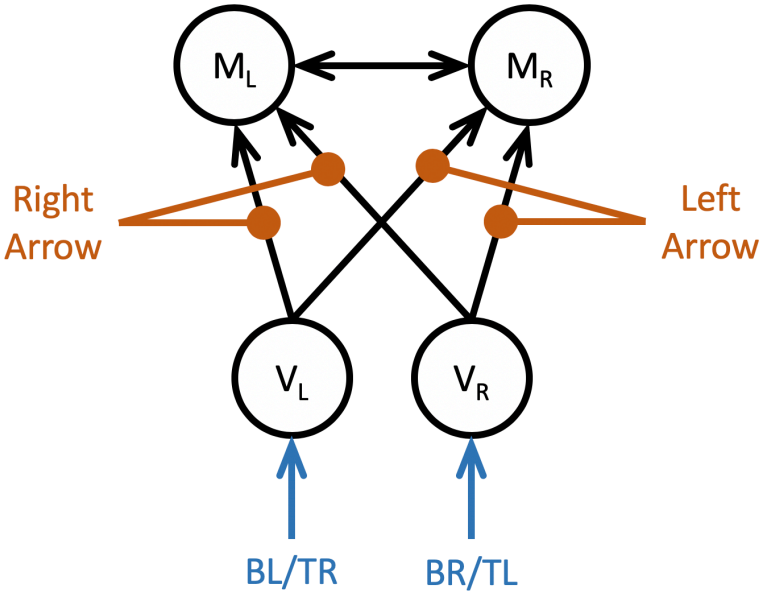


Right > Left



Neuronal state equations

$$\frac{dx}{dt} = f(x,u) \approx f(x_0,0) + \underbrace{\frac{\partial f}{\partial x}}_{A} x + \underbrace{\frac{\partial f}{\partial u}}_{C} u + \underbrace{\frac{\partial^2 f}{\partial x \partial u}}_{B} ux + \frac{\partial^2 f}{\partial x^2}\frac{x^2}{2} + \cdots$$



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