

# **Structural connectivity correlates of behavioural asymmetries in attention measured with diffusion MRI tractography**

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# Attention

Enables focussing on objects/locations that are behaviourally relevant

Visuospatial attention - Focussing on a particular spatial location



Voluntary attention  
Goal directed

# Components of attention

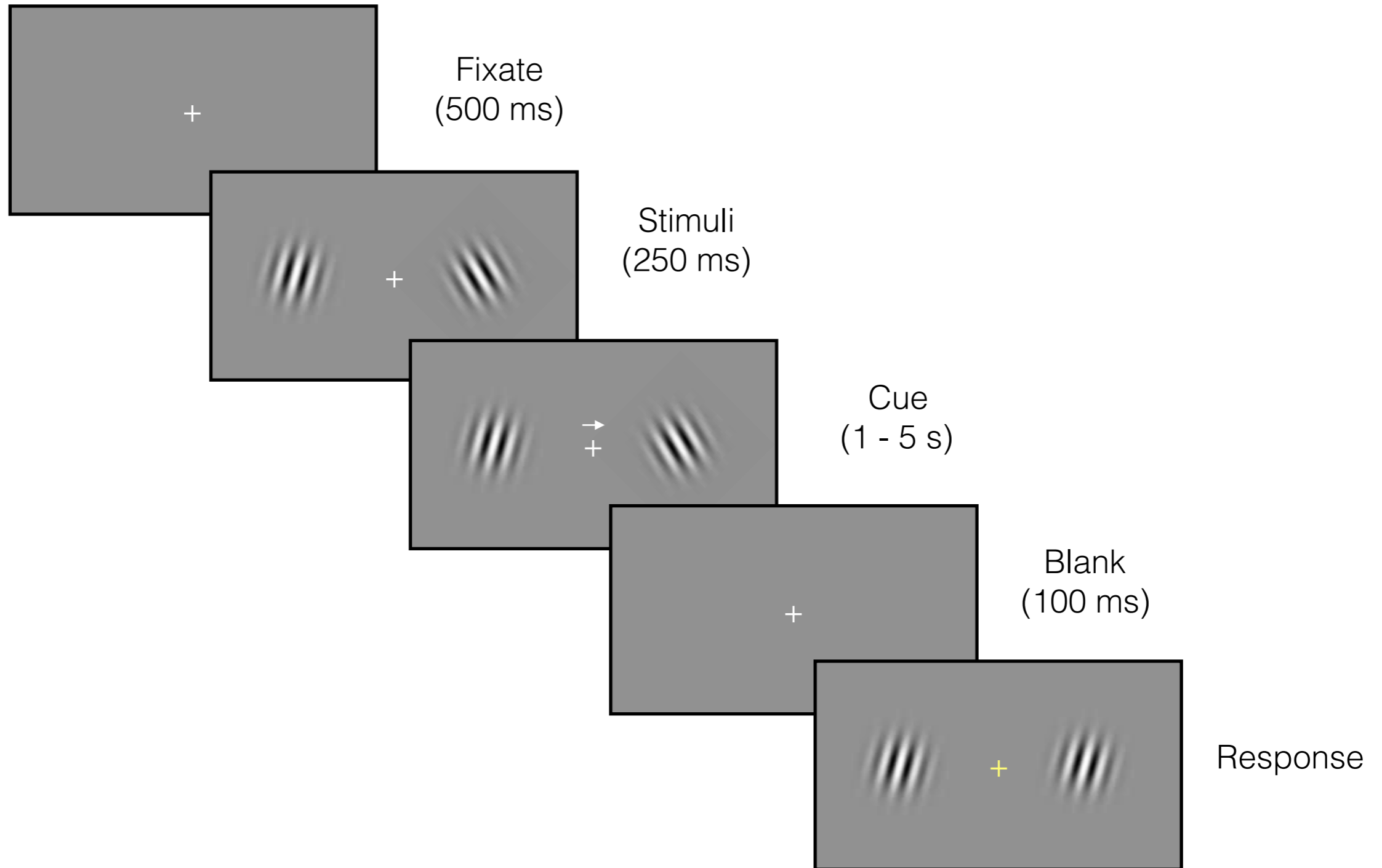
**Sensitivity**



**Bias**



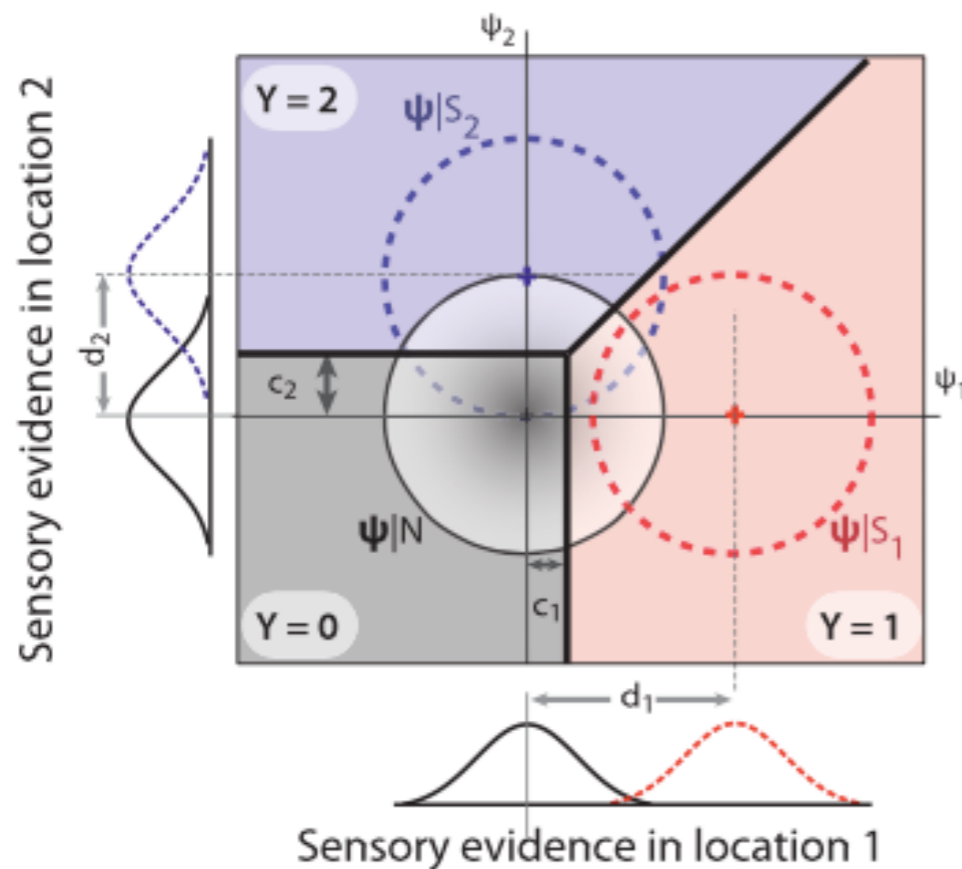
# Measuring behaviour



# Measuring behaviour

3 x 3 contingency table

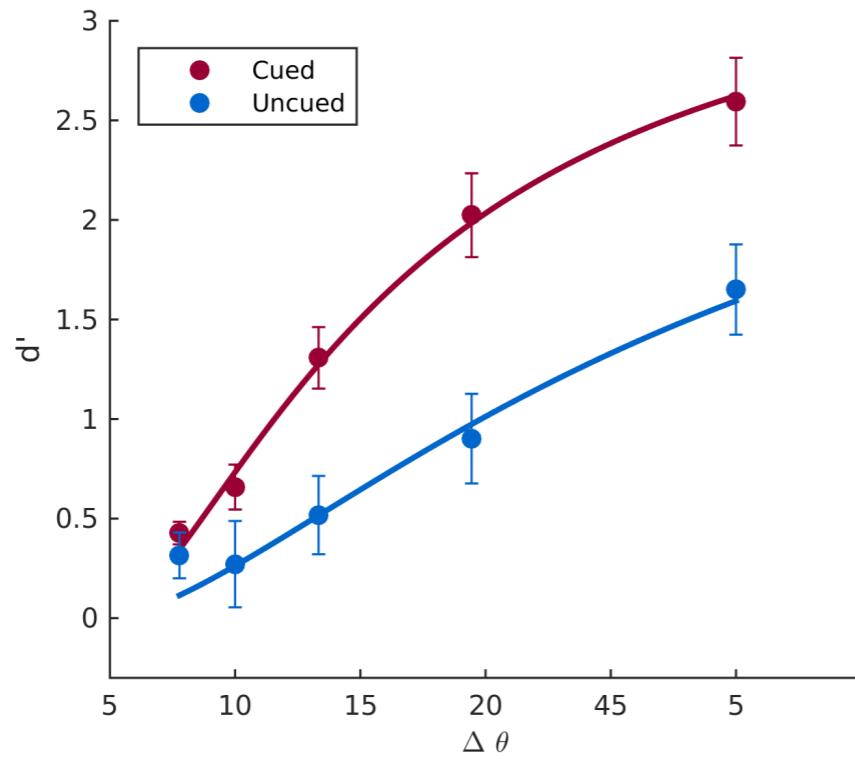
		Response		
		Left	Right	No change
Change	Left	Hit	Mis-identification	Miss
	Right	Mis-identification	Hit	Miss
	No change	False alarm	False alarm	Correct Rejection



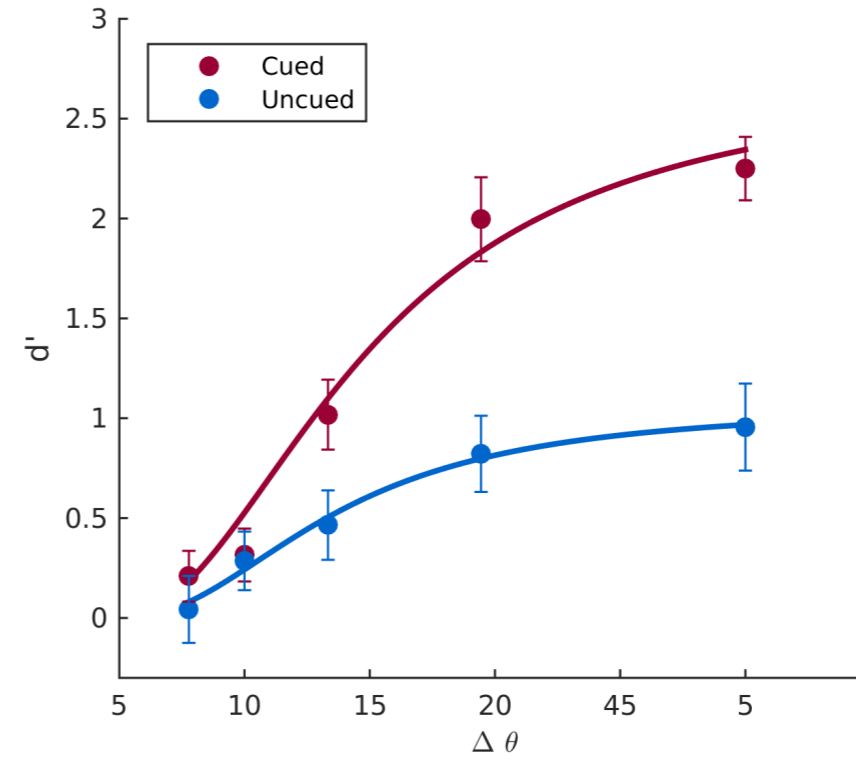
sensitivity ( $d'$ ) and bias ( $\beta$ ) at each location

# Laterality in behaviour

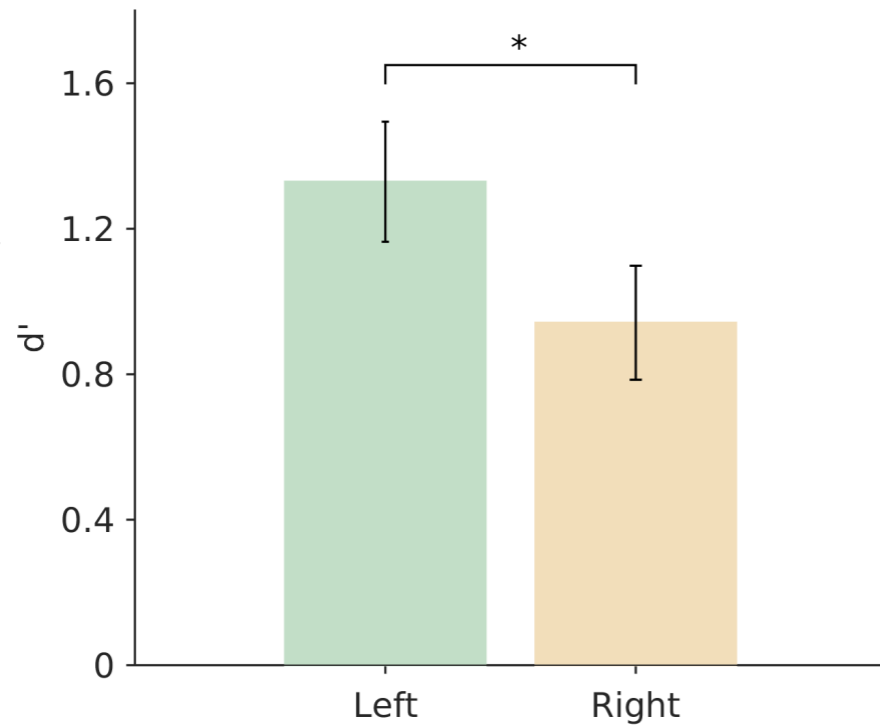
Change left



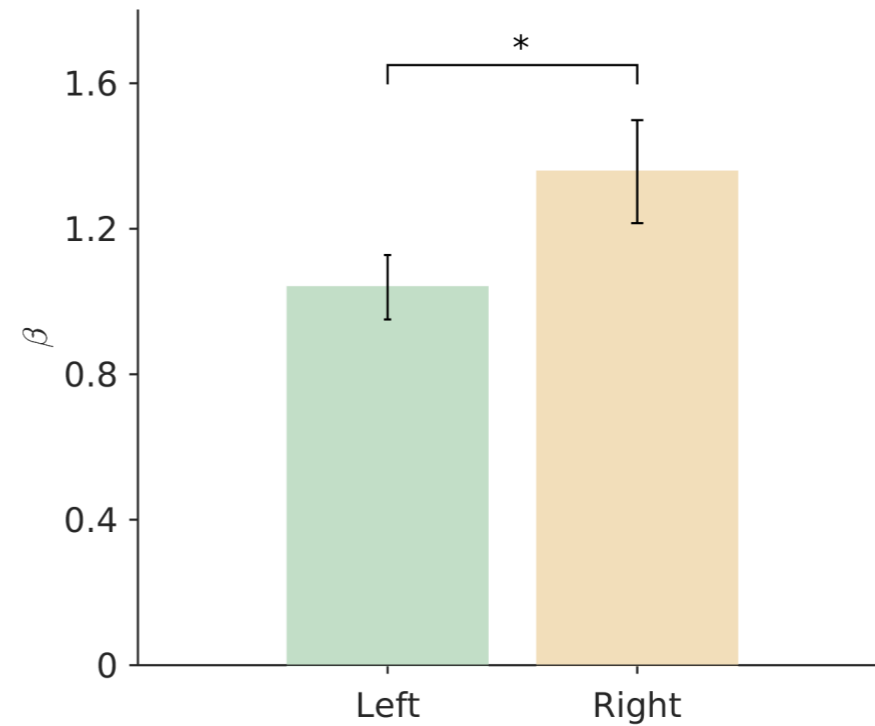
Change right



Sensitivity



Bias



# Interim summary

Strong laterality in behaviour

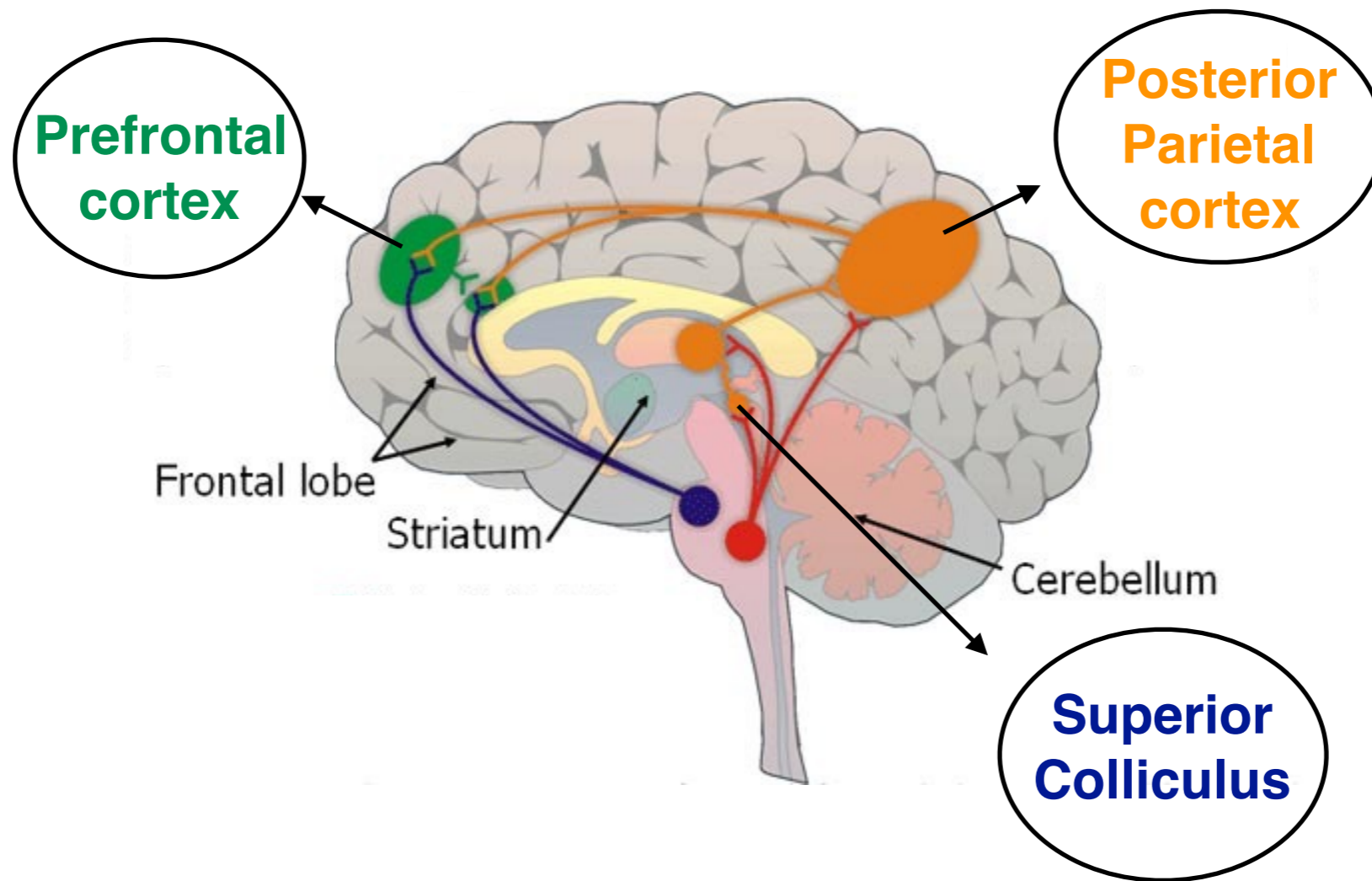
Average **sensitivity** greater on the **left**

Average **bias** greater on the **right**

# The attention network

**Sensitivity/Bias**

**Sensitivity/Bias**



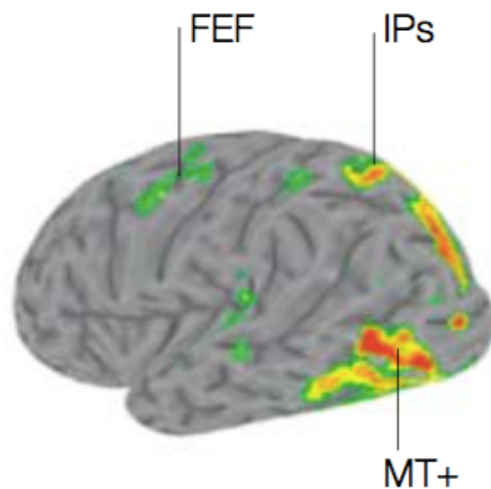
**Sensitivity/Bias**



# How do these regions interact?

## Functional

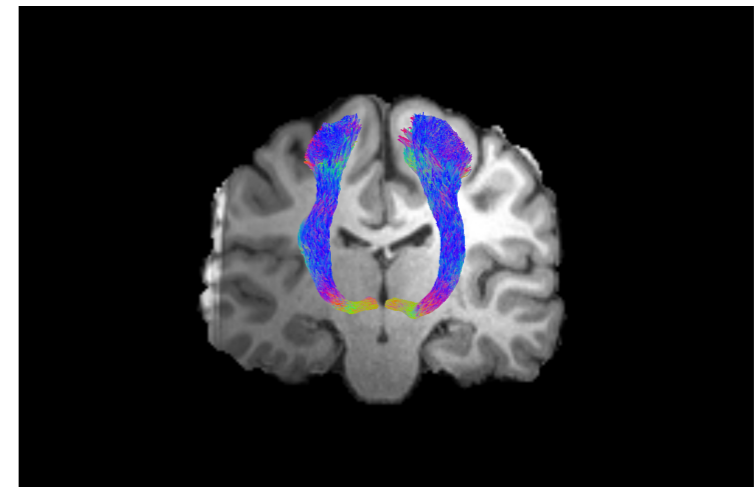
Simultaneous activity across regions



**fMRI, EEG**

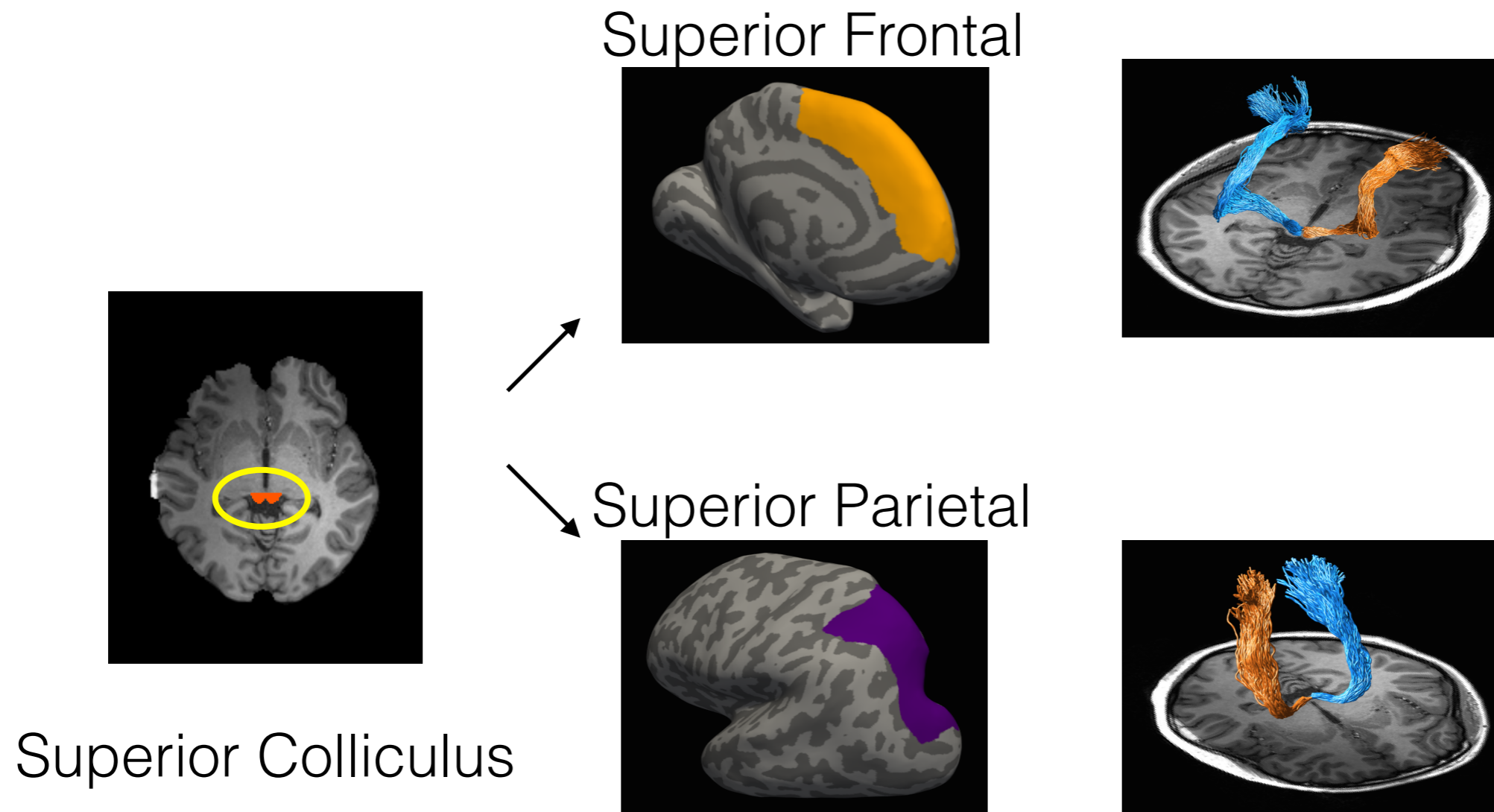
## Structural

Direct physical connections between regions



**dMRI, Tractography**

# SC connectivity



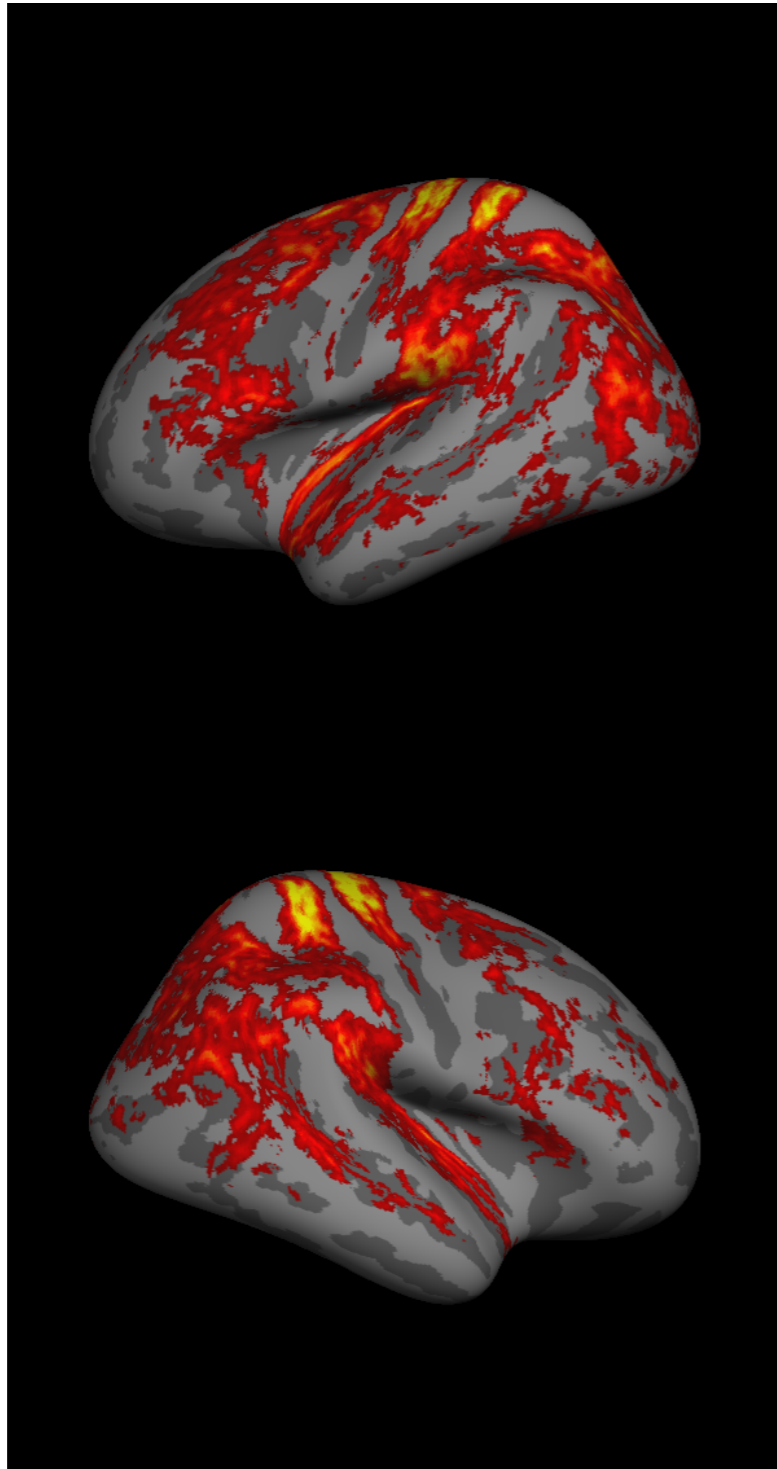
dMRI data acquired using:

b-value 1000, 64 directions

TR: 14600 ms, TE: 95 ms

# Distribution of SC connections

LH



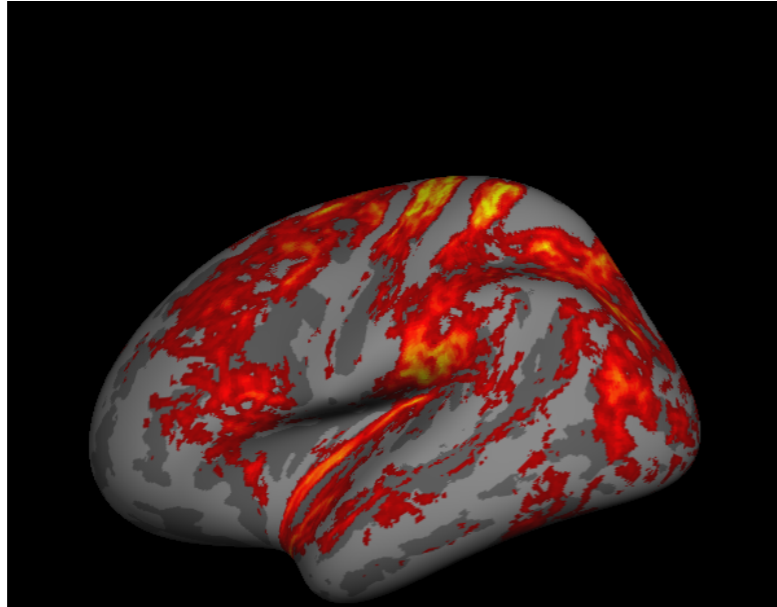
Strong connections of SC with motor, parietal and frontal areas

RH

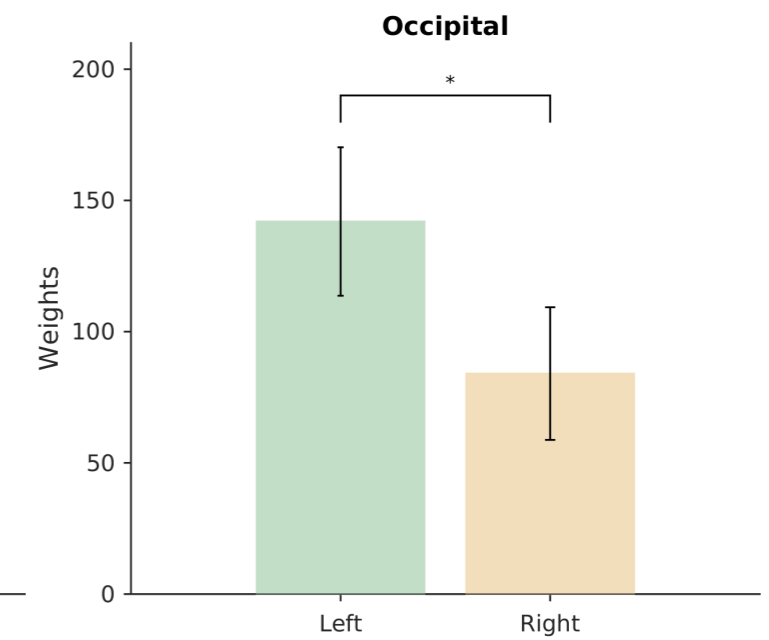
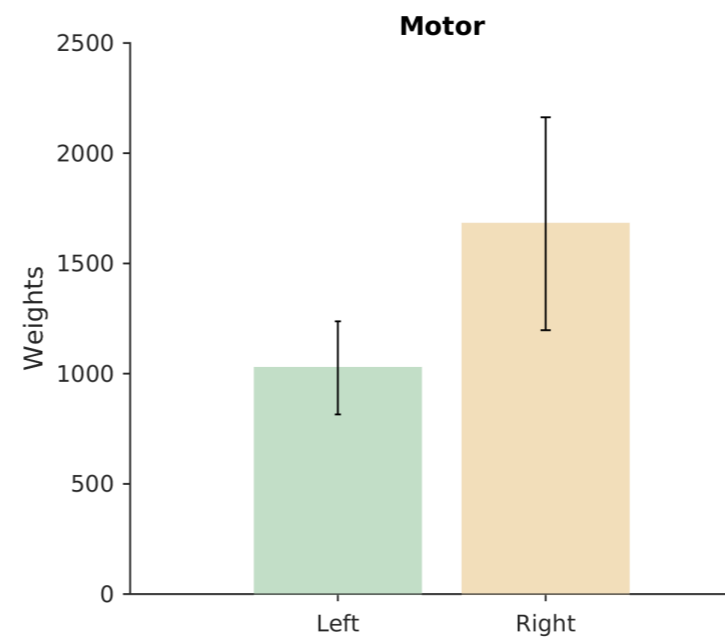
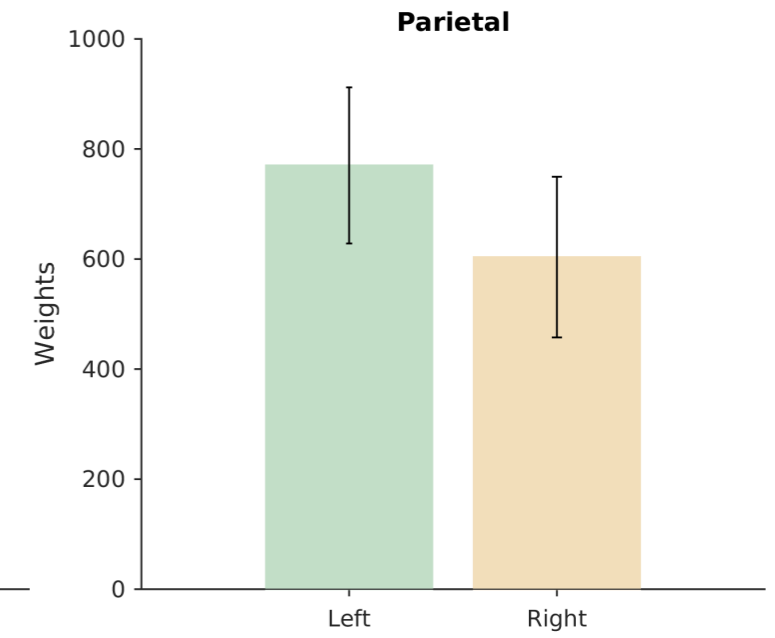
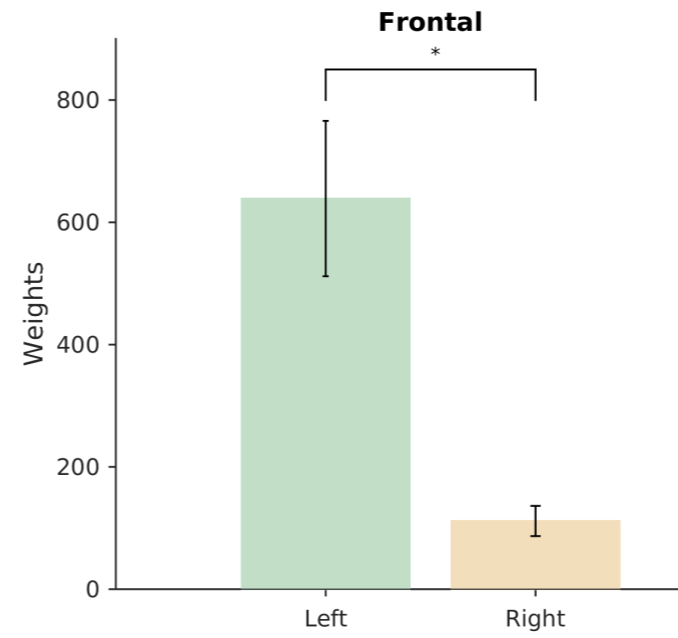
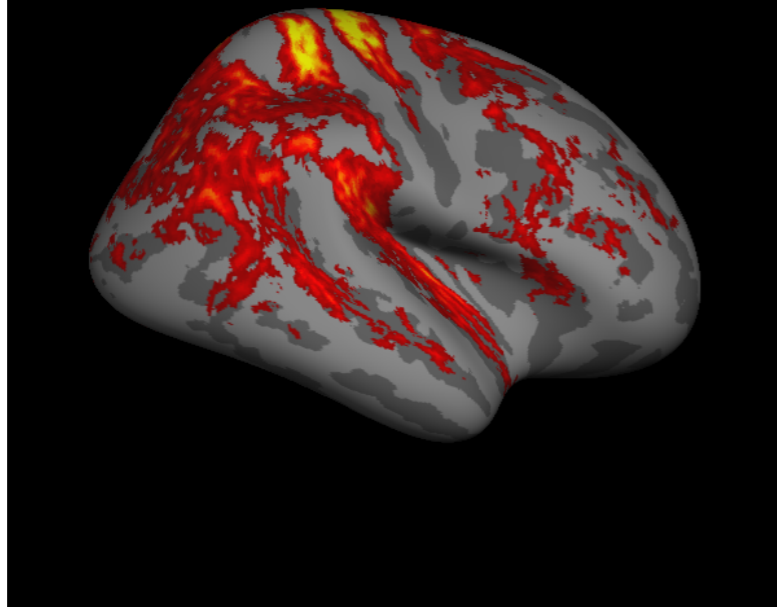
Laterality in connectivity to some regions

# Laterality in SC connectivity

LH



RH



# Summary

Superior colliculus connects strongly to the frontal and the parietal regions - **Potentially involved in modulating attention!**

**Laterality** in connectivity of the Superior Colliculus

**Frontal** and **occipital** cortex connections are **left** lateralised, **motor** cortex connections are **right** lateralised

**Does the asymmetry in behaviour correlate with asymmetry in structural connectivity?**

**Thank You!**