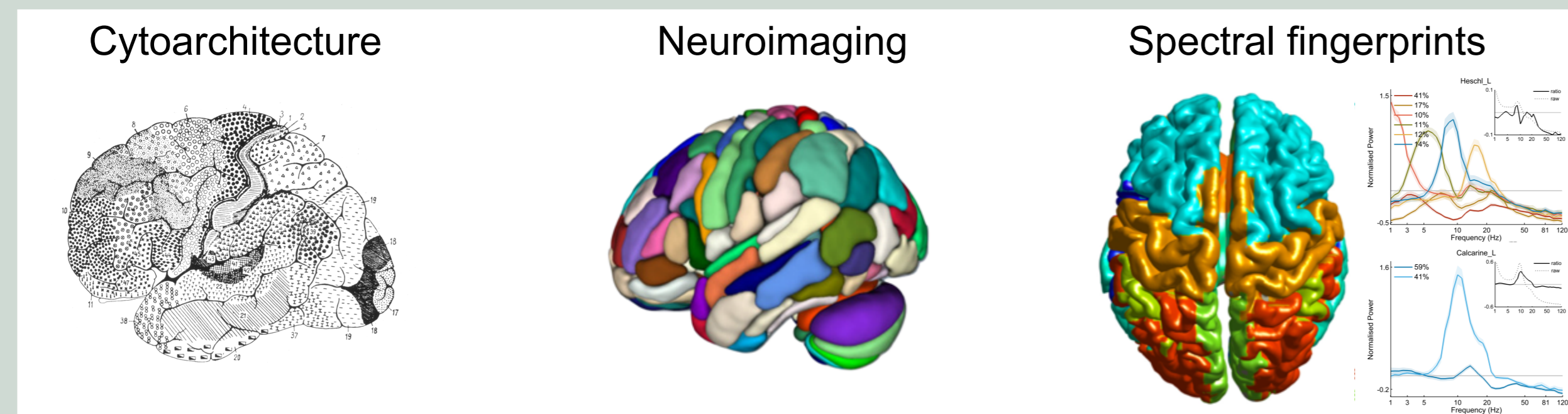


# Data-Driven Classification of Spectral Profiles Reveals Brain Region-Specific Plasticity

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## Introduction | Background



Typical approach to brain organization: cells, imaging  
Novel approach to brain organization: 'spectral fingerprints' (SF)

Do SF reflect functional properties of brain areas or are they epiphenomenal?

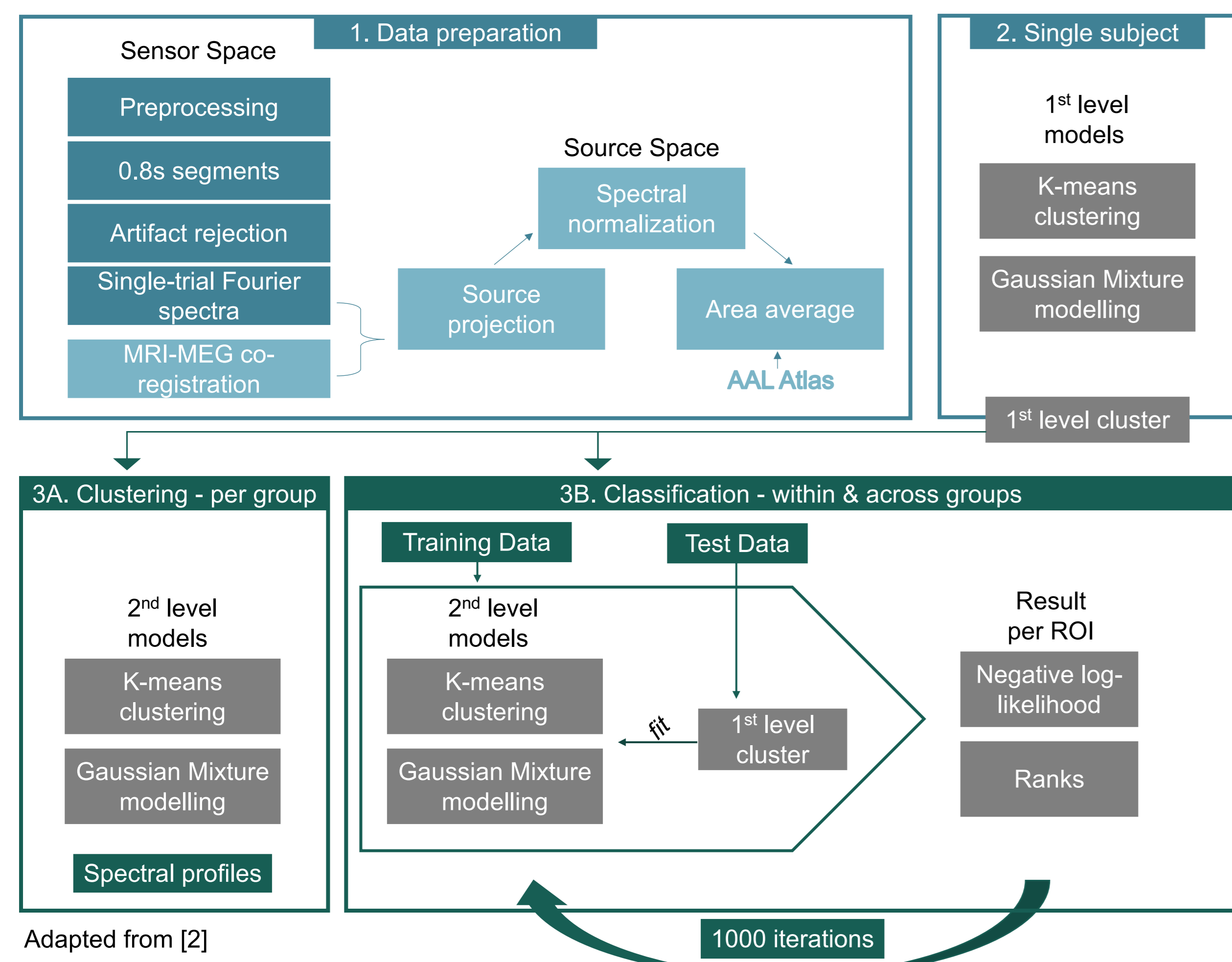
**MEG experiment: are SF plastically reorganized in congenitally blind (CB) individuals?**

CB show *behavioral adaptation* and *cortical reorganization* [1]

**Hypothesis:** SF in sensory cortices differ between CB and sighted in a way that can underwrite perceptual adaptation.

## Methods | Materials

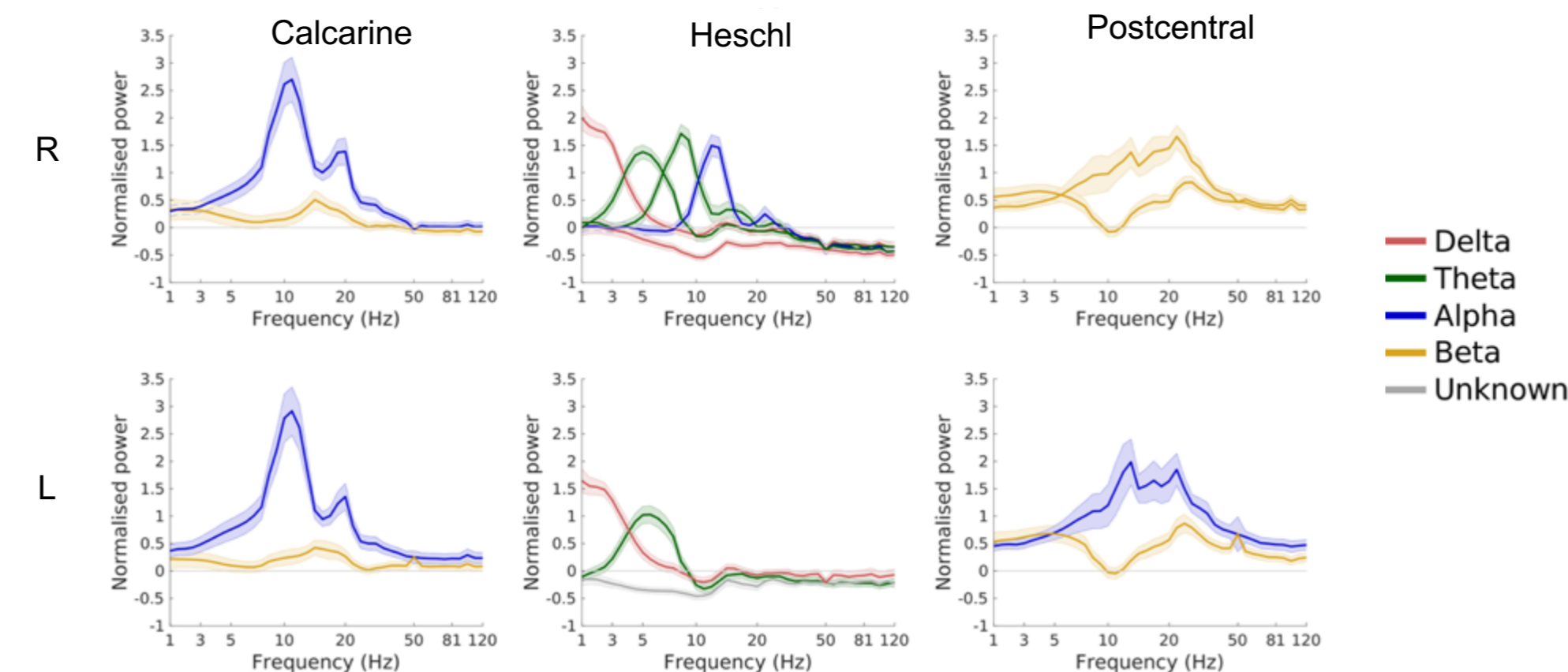
• Resting state MEG  
• **Subjects:**  
S (eyes open): N=23;  
S (blindfolded): N=24;  
CB: N=26



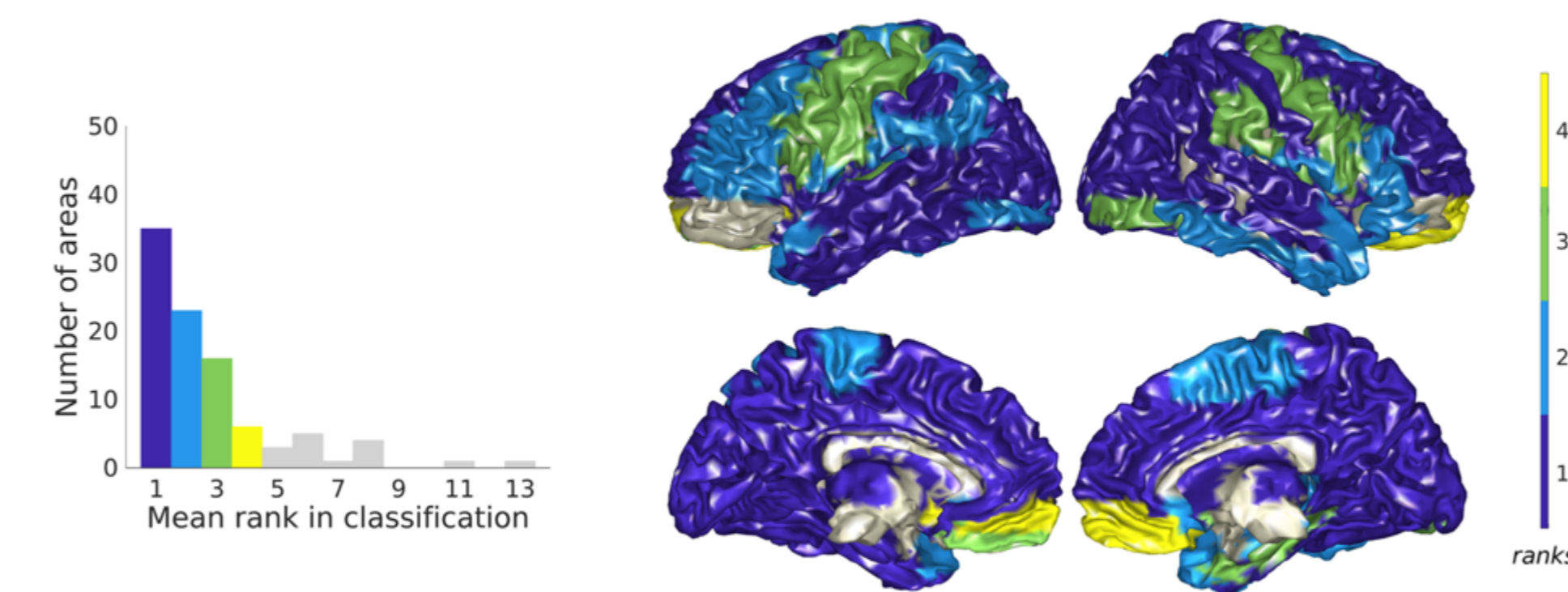
Adapted from [2]

## Spectral fingerprinting (à la Keitel & Gross [1])

Spectral profiles – Sighted (eyes open)



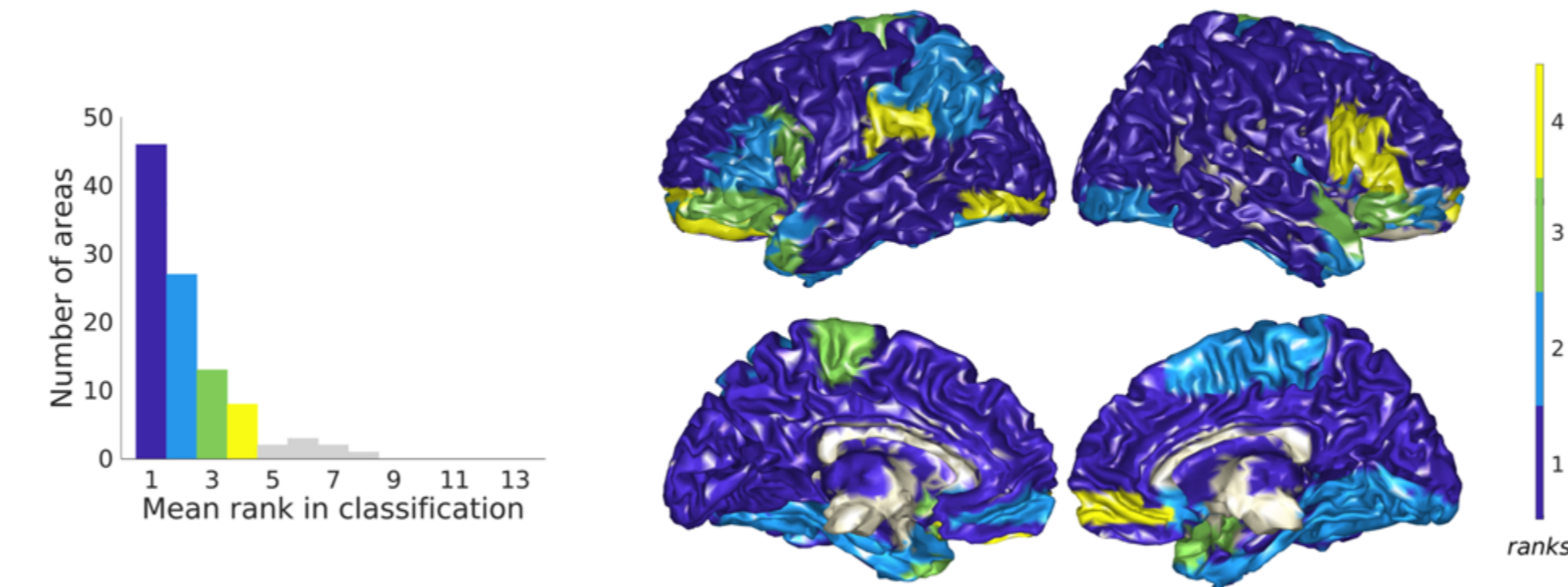
Classification – Sighted (eyes open)



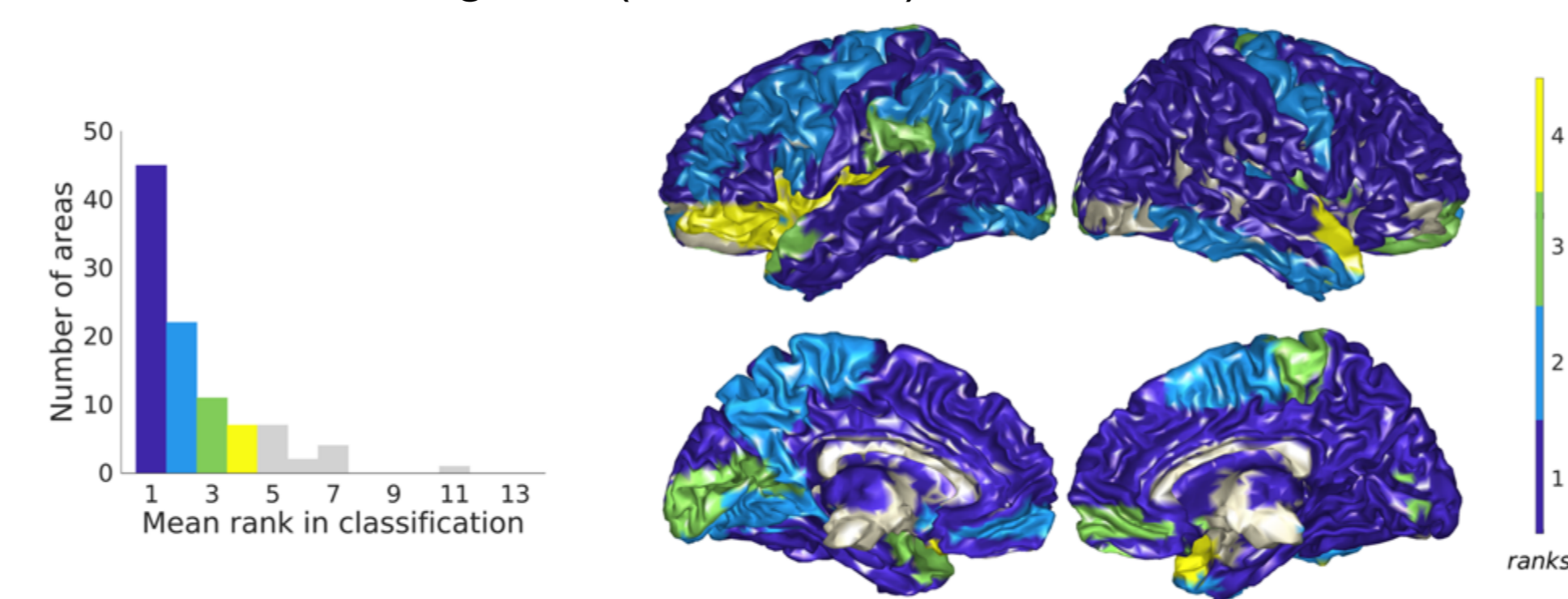
Automatic, region-specific classification based on clustered spectral properties (replication)

## Spectral fingerprinting (à la Keitel & Gross [2])

Classification – Blind

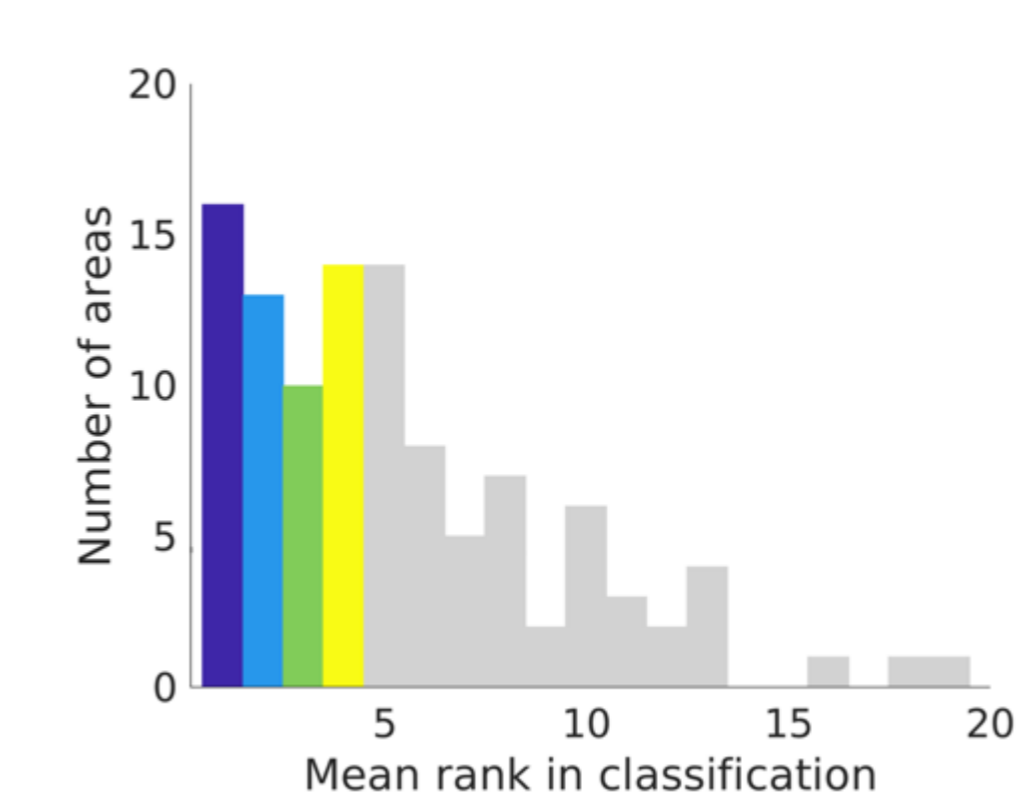


Classification – Sighted (blindfolded)

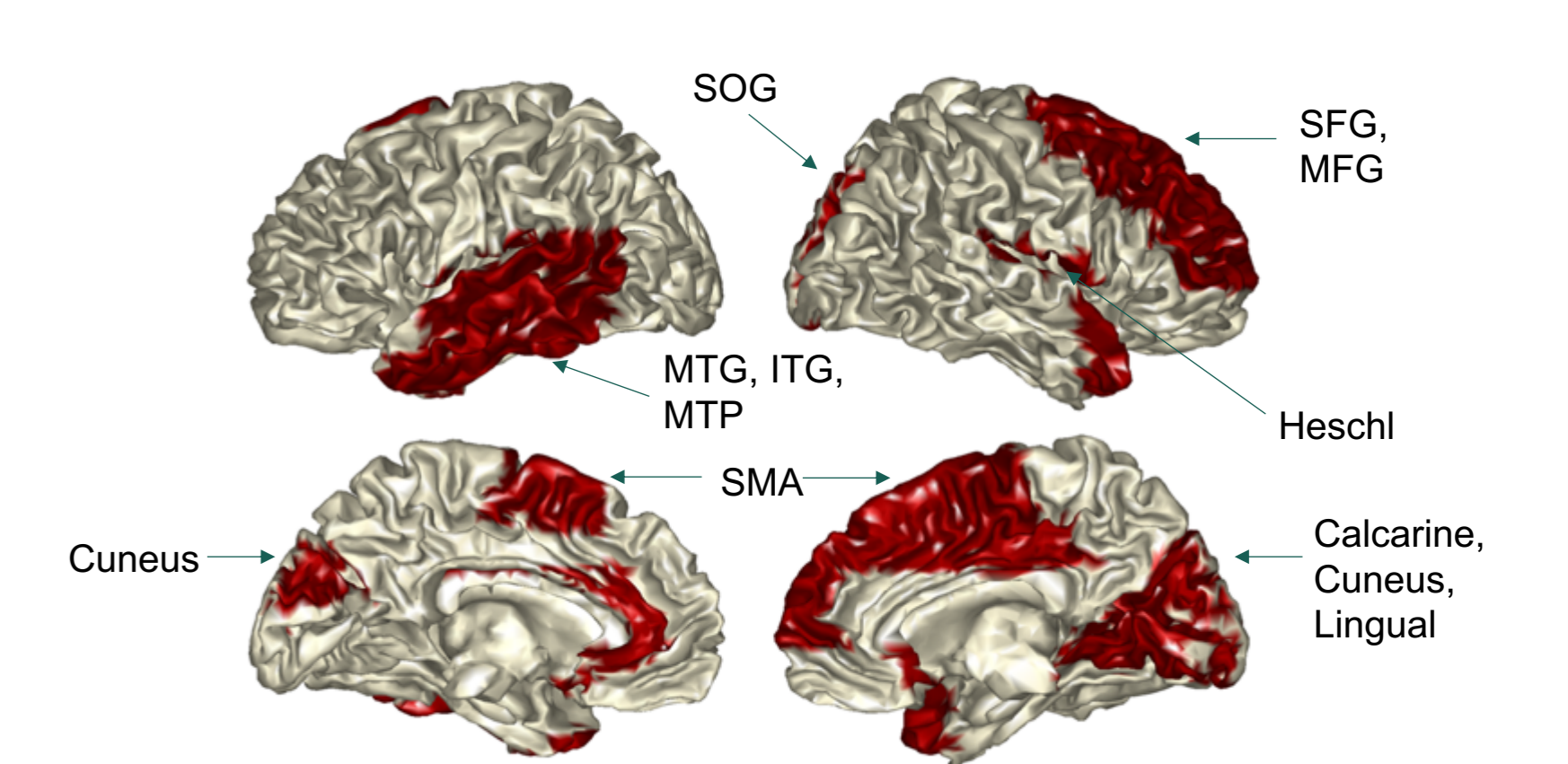


## New news: sensory and right frontal areas do not classify across groups

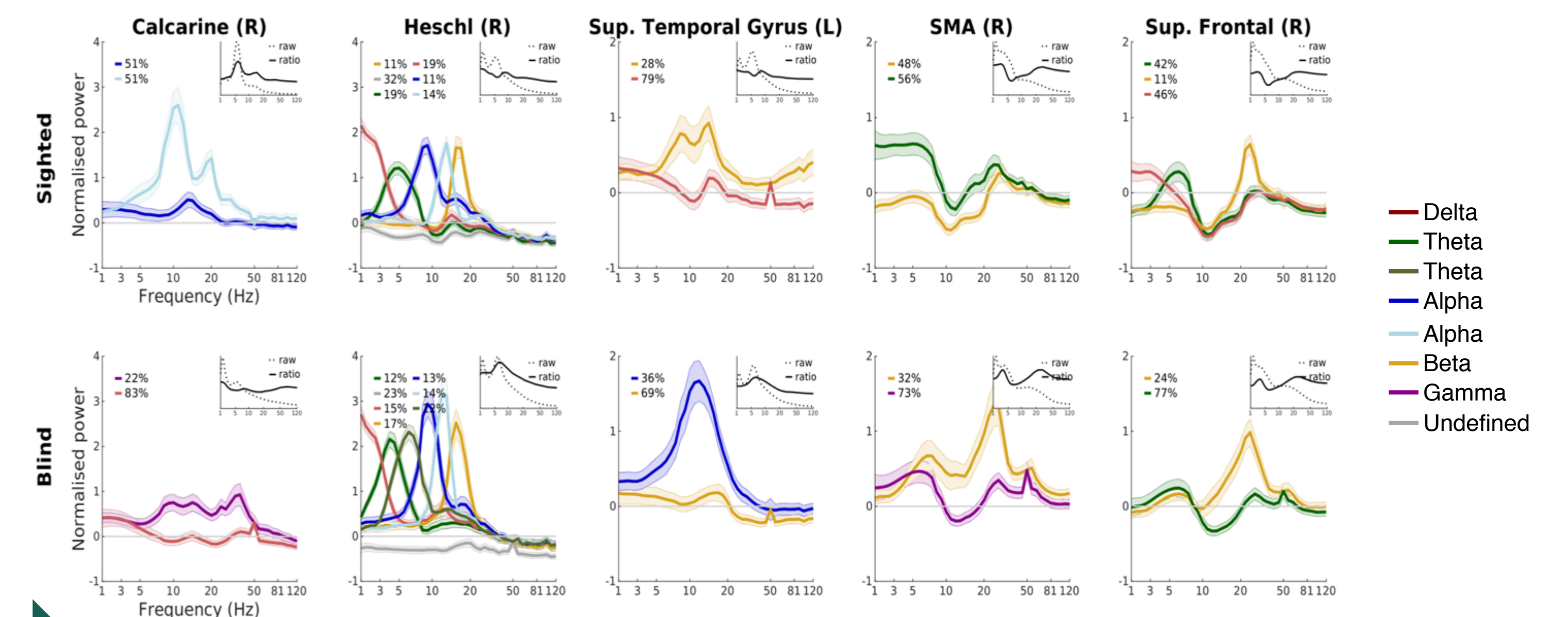
Cross-group classification – Sighted vs. Blind



Cross-group classification – significant brain regions

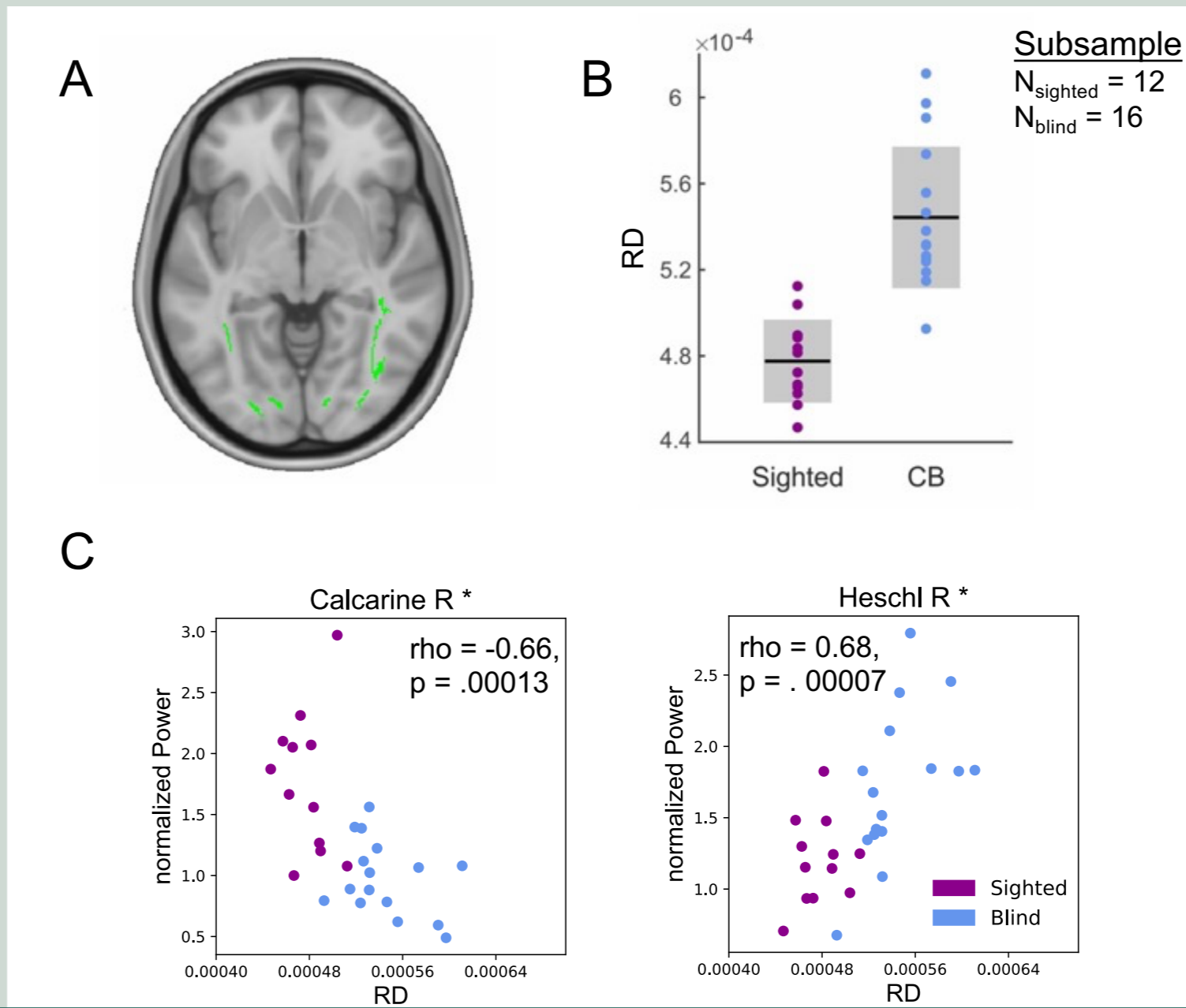


## New news: SF reflect altered power and peak frequencies



CB: no visual alpha, but beta & gamma; more temporal alpha & beta; more frontal beta

## Microstructural group differences



Microstructure correlates with power

## Discussion

1. spectral properties in congenitally blind differ from sighted

- in auditory and visual areas  
→ intra- and cross-modal plasticity
- in right frontal areas  
→ speculation: frontotemporal language network in CB?

2. increased power at higher frequencies in congenitally blind [3,4]

- auditory & frontal: temporal processing
- visual: inhibitory-excitatory circuitry