

Connectivity in the visuo-motor network during Smooth Pursuit

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MOTIVATION



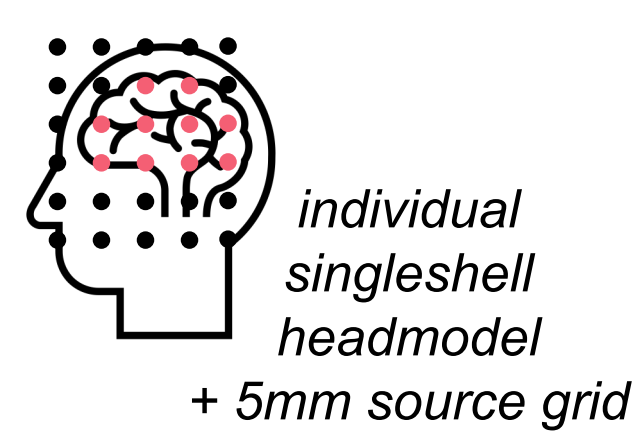
Background

- visuo-motor network enables smooth pursuit eye movements, but function is limited in many patients suffering from psychotic disorders
- limited temporal information on temporal dynamics of smooth pursuit eye movements
- MEG offers sufficient temporal resolution for exploration of temporal dynamics

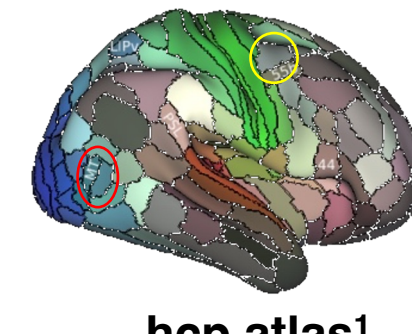
How are eye measures temporally connected to cerebral activity in smooth pursuit triangle tasks?

METHODS

MRI

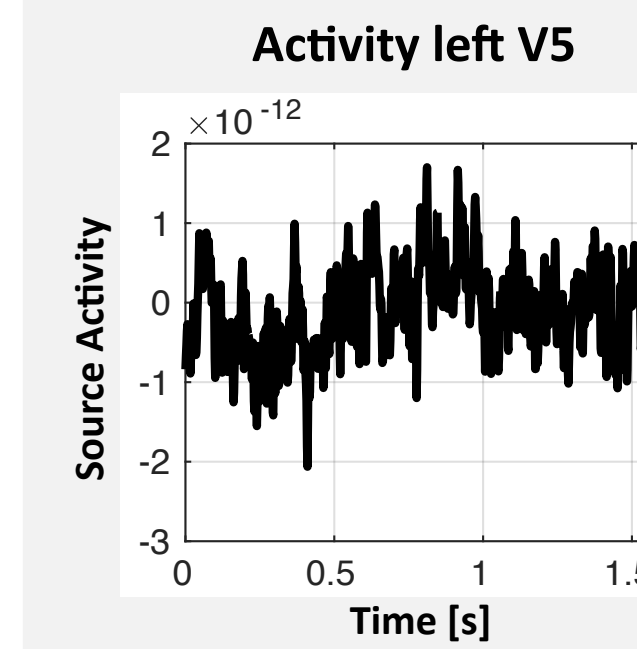
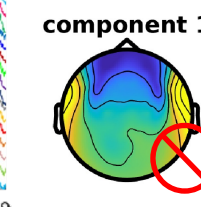
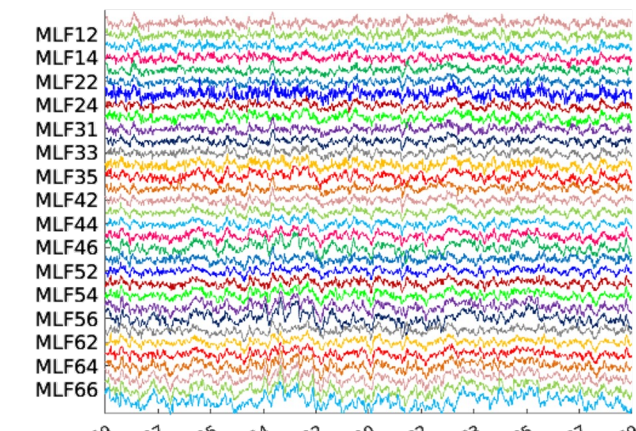


beamforming (3d) for each source grid point



extract main time series per parcel (SVD)

MEG

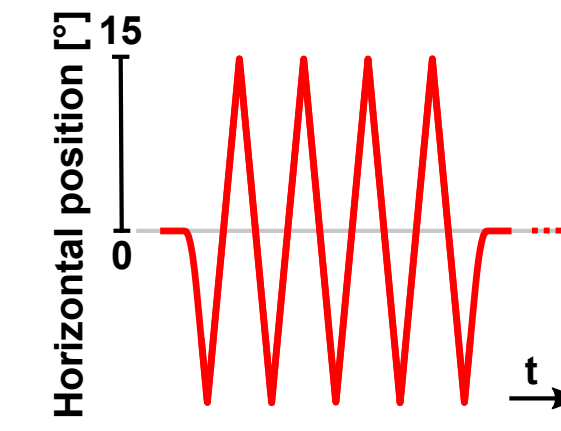
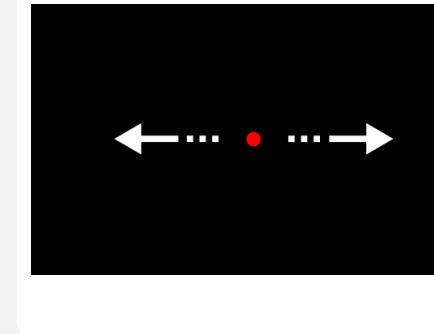


coherence

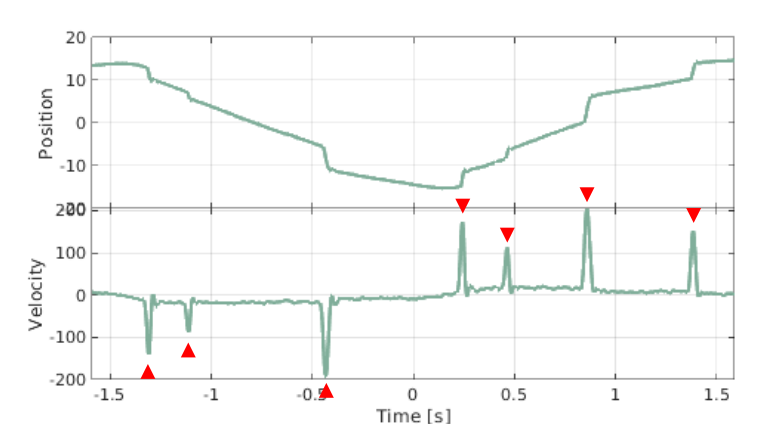
left ramps
right ramps
mixed ramps (l+r)

Paradigm

Continuous pursuit



Eyelink



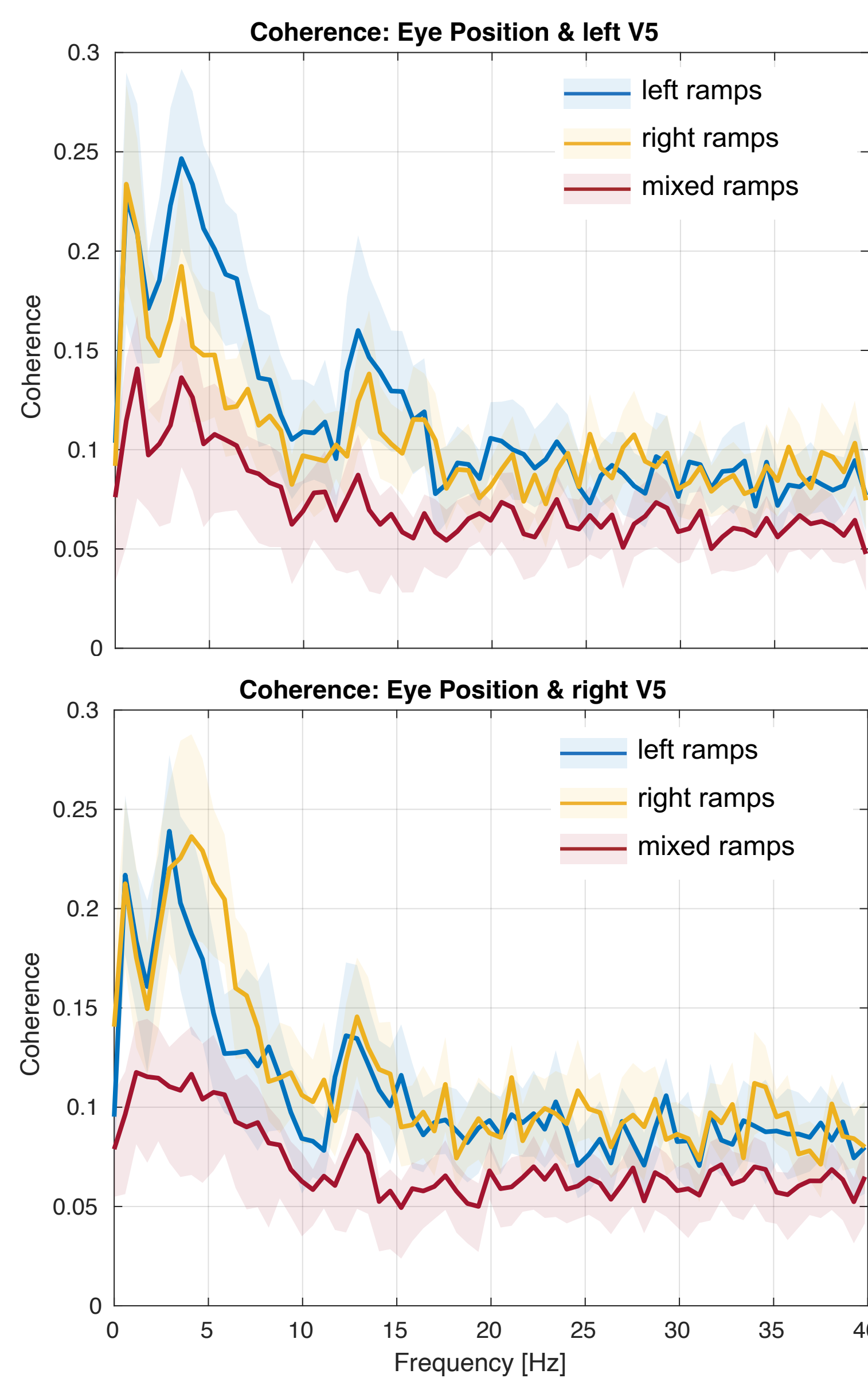
detect saccades & interpolate & filter

Statistics

- single ramps vs. mixed ramps
- 2-sided montecarlo t-test
- cluster correction for multiple comparisons
- significance: $p < 0.05$

RESULTS

Descriptives



Coherence spectra for coherence between eye position and left (upper) or right (lower) V5.

Statistical Analysis

left ramps vs. right ramps vs. mixed ramps

2-7 Hz

position

V5

V5

position error

V5

V5

- lateralization in V5 area
- right V5 stronger than left V5
- error and position very similar

0-2 Hz

velocity

V5

V5

- right hemisphere dominant
- visual areas, but also several others

acceleration

IFSa

PGp

stimulus

3b

V5

6d next to FEF

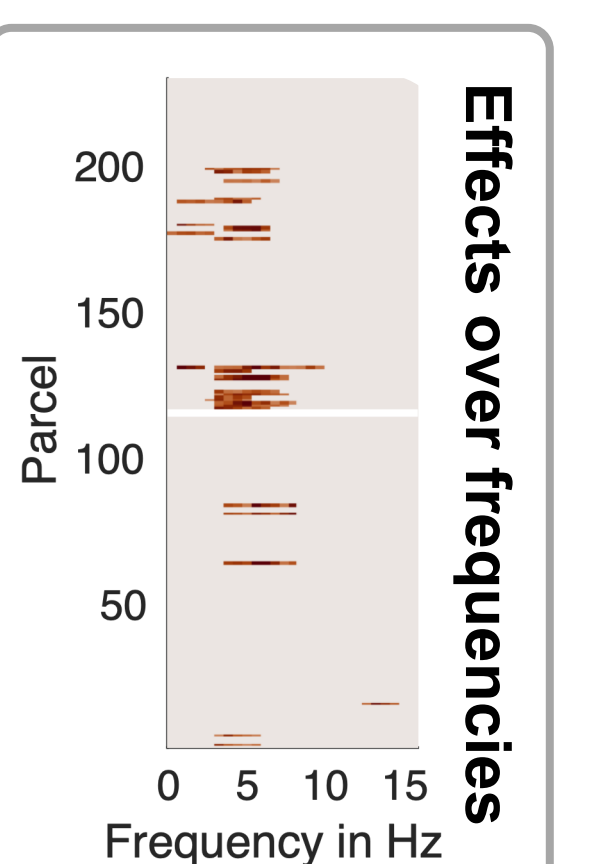
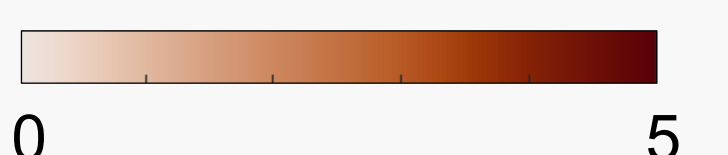
1

2

FEF

- motor areas (1, 2, 3b)
- frontal eye field (FEF, 6d)
- right V5

mean t-values



CONCLUSION

single ramps > mixed ramps

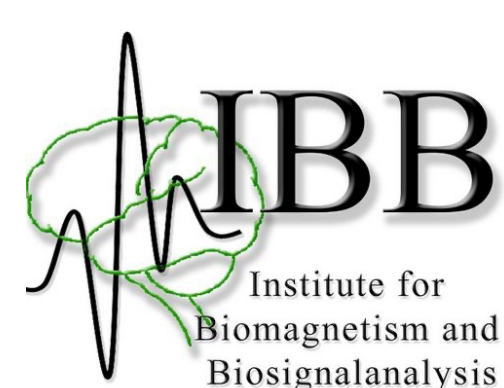
Single ramps show higher coherence than mixed ramps, even when left and right ramps have similar coherence.

right hemisphere > left hemisphere

More effects appear in the right hemisphere than in the left hemisphere (esp. V5 area), which is in accordance with literature findings, where the right V5 is stronger than the left V5. In addition, there is a strong lateralization for position and error.

visual & motor areas

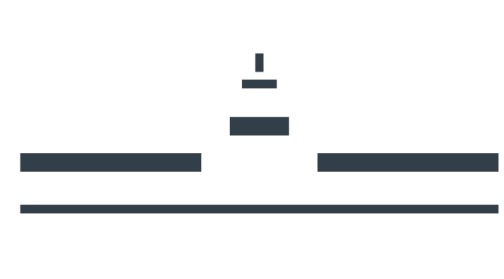
Most effects are in visual areas, but for the stimulus coherence, also motor areas (incl. FEF), are active. Some more areas show effects and need to be analyzed further.



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