

A Multimodal Neuroimaging Case Study of Blindsight in Cortical Blindness



Cassandra M. Levesque¹, Sharif I. Kronemer¹, Javier Gonzalez-Castillo¹, Grace Edwards¹, Beth Rispoli², Tina Tong Liu², Christine Turtzo³, & Peter A. Bandettini^{1,4}

National Institute of Mental Health

¹Laboratory of Brain and Cognition, NIMH/NIH; ²Visual Perception and Plasticity Lab, Georgetown University;

³Acute Cerebrovascular Diagnostics Unit, NINDS/NIH; ⁴Functional MRI Facility, NIMH/NIH

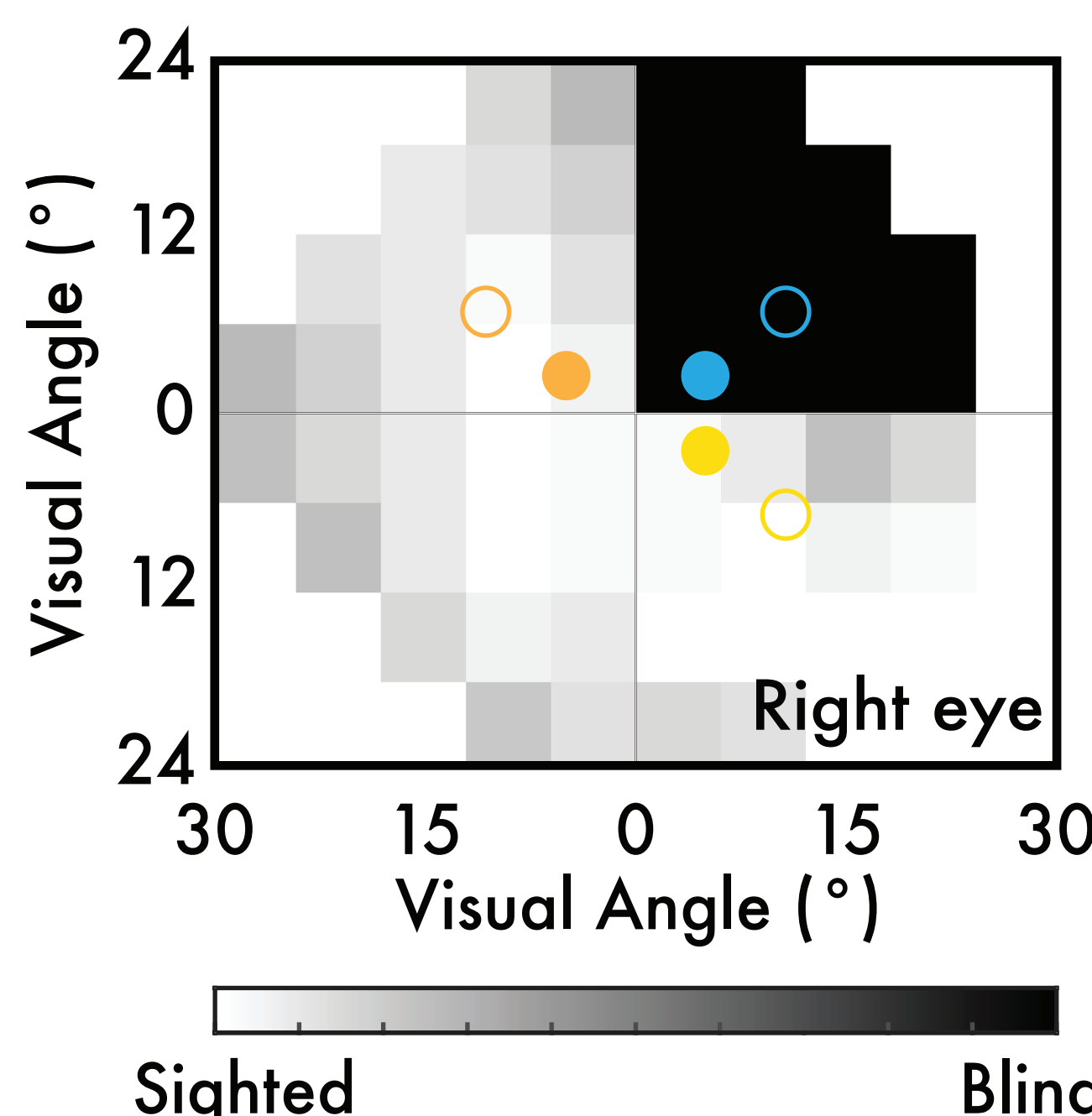
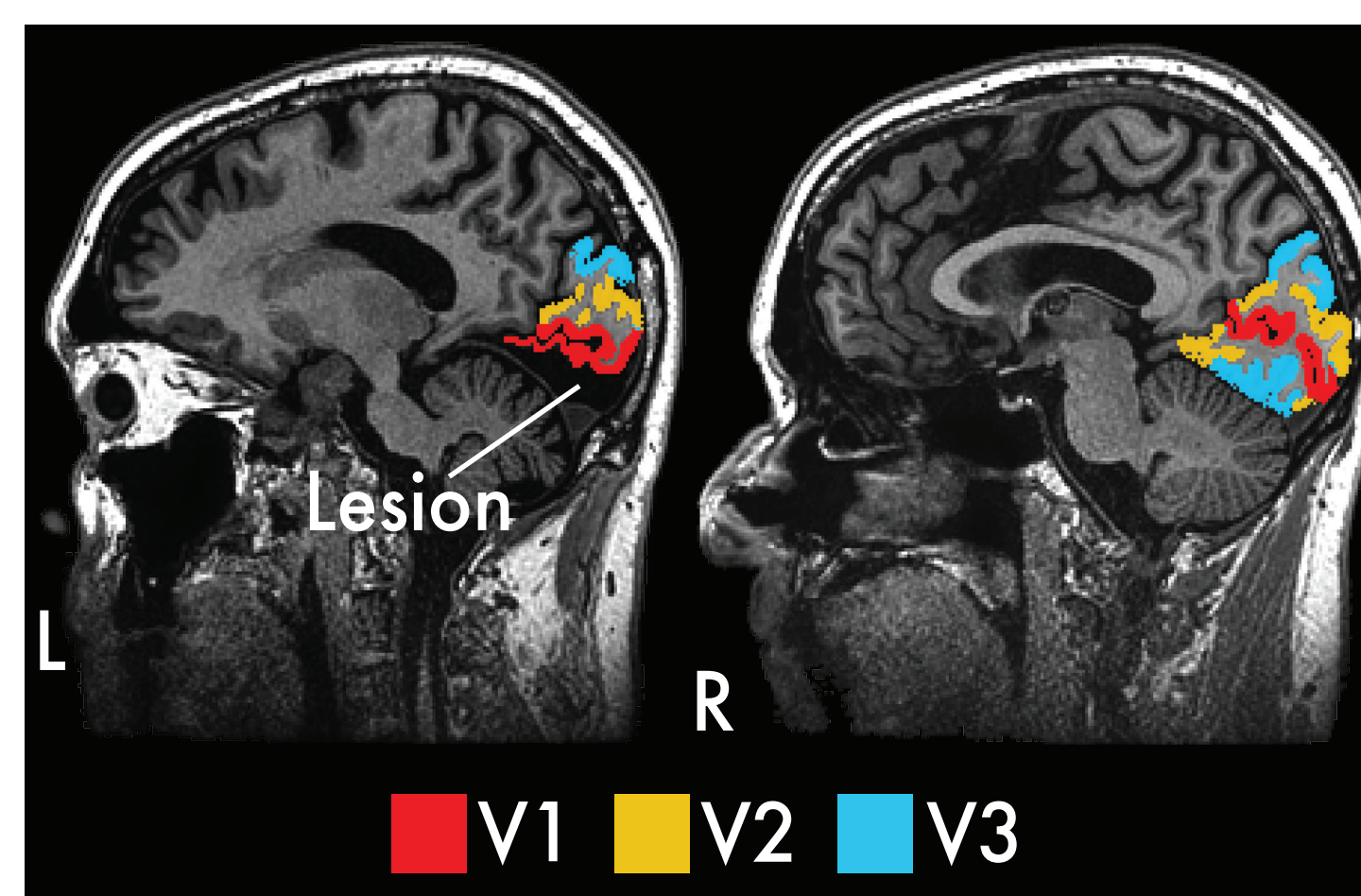
Background

- Cerebral blindness is the complete or partial loss of vision following damage to the visual pathway (e.g., V1). [1][2]
- Some people with cortical blindness experience impaired or residual vision in their blind field, referred to as blindsight. [3]
- P4 is a cerebrally blind person (right homonymous superior quadrantanopia), caused by a stroke in the left visual cortex.
- P4 experiences non-visual "sensations" or "feelings" for some visual stimuli presented in the blind field. [4]

Main Question

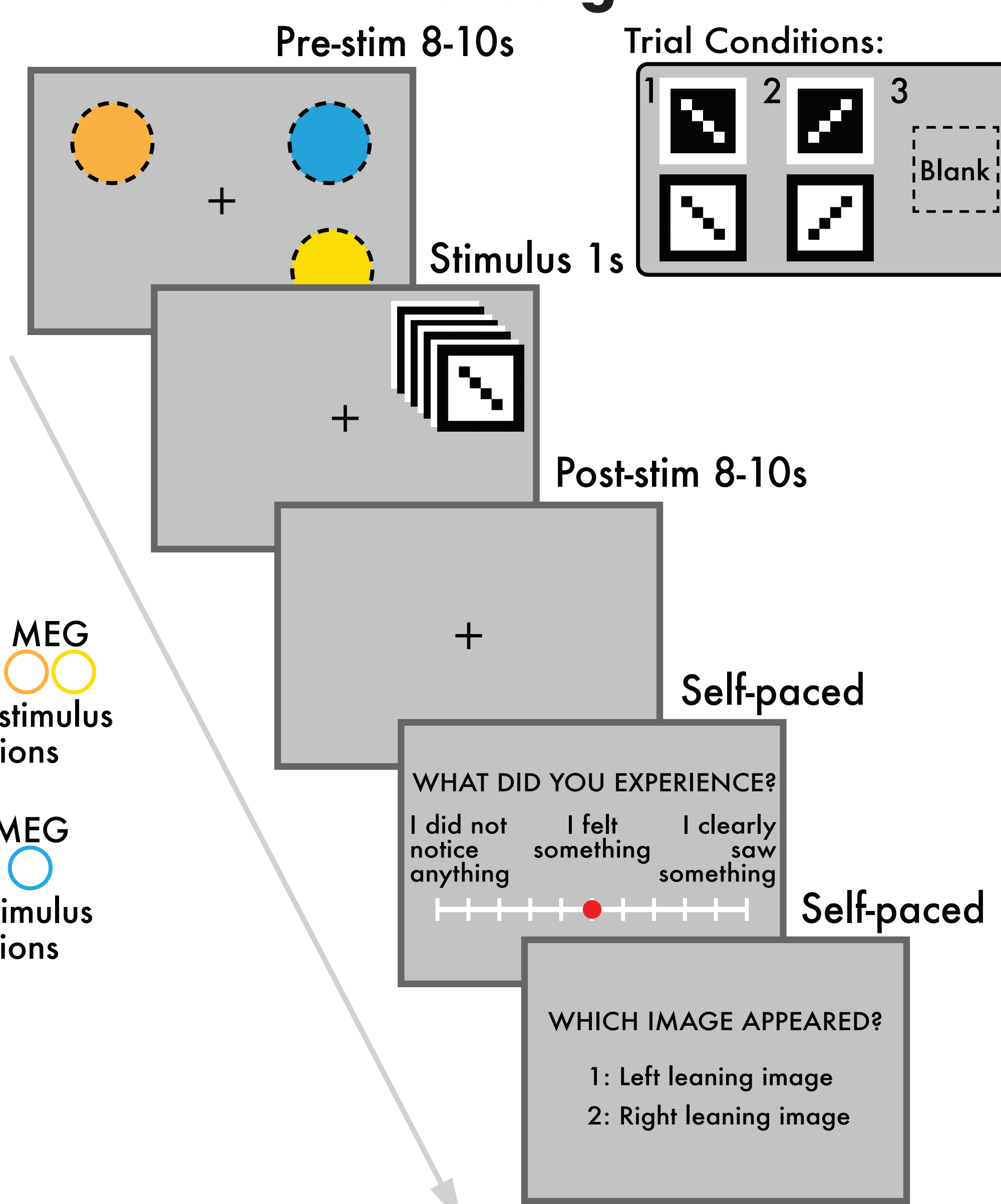
What are the brain mechanisms of residual vision/blindsight in cortical blindness?

Lesion & Blind Field

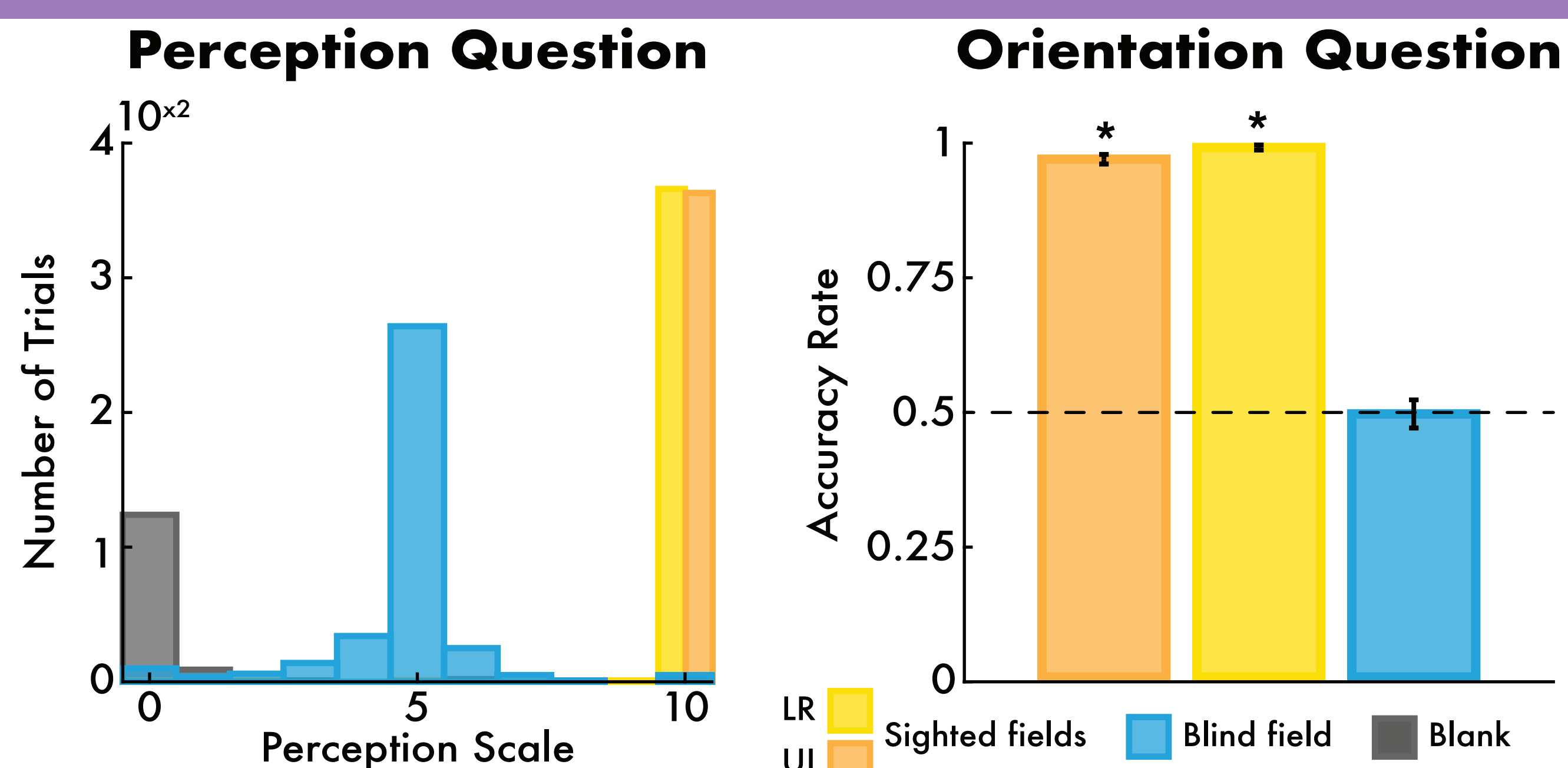


Methods

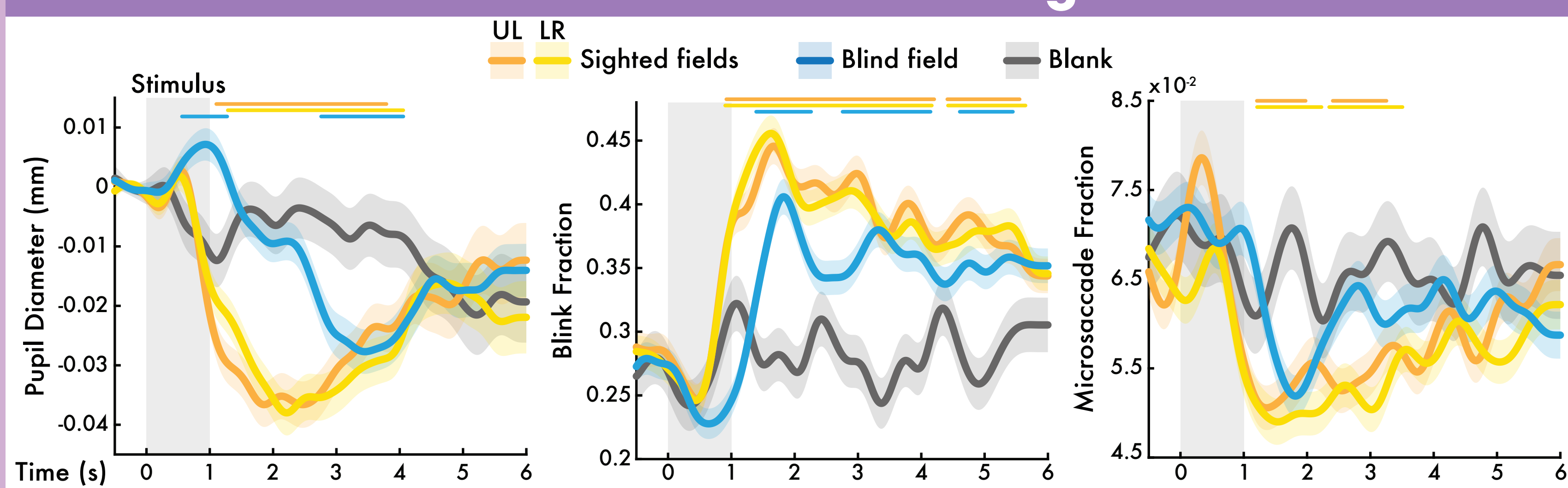
Paradigm



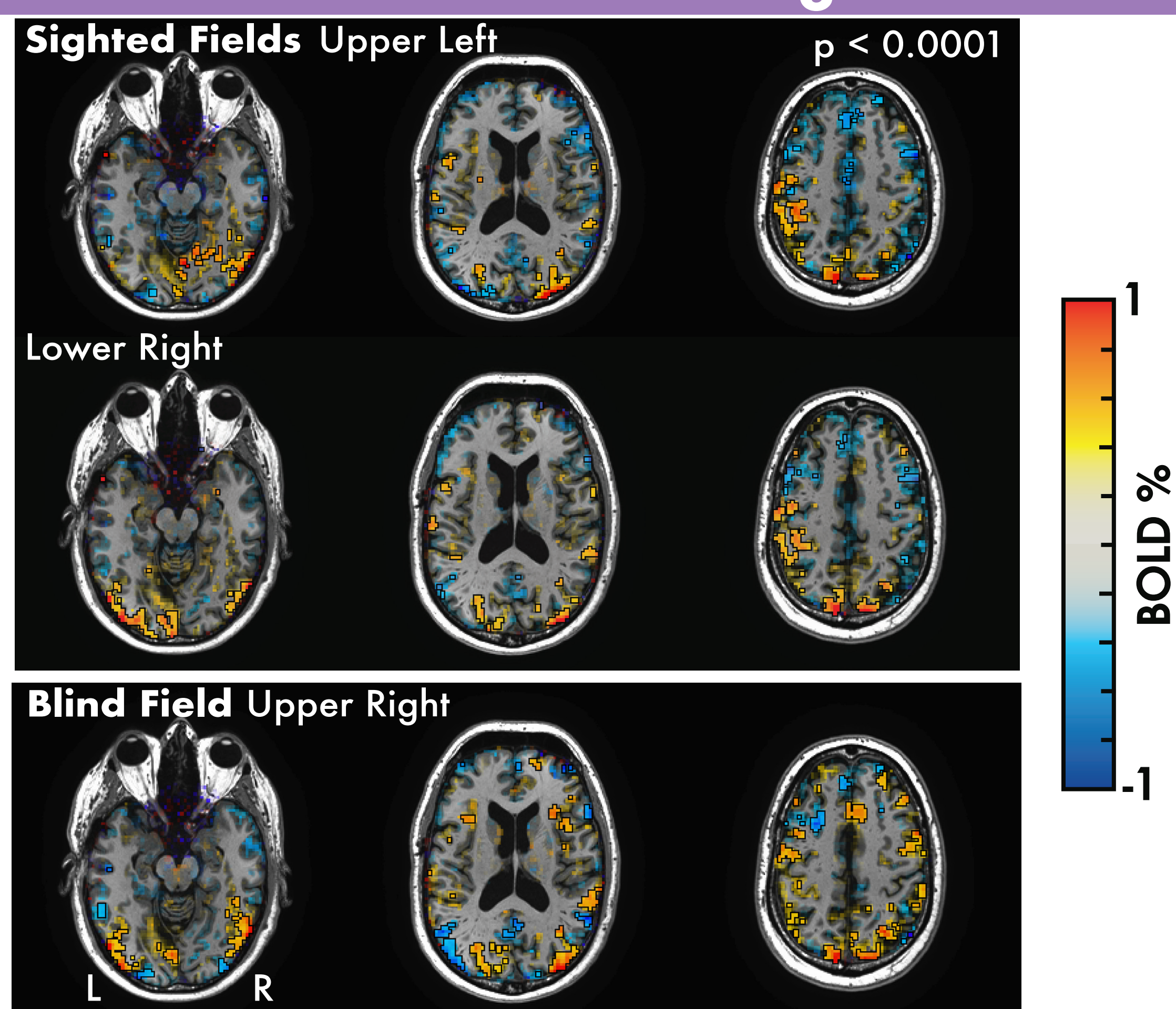
P4 reported "I felt something" for most stimuli shown in the blind field; chance orientation discrimination



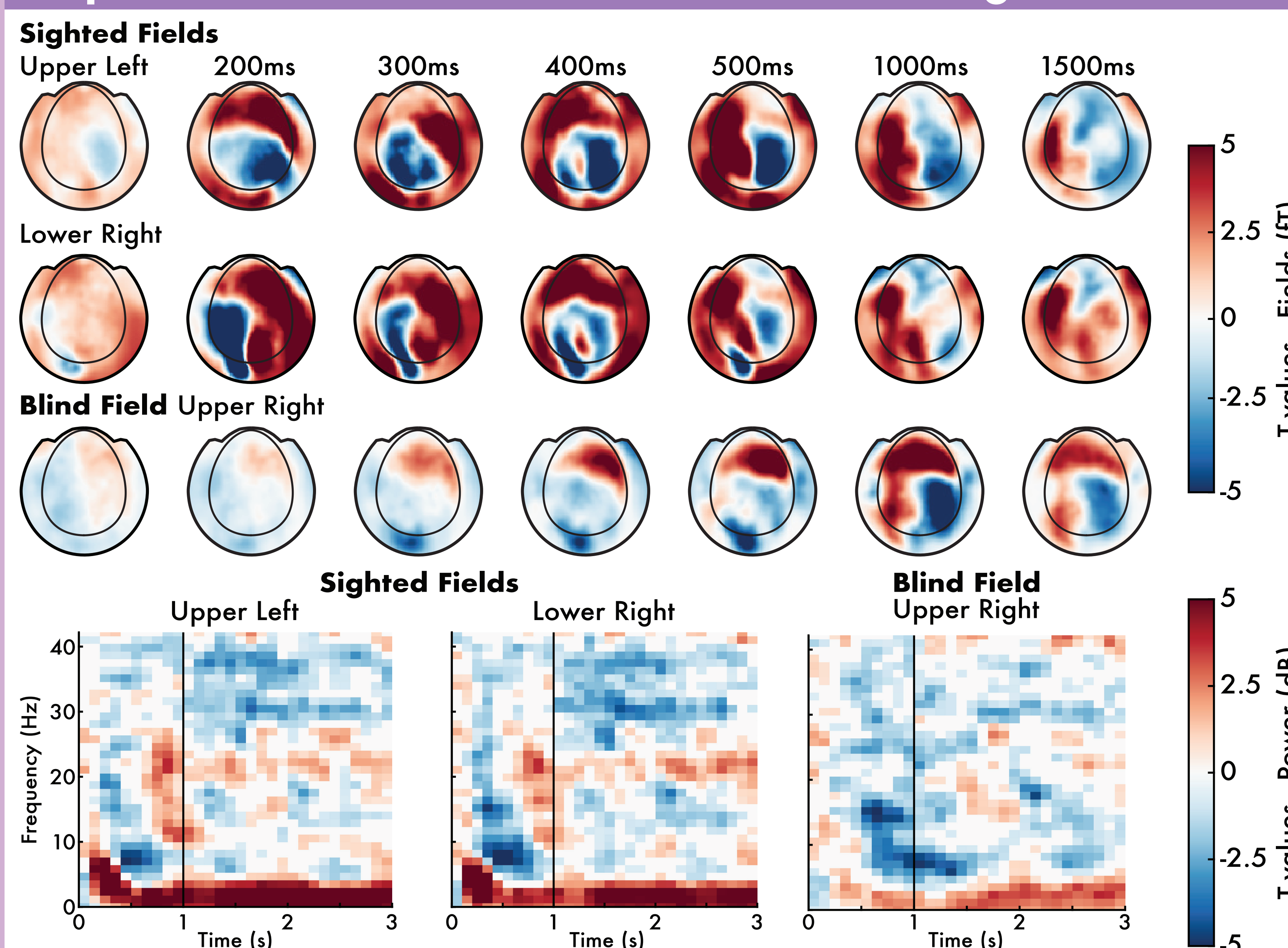
Eye behavior shows decreased and delayed responses in the blind field relative to the sighted fields



Convergent and divergent BOLD activity in the blind field relative to the sighted fields

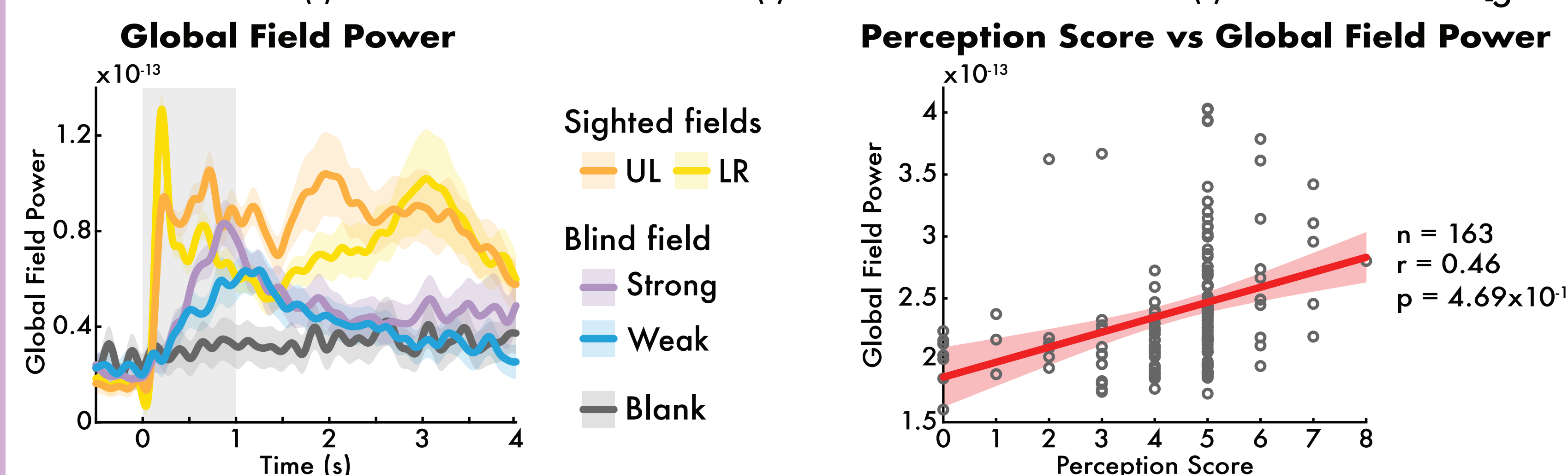


Decreased and delayed fields; distinct time-frequency patterns in the blind field relative to the sighted fields



Conclusions

- Eye behavior showed decreased and delayed responses in the blind field relative to the sighted fields.
- MEG fields showed decreased and delayed responses in the blind field, with signal power positively correlated with perception score.
- fMRI activity shows that the blind field stimuli engage convergent visual cortex regions but distinct salience and frontal network regions.



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Contact Information
cassie.levesque@nih.gov
sharif.kronemer@nih.gov

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