



Using frequency tagging to measure visual perception and selective attention in health and disease

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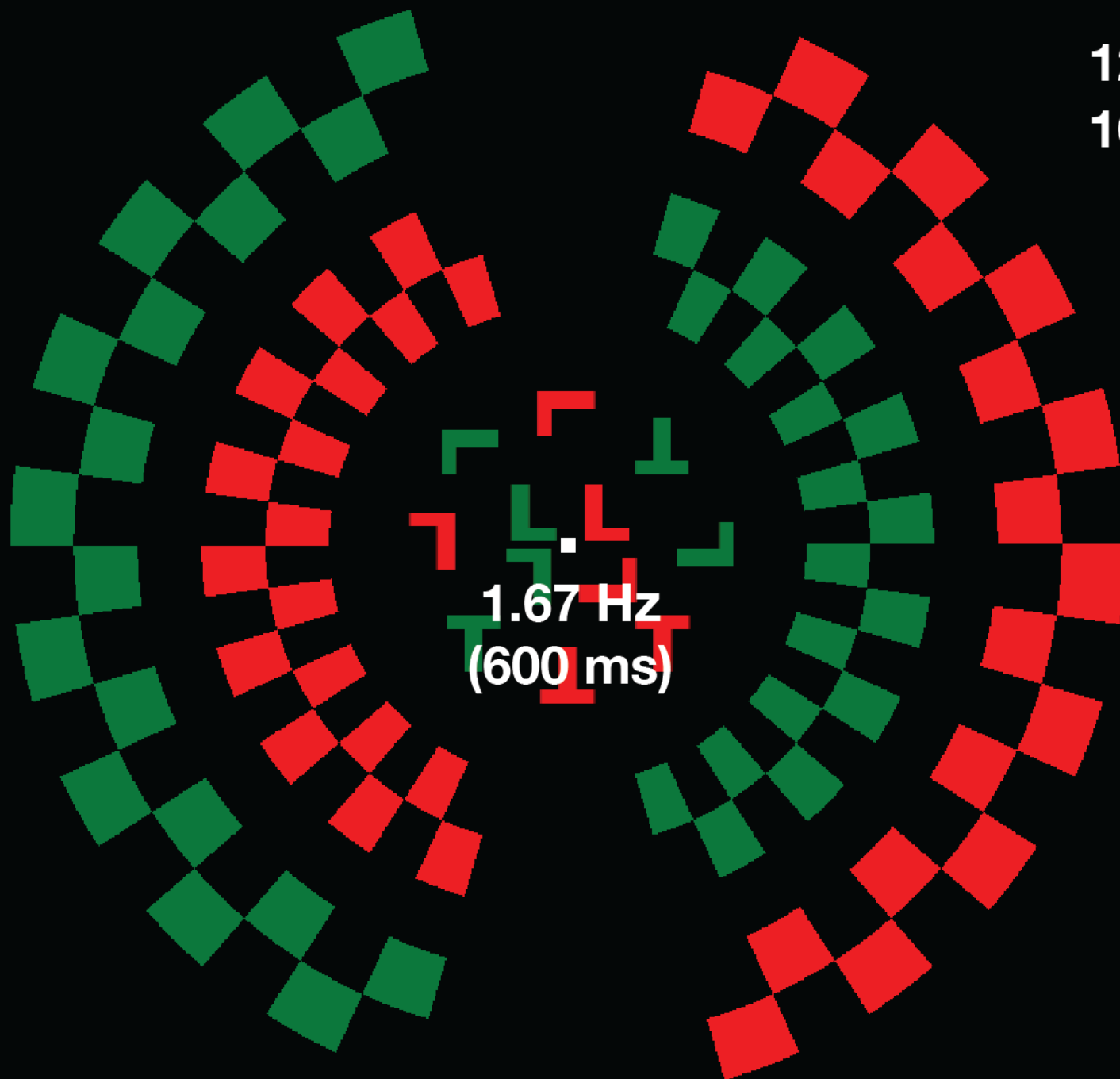








12.50 Hz
16.67 Hz

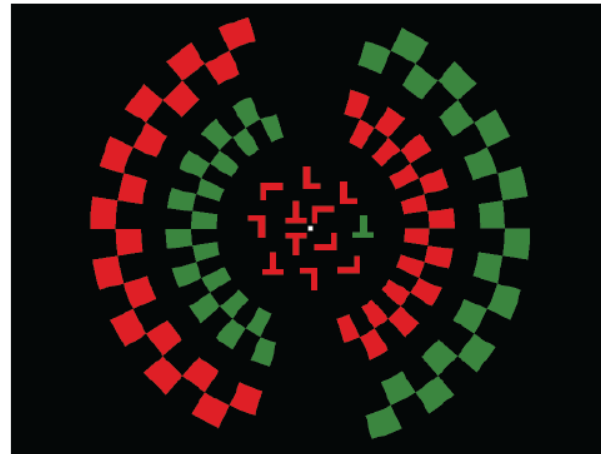
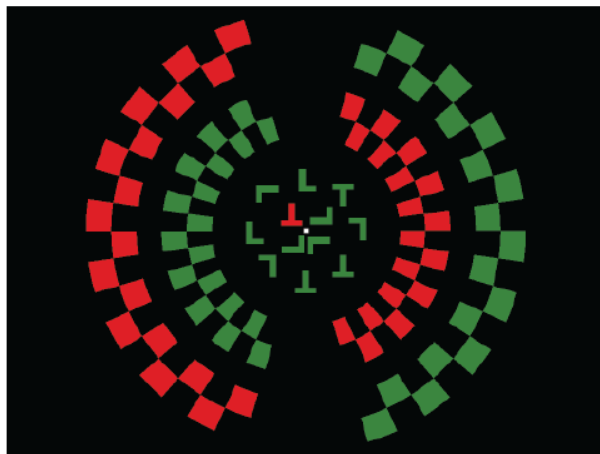


1.67 Hz
(600 ms)

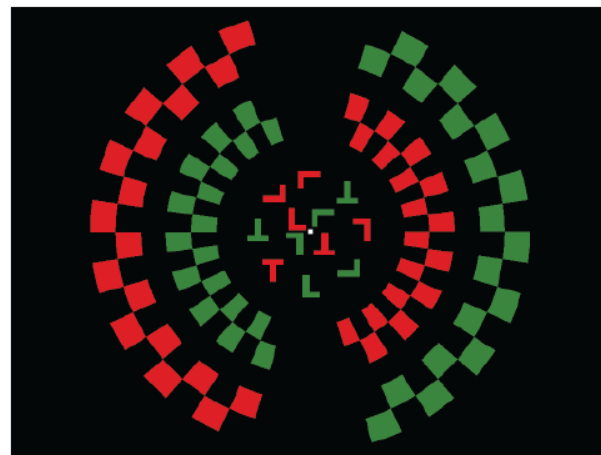
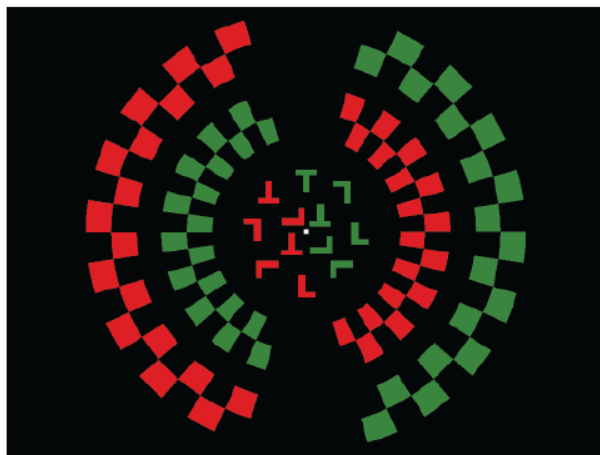
Attend Red

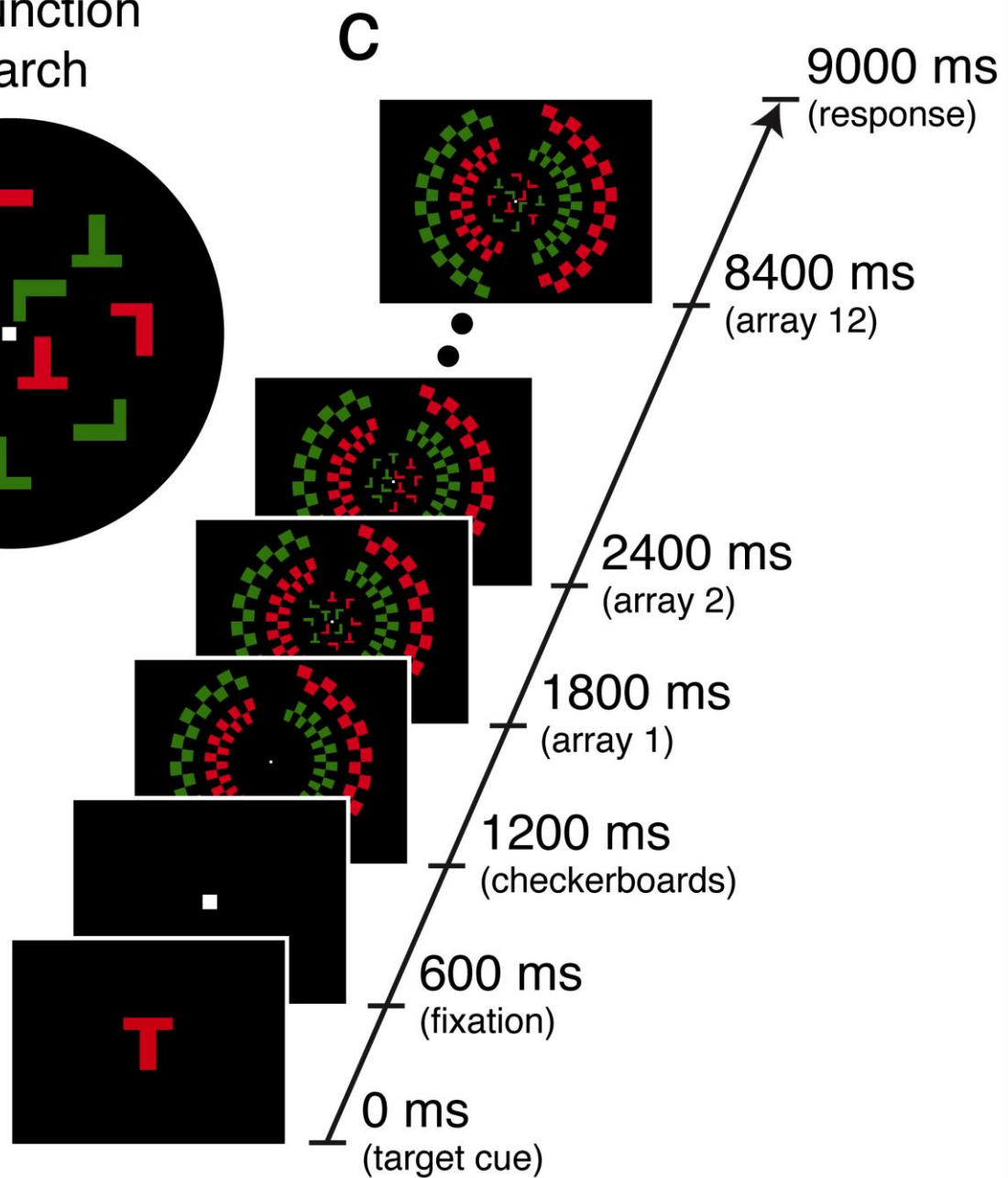
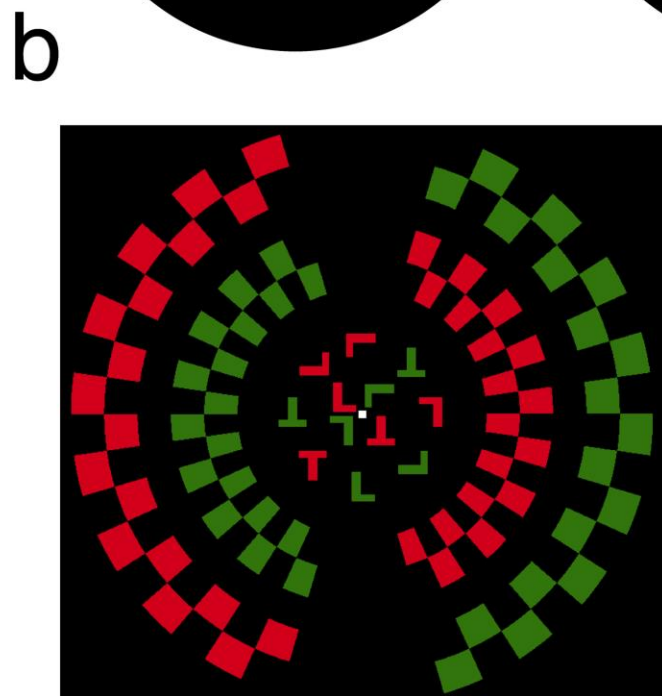
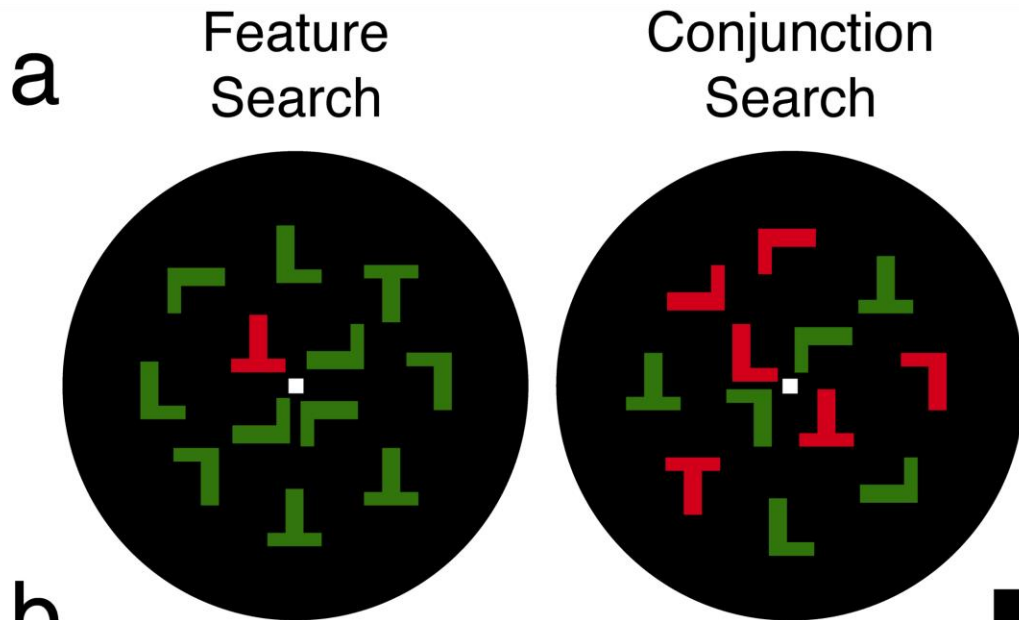
Attend Green

Unique
Feature



Conjunction



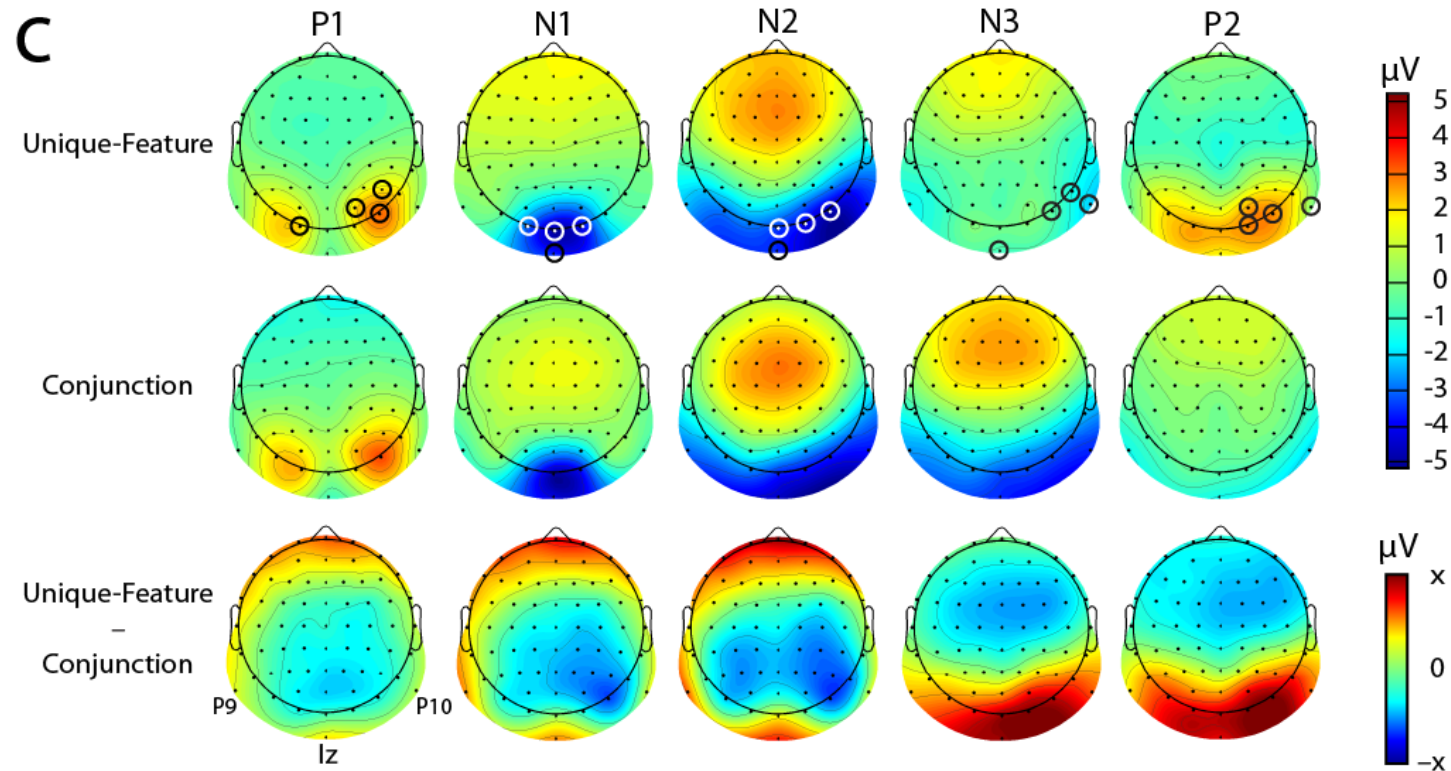
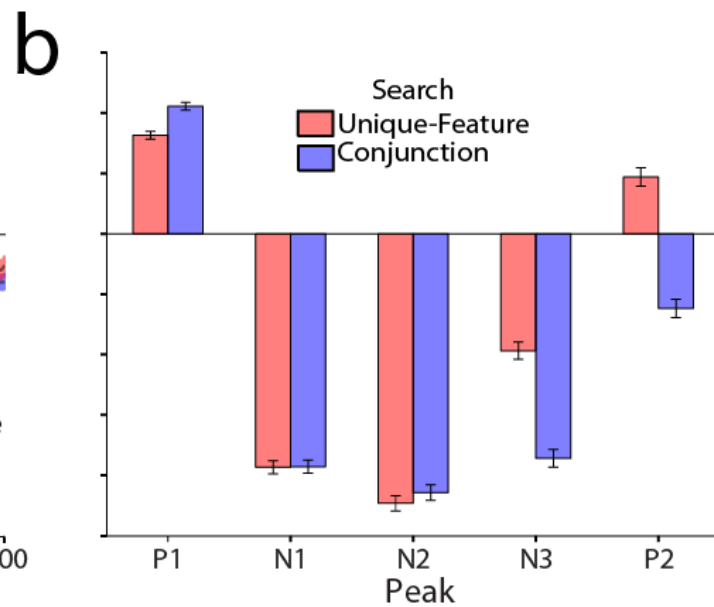
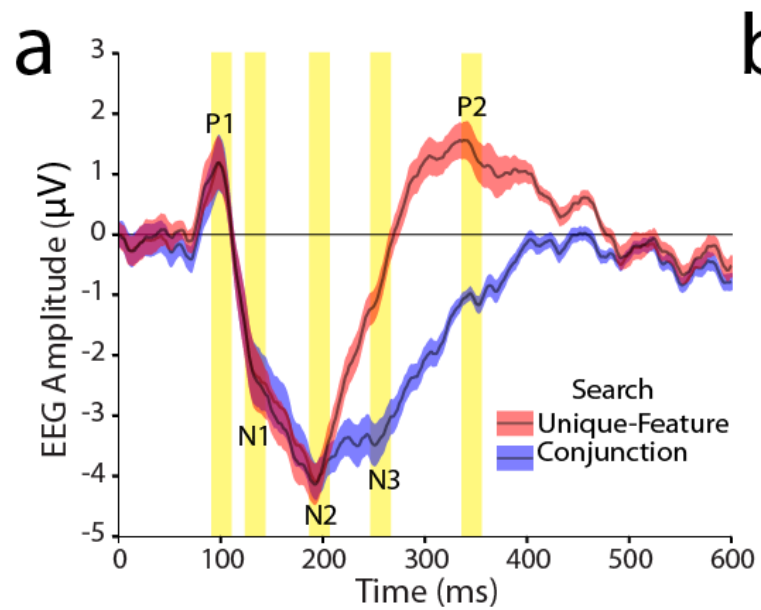


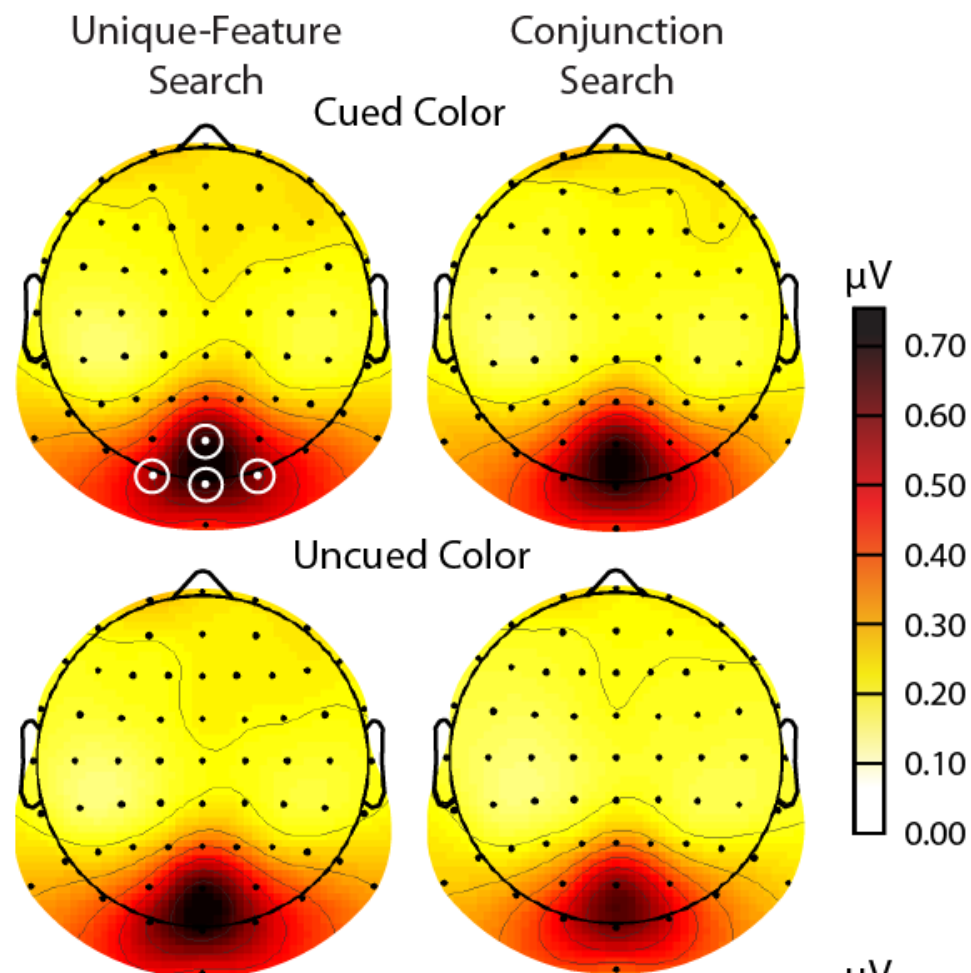
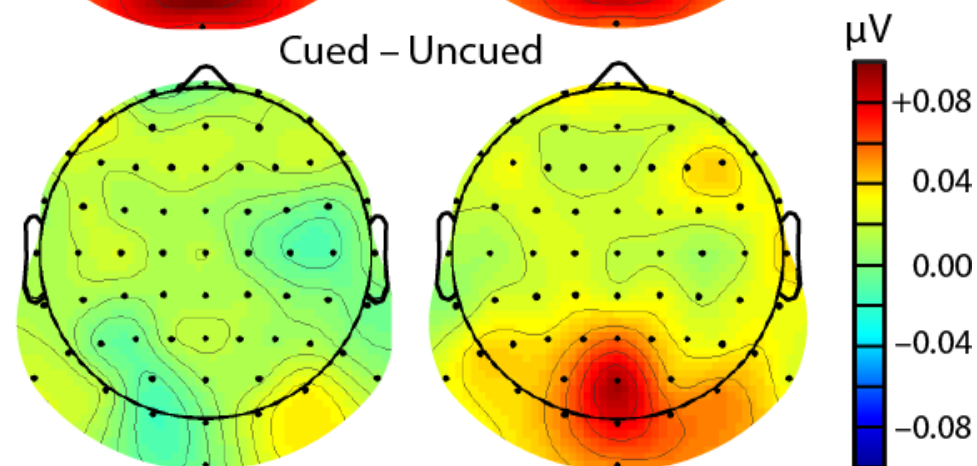
Unique-feature search

T

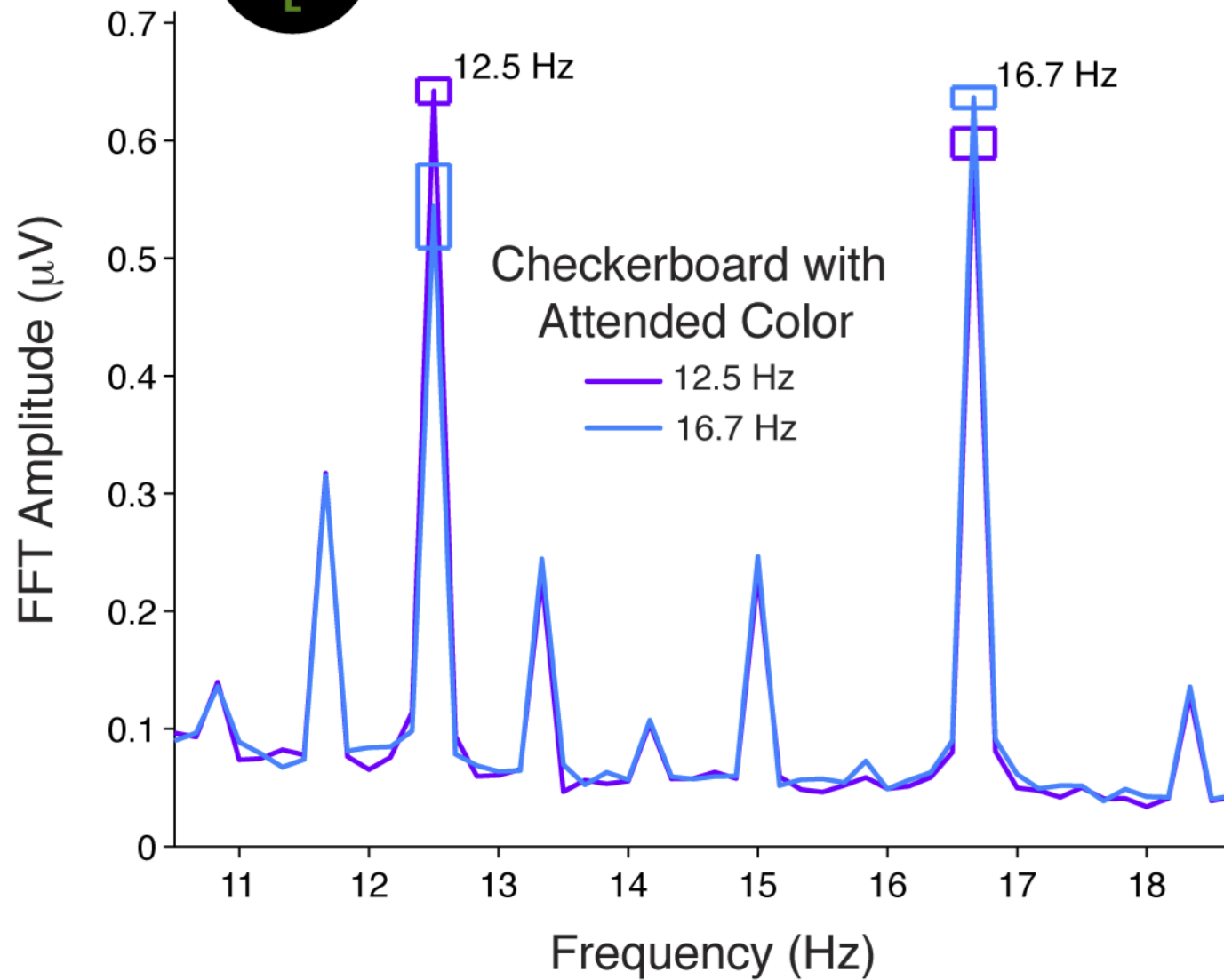
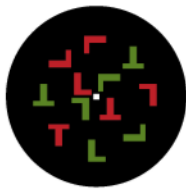
Conjunction search

T

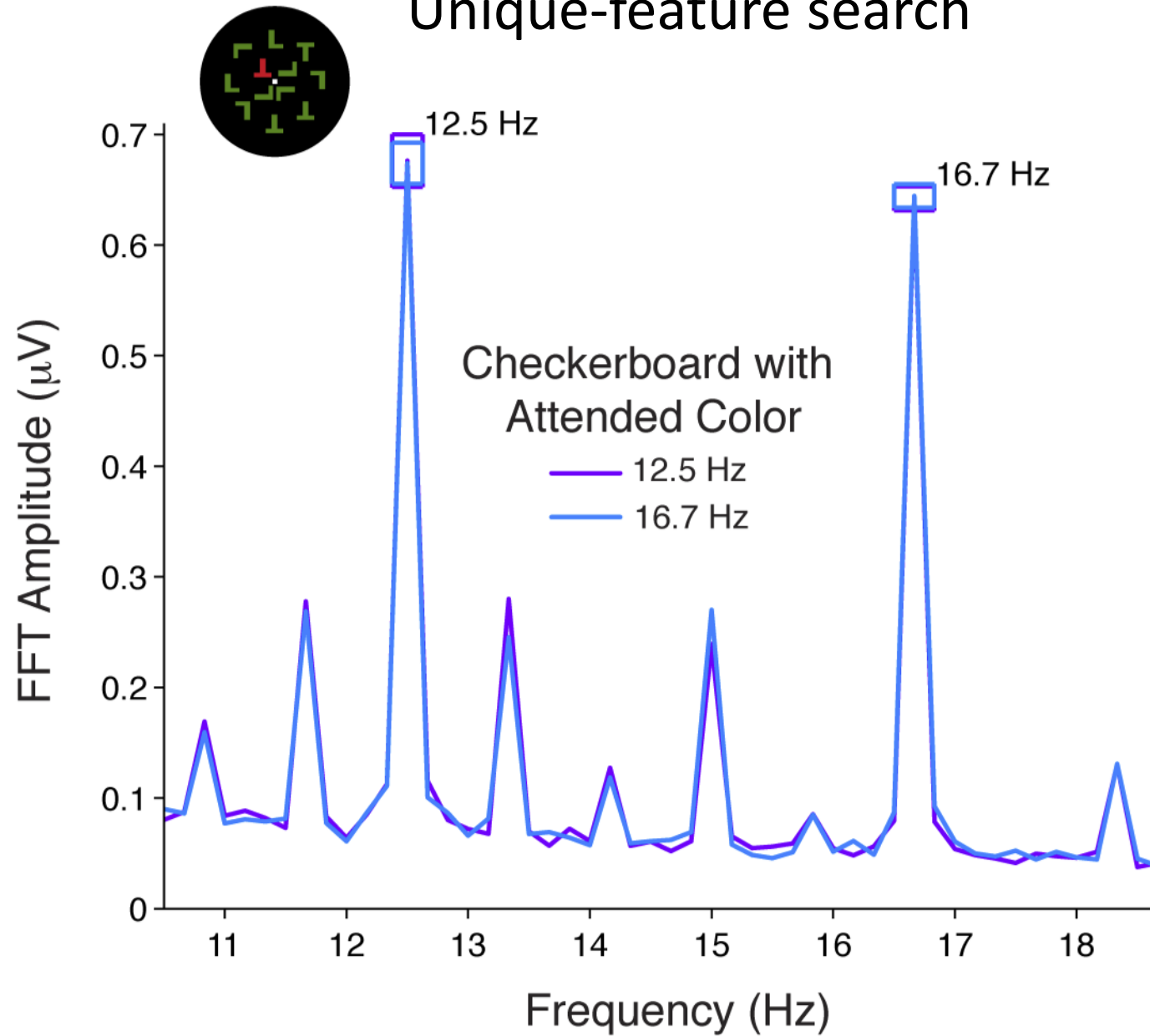


a**b**

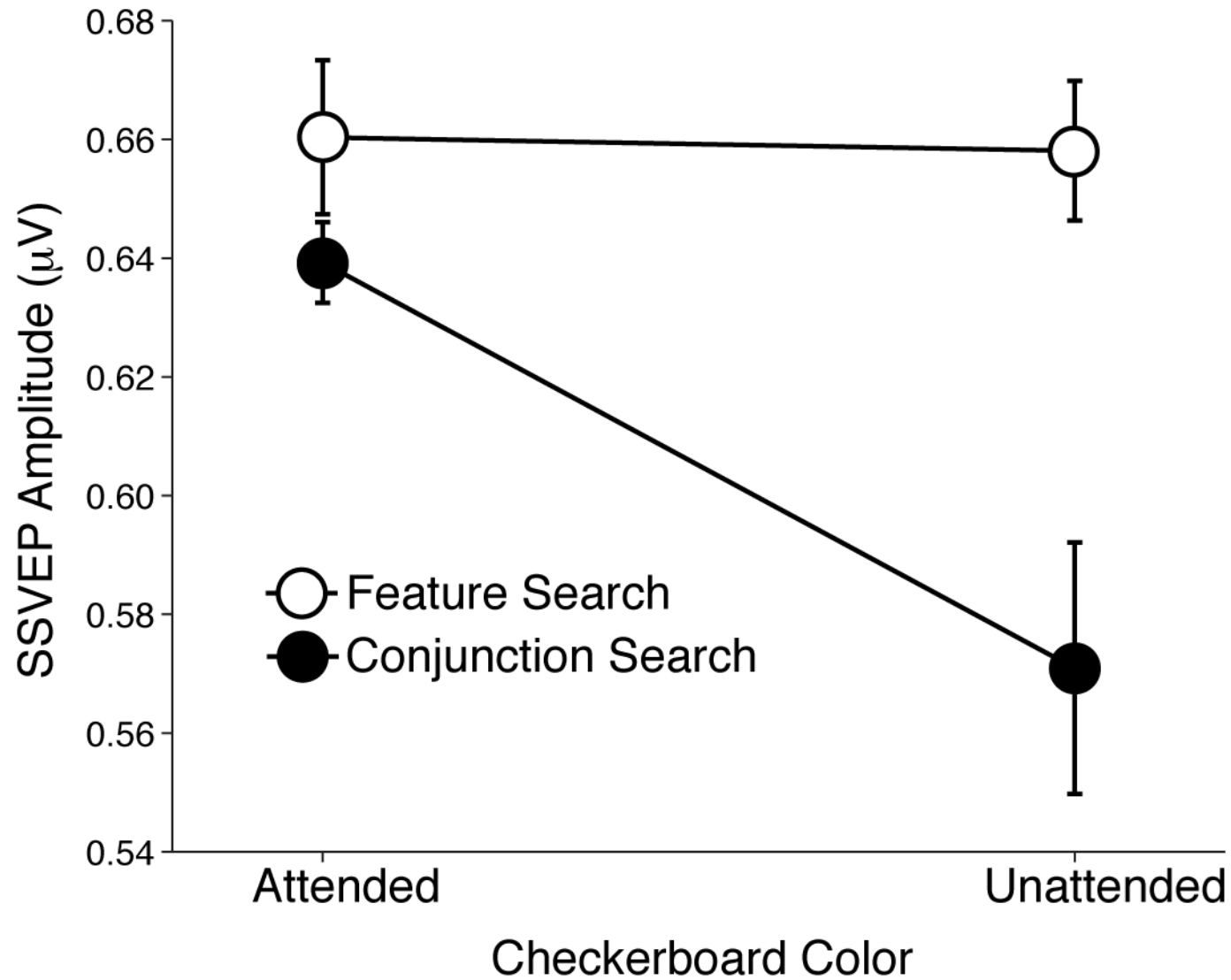
Conjunction search

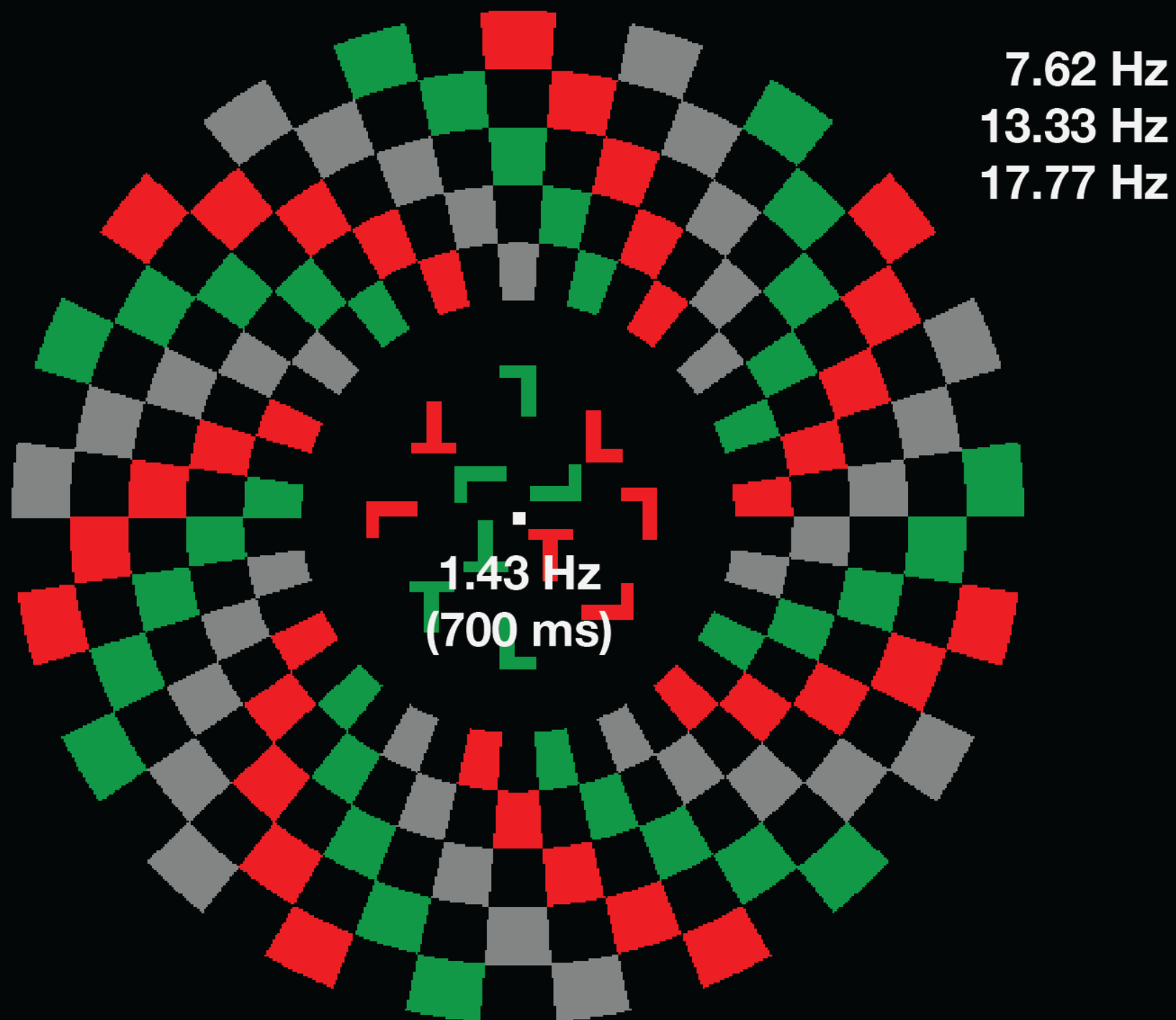


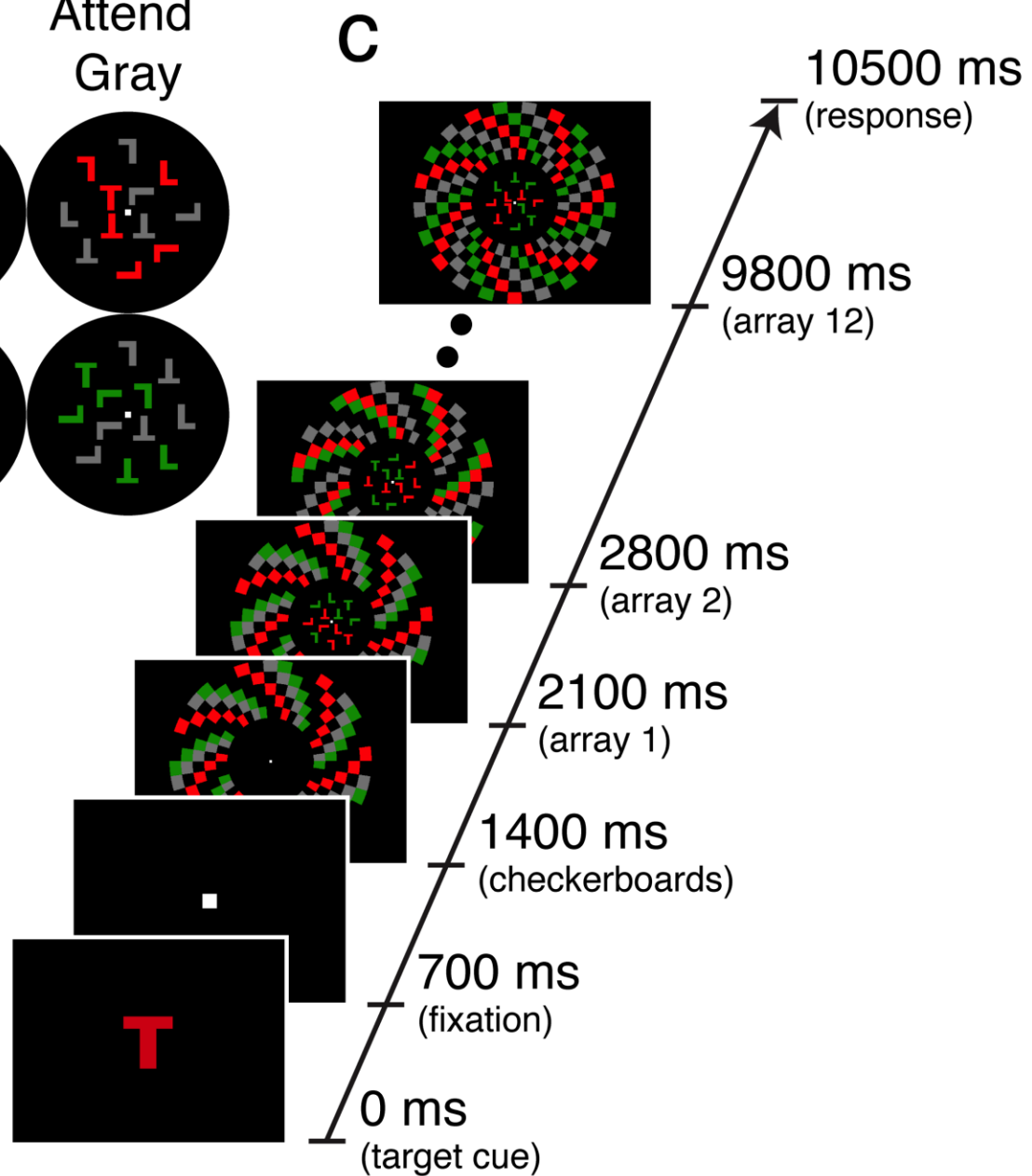
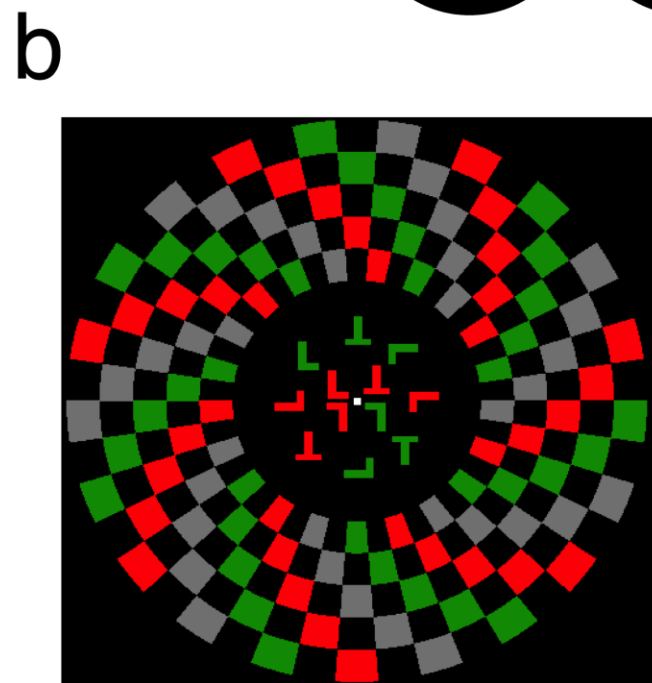
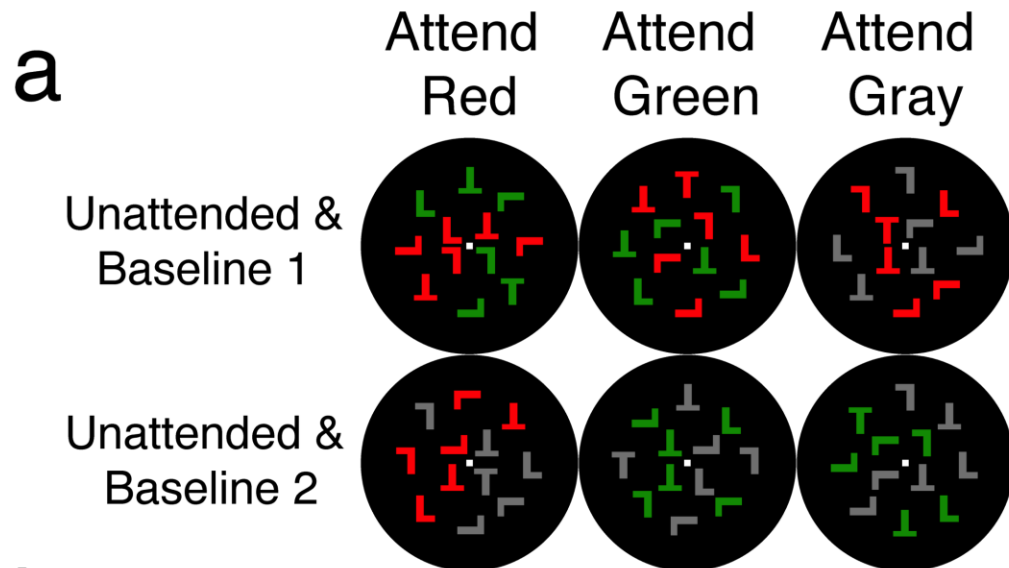
Unique-feature search

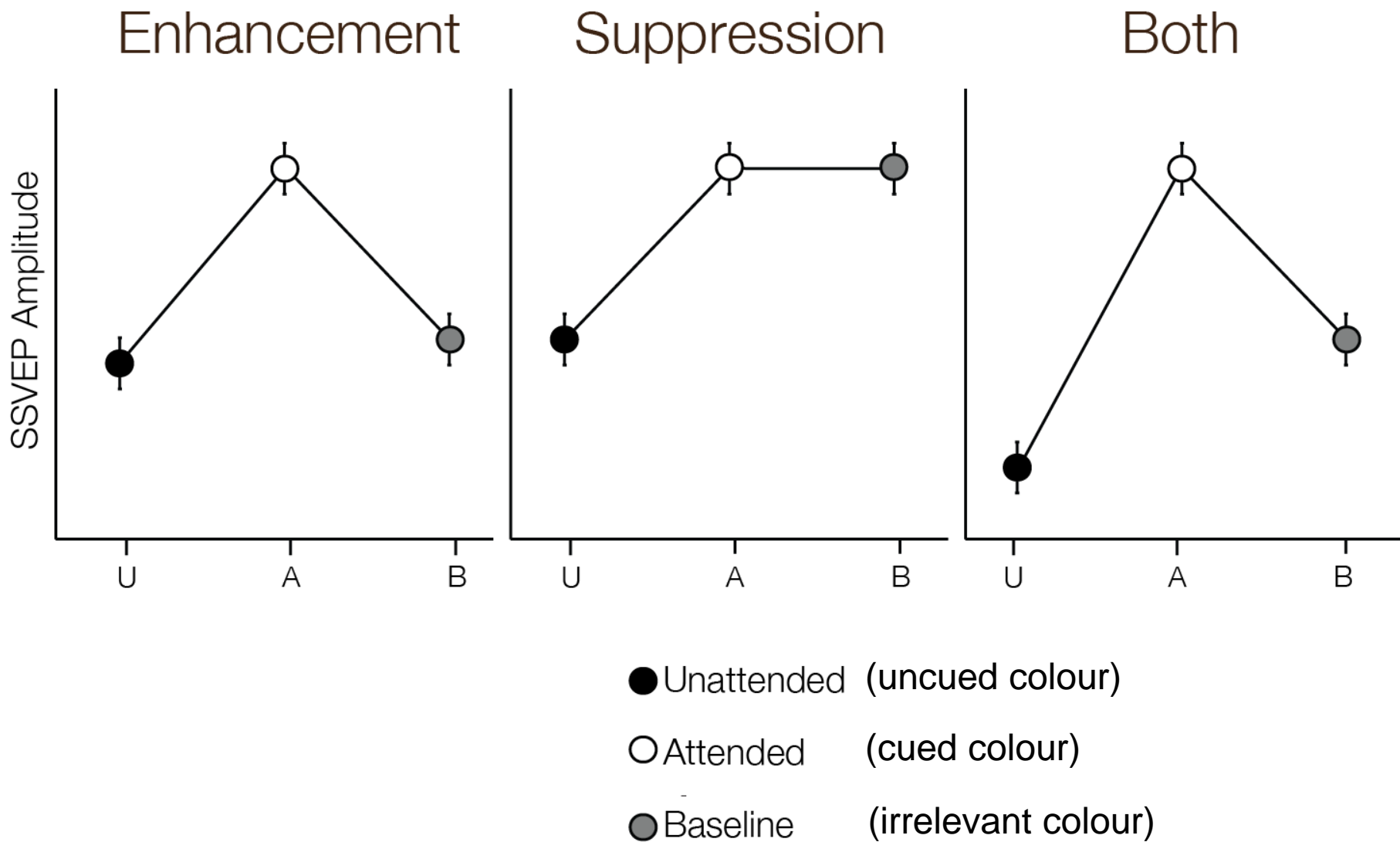


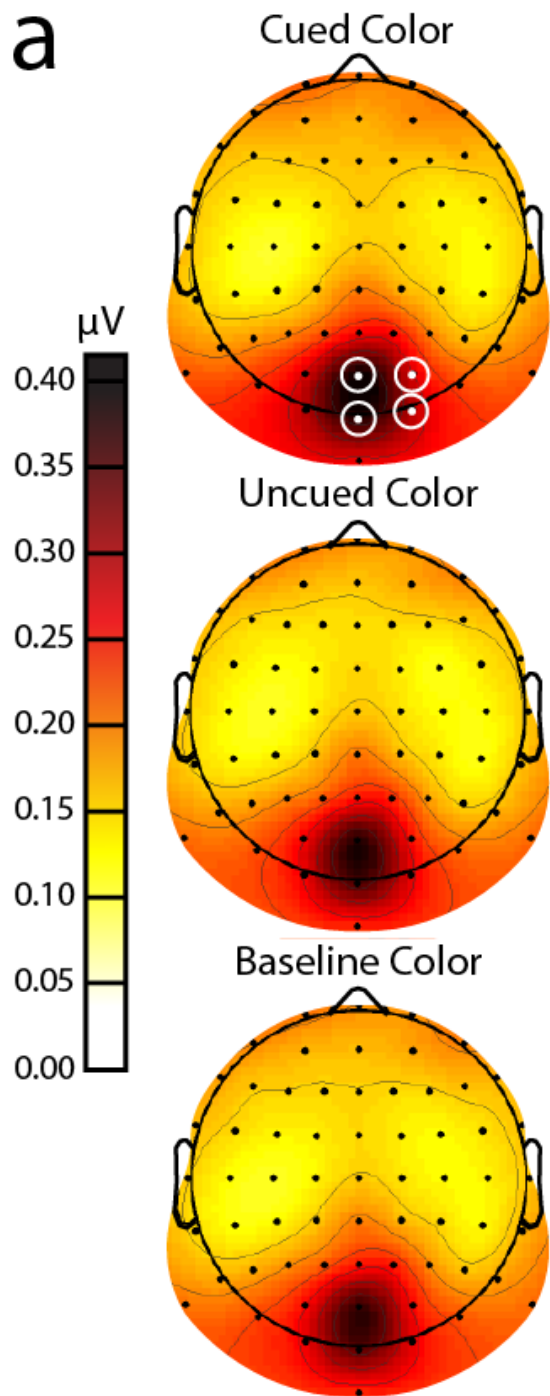
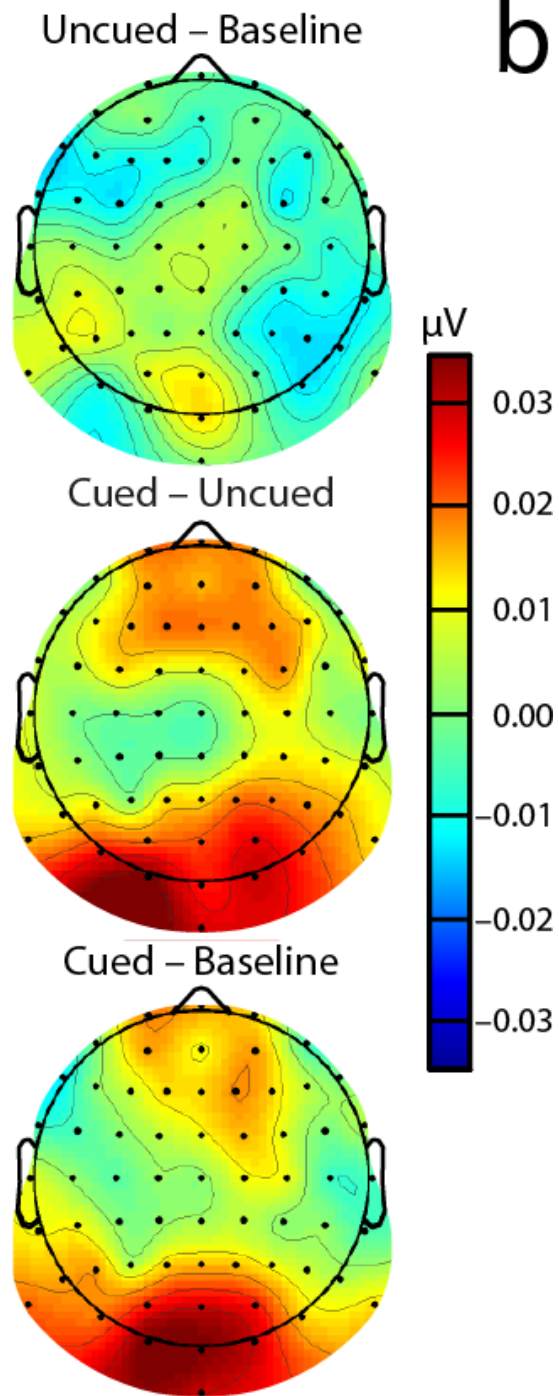
“Attended” = cued colour in search array
“Unattended” = non-cued colour in search array

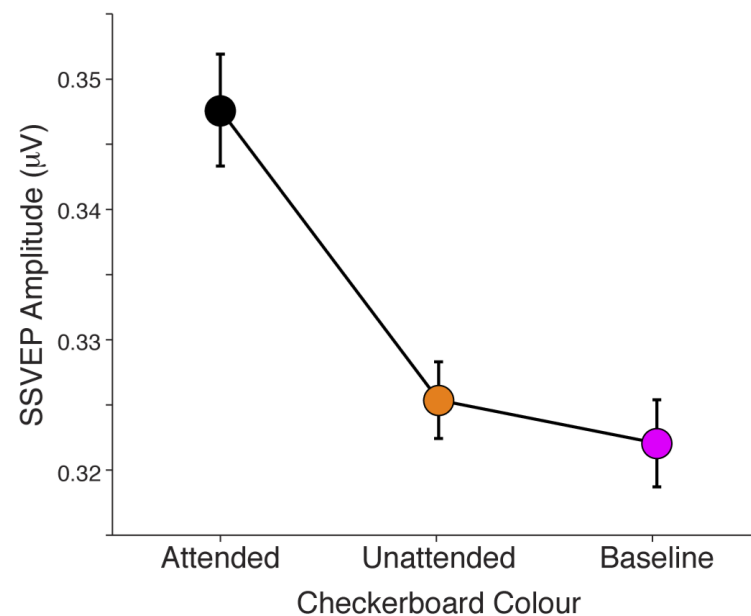
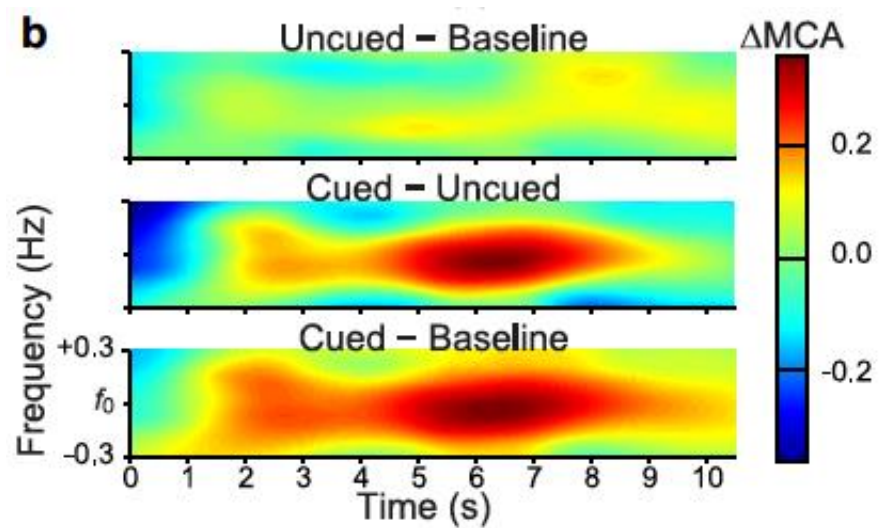
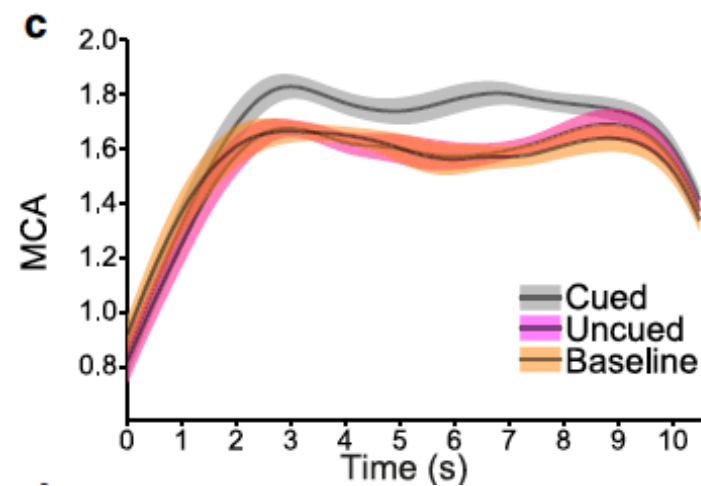
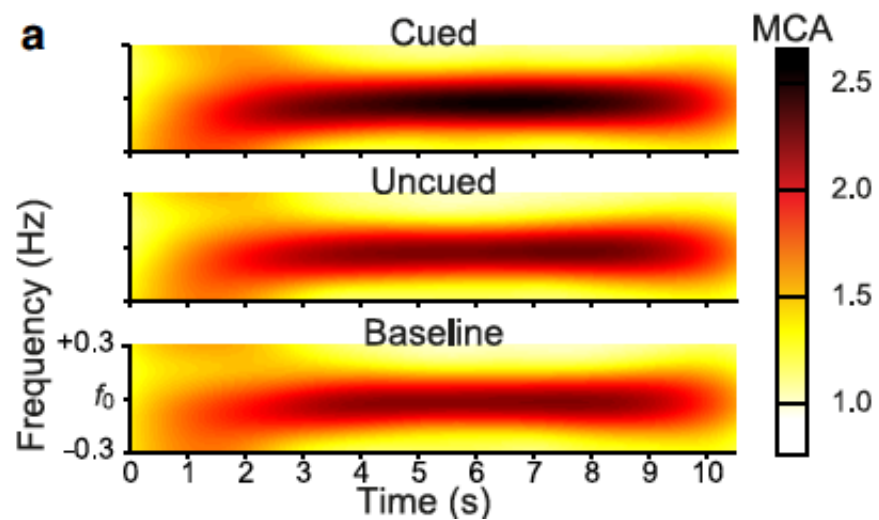








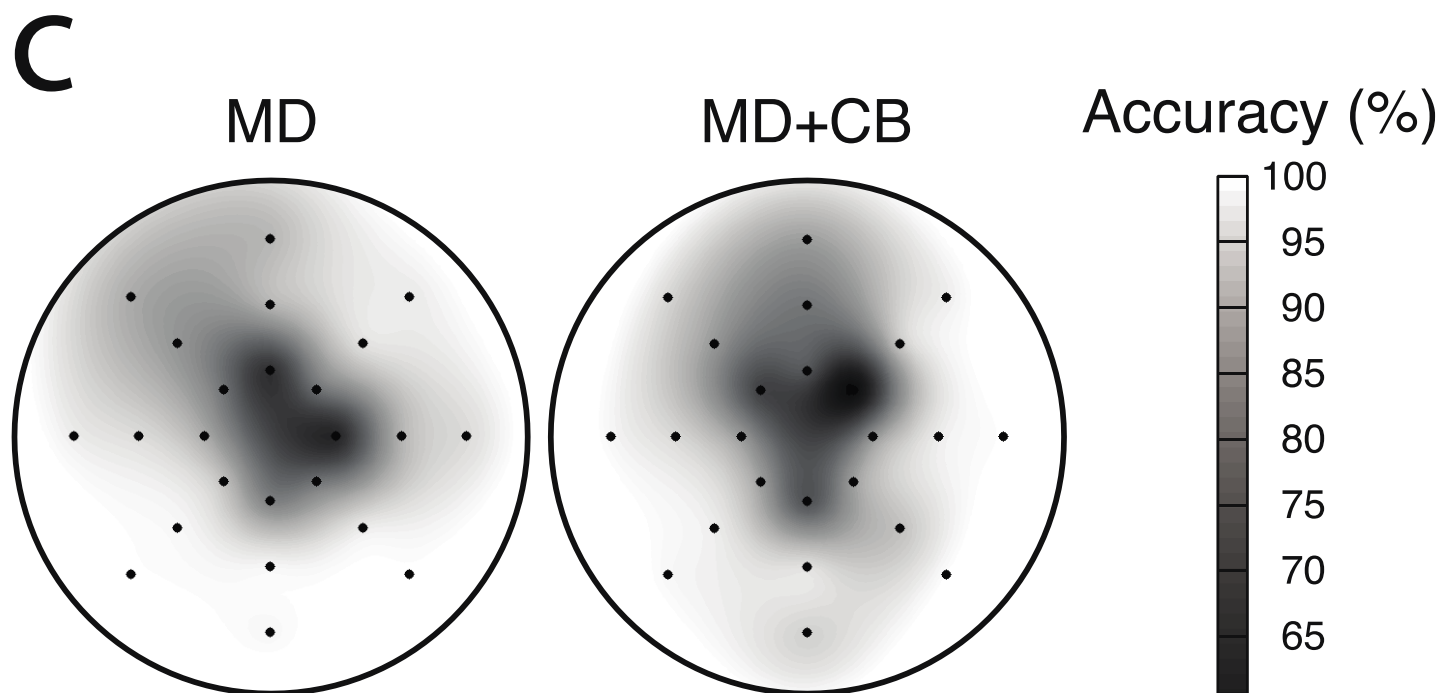
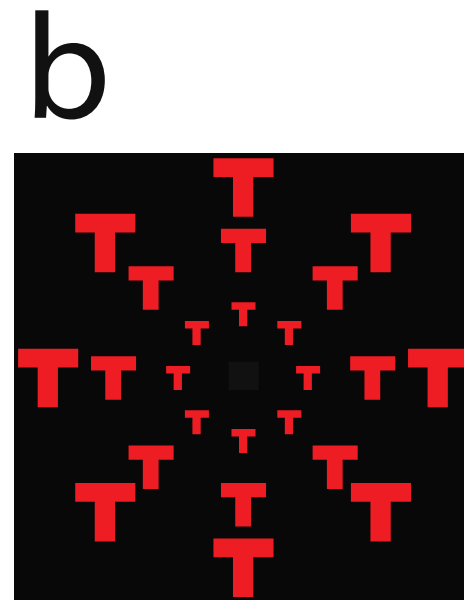
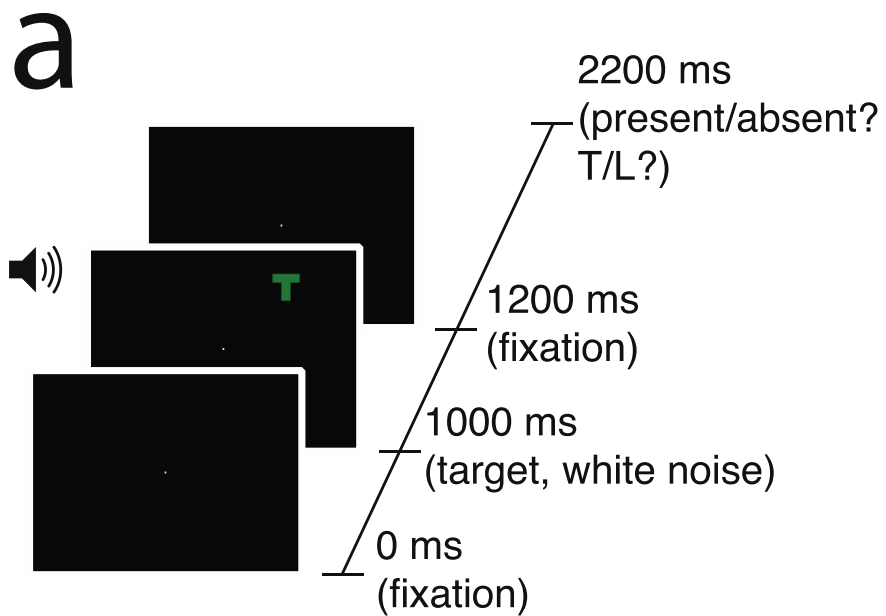
a**b**

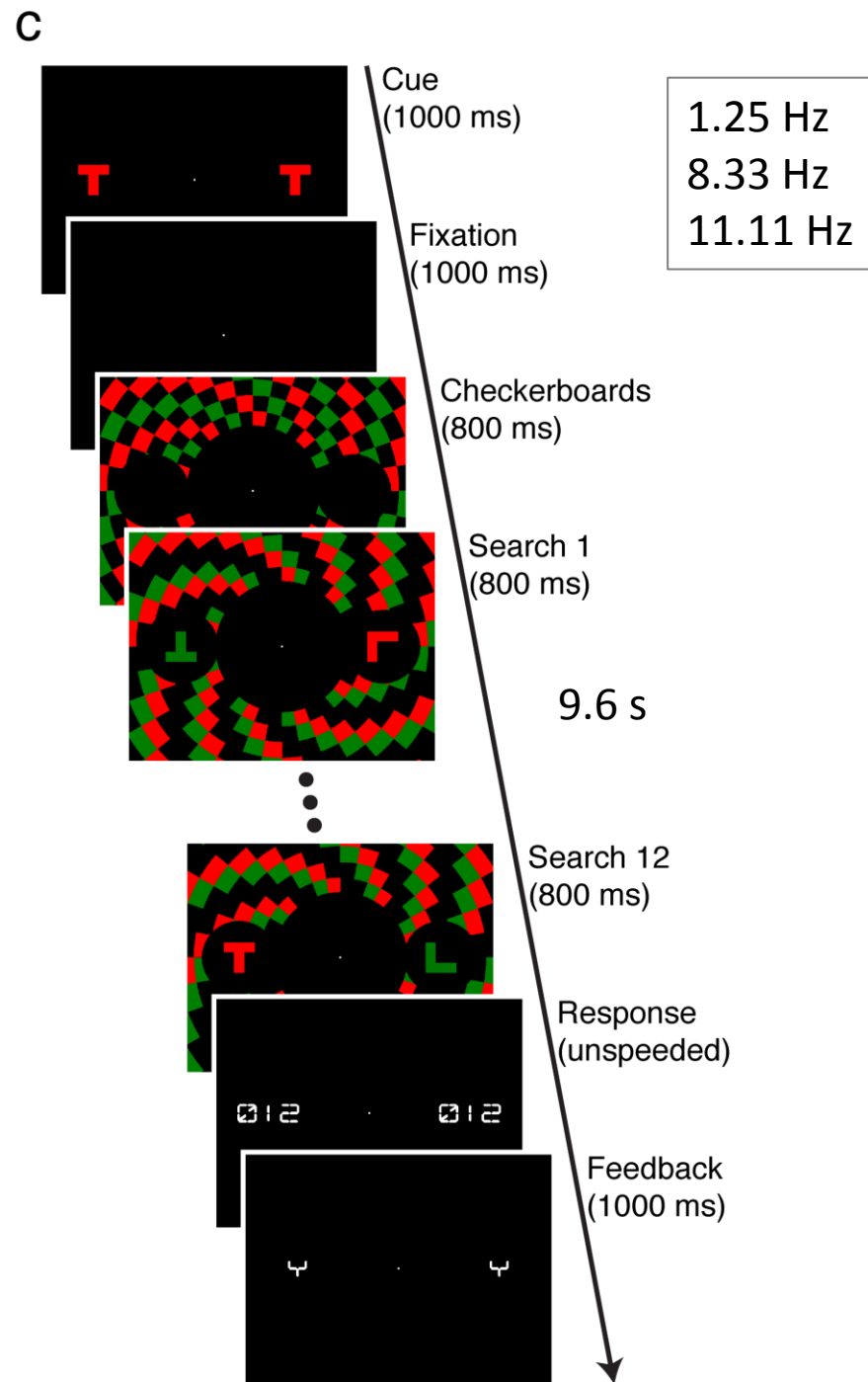
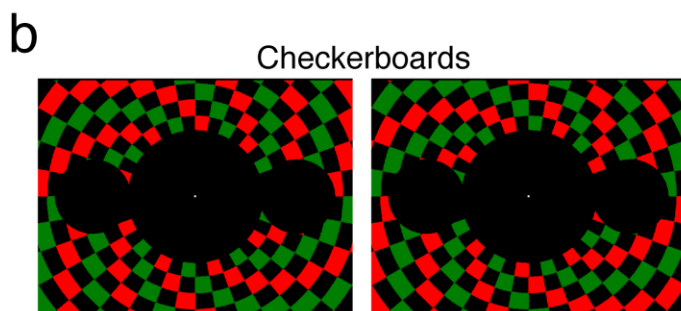
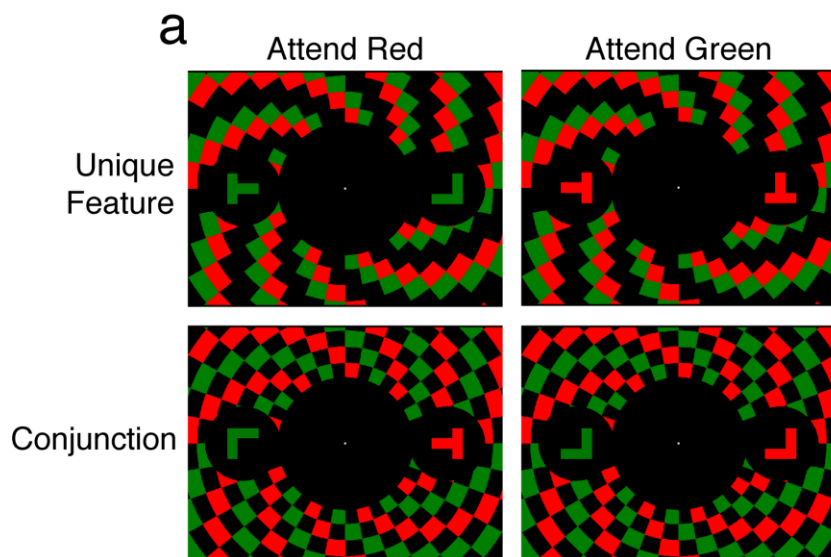


Charles Bonnet Syndrome in macular degeneration



Vukicevic (2010)





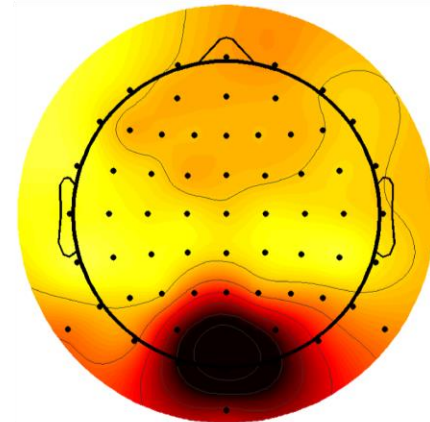
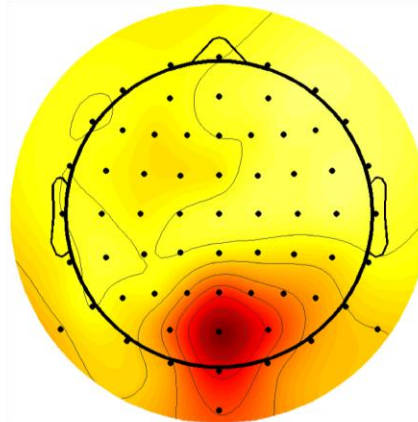
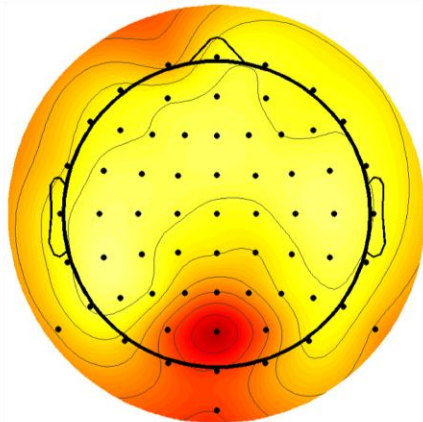
Amplitude Topographies

Controls

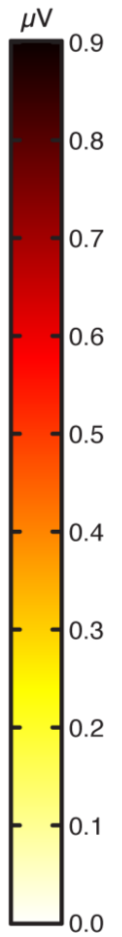
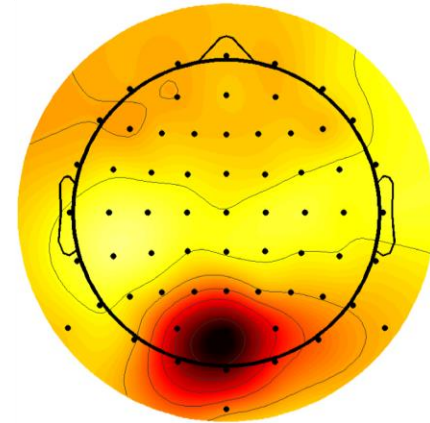
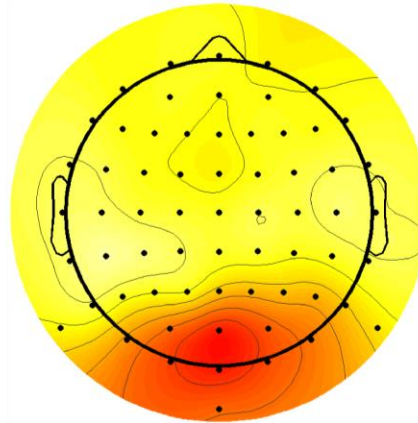
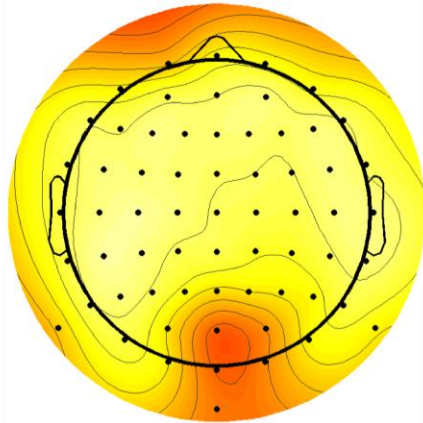
MD

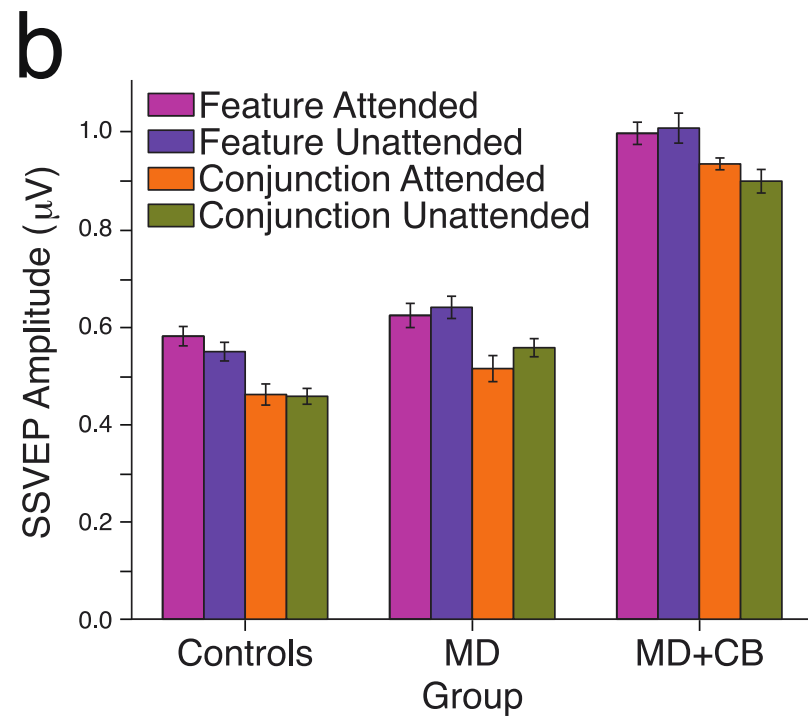
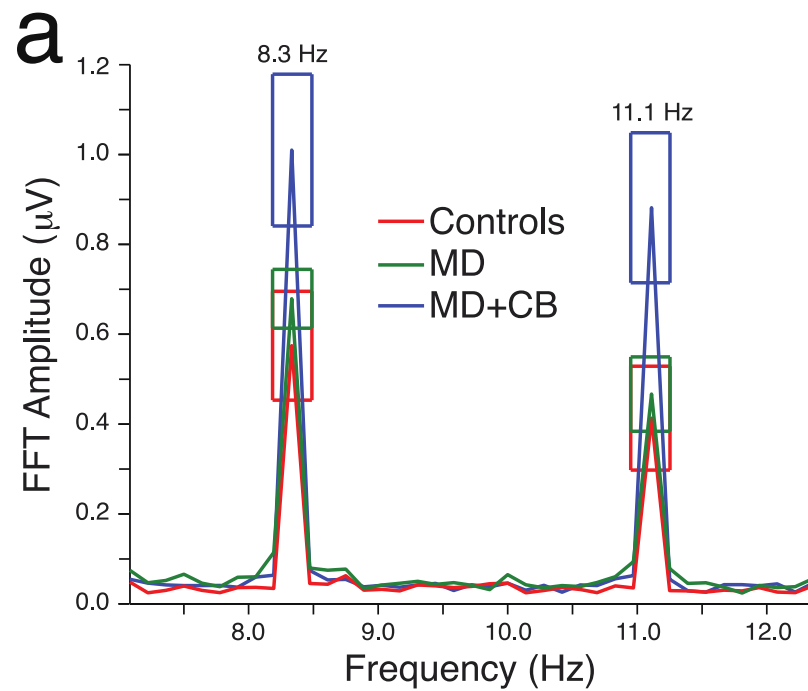
MD+CB

8.33 Hz



11.11 Hz





Conclusions

- **Frequency tagging** is a useful tool for examining the effects of stimulus competition and top-down biases in visual search.
- During active search for feature conjunctions in central vision, neural activity is **enhanced for target features** (e.g., colour) at irrelevant locations in the periphery.
- **No evidence for suppression** of neural activity associated with distractor features at irrelevant locations in the periphery.
- Charles Bonnet Syndrome in macular degeneration:
 - is associated with **hyper-excitability in early visual areas**
 - may reflect **feedback of signals from higher visual areas**



Acknowledgments

Funding:

- Australian Research Council
- National Health & Medical Research Council

Collaborators:

- Paul Dux (UQ)
- David Painter (Hitachi, Japan)
- Susan Travis (UQ)

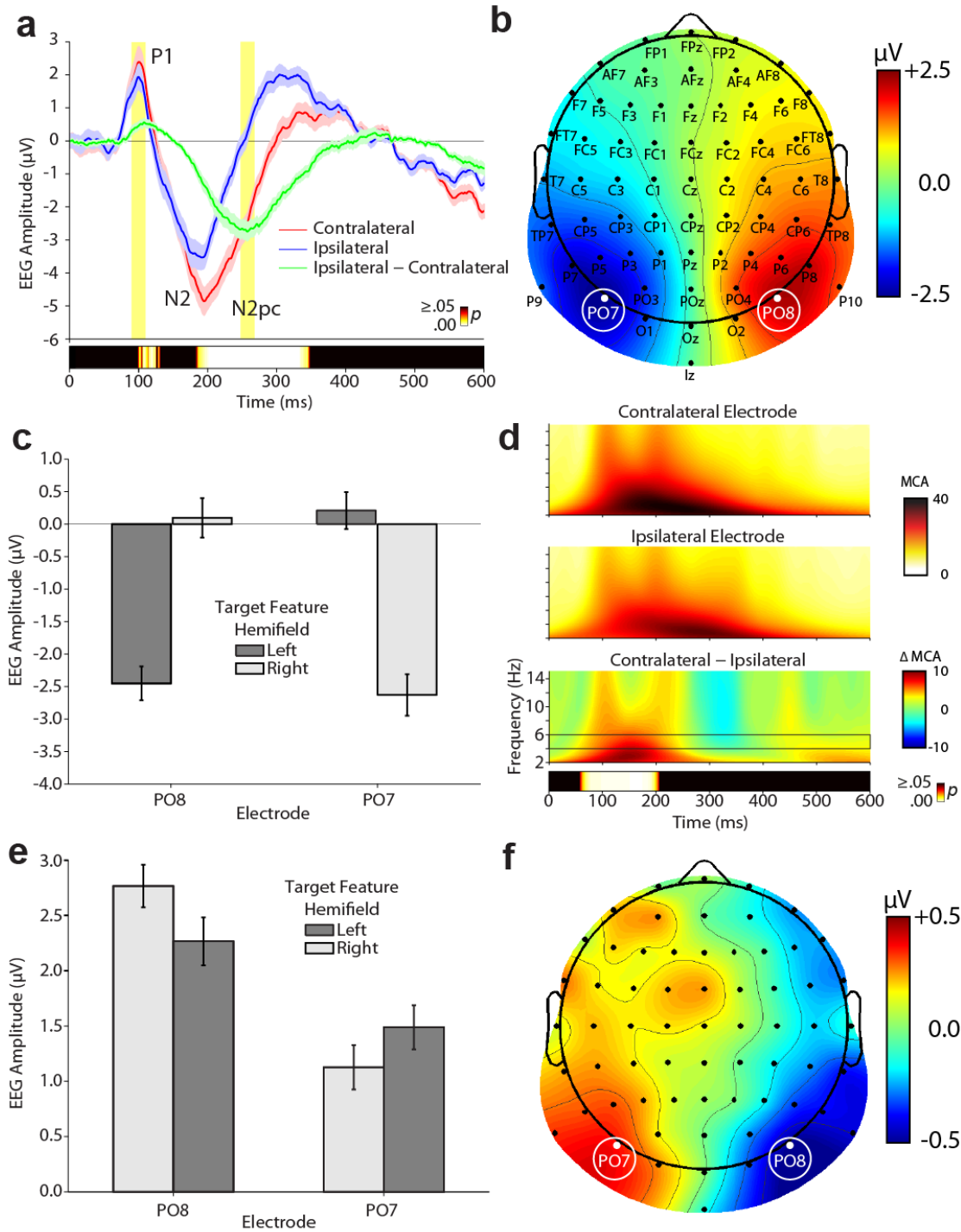
**POSTER – TAT014: Attending to the unseen:
the effects of spatial attention on neural
responses to visible and invisible stimuli (Smout,
Mattingley)**

Behavioral/Cognitive

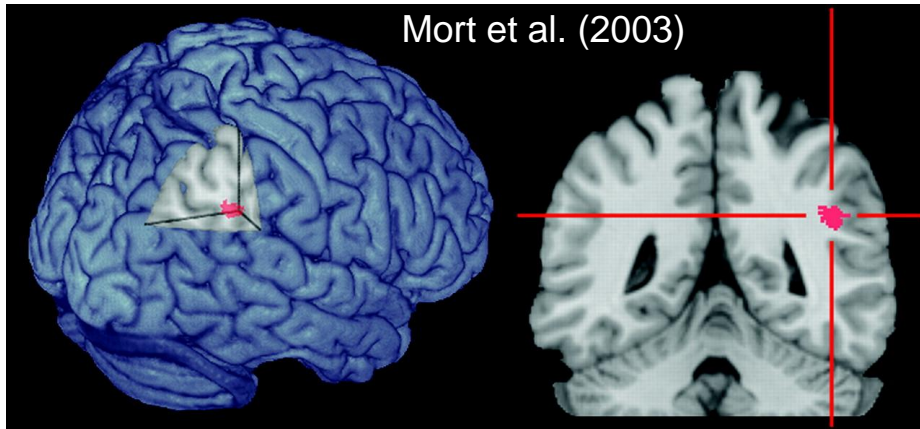
Neural Responses to Target Features outside a Search Array Are Enhanced during Conjunction but Not Unique-Feature Search

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¹The University of Queensland, Queensland Brain Institute, St Lucia 4072, Australia, and ²The University of Queensland, School of Psychology, St Lucia 4072, Australia



Unilateral spatial inattention – ‘neglect’



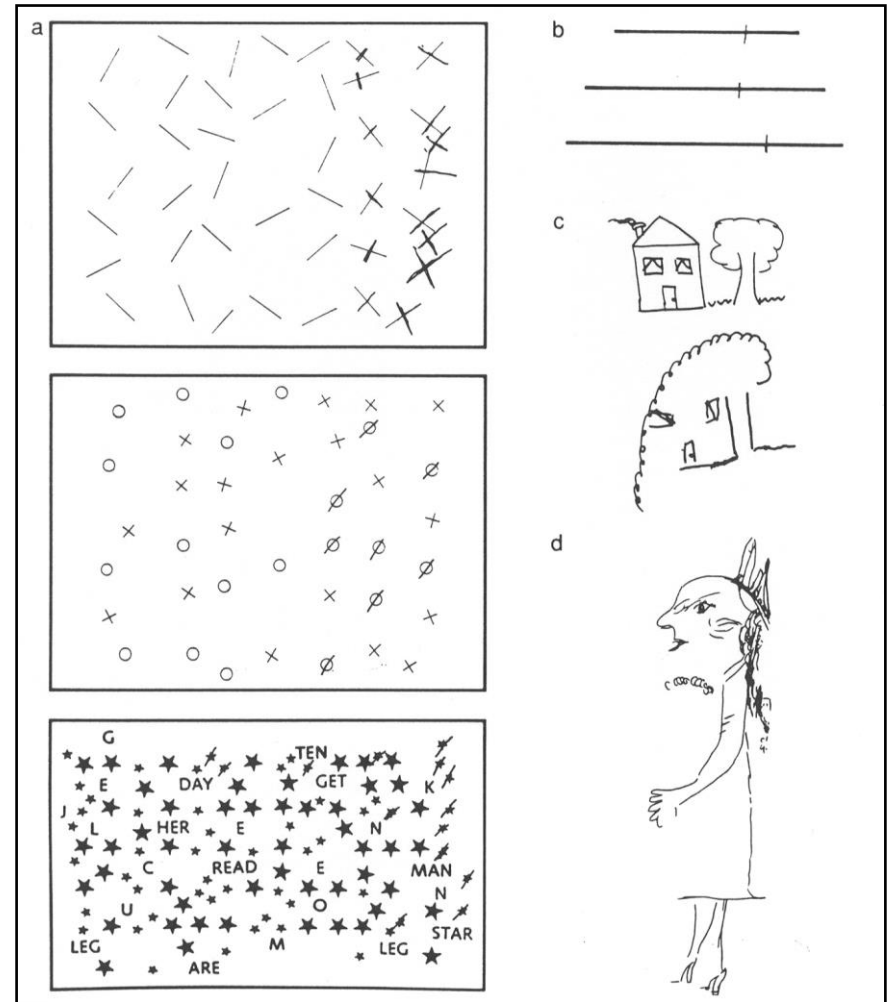
Right



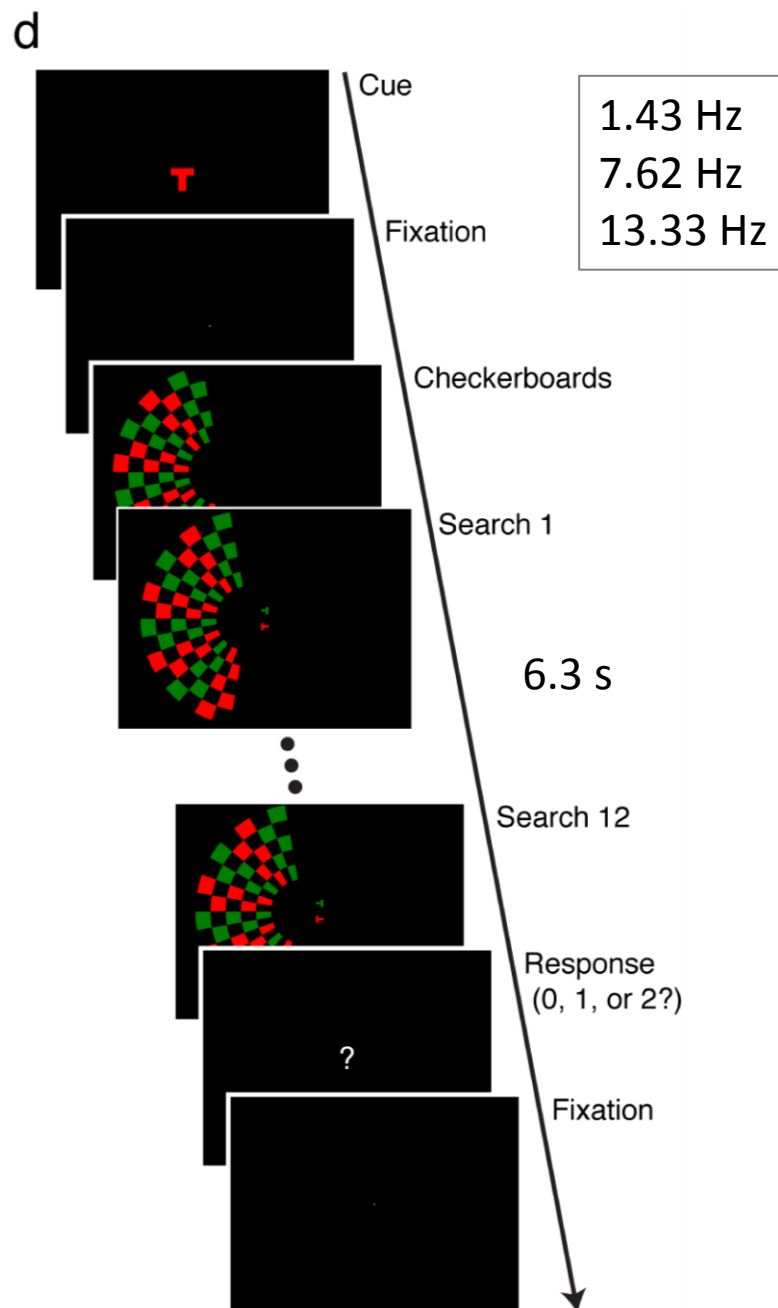
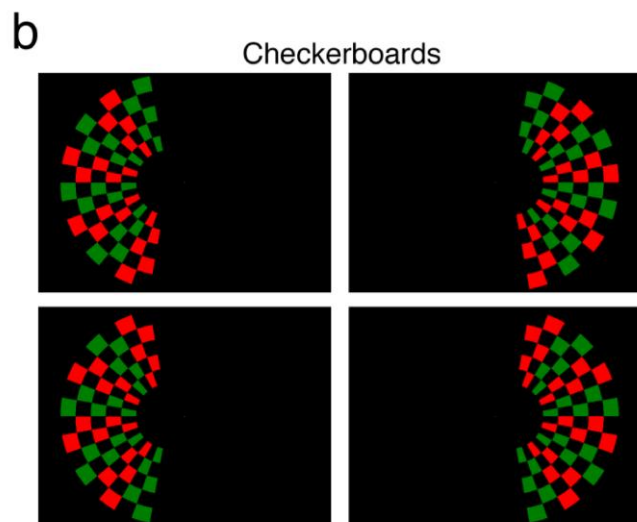
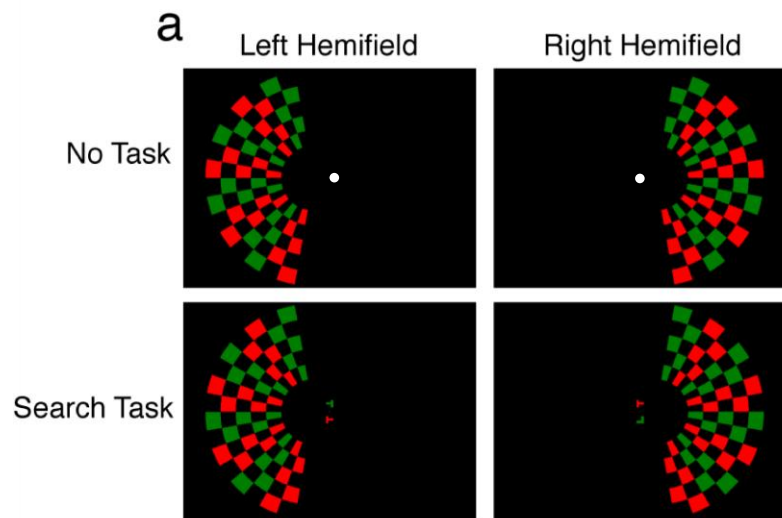
Right

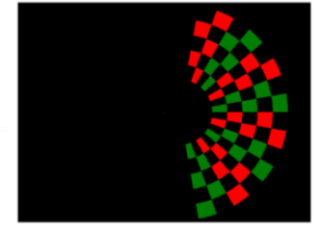
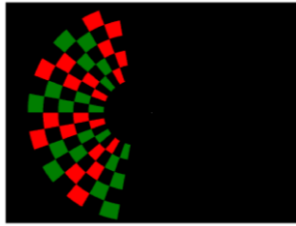
Left

Fruhmann-Berger & Karnath (2005)



Mattingley et al. (1995)

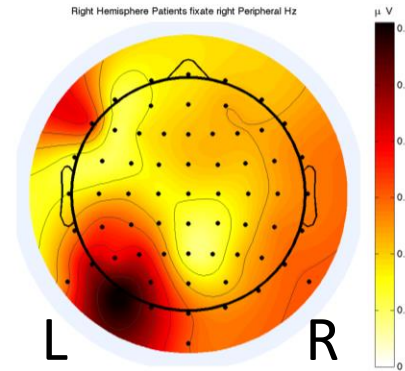
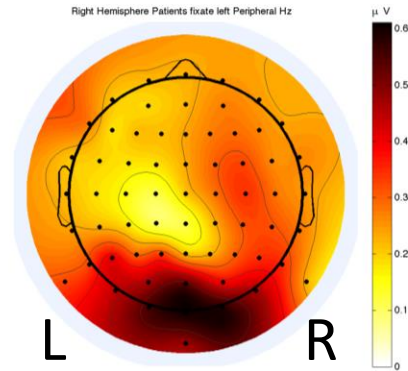




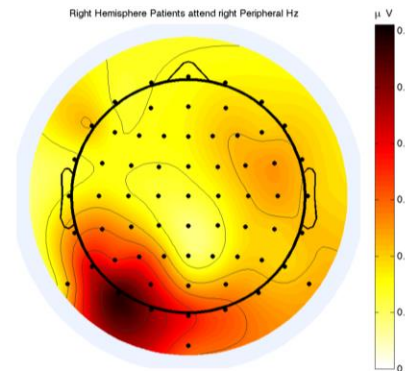
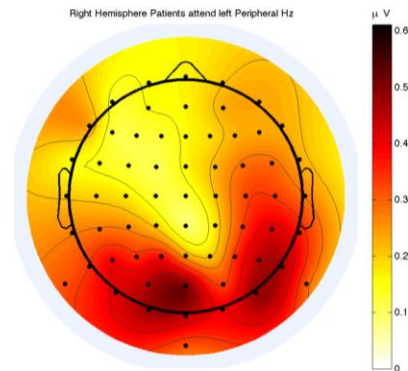
Left

Right

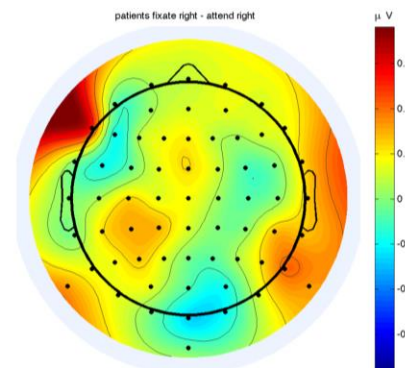
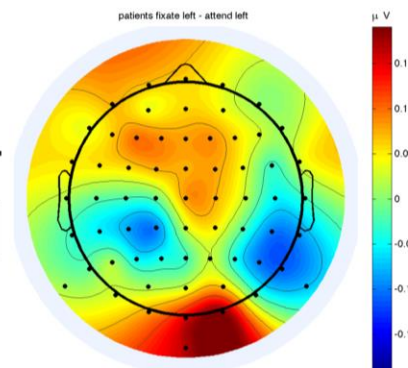
Fixate

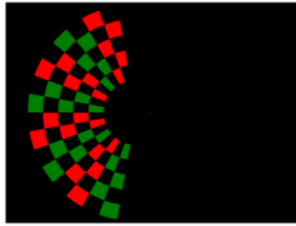


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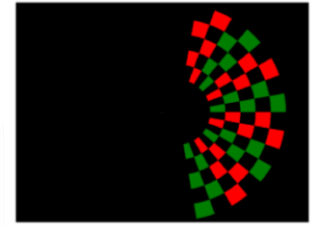
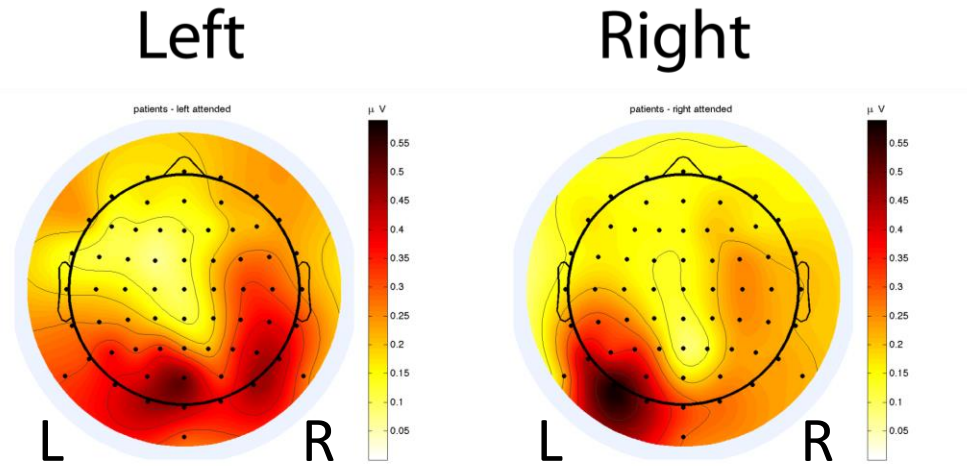


Fixate -
Attend

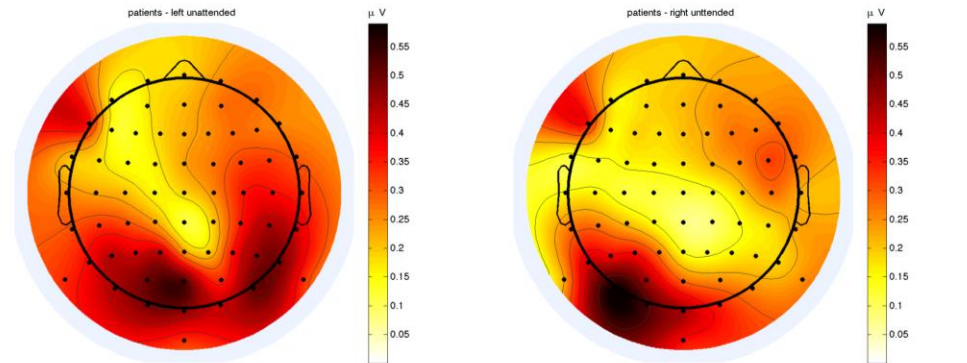




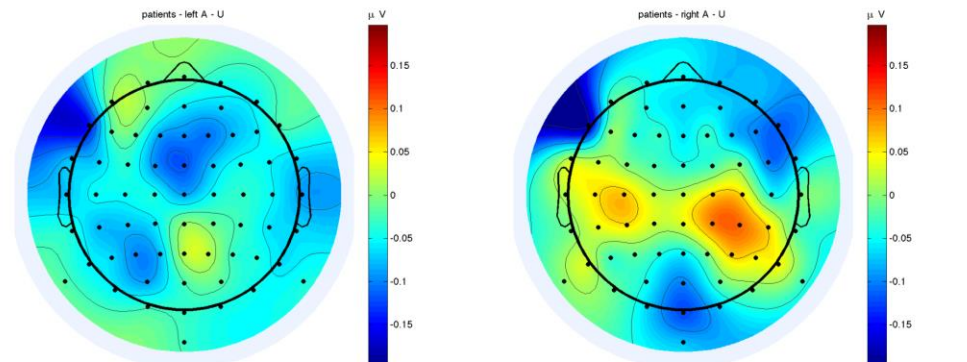
Attended



Unattended



Attended -
Unattended



Charles Bonnet Syndrome

Lullin saw: “from time to time, in front of him, figures of men, of women, of birds, of carriages, of buildings ... All these visions appear to him in perfect clarity and affect him as strongly as if the objects themselves were present.”

