Spatial Attention Tunes Temporal Processing in Early Visual Cortex by Speeding and Slowing Alpha Oscillations

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Outline

Materials and Methods

Trial Structure

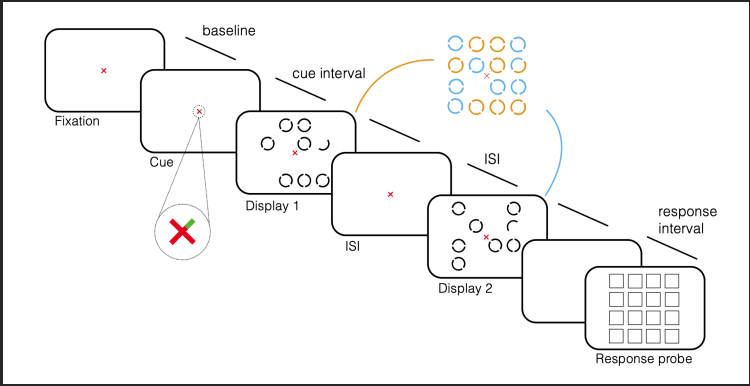
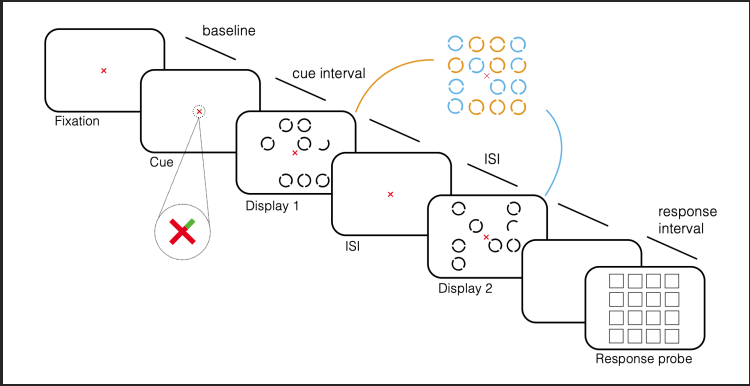


Figure 1: Trial Structure

Trial Structure



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Timeline:

- pre-cue: 1000-1500ms
- cue interval: 850-1350ms (randomized)
- display: 16.67ms
- ISI: 48.3ms
- response delay: 400ms

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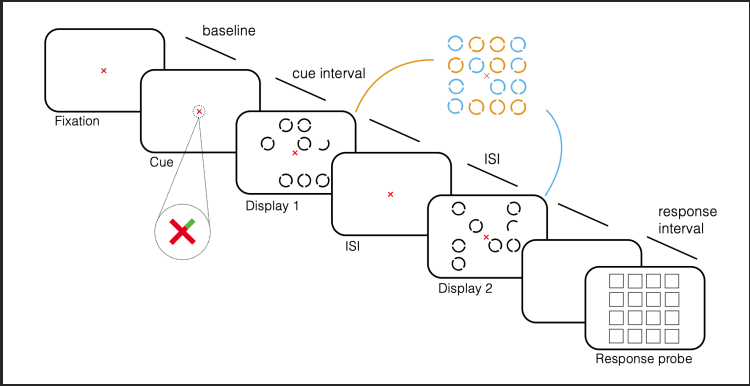

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visual cue: **red** cross

- 75% (T): one of the arms turn **green** (75% valid)
- 25% (C): neutral cue

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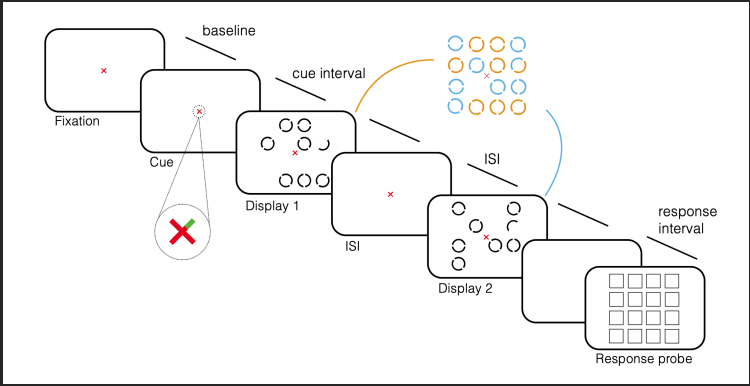

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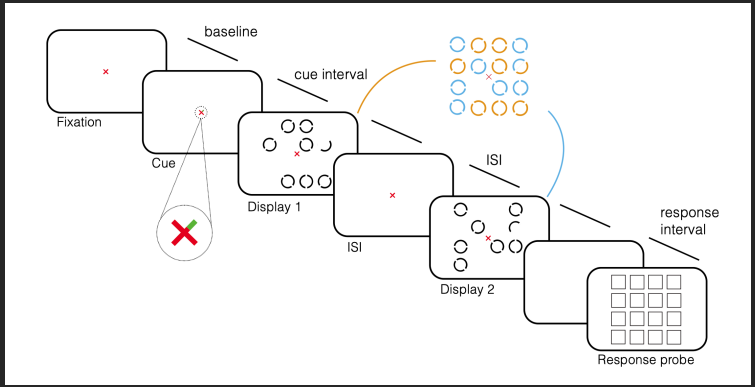
2 displays: complementary, non-overlapping

- neutral cue: the 2 displays **complete** each other
- empty: one left **empty** in both

Trial Structure



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task: moving a highlighted square

- **segregation**: targeting the half circle
- **integration**: targeting the empty spot

Measures

Eye tracking

MEG recording

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- sampling rate: 1kHz
- rejection:
  - saccades: 7±7% trials
  - blinks: 3±4% trials

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MEG recording

- estimate instantaneous $\alpha-$frequency: 7- to 14-Hz frequency band
- rejection
  - nonbiological noise: 10 ± 1 channels

Analysis

Source analysis

Numerical analysis

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- combine head digitization data with **anatomic MRI** data
- regions of interest:
  - parietal cortex
  - occipital cortex

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Numerical analysis

- method: 2-way repeated ANOVA
- noise of raw estimates of α frequency: center on results following a **neutral-cue**
  - within each of the integration/segragation conditions separately

Other technical details

- Participants: 29 (**normal/corrected-to-normal** vision; age 24$\pm$2.7 years; 11 male, 18 female)

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- Base for numerical analysis: a shift in the **neutral-cue** baseline emerges equally in **ipsilateral** and **contralateral** signals

References I

Sharp, P., Gutteling, T., Melcher, D., & Hickey, C. (2022). Spatial attention tunes temporal processing in early visual cortex by speeding and slowing alpha oscillations. *Journal of Neuroscience*, *42*(41), 7824–7832.

Thank you!