

The influence of physical salience depends on goal-driven attentional guidance

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Research Question

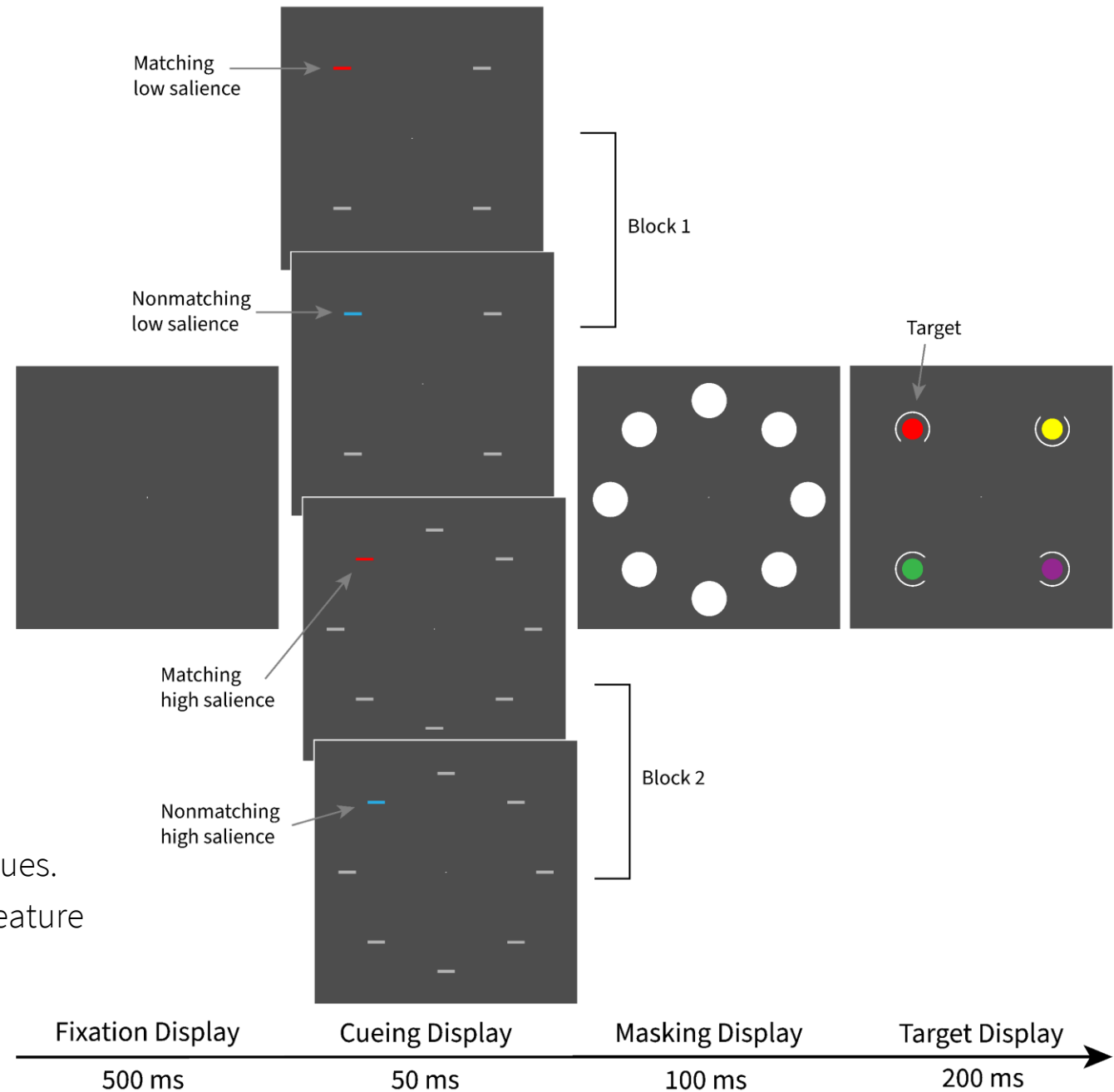
- **Do highly salient stimuli capture attention in a bottom-up way, independent of search goals?**
- *Signal Suppression Hypothesis* (Gaspelin et al., 2015)
 - Task-irrelevant salient stimuli are suppressed.
 - No attentional capture measurable → suppression below baseline performance.
- *Bottom-Up Hypothesis* (Wang & Theeuwes, 2020)
 - Highly salient stimuli cannot be suppressed. They capture attention despite being task-irrelevant.
 - Only stimuli with low salience or nonsalient stimuli can be suppressed.
- *Contingent-Capture Hypothesis* (Folk et al., 1992)
 - Only task-relevant features capture attention. Stimuli with task-irrelevant features do not, even if they are salient.
 - But maybe the usually used task-irrelevant stimuli were not salient enough.

Spatial Cueing Design

- Using cues to measure attentional capture or suppression
 - Cues precede target (valid trials) or nontarget (invalid trial)
 - If reaction times are faster in valid than invalid trials → cue captured attention (if slower → attentional suppression)

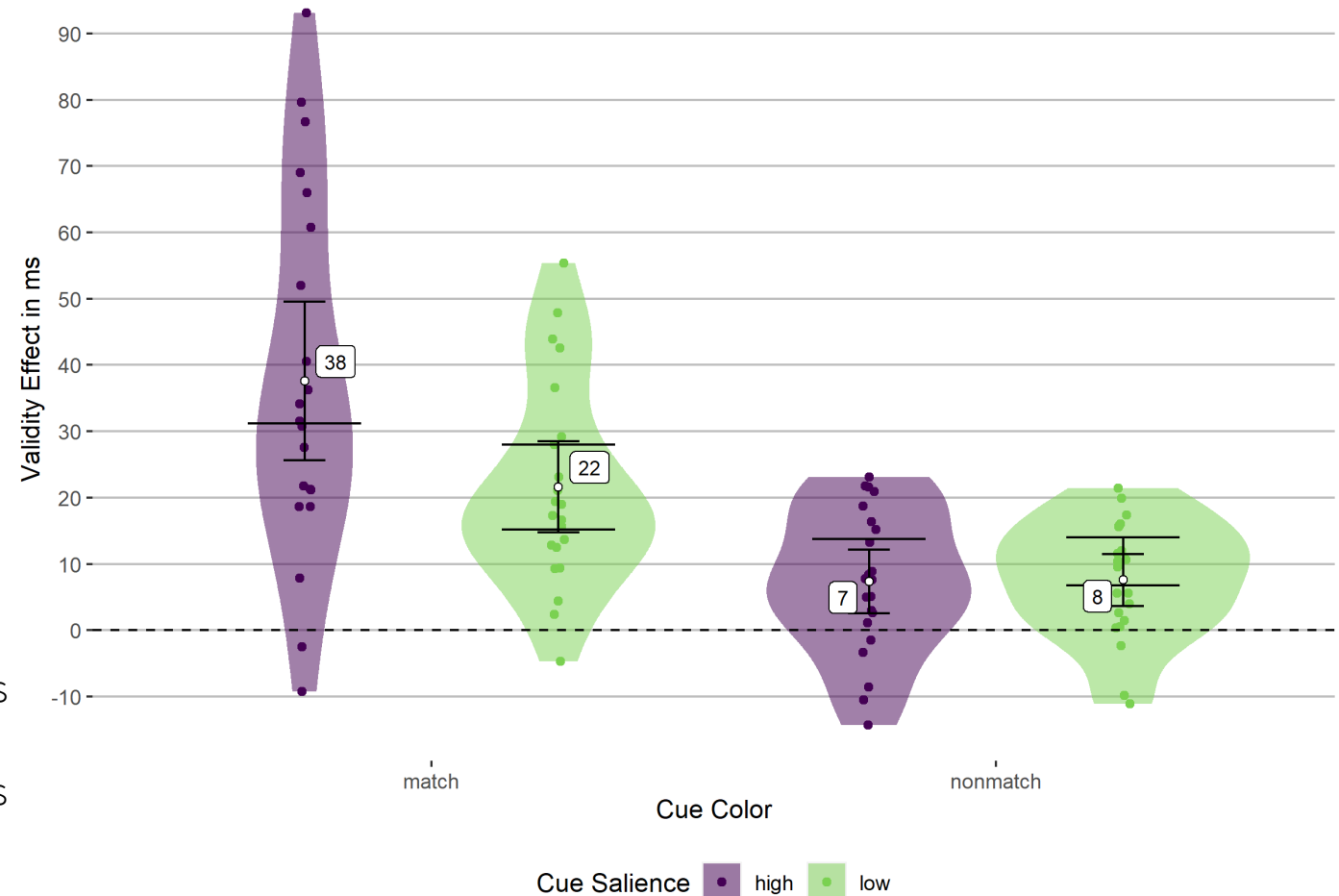
Advantages over the usually used capture-probe design

- Task is the same in each salience condition
 - Increasing set size in a capture-probe design to manipulate salience changes search task
- Multiple cues can be used. In capture-probe designs...
 - ... only task-irrelevant singletons can be used
 - Thus, it is not known how salience affects task-relevant cues.
 - ...the irrelevant singleton is a distractor with a consistent feature
 - Allows distractor-based suppression (Lien et al., 2021)



Results

- Validity effects
 - Mean reaction time in valid compared to invalid trials
 - Matching cue (in target color)
 - Nonmatching cue (in irrelevant color [not in target display])
 - Low and high salience condition (block-wise, random order)
- Substantial validity effects only of matching cues
 - Significant difference between high and low salient cues
- Small (but significant) validity effects of nonmatching cues
 - No influence of salience
 - Shouldn't bottom-up capture be influenced by salience?
 - No evidence for suppression of nonmatching cues.



Narrow error bars: 95% CI of t test against zero.

Wide error bars: 95% comparison interval for difference between conditions. The most extreme values have only one error bar since these values can only be compared to a less extreme value. No overlapping indicates a significant difference.

Discussion

- Neither evidence for capture nor suppression for nonmatching cues.
 - No support for...
 - ...*Signal Suppression Hypothesis*
 - ...*Bottom-Up Hypothesis*
 - **Consistent with *Contingent-Capture Hypothesis*.**
- Saliency influenced how strong matching cues captured attention.
 - Interaction between bottom-up and top-down factors in attentional guidance.
- Attentional capture of salient singletons (Wang & Theeuwes, 2020) was also not replicated by Stilwell and Gaspelin (2021)
 - Probably due to floor effects when reporting probes in high set sizes
 - Stilwell and Gaspelin (2021) found suppression of irrelevant singletons, independent of saliency.
- The irrelevant singleton might have been suppressed since it was consistently a distractor feature in the target display
→ distractor-based suppression (Lien et al., 2021)
- Our nonmatching cue had a color that was never shown in the target display.
 - Might explain, why we did not find any suppression.