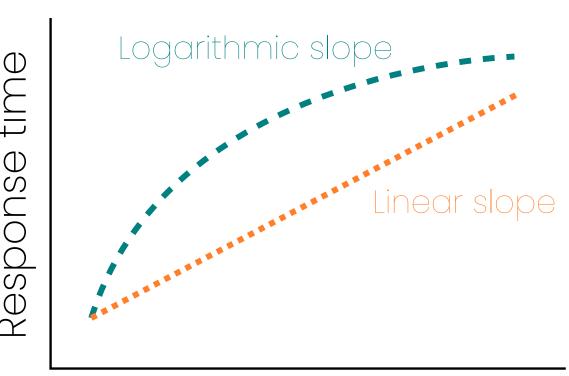
Highly efficient attentional selection of colors despite high target-distractor similarity Angus F. Chapman & Viola S. Störmer

Background

- Visual search efficiency is strongly modulated by the similarity between targets and distractors¹⁻²
- Manipulating the number of distractor items in a search array can increase response times linearly or logarithmically³
- The target contrast signal (TCS) model⁴ predicts that logarithmic search slopes should be proportional to target-distractor similarity

Aim

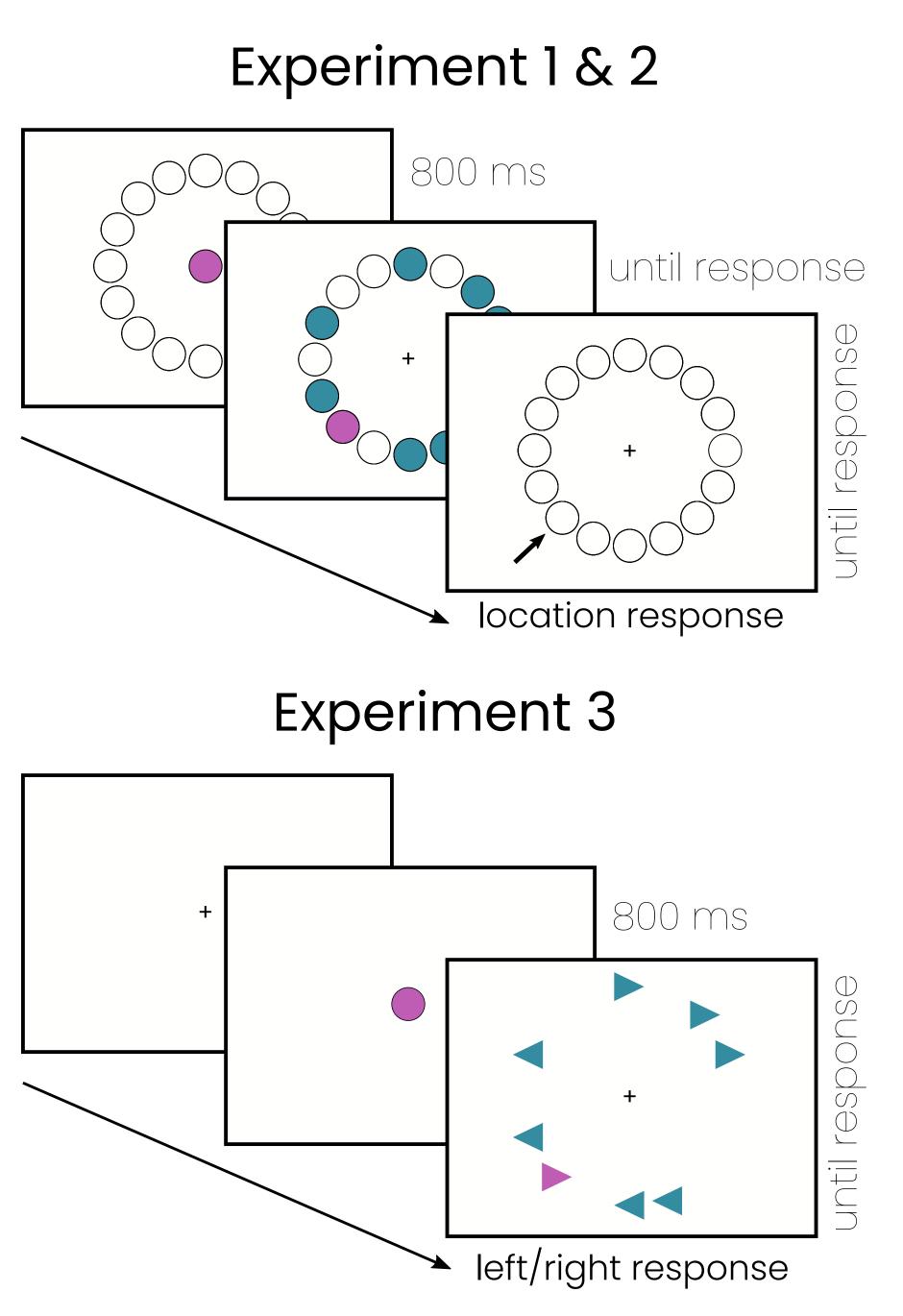
Investigate how color similarity affects the relationship between visual search set size and response time



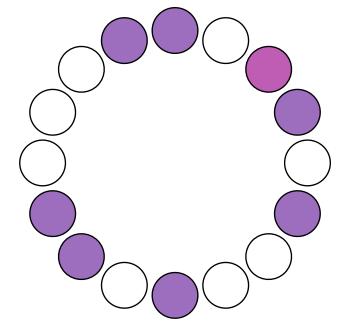
Visual search set size

Task

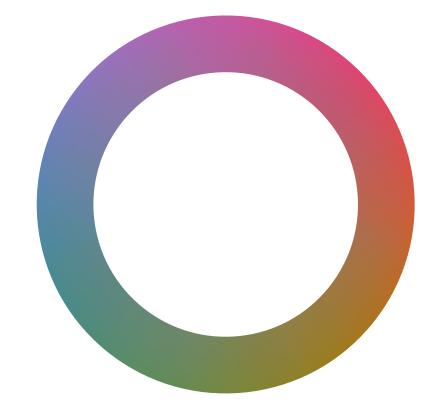
Participants performed an oddball visual search task in which they searched for a target presented in one color among distractors in another color



In each experiment, we manipulated the color similarity between targets and distractors, as well as the number of visual search distractors

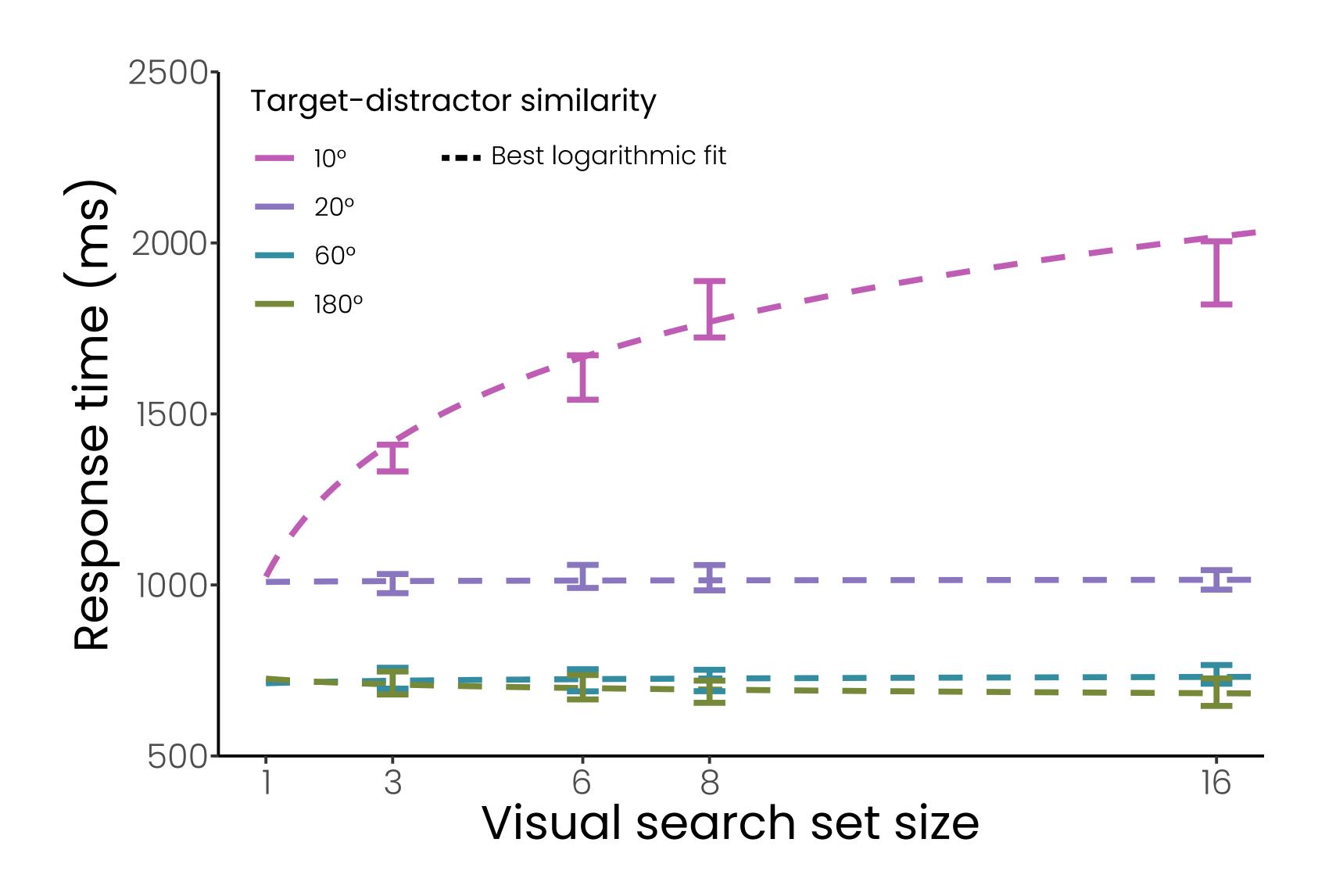


Example display with 20° target-distractor similarity



360° CIELab color space

Experiment 1 (n = 50) How does similarity affect search slope?



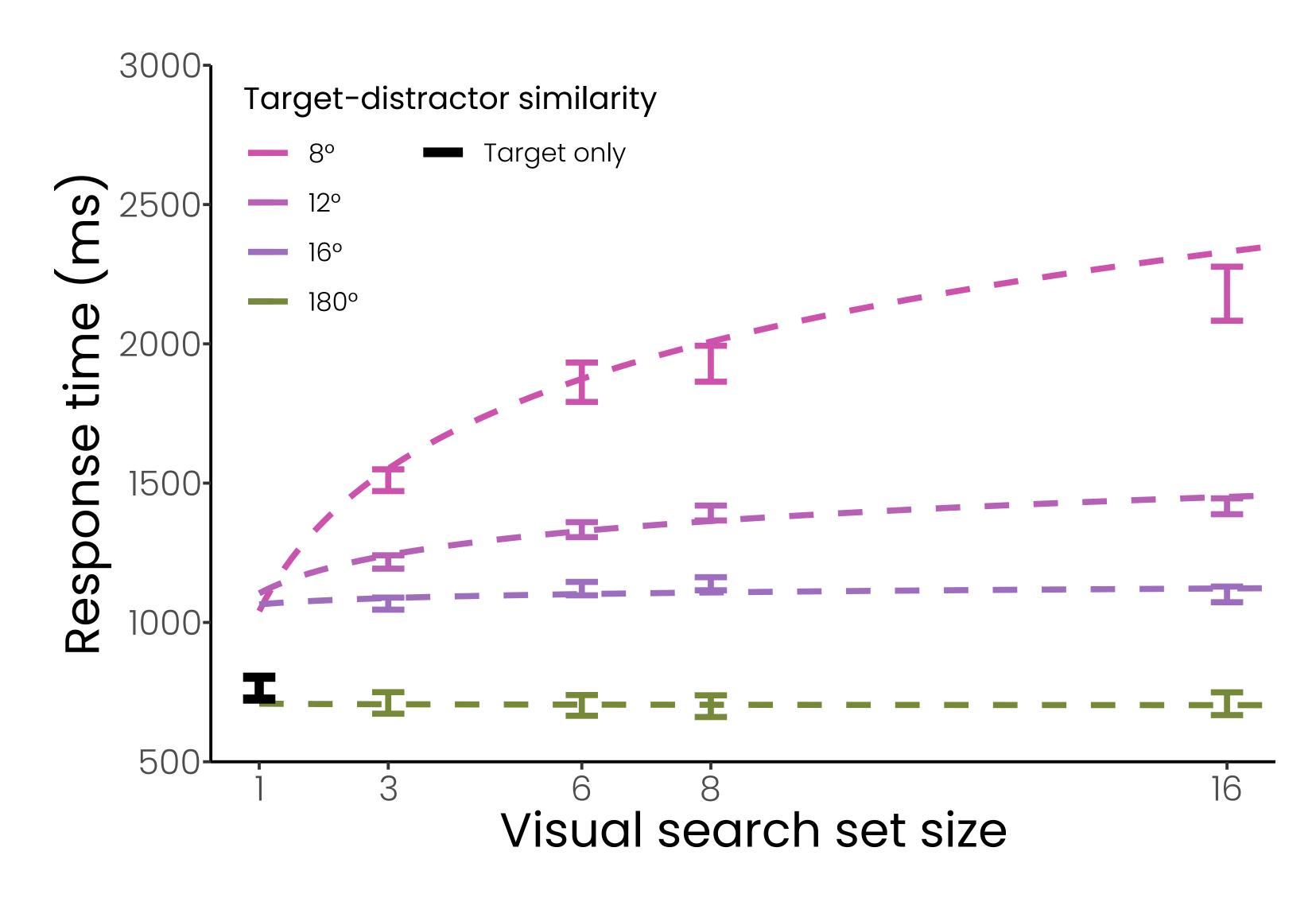
- Increasing the number of distractors only had an impact on search RTs when the target-distractor similarity was 10°
- Overall, a logarithmic model of search slopes was favored over a linear model, $\triangle AIC = -34.7$
- There were differences in the average RT between similarity conditions, which could reflect variations in confidence for oddball detection

Summary

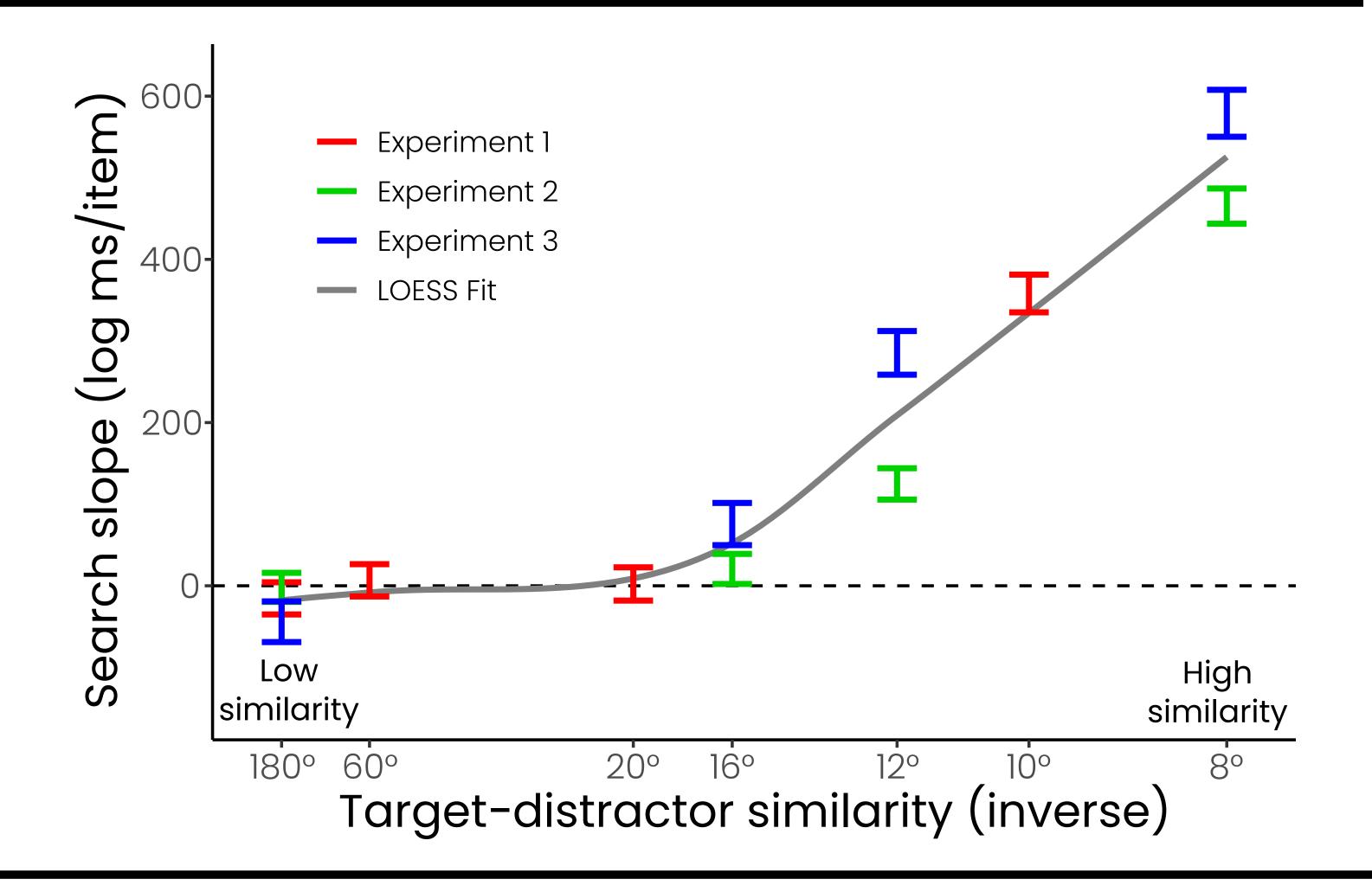
- We found non-significant (zero ms) search slopes for target-distractor similarities greater than ~20°
- Attentional selection is highly efficient even at high color similarities
- In line with the predictions of TCS⁴, we found logarithmic search slopes that increased proportionally to targetdistractor similarity
- Consistent with a mechanism that accumulates signals of the contrast between target and distractor features

Experiment 2 (n = 50)

How do highly similar distractors affect search slope?



- Search RT was significantly modulated by the number of distractors for all target-distractor similarities below 180°
- Logarithmic search slopes were again favored over linear search slopes, $\triangle AIC = -60.5$
- RTs in the target-only condition were comparable to those with 180° similarity, but did not extrapolate well to higher similarity levels, p < .001

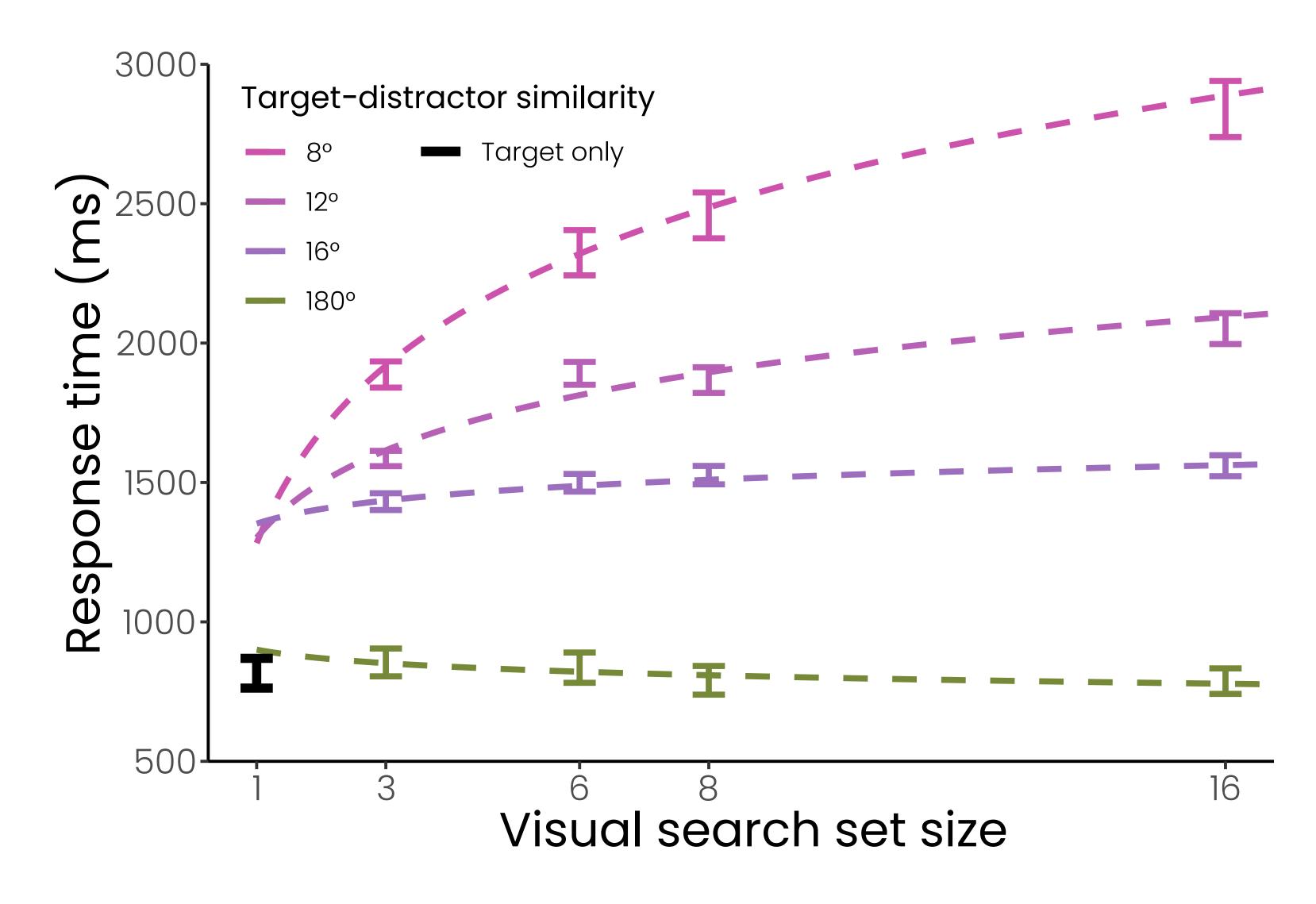






Experiment 3 (n = 50)

How does similarity affect search slope in a discrimination task?



- Overall, the results mirrored those of Experiment 2
- Logarithmic search slopes were again favored over linear search slopes, $\triangle AIC = -58.1$
- The target-only condition did not extrapolate well to high target-distractor similarities, p < .001
- Discrimination in visual search follows a similar RT × set size function as detection

Acknowledgements

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