INHIBITION OF ATTENTION TO IRRELEVANT AREAS OF A SCENE DURING VISUAL SEARCH

Effie J. Pereira, Yu Qing Liu & Monica S. Castelhano
Department of Psychology, Queen's University, Kingston, ON, Canada

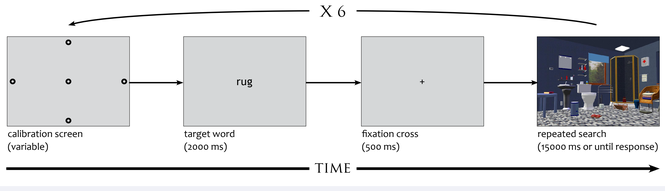
BACKGROUND

- During visual search tasks, attention and eye movements are guided towards target-relevant information (Findlay, 1997; Scialfa & Joffe, 1998).
- Many studies have demonstrated that attentional mechanisms can enhance processing in target-relevant areas; however, research has also shown that mechanisms may also inhibit irrelevant information (Folk, Remington & Johnston, 1992; Leber & Egeth, 2006; Leber, Kawahara & Gabari, 2009; Thompson, Underwood & Crundall, 2007).
- With real-world scenes, contextual information has been shown to facilitate search by cueing important regions; however, whether context also improves search through the inhibition of irrelevant regions is still unclear (Neider & Zelinsky, 2006; Wolfe, Võ, Evans & Greene, 2011).
- In the present study, we investigated whether target-irrelevant regions are inhibited during visual search using a repeated search task.

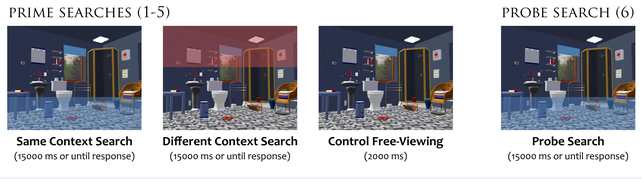
METHODS

- Twenty-five Queen's University undergraduates with normal or corrected-to-normal vision participated in the study.
- Each scene was divided into three contextual regions: upper, middle, and lower (Torralba, Oliva, Castelhano & Henderson, 2006).

- Each trial consisted of 5 prime searches and a final probe search, all within the same scene.



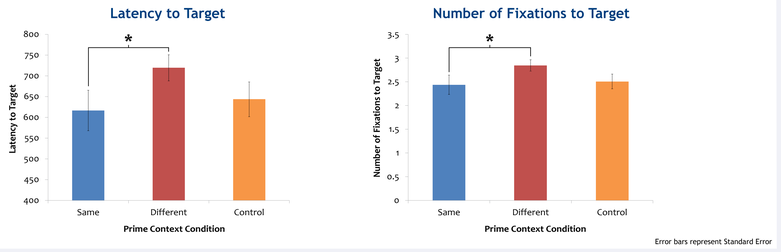
- The 5 prime searches were manipulated across three conditions, relative to the probe search:



RESULTS

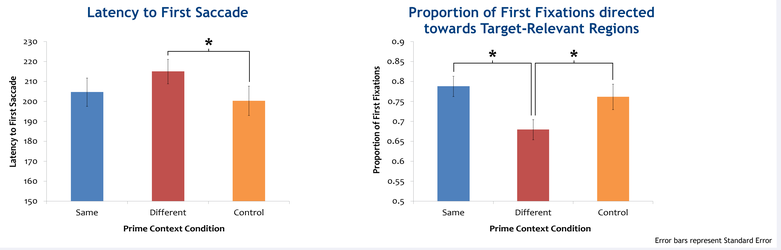
- Across all conditions, accuracy was 90% and reaction time was 1.6 seconds.
- All following analyses were conducted on the final probe search only.

VISUAL SEARCH ANALYSIS



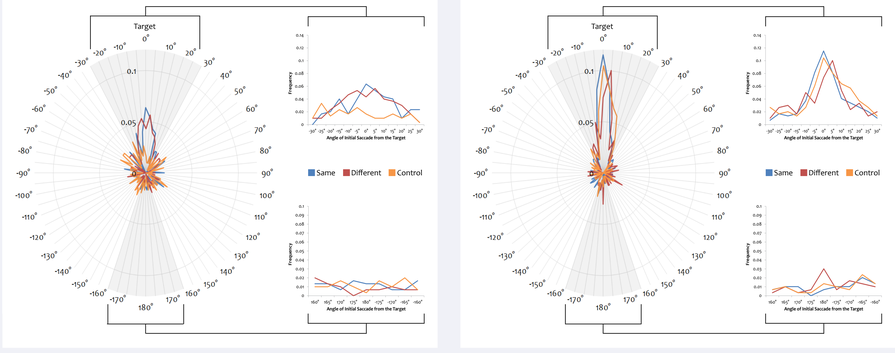
- Overall, search was most efficient when locating targets within the Same contextual region.

INITIAL SACCADE ANALYSIS



- Initial saccades were launched quicker and more effectively when the current target region had not been previously ignored.

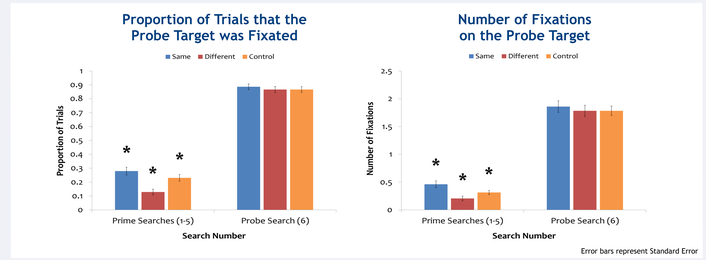
PROPORTION DISTRIBUTION OF ANGLE OF INITIAL SACCADE

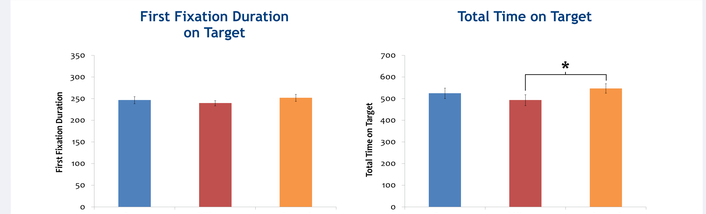


- Initial analyses showed decreased search effectiveness for the Different condition and are consistent with the notion that processing is inhibited in target-irrelevant regions.

IS IT MEMORY?

- Could these findings be driven by incidental memory for the probe target?





- Participants were more likely to fixate on the probe target during the prime searches in the Same and Control condition than in the Different condition, which may have led to differences in incidental memory for that object.
- However, target recognition measures for the probe search did not provide evidence that processing of the probe target was linked to previous exposure.
- The results suggest that our findings were not driven by memory for the probe target (Võ & Wolfe, 2013).

CONCLUSIONS

- Our findings are consistent with the inhibition of contextually-irrelevant target regions during visual search, and further suggests that inhibition is a likely *additional* mechanism by which attention is allocated in scenes.
- The pattern of results imply that scene context can create a *spatial attentional set* based on target-relevant contextual regions, suppressing attentional processing outside of these task-relevant areas.

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