Pop-out in feature search is spatiotopic

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Introduction
With each saccade, the image on the retina shifts abruptly but our perception of the world remains stable. Numerous studies have examined the role of spatial attention in matching pre- to post-saccadic visual information [e.g., 1]. But the processing of feature-based attention across saccades remains unclear.

Experimental design

Task
- Odd-ball search: target is the item with the unique colour in display, the target color is not known in advance.
- Participants (N=6) made a saccade and had to report the location (top or bottom) of the small white bar on the pop-out target. The white bar was only present in the post-saccadic display.

Reaction time advantage

<table>
<thead>
<tr>
<th>Conditions across saccade</th>
<th>Target position:</th>
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</thead>
<tbody>
<tr>
<td>BASELINE POST ONLY</td>
<td>pre- &amp; post-saccadic targets at same spatial location</td>
</tr>
<tr>
<td>PRE&amp;POST</td>
<td>pre-saccadic preview &amp; post-saccadic search displays</td>
</tr>
</tbody>
</table>

\[ \Delta \text{RT} = \text{RT}_{\text{PRE&POST}} - \text{RT}_{\text{POST}} \]

Eccentricity effect

Horizontal component, relative to saccade direction

Mean across all pre-saccadic positions

Mean RT (ms)

Error bars indicate SEM

Experiment 1: SAME color across the saccade

Pre- and post-saccadic search displays have the same target and distractor color assignments

Experiment 2: OPPOSITE color across the saccade

Pre- and post-sac search displays have opposite target and distractor color assignments

Conclusion
The pre-saccadic target preview speeded the reaction time most at the spatiotopic location when the pre- and post-saccadic target color was the same across the saccade.

The pre-saccadic target preview impaired the post-saccadic feature-search when the target and distractor colors were switched across the saccade, but did so least at the spatiotopic location.

→ The pre-saccadic search preview provides preliminary information on both color and location target.

→ The transsaccadic attention effect is localized to the spatial target position: spatiotopic as opposed to retinotopic.

→ However, it is also specific to the original target and distractor colors and is not solely a localized processing benefit.

References

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