Object-Based Attention is Oriented More Efficiently Along the Horizontal Meridian than the Vertical Meridian

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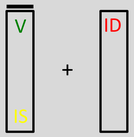
Introduction

• Object-based attention (OBA) leads to preferential processing of visual information contained within the boundaries of an attended object

• Previous studies using the double-rectangle cueing paradigm[1] have found:

  • Valid (V) RT < Invalid-same (IS) RT (space-based attention effect)

  • Invalid-same (IS) RT < Invalid-different (ID) RT (OBA effect)

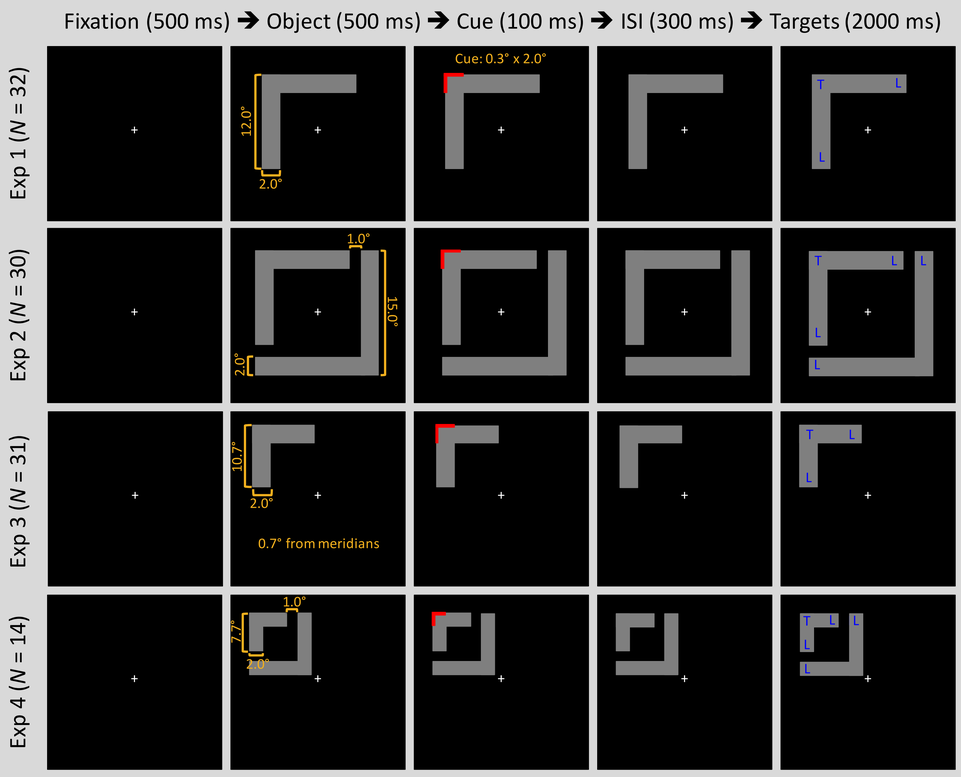


• OBA exhibits object-specific attentional prioritization strategy[2]: selection of cued location and prioritization of attention to "high probability" locations in attended object over "low probability" locations in unattended objects

• Recent work shows greater OBA effects for horizontal vs. vertical rectangles[3]; difference eliminated when controlling for attention shifts across meridians[4]

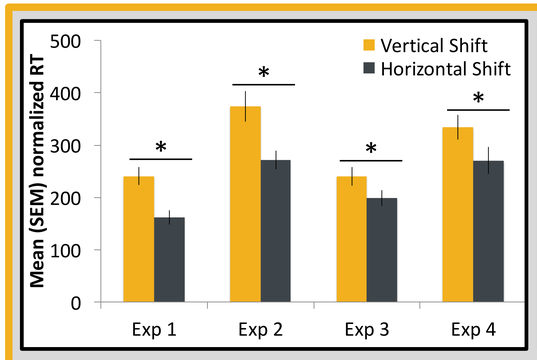
• Here, we examine shifts of OBA as a function of crossing the horizontal and vertical visual field meridians

Method

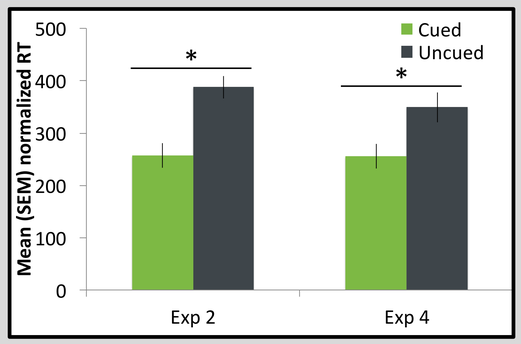


960 trials • 60% valid trials • 20% invalid trails • 20% catch trials Note: objects and targets not drawn to scale

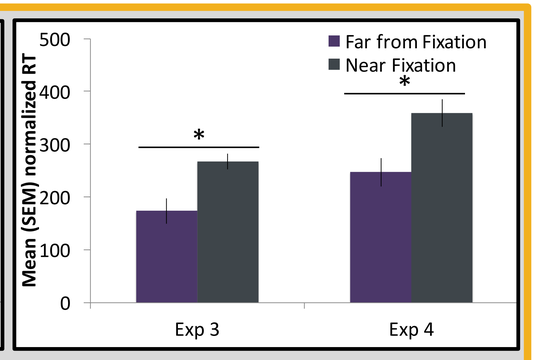
Results



Attentional Shift main effect: *ps* < .001



Object Type main effect: *ps* < .001



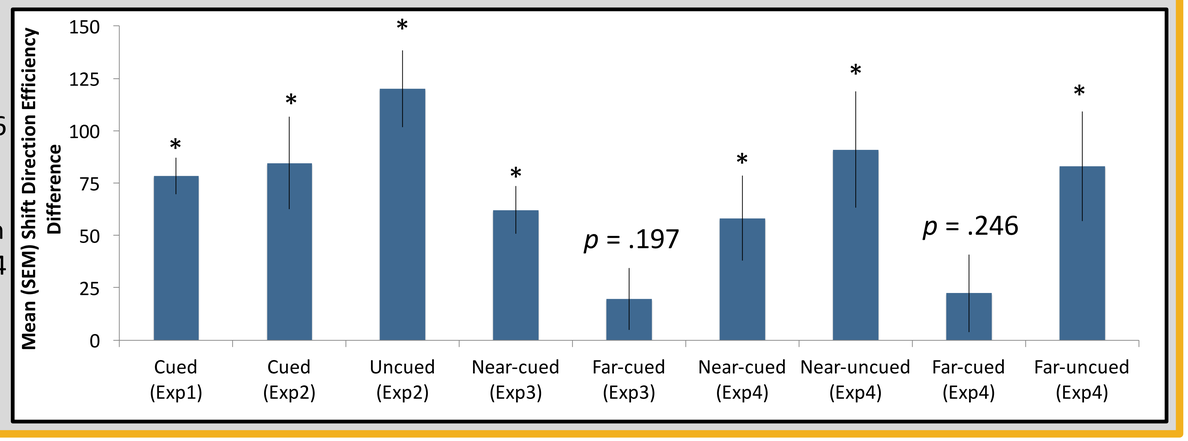
Object Location main effect: *ps* < .001

	Cued (Exp1)	Cued (Exp2)	Uncued (Exp2)	Near-cued (Exp3)	Far-cued (Exp3)	Near-cued (Exp4)	Near-uncued (Exp4)	Far-cued (Exp4)	Far-uncued (Exp4)
Invalid Vertical - Valid	240.75	299.38	448.02	297.52	183.38	335.91	455.47	216.22	330.28
Invalid Horizontal - Valid	162.35	214.89	328.02	235.46	163.82	277.69	364.47	193.90	247.19
Difference	78.40	84.49	120.00	62.06	19.56	58.22	91.00	22.32	83.09

<u>Experiment 2</u>
Attention Shift x Object Type
$F(1,29) = 5.70$, $p = .024$, $\eta_p^2 = .16$

<u>Experiment 3</u>
Attention Shift x Object Location
$F(1,30) = 4.77$, $p = .037$, $\eta_p^2 = .14$

<u>Experiment 4</u>
All interactions: $ps \geq .081$



Discussion

• When crossing screen meridians: horizontal shifts < vertical shifts

• When not crossing screen meridians: horizontal shifts < vertical shifts (cued near fixation, shifting away from screen meridians)

• When not crossing screen meridians: horizontal shifts = vertical shifts (cued far from fixation, shifting toward screen meridians)

Pattern of performance supports Horizontal-Vertical Anisotropy[5] (performance is better horizontally than vertically)

These findings necessitate updating OBA theories to include effects of meridian crossings and object/target location within the visual field

References

1. Egly, Rafal, & Driver. (1994). *JEP: General*
2. Shomstein & Yantis. (2002). *Perception & Psychophysics*
3. Pilz et al. (2012). *PLoS One*
4. Greenberg et al. (2014). *Journal of Vision*
5. Carrasco, Talgar, & Cameron. (2001). *Spatial Vision*

Acknowledgements

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