

A REVERSAL OF THE SAME-OBJECT BENEFIT IN VISUAL ATTENTION

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Introduction

Divided visual attention often shows a **same-object benefit**: Processing of visual features is enhanced when these are located on the same object – compared to different objects.

This suggests that attention can be object-based.

However, questions remain as to the nature of this effect:

(1) The role of spatial location in object-based selection is unclear:

- divided attention to features in bilateral hemifield is better than to features within the same hemifield [1]
- measures of the same-object benefit may not control the location of target features in the visual field [2]

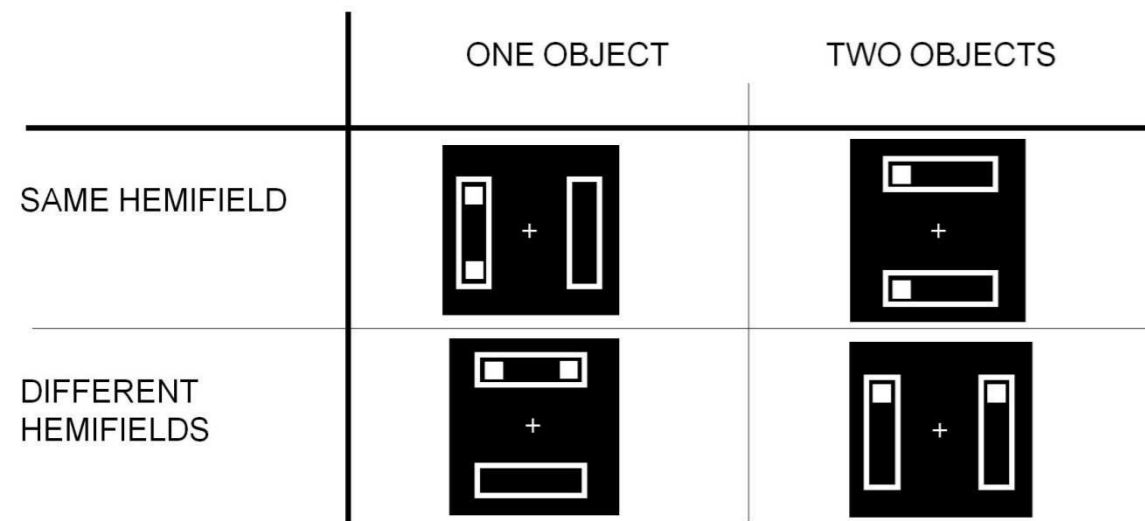


Figure 1. Object-location and hemifield location conditions used in Experiments 1-5. Same-object effects were calculated by comparing responses to features in identical locations.

(2) Some studies find no same-object benefit or even the opposite effect: a **same-object cost** [3-4]. This suggests that same-object features sometimes compete for selection.

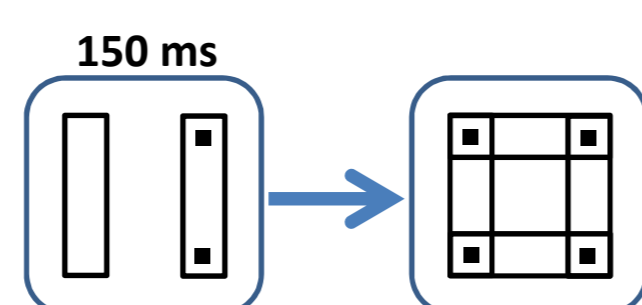
Aims

- Does visual field location of target features influence the same-object benefit? Compare unilateral and bilateral hemifield presentations (Experiments 1-2)
 - If location does not affect selection then unilateral and bilateral features should enjoy a same-object benefit.
- Does previewing objects facilitate selection of same-object features? Experiments 3-5
 - If yes, then correct object previews should produce same-object benefits but incorrect previews may reduce the benefit
- Across experiments, spatial location of target features was identical for same- and different objects (Fig. 1)

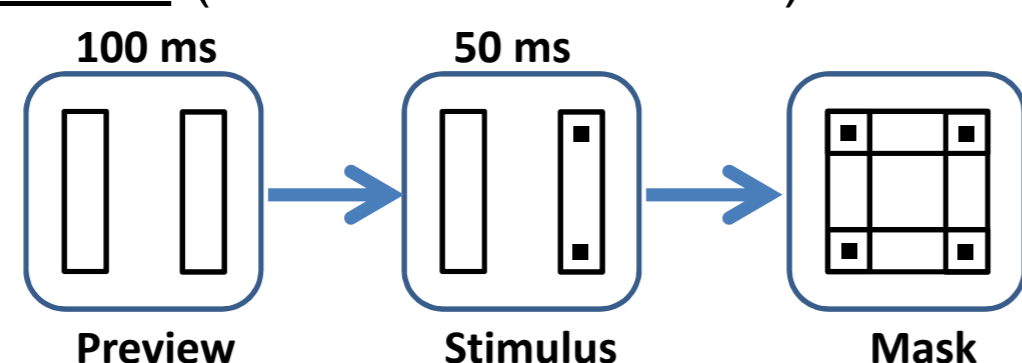
Overview of experiments

Divided attention tasks: responding to 2 features presented on the same or different objects

Experiments 1-2: Enumerating (Exp 1) target features ("1 or 2?"), or localising on the object (Exp 2; "same or different object?")

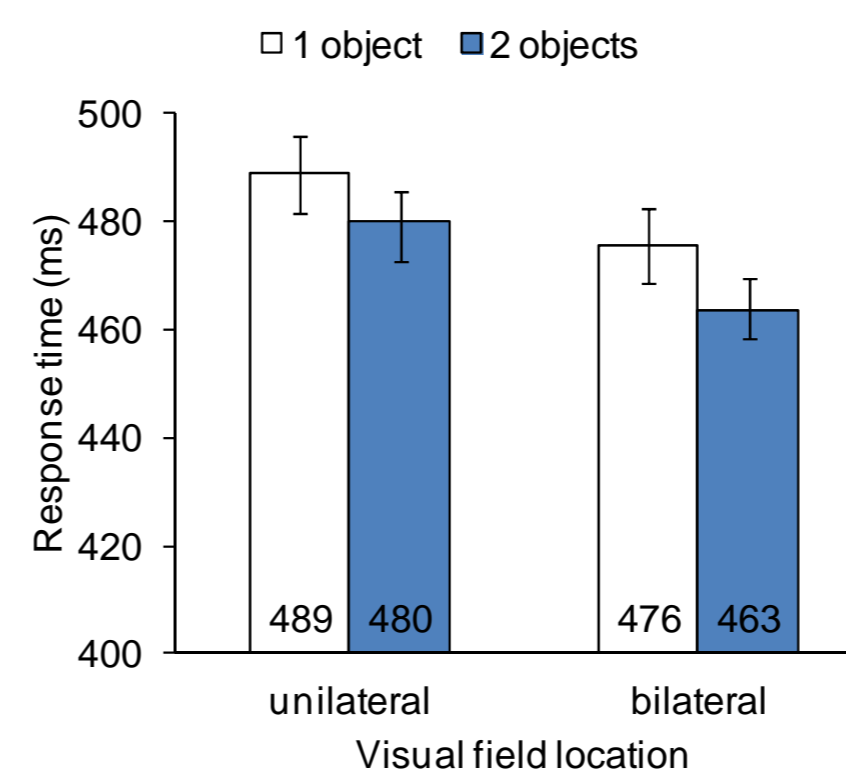


Experiments 3-5: Testing the effect of object previews: No preview (Exp 3); a correctly oriented object preview (Exp 4), or a randomly oriented (vertical or horizontal) preview (Exp 5)



Results

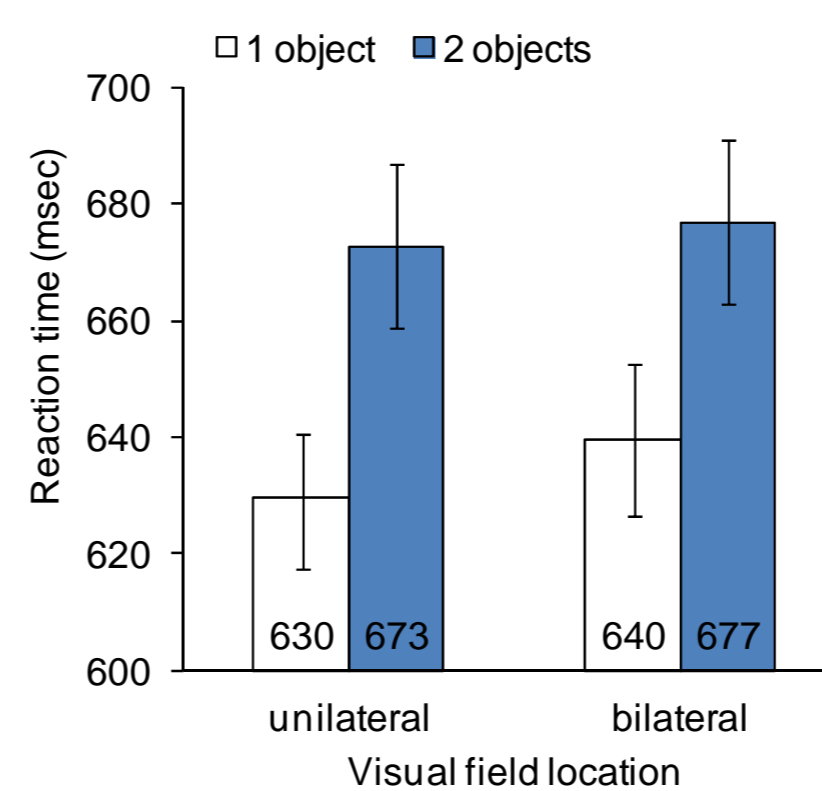
Experiment 1: counting



Response times ($M \pm 95\% CI$)

Faster responses to features located on 2 objects than on 1 object ($p < .014$): a reversal of the same-object benefit. Also, a bilateral field advantage ($p < .004$). No interaction between object location and visual field ($F < 1$)

Experiment 2: Localising

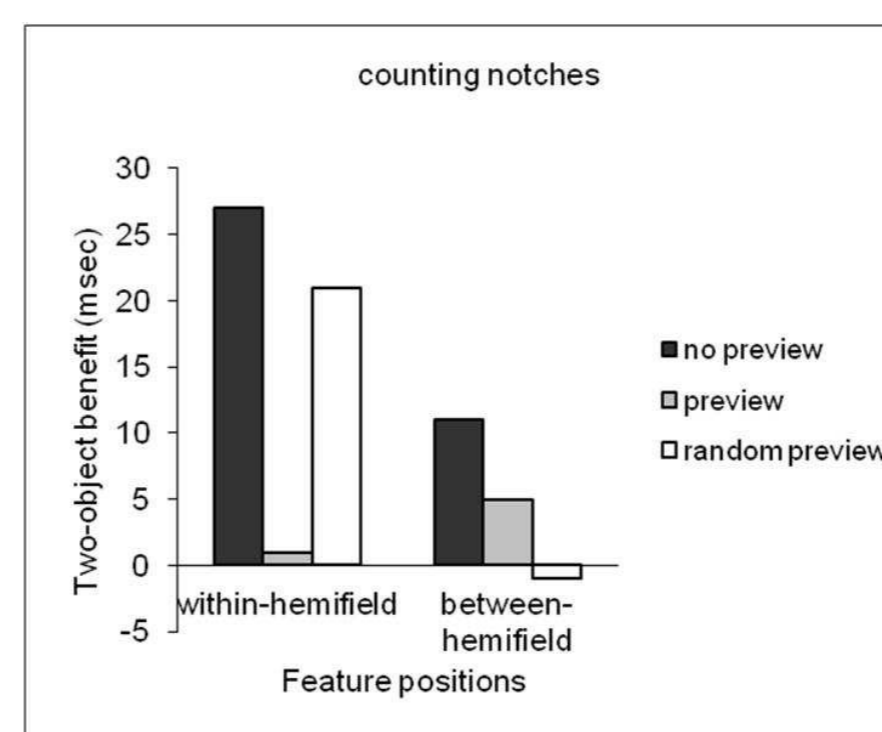
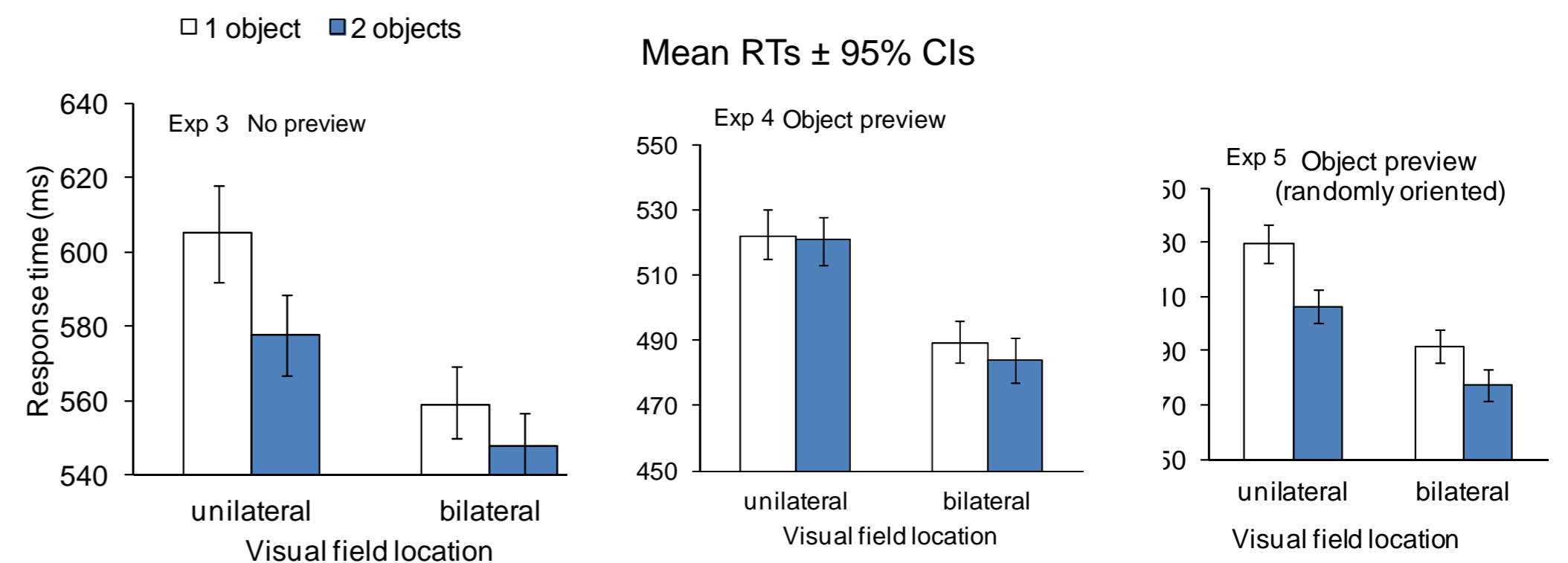


Same-object benefit: faster "same-object" than "different-object responses" ($p < .008$)

No effect of visual field ($p > .06$) or interaction ($F < 1$)

Experiment 2 provides an explicit test of object-based selection, and demonstrates clearly object-based selection

Experiments 3-5: Effects of object previews



Previewing the objects reduced the different-object benefit (Exp. 4-5), but most particularly when the previewed objects had the same orientation as the stimulus objects (Exp. 4).

A bilateral field advantage was found throughout Experiments 3-5

No interaction between field and object location, though a marginal interaction in Exp. 3 ($p = .09$)

Conclusions

- The reversal of the same-object benefit suggests that within-object competition between features can sometimes be stronger than between-object competition.
- This reversal was stronger for unilateral than bilateral features, suggesting its nature is partly spatial. The weaker competition in bilateral presentations could be due to the operation of independent selection mechanisms in the hemispheres [1]
- Object previews reduce the different-object benefit, suggesting that segmentation of objects facilitates object-based attention and overcomes competition between same-object features.
- Whether same-object features cooperate or compete for selection appears to be dependent on spatial and nonspatial factors.