Visual-field asymmetry in the top-down control of attention

Feng Du and Richard A. Abrams
Washington University

Introduction

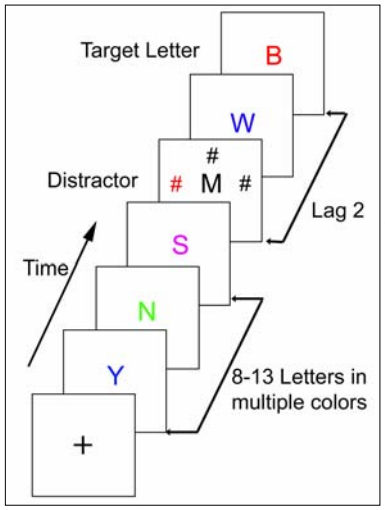
Perceptual asymmetries, well established by many behavioral studies such as dichotic listening, line bisection, and various free-viewing tasks, presumably reveal the hemispheric lateralization of brain function. For example, neurologically healthy adults tend to bisect lines slightly to the left of their physical center (McCourt & Garlinghouse, 2000; McCourt & Jewell, 1999). In addition, participants tend to choose the stimulus whose salient feature is on the left-hand side more than the stimulus with a salient feature on the right-hand side (Luh, Redl, & Levy, 1994; Nicholls, Bradshaw, & Mattingley, 1999, 2001). These perceptual asymmetries reveal a leftward bias of spatial attention, however no such bias has yet been reported for tasks involving contingent attentional capture.

The current study tested the spatial distribution of contingent capture and onset capture over the left and right hemi-fields using spatial blink and visual search tasks.

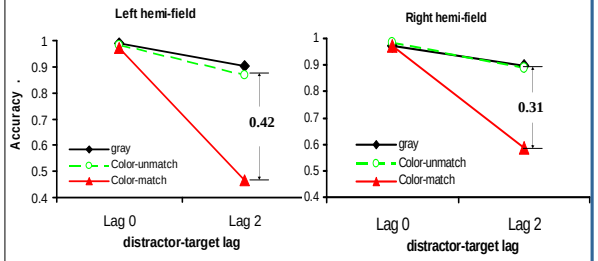
Experiment 1

Methods

Subjects were required to identify the centrally-presented letter that was in the specified target color. One critical frame on each trial contained a peripheral distracter (#) that sometimes included a color singleton that either matched or did not match the target color. The color-matched # appeared either in the left or the right hemi-field.

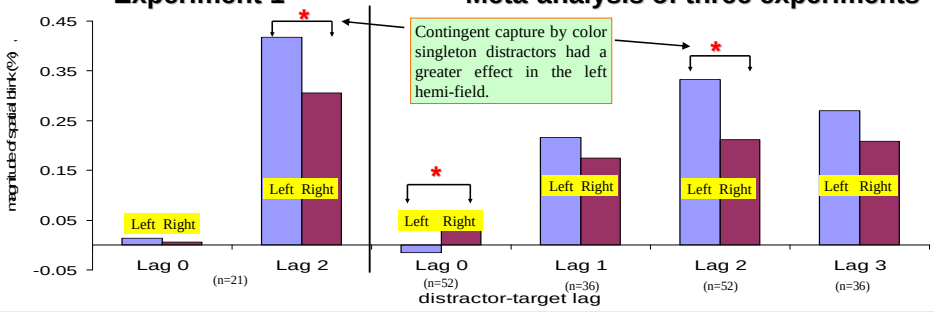


Results



Only ***color-matched distractors*** produced a spatial blink, with a larger spatial blink observed when the ***color-matched distractors*** appeared in the ***left hemi-field*** compared to ***the right hemi-field***, [$F(2,40) = 6.21$, $p < .005$].

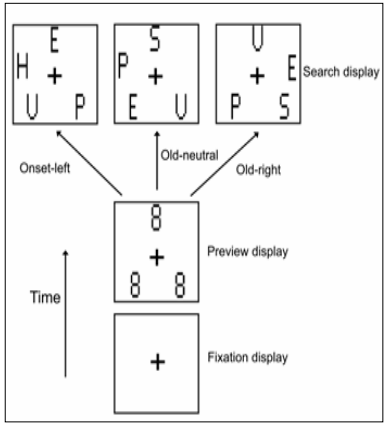
Experiment 1 / Meta-analysis of three experiments



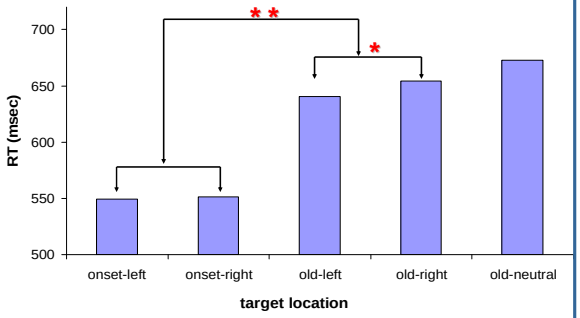
Contingent capture by color singleton distractors had a greater effect in the left hemi-field.

Experiment 2

Methods



Results



RT to onset targets was faster than that to non-onset targets, [$t(35) = 14.99$, $p < .001$]. Subjects made faster responses to existing ("old") items in the left hemi-field than those in the right hemi-field [$t(35) = 2.13$, $p < .05$]. But RT to onset targets was symmetric across the two hemi-fields.

Conclusion

Experiment 1 and the meta-analysis of three previous experiments showed that the color-matched distractors in the left hemi-field captured attention more strongly and produced a much larger impact on the identification of the central target than did the same distractors in the right hemi-field. Experiment 2 showed that onset capture is symmetric across the two hemi-fields.

Reprint available at http://rabrams.net