Distractor Suppression in Visual Search
Alex Muhl-Richardson, Sergio Andrés Recio & Greg Davis
Department of Psychology, University of Cambridge

Contact: am2662@cam.ac.uk

Background
• Target templates specify visual features that guide attention towards targets during search; distractor templates are similar but facilitate the suppression and rejection of distractors.
• Distractor suppression can be reactive (search and destroy [SaD]; Moher & Egeth, 2010) or proactive (templates for rejection; Daffron & Davis, 2015; Geng, 2014).
• Previous studies have not examined the function of distractor templates in isolation (ensuring that a target template cannot be extrapolated).

Method

Method (continued)

Exp. Instruction Pre-cue Set size N
1 Ignore - 2 16
2 SaD - 2 16
3 Find - 2 16
4 Ignore Distractor congruent 2 16
5 SaD Distractor congruent 2 16
6 Ignore/SaD* Distractor congruent/incongruent (blocked)* 2 16
7 Ignore/SaD† Distractor congruent 2/4* 32
8 Ignore No [SOA/fixation cross during interval]* 2 16
9 Ignore Distractor congruent/incongruent (interleaved)* 2 16
10 Ignore Simple colour 2 16

Note: * = manipulated within-subjects, † = manipulated between-subjects

Results (continued)
• In exps. 1 and 2 a greater proportion of first fixations were to distractors, F(1,15) = 4.65, ps < .048, np2 > .24; in exp. 3 a greater proportion of first fixations were to targets, F(1,15) = 33.93, p < .001, np2 = .69.
• In exp. 4 a greater proportion of first fixations were to targets, F(1,15) = 12.60, p < .001, np2 = .56; in exp. 5 there was no effect F(1,15) = .37, p = .550.
• In exp. 6 there was a significant interaction of instruction and first fixation location, F(1,15) = 4.99, p = .041, np2 = .25; in exp. 7 the same interaction was present, F(1,15) = 18.12, p < .001, np2 = .38.
• In exp. 8 there was interaction between SOA and first fixation location, F(1,15) = 1.41, p = .253, but the presence of the fixation cross during the interval did interact with first fixation location, F(1,15) = 10.03, p = .006, np2 = .41.
• In exp. 9 a greater proportion of first fixations were to targets, F(1,15) = 6.11, p = .026, np2 = .29; in exp. 10 there was no effect, F(1,15) = 1.11, p = .285.

Discussion
• We examined visual search in the absence of any kind of target template.
• The location of the first fixation participants made after the onset of the search array was used as an indicator of their distractor suppression strategy.
• Participants initially failed to show reliable early guidance to targets or distractors. However, when instructions to ignore were combined with a pre-cue of any photographic stimulus, there was a reliable tendency to first fixate targets.
• This pattern of first fixations is consistent with a proactive, template for rejection, approach to distractor suppression when searching without a target template.
• We speculate that the pre-cue may generate a shift in attentional weighting that facilitates proactive suppression of distractors.
• This work has implications for applied search tasks and we are currently running a series of experiments examining distractor suppression in X-ray baggage search.

References