



Things Fall Apart: The Transience of Binding in Visual Search

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Introduction

Object recognition in visual search can be thought of as a 3 step process:

- Step 1) Candidate 'object' selected by attention
- Step 2) Attributes of the 'object' are bound into recognizable item
- Step 3) Bound item is linked to representation in memory

But what happens when attention is redeployed to a new object?

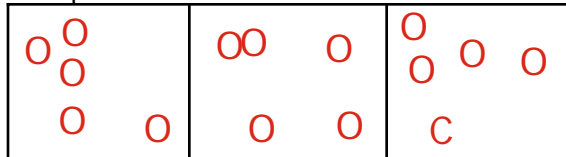
Our previous research suggests links to memory (Step 3) are broken when attention is re-deployed to a new object, allowing only one object to be recognized at a time. (Wolfe, Klempe & Dahlen 2000; JEP:HPP 26,2 693-716).

So now we have shifted the focus to binding (Step 2). Does binding persist after attention is redeployed?

General Method:

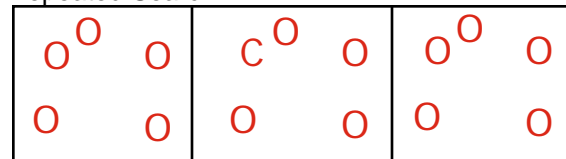
UNREPEATED VS. REPEATED SEARCH

Unrepeated Search



All items randomly repositioned on each trial.

Repeated Search



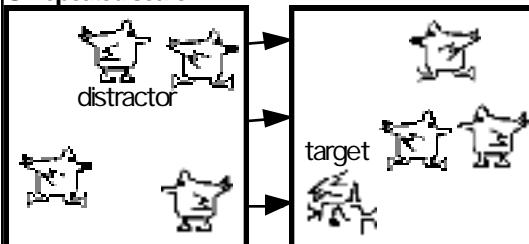
Items remain in same location through block of a fixed set size. Display is jittered a few pixels to left or right after each trial to mask introduction of target.

General Question: Is there a benefit in search performance from prolonged exposure to an unchanging display (Post-attentive benefit?)

Experiment One:

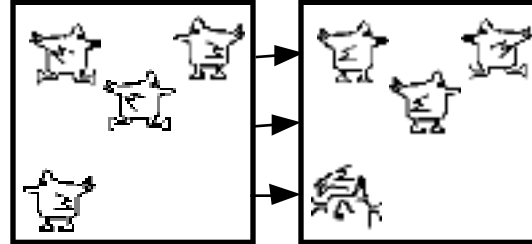
SEARCH FOR THE ROADKILL stimulus size 3° x 3° ; display field 29° x 30°

Unrepeated search



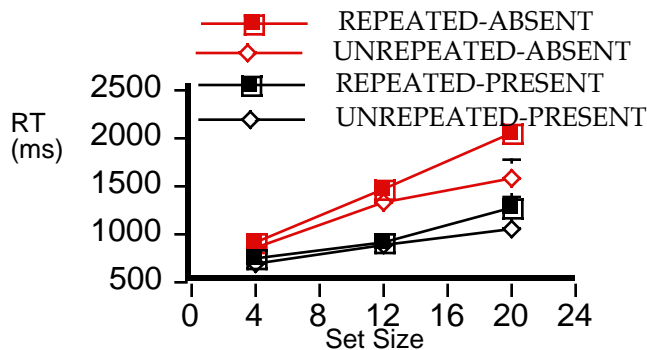
New chickens are presented in random positions on each trial with 400ms blank screen between trials

Repeated Search



Items remain in same location for set size block. Chickens moved their feet at start of trial to mask transients produced by introduction of target

Results & Discussion



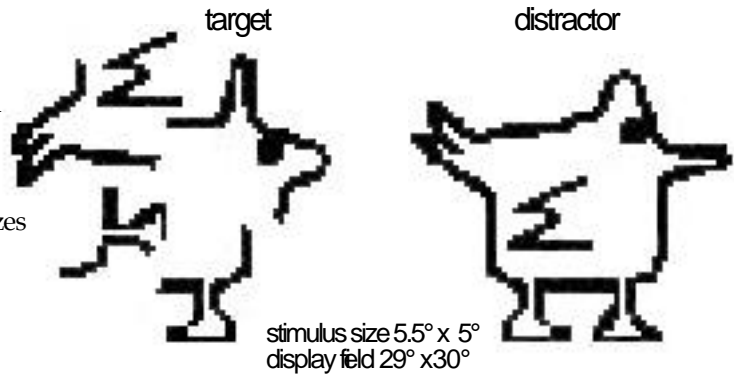
Question: Do Ss perform faster and/or more efficient searches for a target when it represents the "unbinding"/destruction of existing objects versus just appearing at the start of a trial?

Answer: NO! There was **no significant difference** between the Repeated and **Unrepeated** search conditions

Fig One. Target present & absent mean RT x set size data. Set sizes: 4,12,20. 80 trials/condition/set size.

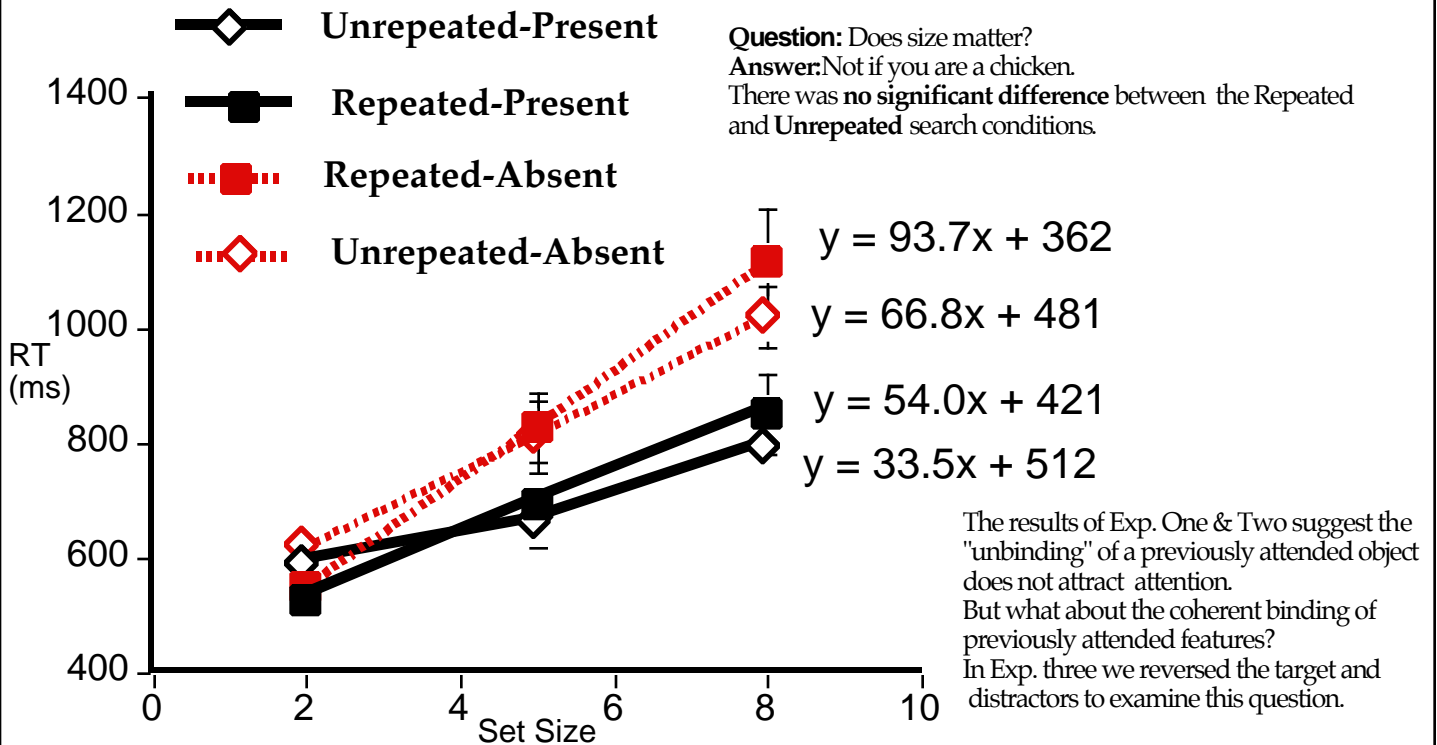
Experiment Two: BIGGER CHICKENS

It could be argued the stimuli in Exp. One were too small for Ss to distinguish without having to fixate. Though the slopes in Exp. One do not suggest the task required fixation, we replicated Exp. One with two minor changes: 1) larger stimuli and 2) smaller set sizes (2,5,8)



Results & Discussion

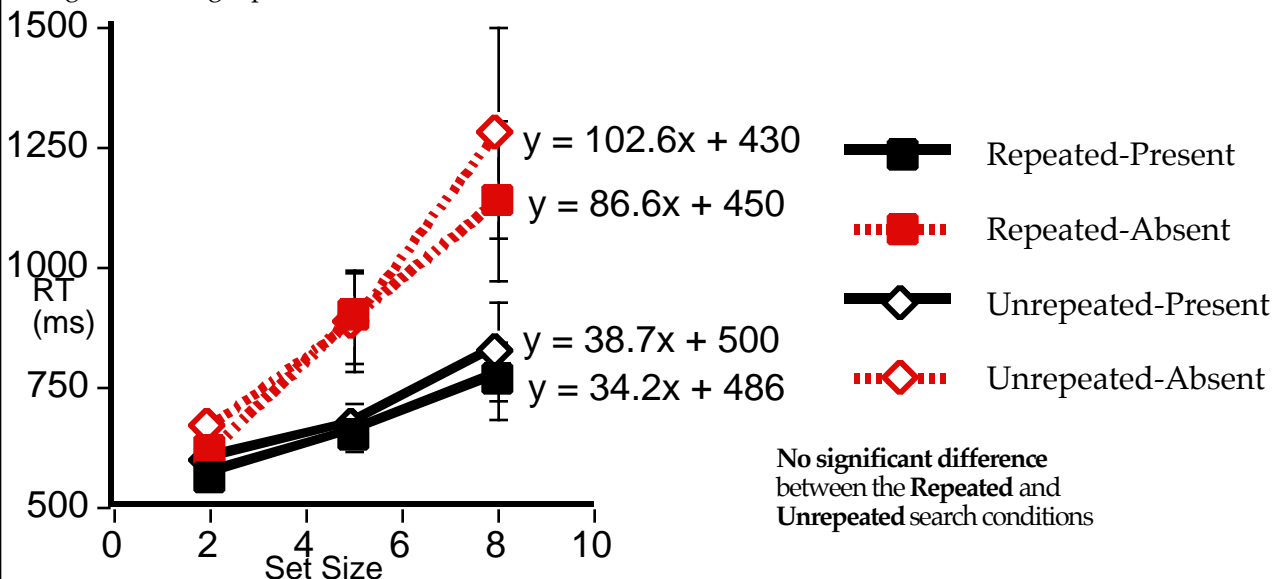
Fig Two. Target present and absent mean RT x set size data (n=8). Set sizes: 2,5,8. 80 trials/condition/set size .



Experiment Three: SEARCH FOR THE CHICKEN

We replicated experiment two, but reversed the target and distractors.

Fig Three. Target present and absent mean RT x set size data (n=8). Set sizes: 2,5,8. 100 trials/condition/set size .



Experiment Four: SEARCH FOR THE SCRAMBLED OBJECT

To ensure our previous results were not due to the idiosyncratic behavior of game fowl, we extended our Repeated search paradigm to real-world objects.

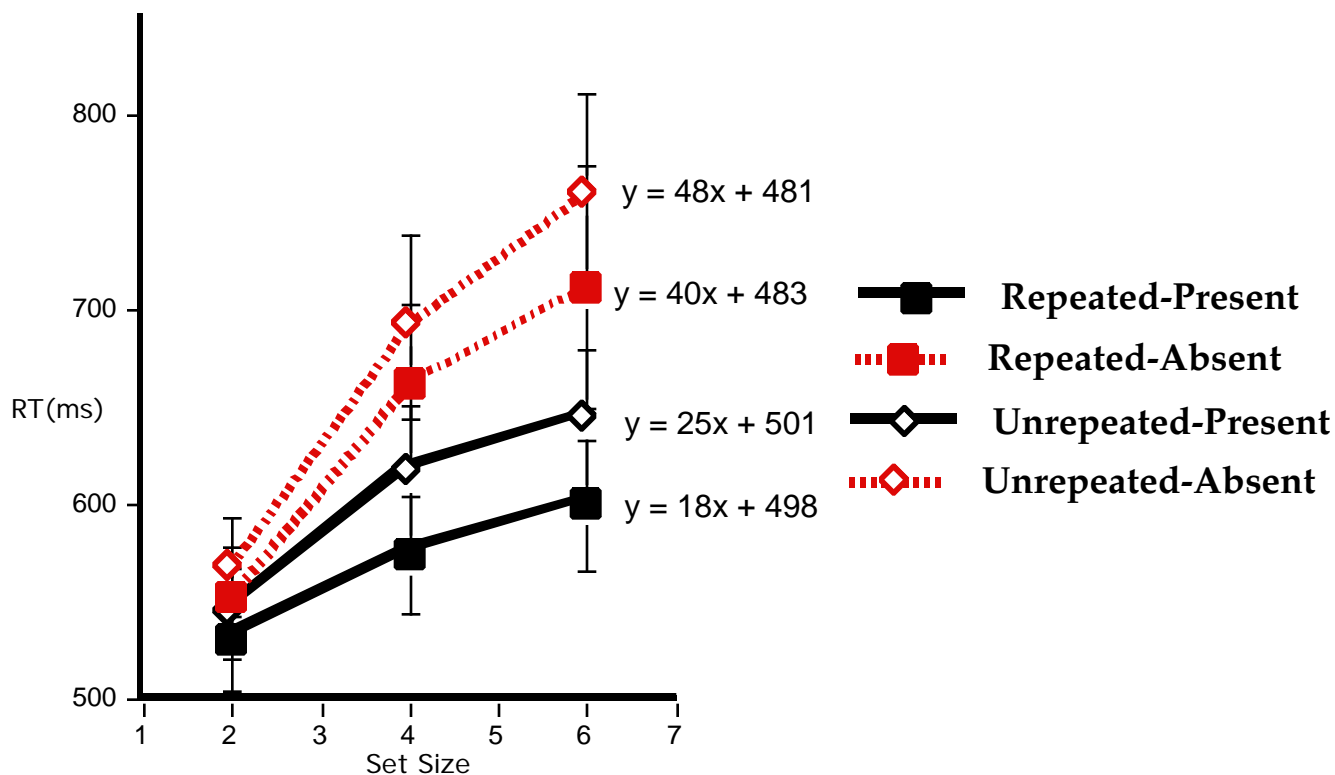
Is a scrambled object present?



Repeated search condition shown above. Target present trial on right (target = scrambled fruit bowl). In the **Unrepeated** condition all objects re-positioned randomly on each trial. Subjects were given chance to become familiar with 'scrambled' version of all objects before experiment began.

Results & Discussion:

Fig 5. Target present & target absent mean RT x set size data (n= 14). Set size: 2,4,6. 288 trials/condition/set size.



Once again, we find **no significant difference** between the **Repeated** and **Unrepeated** search conditions.

Experiment Five: REPEATED SEARCH IN SCENES

To investigate whether a 'real world' context would effect repeated search performance, we replicated Experiment Five with the addition of a background scene.

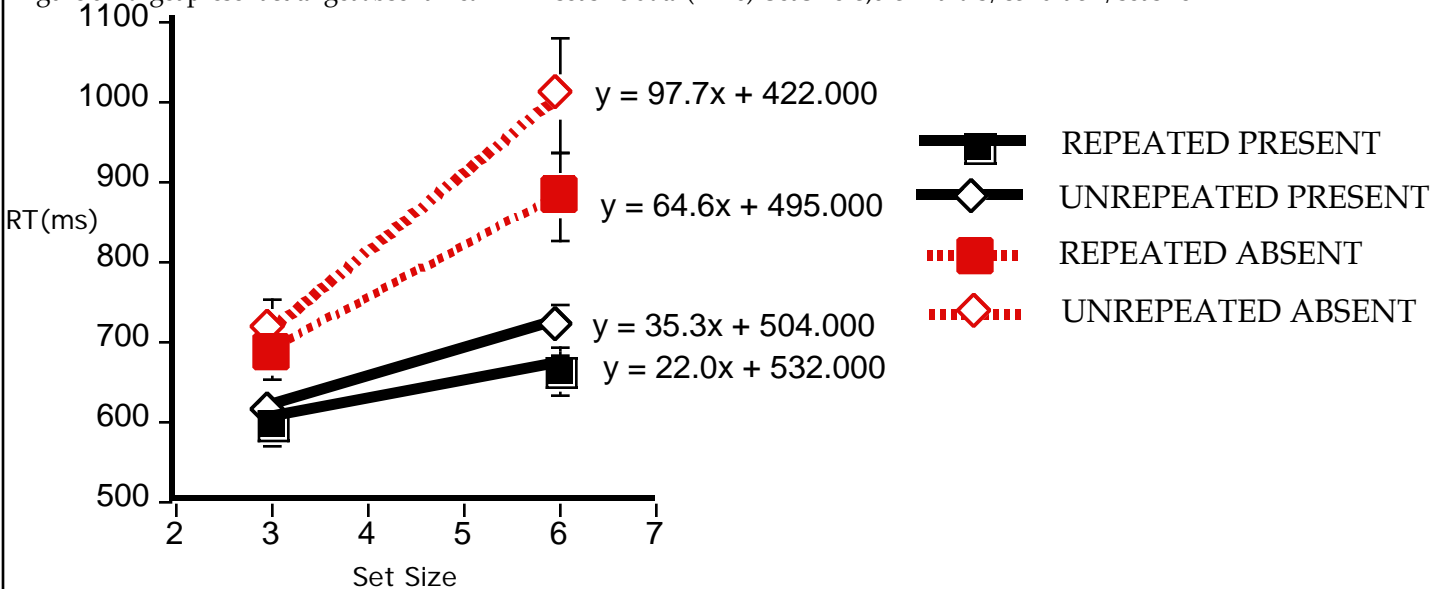
Is a scrambled object present?



Repeated search condition shown above. Target absent on left frame, target present on right (target = scrambled parrot). In **unrepeated** search all items repositioned randomly on each trial. Subjects were give chance to become familiar with 'scrambled' version of all objects before experiment began.

Results & Discussion

Figure 6: Target present & target absent mean RT x set size data (n=16). Set Size: 3,6. 312 trials/condition/set size



The addition of a background scenes / real world context did not effect the general pattern of results. There was **no significant difference** between the **Repeated** and **Unrepeated** search conditions

Conclusions:

The destruction of previously attended objects in unchanging displays **does not attract attention**.

We found **no evidence of a Post-attentive benefit** in search (e.g., improved search performance form prolonged exposure to stable displays). Search through **repeated** displays are the same as search through **unrepeated** displays.

Binding does not persist - or if it does, it has no impact on visual search. Currently unattended items seem to revert to their pre-attentive state when attention is redeployed