



Repetition blindness: Bug or feature?



Alison L. Morris
Iowa State University

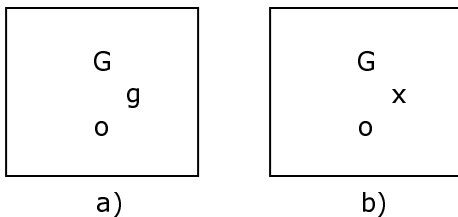
Catherine L. Harris
Boston University

Introduction

Repetition blindness (RB) is the failure to report the presence of repeated items in brief displays. Although RB is usually demonstrated using sequential displays in rapid serial visual presentation, it can also be shown using simultaneous displays e.g., (Luo & Caramazza, 1995; Mozer, 1989). It is not clear whether RB represents a "bug" in the visual system that only manifests itself in displays created in the laboratory, or whether RB is a "feature" of the visual system with an adaptive function. In the latter case, RB could arise from a mechanism that gives priority to novel items over repeated items in a visual scene (Soto-Faraco, 2000).

Nature of the "bug" – types and tokens

According to Kanwisher (1987; 1991) RB is a failure to assign an identical type to two different tokens. Token individuation requires serial attention. If tokenization of repeated items is more difficult, we might require a longer-duration display in order to accurately perceive all the letters in a) compared to the letters in b):



Therefore, if an observer's task is to detect the presence of a vowel, difficulty in tokenizing the repeated g could potentially slow down this process in a), but not in b).

A "feature?"

However -- if difficulty in tokenization of repeated items results in preferential deployment of attention to novel items, observers should be faster and more accurate at detecting the vowel in a) compared to b).

Target-absent trials

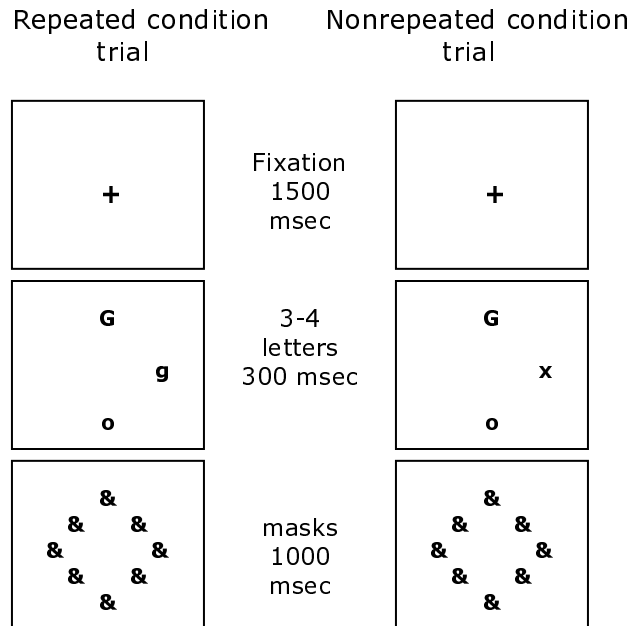
Both the "bug" and "feature" accounts of RB predict that when no target is present, observers should show *longer* response times and *less* accuracy when letters are repeated in the display (the standard RB effect).

In addition, effects on target-present trials should be smaller than effects on target-absent trials, because the latter can potentially occur on every trial, but the former should occur on only about 1/3 of the trials.

Experiment 1 – Procedure

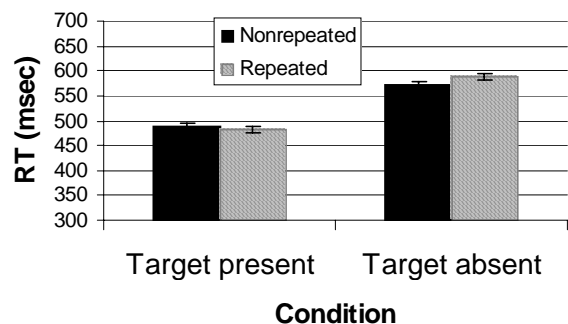
Participants were seated in front of a computer and a button box
One button labeled YES and another button labeled NO

Instructions: press the YES button if a vowel appears in the display



Feedback given on each trial: RT in msec for correct trials, "MISS" or "FALSE ALARM" for incorrect trials

Results -- RT



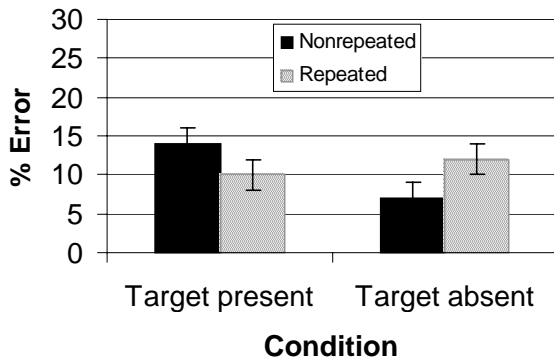
Significant interaction
 $F(1, 29) = 15.1, p < .005$

Target-present condition:

RT difference not significant,
 $t(29) = 1.5, p = .14$
(marginally sig. in item analysis)

Target-absent condition:
Repeated significantly slower than nonrepeated,
 $t(29) = 3.1, p < .005$

Results -- Errors



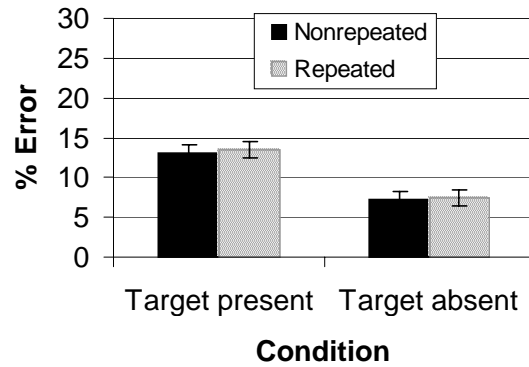
Significant interaction
 $F(1, 29) = 16.0, p < .001$

Target-present condition:
More Misses in nonrepeated than in repeated condition,
 $t(29) = 3.2, p < .005$

Target-absent condition:

More False Alarms in repeated than in nonrepeated condition,
 $t(29) = 3.3, p < .005$

Results -- Errors



Significant effect of target condition,
 $F(1, 29) = 34.2, p < .001$

No effect of repetition, $F < 1$

No interaction, $F < 1$

Experiment 2

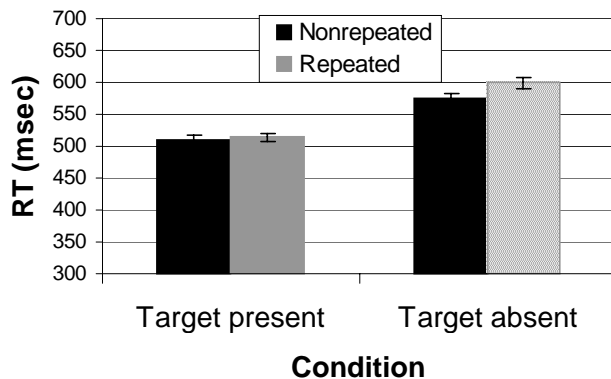
RB effects are generally time-limited. Although a strong effect was observed with a relatively long (300 msec) display, we should see a diminution of the effect with longer-duration displays.

The procedure for Experiment 2 was the same as Experiment 1, except the duration of the letter display was increased to 600 msec.

Conclusions

Although preliminary, these results are consistent with the idea that attention is directed to novel objects prior to repeated objects, and that repeated objects require more processing time for conscious perception. Additional experiments will further investigate the possibility that RB arises from an adaptive attentional mechanism sensitive to novelty.

Results -- RT



Significant interaction
 $F(1, 29) = 16.0, p < .001$

Target-present condition:

More Misses in nonrepeated than in repeated condition,
 $t(29) = 3.2, p < .005$

Target-absent condition:

Repeated significantly slower than nonrepeated,
 $t(29) = 4.2, p < .001$

References

- Kanwisher, N. (1987). Repetition blindness: Type recognition without token individuation. *Cognition*, 27, 117-143.
- Kanwisher, N. (1991). Repetition blindness and illusory conjunctions: Errors in binding visual types with visual tokens. *Journal of Experimental Psychology: Human Perception and Performance*, 17, 404-421.
- Luo, C. R., & Caramazza, A. (1995). Repetition blindness under minimum memory load: Effects of spatial and temporal proximity and the encoding effectiveness of the first item. *Perception & Psychophysics*, 57, 1053-1064.
- Mozer, M. C. (1989). Types and tokens in visual letter perception. *Journal of Experimental Psychology: Human Perception and Performance*, 15, 287-303.
- Soto-Faraco, S. (2000). An auditory repetition deficit under low memory load. *Journal of Experimental Psychology: Human Perception and Performance*, 26, 264-278.