IOWA STATE UNIVERSITY
Department of Psychology

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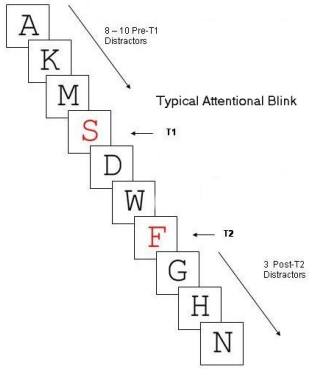
Jeremiah D. Still, Wah Pheow Tan & Veronica J. Dark

Is the magnitude of the Attentional Blink affected by number of items or time?

Introduction

When two targets occur in a rapid serial visual presentation (RSVP) stream, the response to the second target (T2) is less accurate when it occurs 200-500 msec after the first target (T2). Raymond, Shapiro and Arnell (1992) described this as an Attentional Blink (AB).



Interference explanations of AB (e.g., Shapiro, Raymond, & Arnell, 1994) focus on interference caused by the intervening items, while the processing explanations of AB focus on T1 processing time (e.g., Chun & Potter, 1995). Interference models predict that inserting more items in a time interval should increase the magnitude of the blink; processing models do not predict a change.

Most studies confound number of items and time between targets because items are presented at about 1 every 100 msec (e.g., 200 msec = lag 2 = 2 items; 500 msec = lag 5 = 5 items).

Overview

Participants identified two red letters in an RSVP stream of black letters. Letter duration was 24 msec each. Variations in the blank interstimulus interval (ISI) between letters eliminated the confound between time and number of items. Lag was defined as a 96-msec window of time. The number of items within a single lag varied as a function of the ISI. In order to prevent possible perceptual masking, the ISI before and after each target was 72 msec in all conditions.

Table 1. Number of Items Between Targets

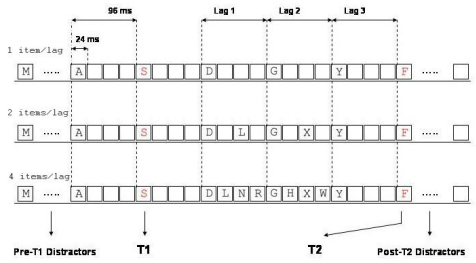
Distractor ISI	Lag 2	Lag 3	Lag 4	Lag 5	Lag 6
72 msec	1	2	3	4	5
24 msec	1	3	5	7	9
0 msec	1	5	9	13	17

Experiment 1: Regular Distractor ISI

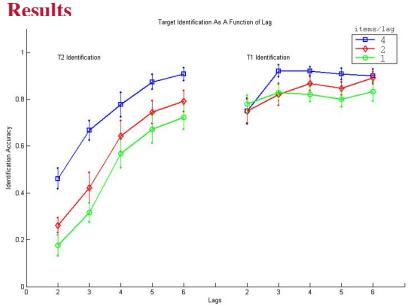
Method

Number of items (1, 2, or 4 per lag) and Lag (2, 3, 4, 5, and 6) were varied within-subject. Table 1 shows the total number of items between targets in each condition. Participants completed 225 experimental trials.

Experiment 1 Illustration



Results



Discussion

AB magnitude decreased as the number of items per unit of time increased, an effect opposite of that predicted by the interference models.

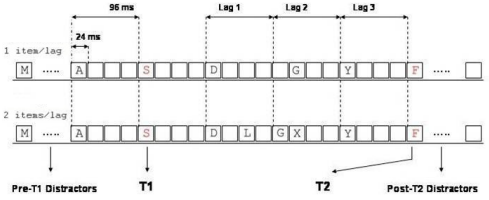
It is possible that the relatively long (72 msec) ISI before each target acted like a salient temporal cue in the 2 and 4 items/per lag conditions, facilitating target processing. Experiment 2 removed the temporal cue by using irregular distractor ISIs between items.

Experiment 2: Irregular Distractor ISI

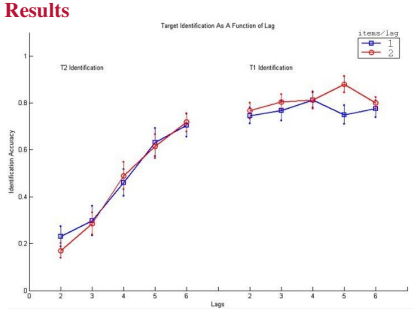
Method

Number of items (1 or 2 per lag) and Lag (2, 3, 4, 5, and 6) were varied within-subjects. ISI duration between items was variable. Participants completed 150 experimental trials.

Experiment 2 Illustration



Results



Discussion

Unlike Experiment 1, number of items per lag did not affect AB magnitude.

General Discussion

Interference explanations predict that presentation of more items per unit of time should produce a larger AB. Experiment 1 showed that increasing the number of items *reduced* the AB, but a salient temporal cue may have been responsible. Experiment 2 varied distractor ISI. AB magnitude did not vary with number of items. It appears that time between T1 and T2 and not number of items is the important variable in AB magnitude.

See Tan, Still and Dark (2006) for further information on the effect of salient temporal cues.

References

Chun, M. M. & Potter, M. C. (1995). A two-stage model for multiple target detection in rapid serial visual presentation. *Journal of Experimental Psychology: Human Perception and Performance, 21*(1), 109 – 127.

Raymond, J. E., Shapiro, K. L. & Arnell, K. M. (1992). Temporary suppression of visual processing in an RSVP task: an attentional blink? *Journal of Experimental Psychology: Human Perception and Performance, 18*(3), 849 – 860.

Shapiro, K. L., Raymond, J. E., & Arnell, K. M. (1994). Temporal allocation of visual attention: Inhibition or interference? In D. Dagenbach & T. H. Carr (Eds.), *Inhibitory mechanisms in attention, memory, and language* (pp. 151 - 188). New York: Academic Press.

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For more information e-mail: jeremiah@iastate.edu