ABC (Attentional Blink Calculation), Easy as 1,2,3: The Effect of T1 Difficulty on an Unmasked RSVP Stream

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Introduction

• Detection of a secondary target (T2) in a Rapid Serial Visual Presentation (RSVP) task is impaired if it appears 100 – 500 ms after an initial target (T1) has been detected.

• This deficit is known as the Attentional Blink (AB)

• Previous research has found that in order for an AB to occur, both T1 and T2 need to be masked (e.g. Ray mond, Shapiro, & Amell, 1992).

• We investigate whether a similar result could be found if T1 was unmasked in Experiment 2 (Figure 2).

• Previous research has found that if T2 was linked to T1 when it was not masked in Experiment 1 (Figure 1) and followed by a mask. T1 was unmasked in Experiment 1 (Figure 1) and T2 was always linked to T1 on 50% of the trials.

• This deficit is known as the Attentional Blink (AB) when it was not linked to T1.

• When T1 was masked an AB occurred regardless of T1 difficulty. However, previous research has found that if T2 was linked to T1 when it was masked a period of approximately 100 ms must occur before the next target can be detected. This may reflect two different processes which produce an additive or interactive effect to decrease T2 accuracy.

General Methods

Each experiment consisted of two conditions: an addition task (the easy task) and a multiplication task (the hard task).

Participants were presented with a skeletal RSVP stream (see Ward, Duncan & Shapiro, 1997) containing only T1 and T2. T2 was always followed by a mask. T1 was unmasked in Experiment 1 (Figure 1) and masked in Experiment 2 (Figure 2).

To make sure that both T1 and T2 were being processed during the stream the T2 task was linked to the answer of T1 on 50% of the trials. However, previous research has found that if T2 was linked to T1 when it was not masked (e.g. Falkmann, 2002; Maki et al., 1997). We therefore expect an AB effect to occur only when T2 was not linked.

• Experiment 1: T1 is Unmasked

• Participants were asked to calculate T1 and then respond to T2. T2 was always linked to T1 on 50% of the trials.

• In half of the trials T2 was the answer to T1 (the "linked" condition) and in the other half of the trials T2 did not equal the answer to T1 (the "unlinked" condition).

• Results:

  1) There was no effect of SOA in either the multiplication task or the addition task when T2 accuracy was calculated.

  2) There was no effect of SOA in the addition task on T2 accuracy when it was not linked to T1.

  3) However, there was an effect of SOA on the multiplication task when T2 was not linked. T2 accuracy increased with increasing SOA.

• Experiment 2: Does the complexity of T1 matter when it is masked?

• T2 accuracy was calculated in the linked condition.

• Results:

  1) There was no effect of SOA in the addition and multiplication task on T2 accuracy when it was linked to T1.

  2) There was an effect of SOA in the addition and the multiplication condition on T2 accuracy when it was not linked. T2 accuracy increased with increasing SOA.

• There was a greater difference in accuracy between the addition and multiplication tasks at SOAs of 180 ms and 270 ms than at the later SOAs.

Conclusions

T1 difficulty affects T2 accuracy in the unlinked condition, when T1 was not masked.

When T1 was masked an AB occurred regardless of T1 difficulty. However, calculation type affected the magnitude of the AB at shorter SOAs.

When T2 was linked to T1 then no AB occurred, consistent with Falkmann (2002) and Maki et al. (1997).

T1 difficulty and masking seem to show a combined effect on T2 detection. This may reflect two different processes which produce an additive or interactive effect to decrease T2 accuracy.

Summary

An effect similar to that of the attentional blink was found when T1 was not masked. However, this only occurred when T1 difficulty increased from an addition to a multiplication task.

An attentional blink was found for both the addition and multiplication task. However, the data suggest that a deeper blink may emerge when T1 involved multiplication.

References


