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

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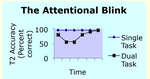
Introduction

• 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. Raymond, Shapiro, & Arnell, 1992).

• We investigate whether a similar result could be found if T1 was *unmasked* by manipulating T1 difficulty.

•If the attentional demands on T1 are made complex then perhaps an effect similar to that of the attentional blink could occur.

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).

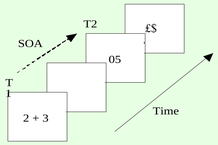


Figure 1

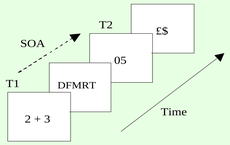


Figure 2

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 then no AB occurred (e.g. Falikman, 2002; Maki et al., 1997). We therefore expect an AB effect to occur only when T2 was not linked.

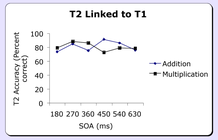
vSOA = variable Stimulus Onset Asynchrony of 180, 270, 360, 450, 540, 630 ms

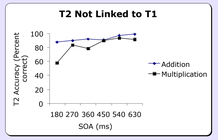
Experiment 1: T1 is Unmasked

Participants were asked to calculate T1 and then respond to whether T2 was the answer to T1 or not.

In half of the trials T2 was the answer to T1 (the "linked" condition). 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 on T2 accuracy when it was linked to T1.

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.

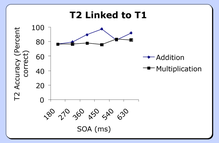
Summary

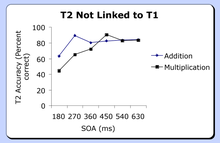
An effect similar to that of the attentional blink was found even when T1 was not masked. However, this only occurred when T1 difficulty increased from an addition to a multiplication task

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

Experiment 2 was identical to Experiment 1, except here T1 was followed by a mask. Does T1 difficulty affect the attentional blink in this case?

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 on the addition and the multiplication condition on T2 accuracy when it was not linked. T2 accuracy increased with increasing SOA.

3) 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.

Summary

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

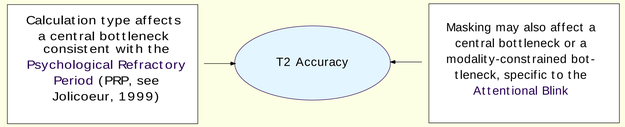
Conclusions

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 Falikman (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.



It is important to tease apart the different factors, which often co-occur within the AB but need to be and can be studied independently.

References

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