T1 difficulty modulates the attentional blink only when T1 is unmasked

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T1 difficulty modulates the attentional blink only when T1 is unmasked: Implications of attentional capture in the attentional blink!

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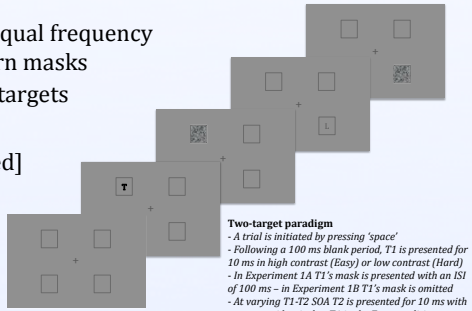
Introduction

- We use the two-target paradigm and examine bottleneck predictions of how T1 difficulty affects the attentional blink
- Bottleneck theories suggest that making T1 easier to perceive should clear second stage processing faster resulting in a reduced attentional blink
- Previously we found no effect from varying T1 contrast or T1 duration, but proposed that the effect may have been confounded by involuntary attention directed to the mask
- In a new study we vary T1 contrast and examine the effect on the attentional blink when T1 is masked compared to when T1 is unmasked

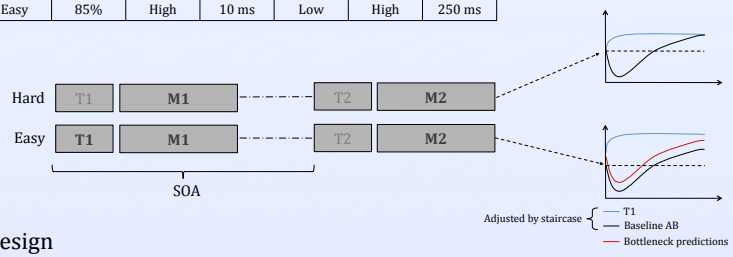
Method

- Stimuli
  - 20 letter targets presented at equal frequency
  - Randomly generated dot pattern masks
  - Masks presented 100 ms after targets
- Main variables
  - T1 masking [Masked, Unmasked]
  - SOA [100, 200, 300, 400, 600]
  - T1 difficulty [Hard, Easy]
- Instructions
  - Report identity of T1 and T2
  - Guess if uncertain



Two-target paradigm
- A trial is initiated by pressing 'space'
- Following a 100 ms blank period, T1 is presented for 10 ms in high contrast (Easy) or low contrast (Hard)
- In Experiment 1A T1's mask is presented with an ISI of 100 ms – in Experiment 1B T1's mask is omitted
- At varying T1-T2 SOA T2 is presented for 10 ms with a contrast identical to T1 in the Easy condition
- T2 is succeeded by a mask with an ISI of 100 ms
- T1 and T2 positions are different within trials and pseudo-randomly selected between trials

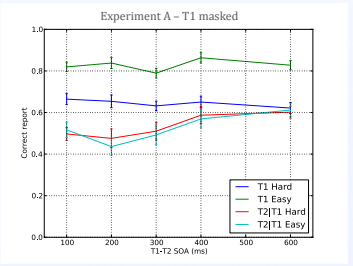
Condition	T1 accuracy	T1 contrast	T1/T2 duration	T2 contrast	Mask contrast	Mask duration
Hard	60%	Low	10 ms	Low	High	250 ms
Easy	85%	High	10 ms	Low	High	250 ms

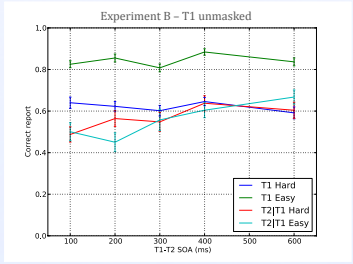


- Design
  - T1 masking varied between Experiment 1A and 1B
  - Factorial ordered SOA and T1 difficulty within experiments
  - 48 trials in each of the 10 factorial combinations
  - 18 observers conducted Experiment 1A and 1B in counterbalanced order

Findings

- Proportions of correct report are plotted as function of SOA
- Proportions were arcsine transformed and analyzed with repeated measures ANOVAs
- T2 main effect of SOA in Experiment A and B indicates an attentional blink
- Experiment A – T1 masked:
  - % Main effect (T1 difficulty) [F(1,17) = 0.73, p = 0.41]
  - % Interaction effect (SOA x T1 difficulty) [F(4,68) = 1.24, p = 0.30]
- Experiment B – T1 unmasked:
  - % Main effect (T1 difficulty) [F(1,17) = 0.60, p = 0.45]
  - ✓ Interaction effect (SOA x T1 difficulty) [F(4,68) = 8.03, p < 0.001]
    - ✓ Main effect (T1 difficulty, SOA = 200 ms) [F(1,17) = 25.90, p < 0.001]





Preliminary conclusion*

- Varying T1 difficulty by target contrast modulates the attentional blink only when T1 is unmasked
- Contrary to bottleneck predictions we observed that making T1 easier to perceive increases the magnitude of the attentional blink
- We suggest that this finding indicates capture of involuntary attention which increases with contrast
- Similarly we suggest that involuntary attention directed towards T1's mask confounded the effect of T1 difficulty in Experiment A

* Inference is based on a single significant data point. In follow up experiments we examine if the effect observed in Experiment B is modulated by properties of T1

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