Precision takes time

Nijenkamp, Rob; Swan, Garrett; Broers, Nico; Nieuwenstein, Mark

Precision takes time:

Evidence for retroactive dual-task interference in a color reproduction task

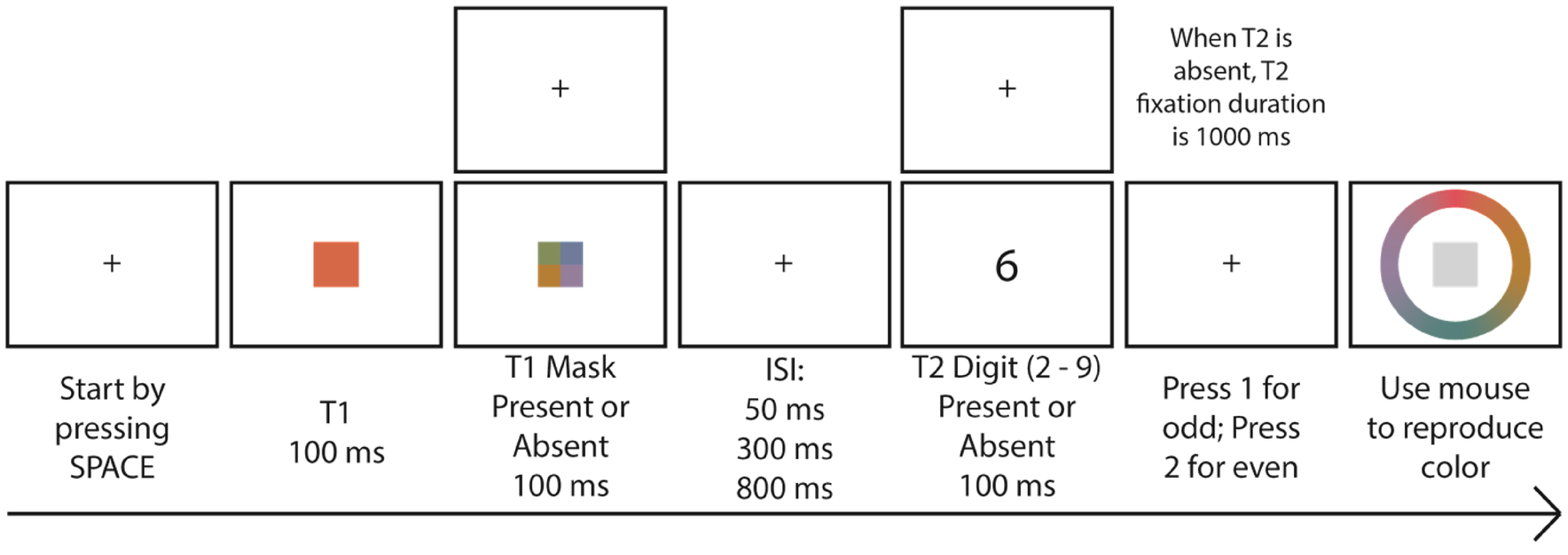
Rob Nijenkamp[1], Garrett Swan[2], Nico Broers[3] , Mark Nieuwenstein[1]

[1]University of Groningen; [2]Penn State University; [3]University of Münster

Introduction

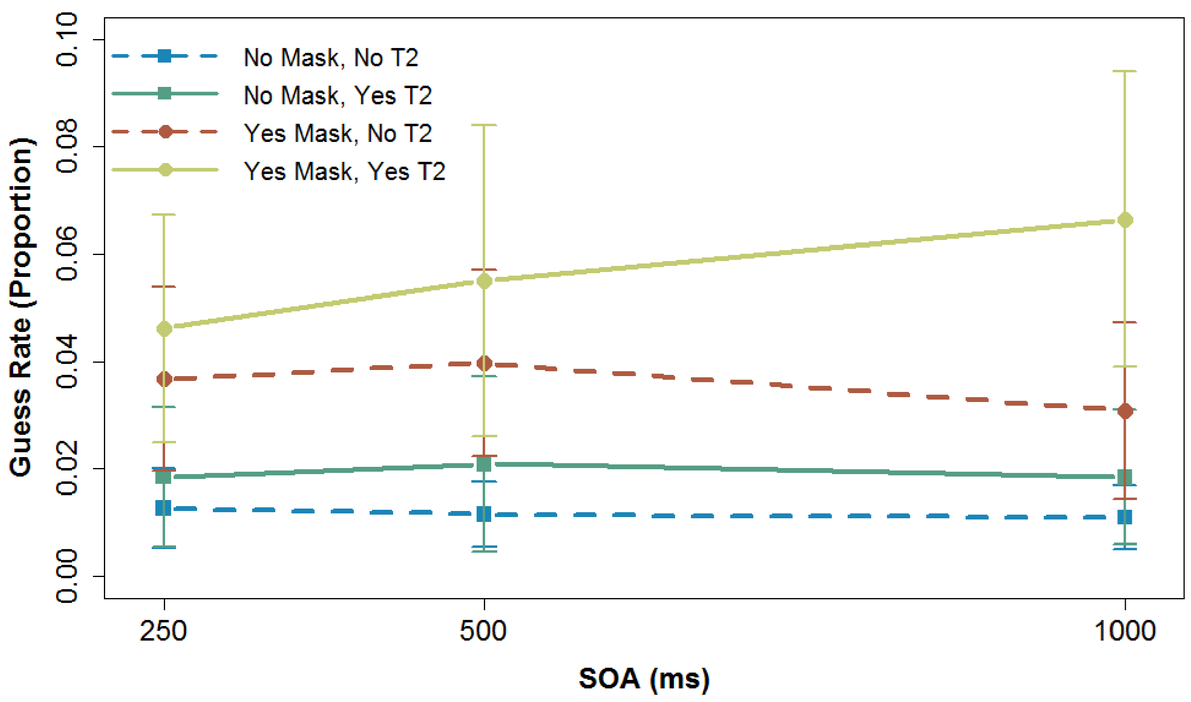
- The formation of a durable short-term memory representation for a first visual target (T1) can be disrupted for up to one second by a trailing task (T2) that requires a quick decision and response [1]. This is indicated by the fact that performance for T1 improves as the stimulus onset asynchrony (SOA) between T1 and T2 increases from 250 to 1000 ms.
- The disruption of short-term memory consolidation was also found when T1 was masked, thus showing that consolidation continues after a mask.
- In the studies by Nieuwenstein and Wyble, the first target was a string of letters or an unfamiliar complex visual shape [1]. In the current study, we examined whether the presence of T2, specifically a digit odd-even task, would also interfere with the formation of a precise memory representation for a color, using a color reproduction task [2].

Task

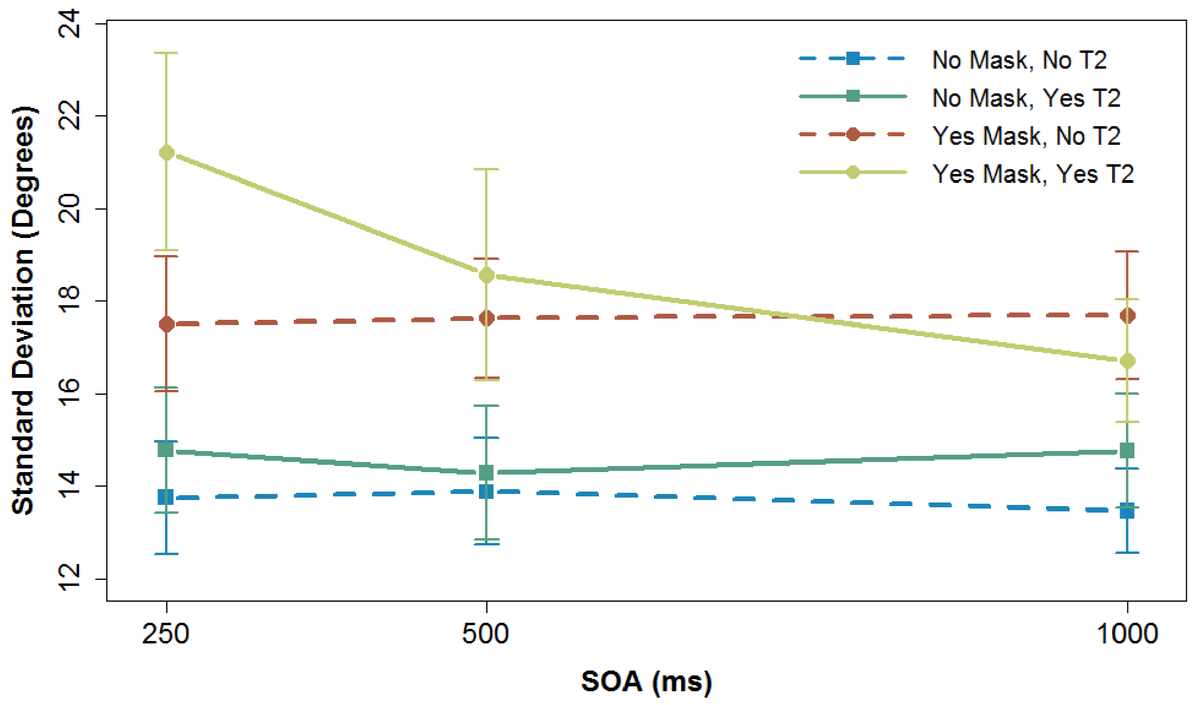


Results

The error term (i.e. the deviation between the presented color and the reported color in degrees) was run through the standard mixture model [2] in the MemToolbox [3], and yielded the guess rate (left plot below) and standard deviation (right plot below).



A repeated measures ANOVA ran on the guess rate revealed significant main effects for **Mask** ($F(1, 40) = 17.35$, $p < .001$) and **T2** ($F(1, 40) = 5.23$, $p = .028$), with the guess rate being higher after the stimulus was masked and when T2 was present; No main effect for SOA or any interaction effects were observed for the guess rate ($p > .05$).



A repeated measures ANOVA ran on the standard deviation revealed significant main effects for **Mask** ($F(1, 40) = 138.08$, $p < .001$), **T2** ($F(1, 40) = 10.05$, $p = .003$), and **SOA** ($F(2, 80) = 4.81$, $p = .011$). Furthermore, we found a significant 2-way interaction between **T2** and **SOA** ($F(2, 80) = 4.22$, $p = .018$) and, most interestingly, a significant 3-way interaction between **Mask**, **T2**, and **SOA** ($F(2, 80) = 3.78$, $p = .027$).

Conclusions

The presence of T2 disrupted the formation of a precise WM representation for T1, even after T1 had been masked. No such disruption was found when T1 was not masked. Taken together, these findings show that masking increases the time it takes to form a precise WM representation, rather than interrupting this process [4, 5]. Accordingly, the current findings support the recent conclusion that a mask does not fully interrupt the consolidation of the memory trace [e.g., 6]. If anything, our results suggest that masking increases consolidation time.

References

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r.nijenkamp@rug.nl