

Visual Working Memory Affects the Perception of Ambiguous SFM (Structure-From-Motion) by Enhancing Internally Representation

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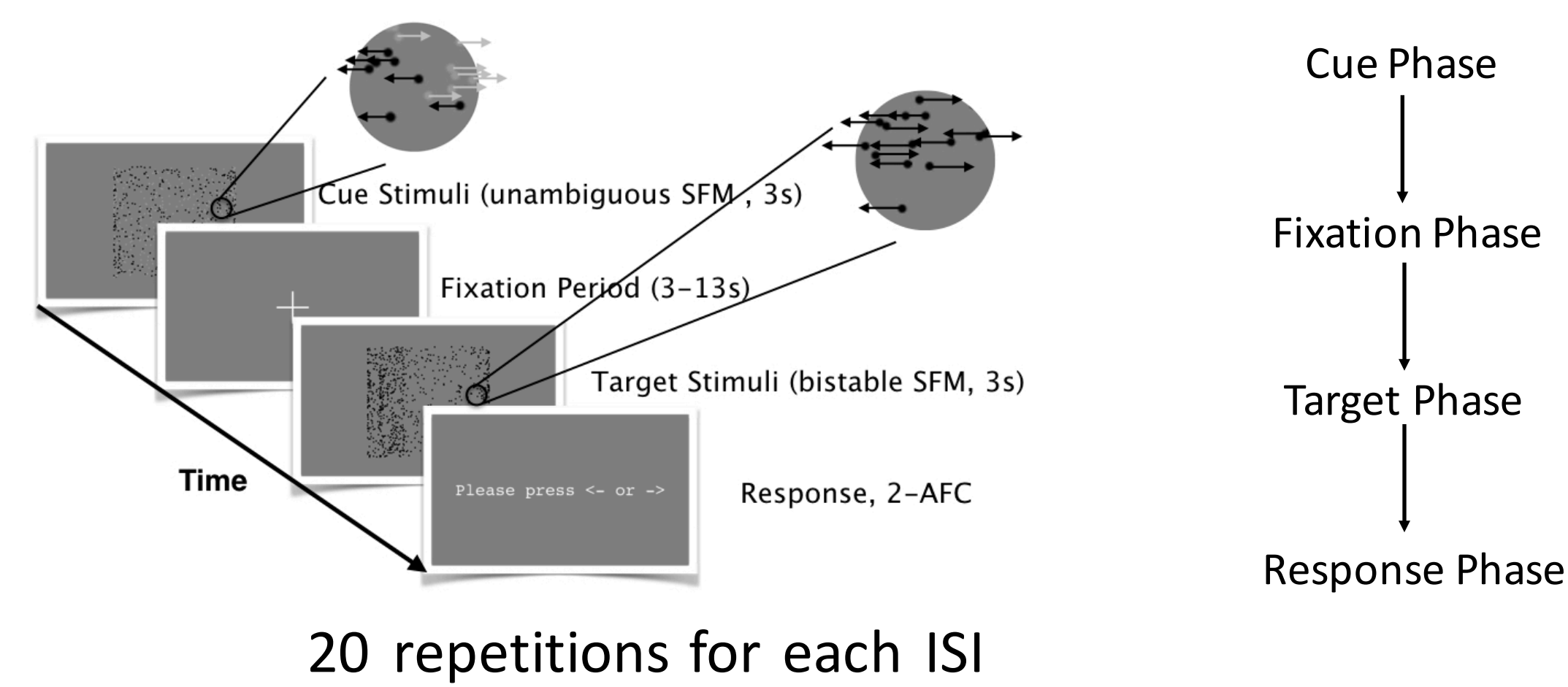
Introduction

Unambiguous prior stimulus can cause an ambiguous stimulus to be perceived in the same way. Holding the unambiguous stimulus in visual working memory could strengthen this effect (Scocchia et al., 2013).

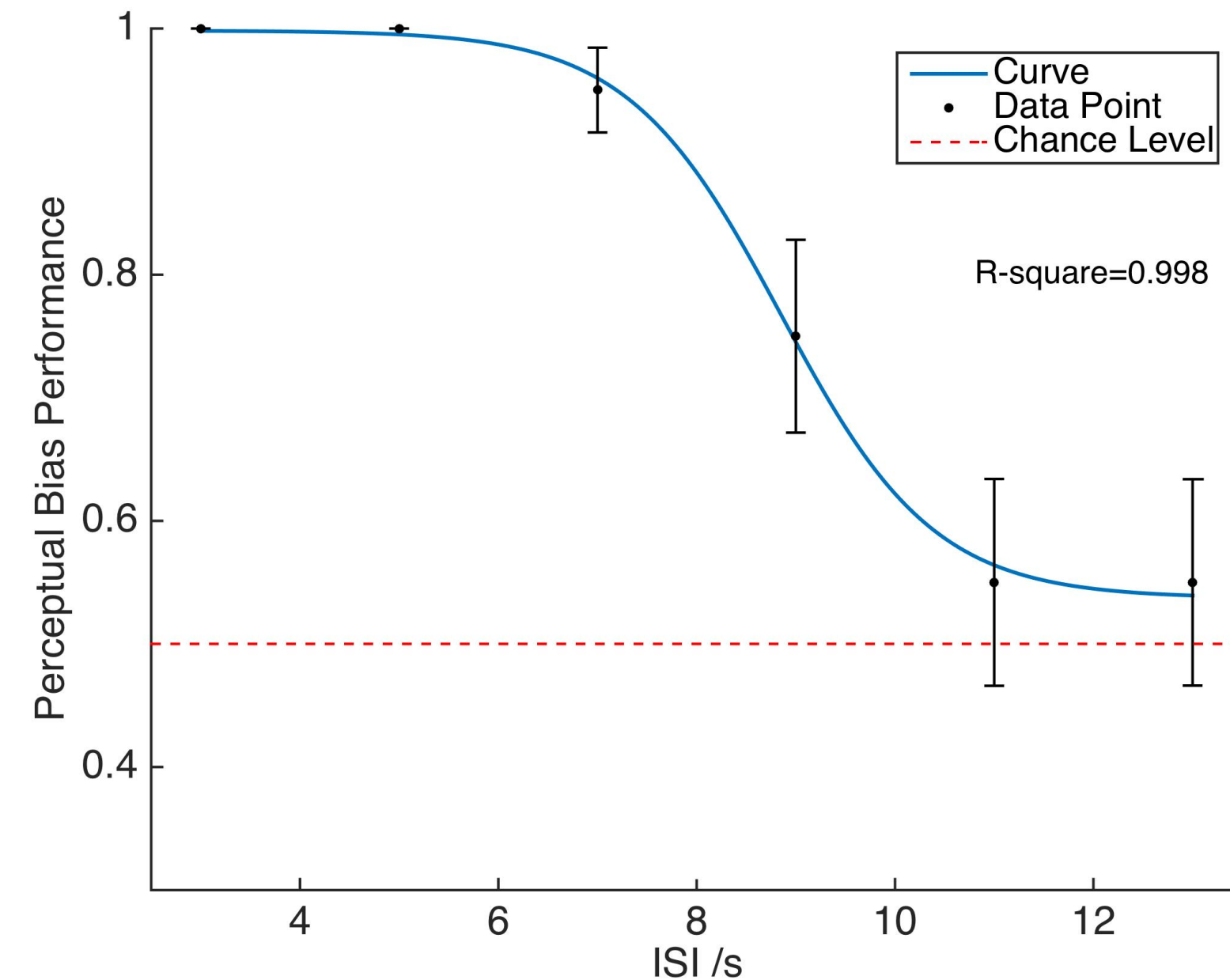
Question: How VWM content effect the representation of coming-up visual stimulus ?

Experiment 1

Stimulus



Results



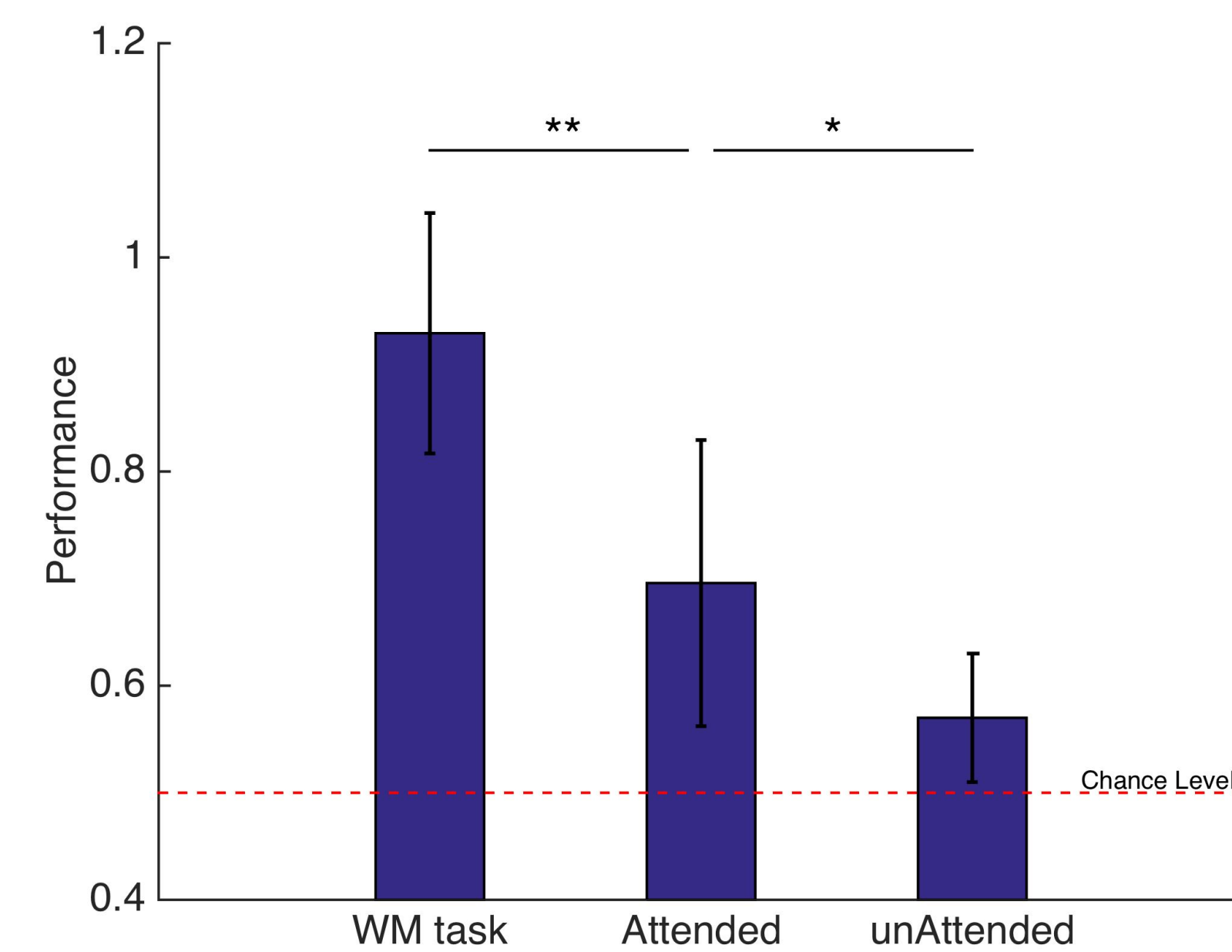
Perceptual bias performance decay along time, pretty like working memory.

Dual Task

- 1) Working Memory Task, report rotational speed difference
- 2) Attention Task, Report rotational direction of the cue stimulus
- 3) SVP task, drive attention out from the SFM

ISI = 9s, 40 repetitions for each subject

Results



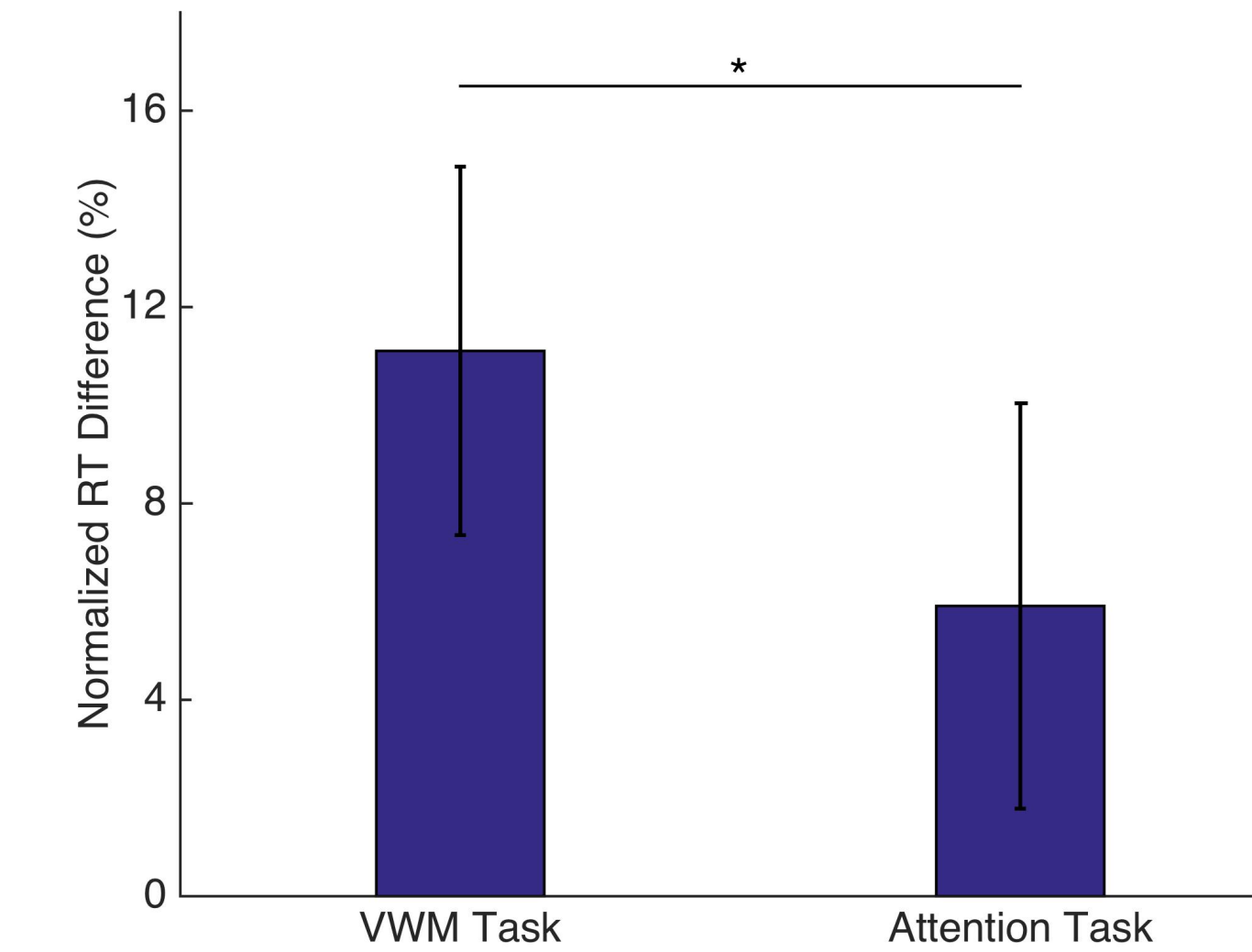
Subject could capture the difference of rotation speed between cue phase and target phase (VWM Performance: 0.785 ± 0.052 s.e.m.). The relevant visual working memory tasks could strengthen the perceptual bias significantly ($t(6) = 3.27$, $p = 0.008$), This perceptual bias is attentional demanded.

Experiment 2

We changed the stimulus in target phase from ambiguous SFM to unambiguous SFM (just like cue stimulus).

The rotational direction of the SFM in the target phase may congruent of incongruent with the stimulus in the cue phase. Usually, the subject response faster in the congruent situation. We measure RT difference of that.

Results

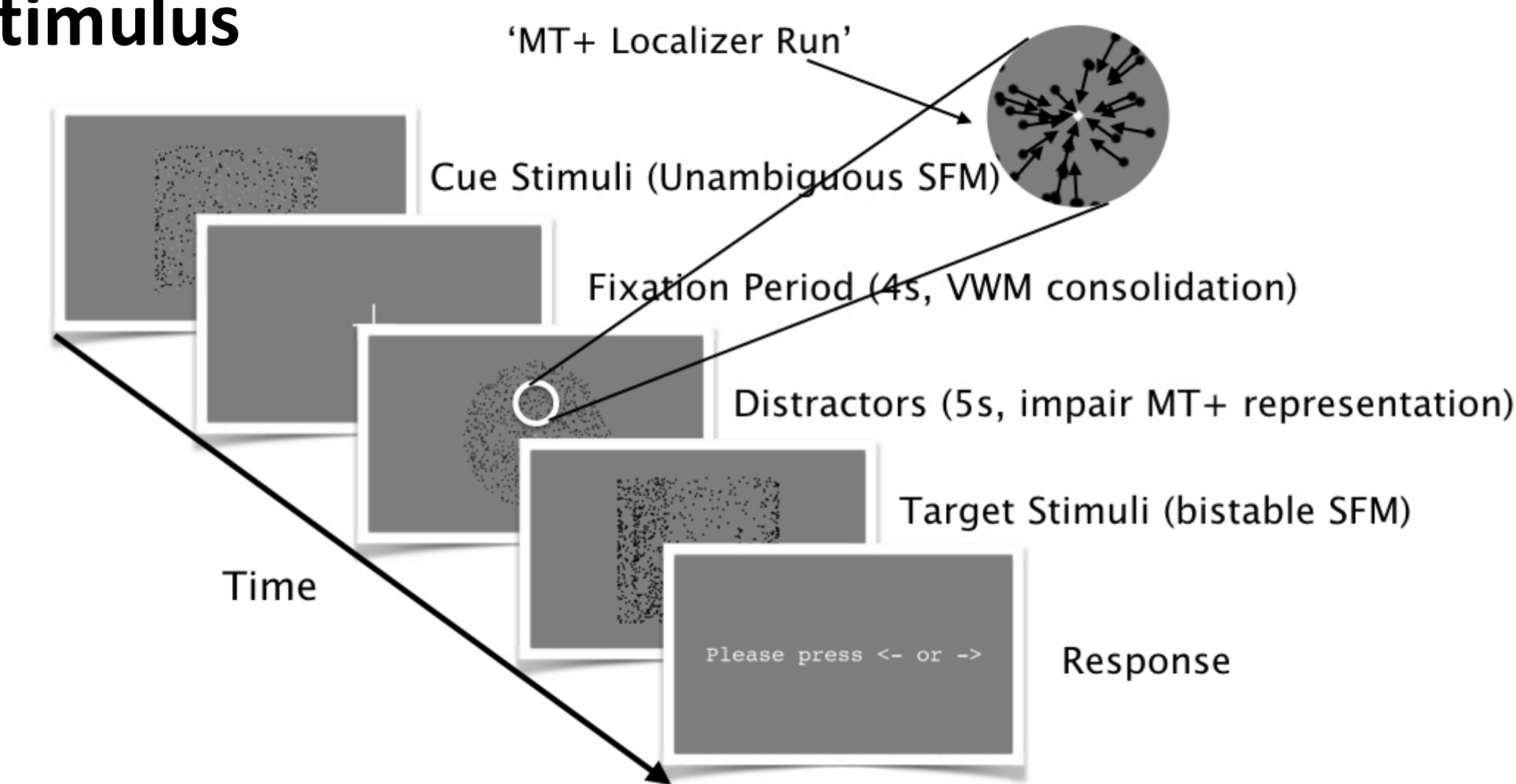


The normalized difference of this RT contrast get larger ($t(6) = 2.28$, $p = 0.04$) when subjects performing a WM task. Pretty like the working memory STROOP effect (Kiyonaga and Egner, 2014). It may due to internally representation evoked by VWM.

Experiment 3

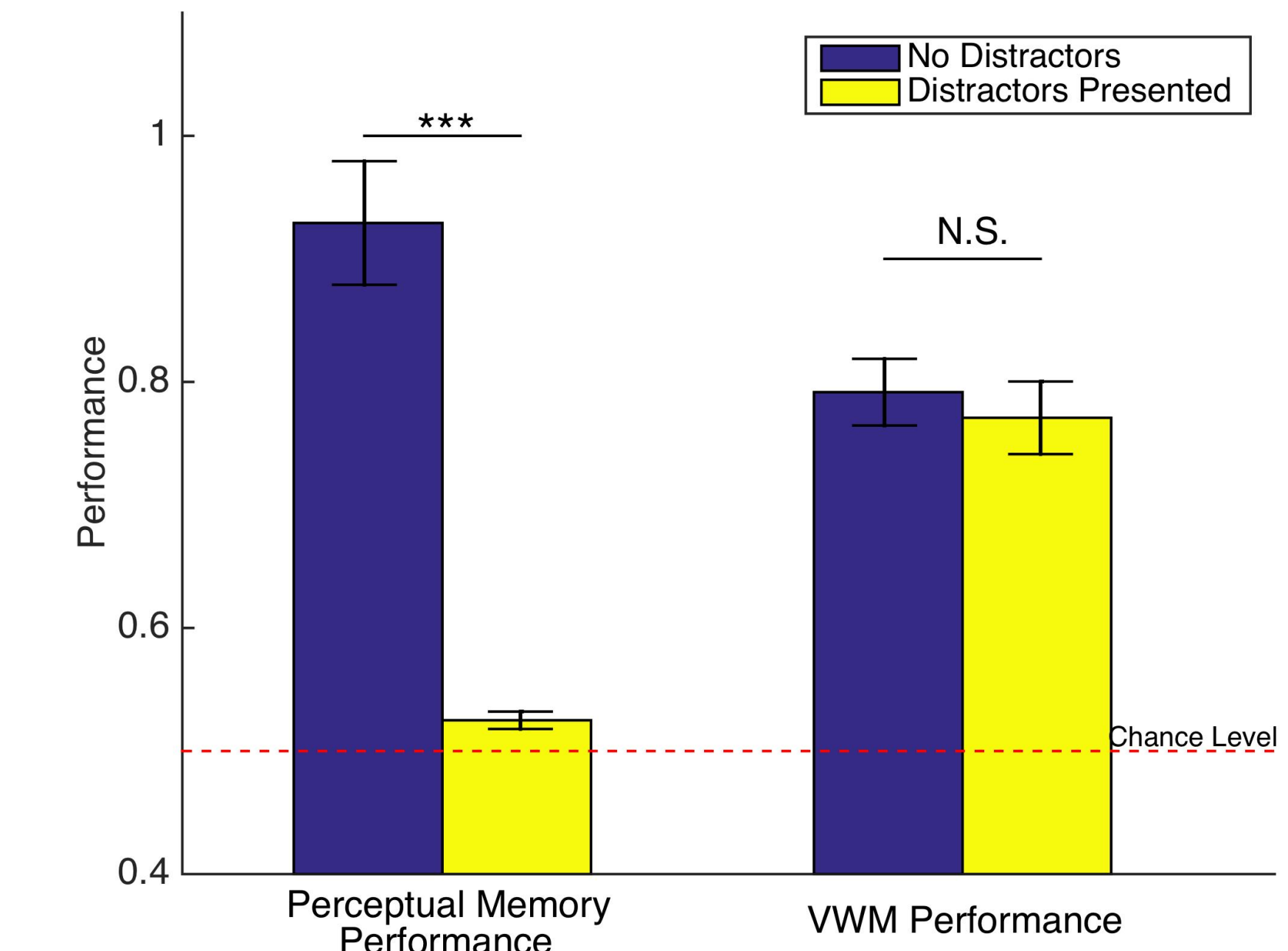
Aim: Can we eliminate this perceptual bias by disturb the internally representation ?

Stimulus



We asked the subject to perform the same task just like the WM condition in the experiment 1. To disturb the representation of the MT+ cortex during the fixation period, we added a distractors stimulus using the moving dots stimulus used for fMRI MT+ localizer run.

Results



The distractors eliminated the perceptual bias significantly ($t(6) = 7.9$, $p < 0.001$). Meanwhile the VWM accuracy is little affected ($t(6) = 0.57$, $p = 0.58$). This result is pretty match to the recent finding on the mechanism of the VWM and VSTM, that the VWM was robustly maintained by delay activity in superior-IPS, rather than other EVC (Bettencourt & Xu 2016).

Conclusion

Our results suggested that VWM content could affect the perception of ambiguous SFM by enhancing internally representation in the delay period.

References

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Acknowledgements

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