



Perceptual Consequences of Delaying the Post-saccadic Target

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1. Saccades and Temporal Perception

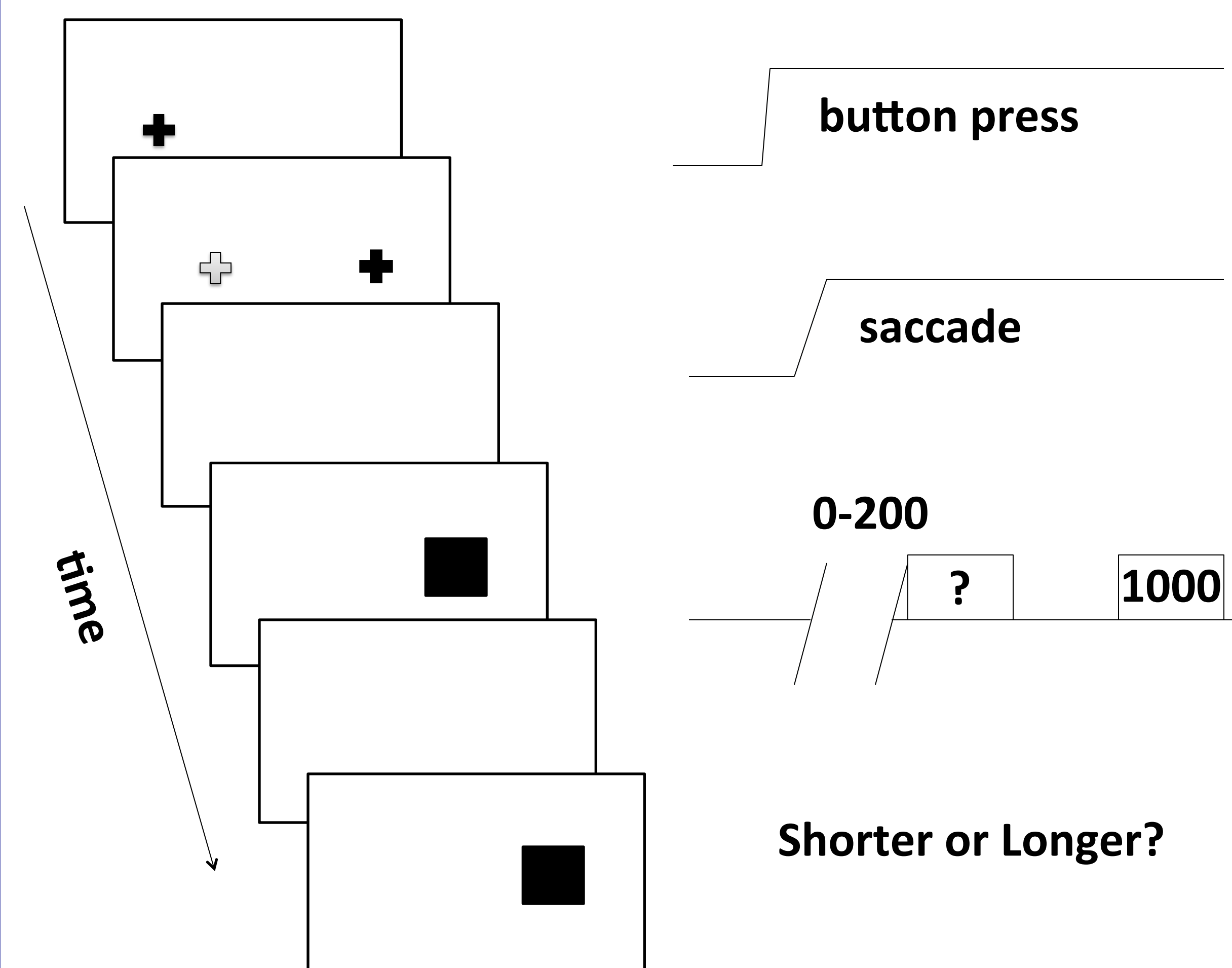
Background research:

- Temporal gaps caused by saccadic suppression
- Perceptual 'filling in' by antedating of stimulus onset to motor command signal (Yarrow et al. 2001)
- Temporal recalibration to delayed sensory consequences (Parsons, Novich, Eagleman 2013)

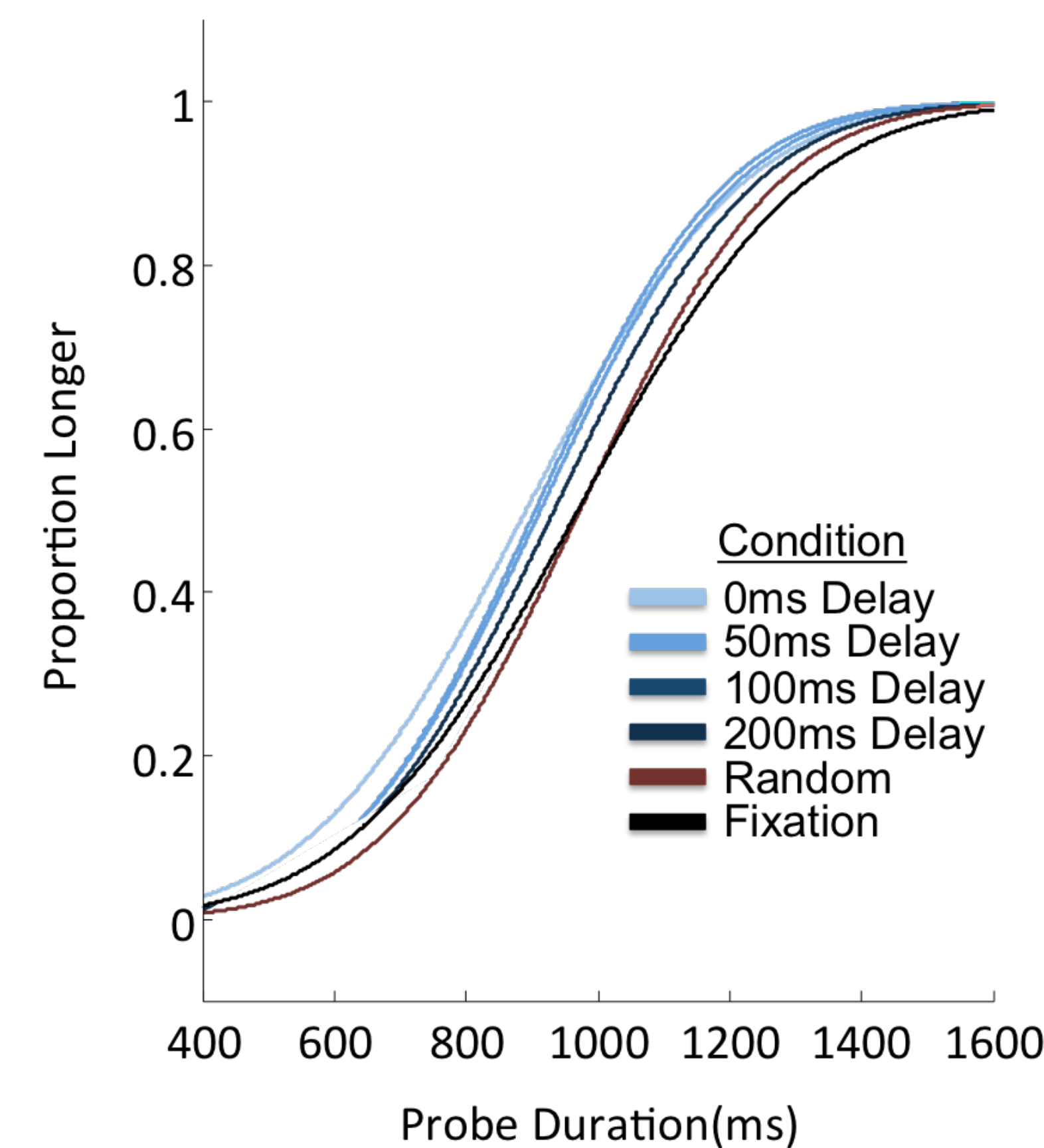
Questions:

- Does delaying the post-saccadic percept induce a temporal illusion?
- Is the effect modulated by temporal predictability or contiguity? (Cravo, Claessens, Baldo 2011)
- Do changes in the motor command (i.e. peak velocity) correlate with perceptual reports (Shadmehr et al. 2010)

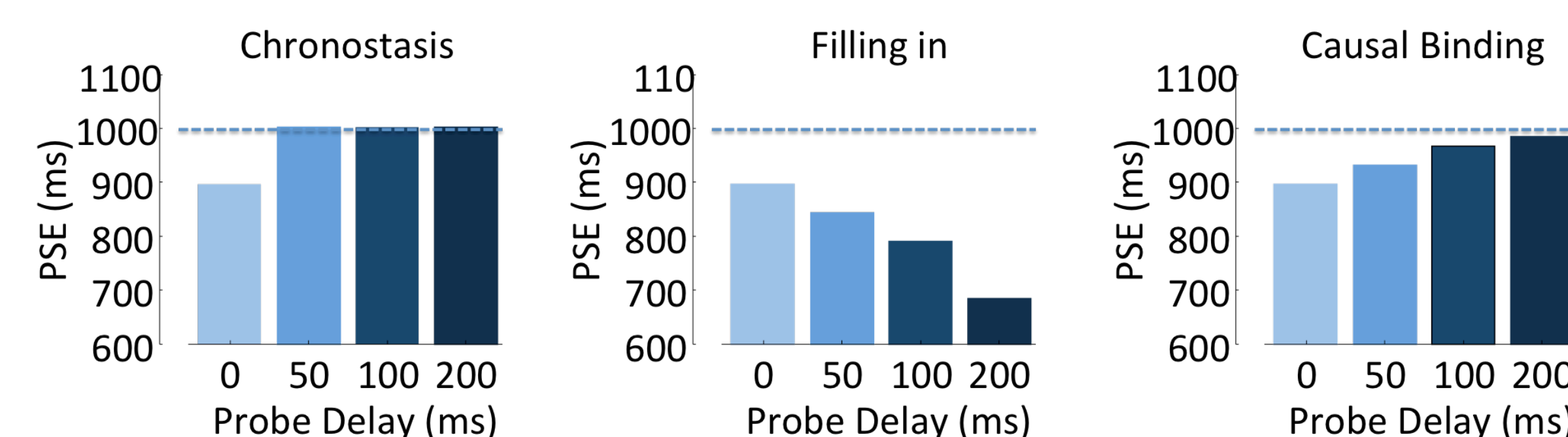
2. Experimental Design



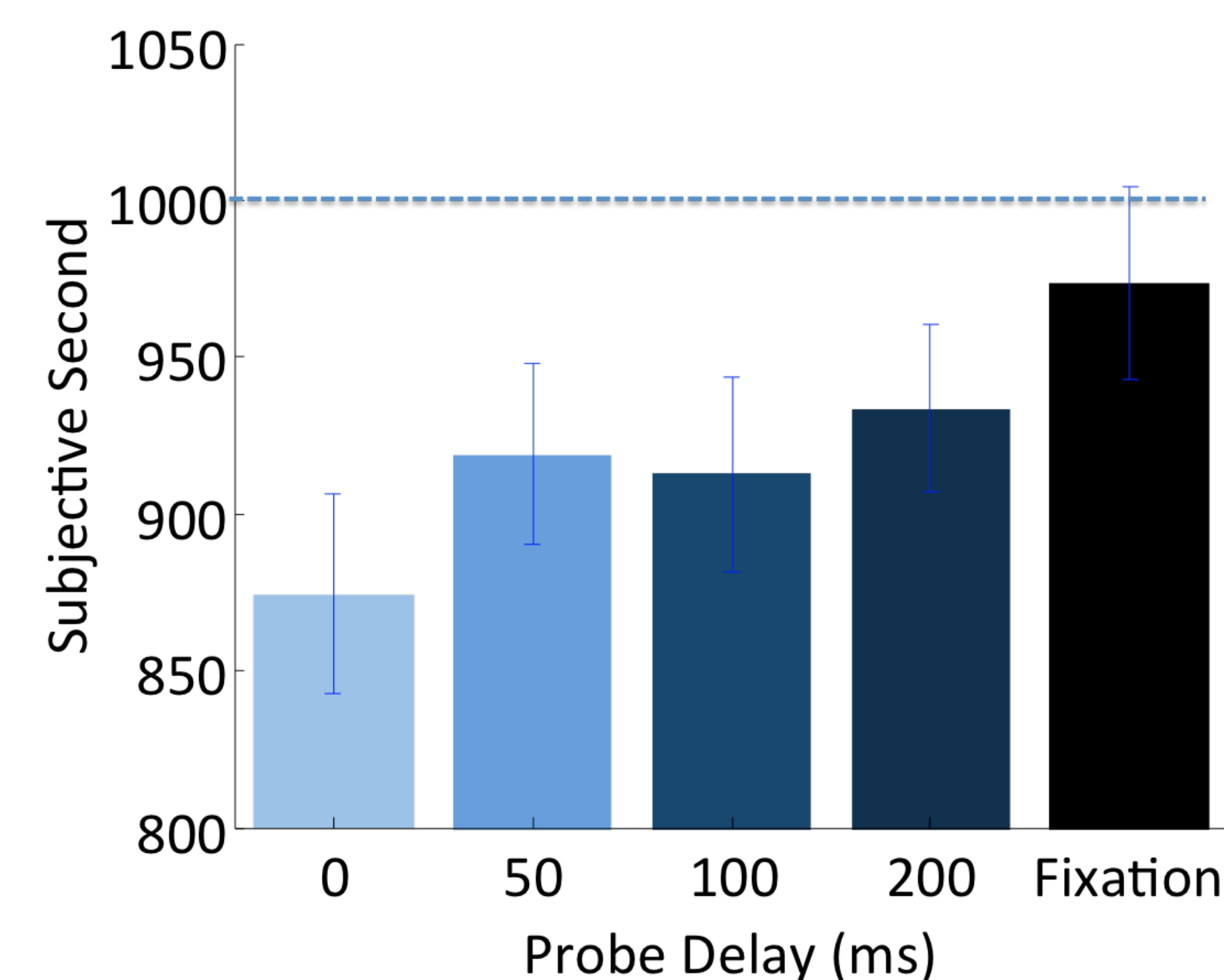
3. Psychometric Functions



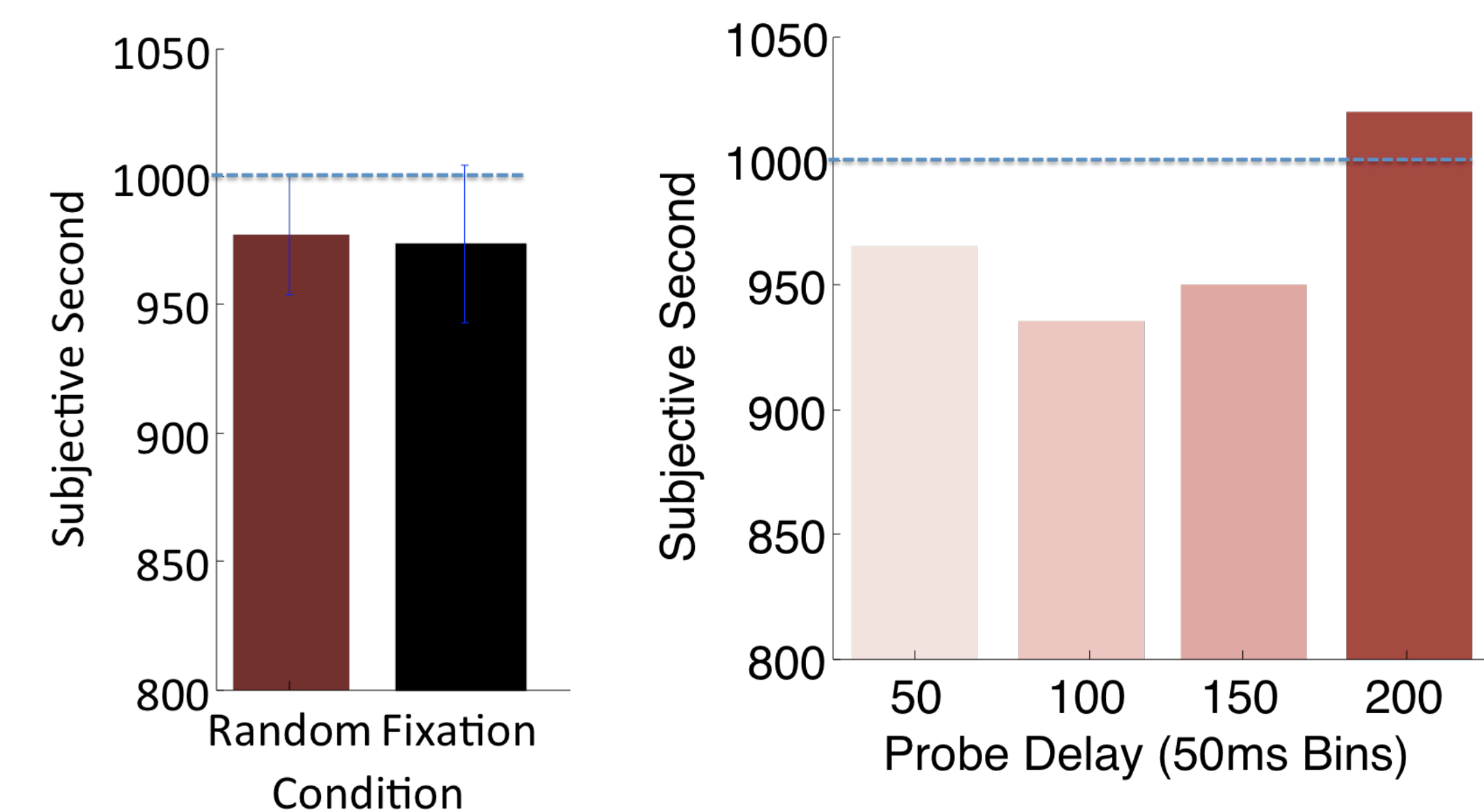
4. Model Comparison



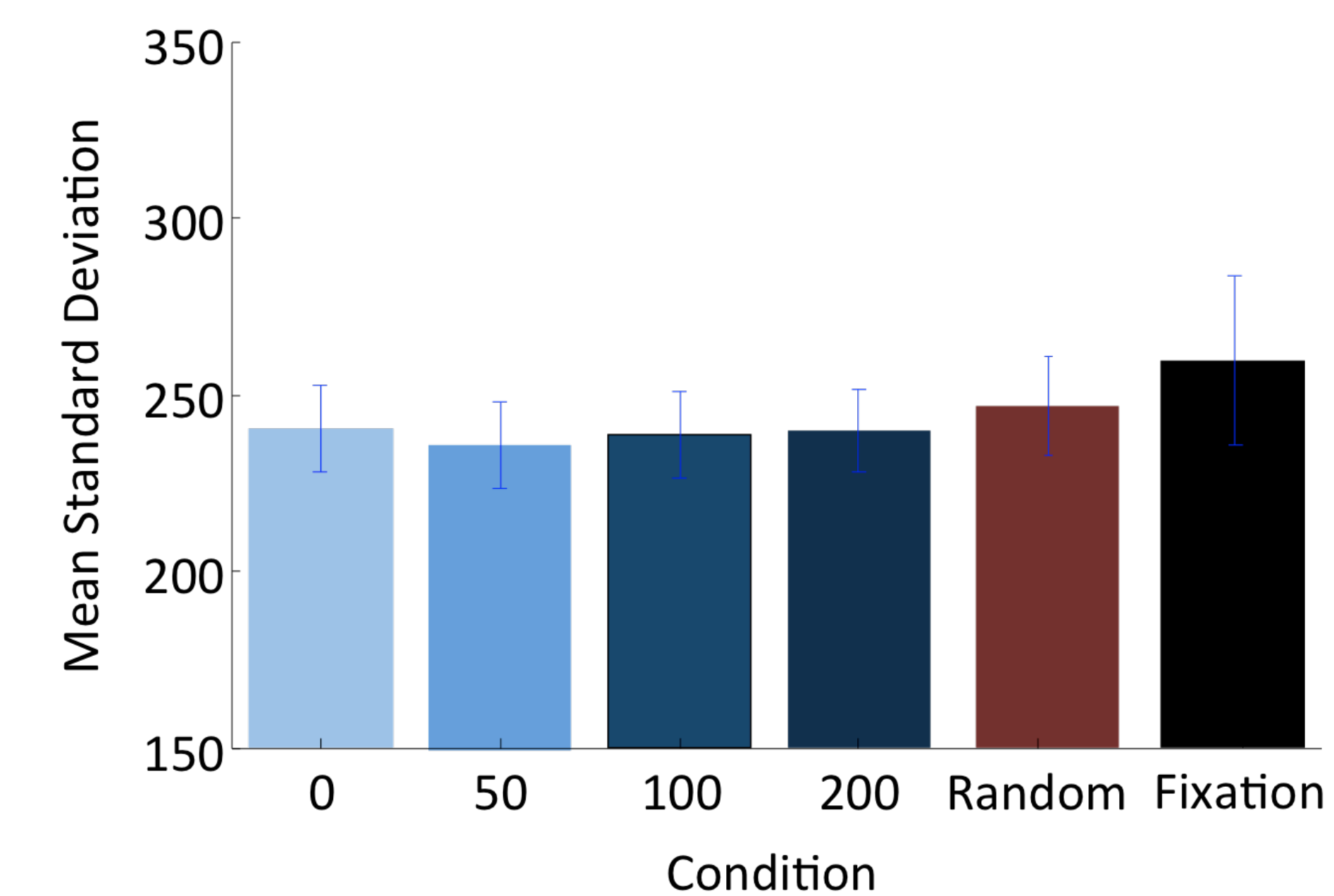
5. Effect of Delays



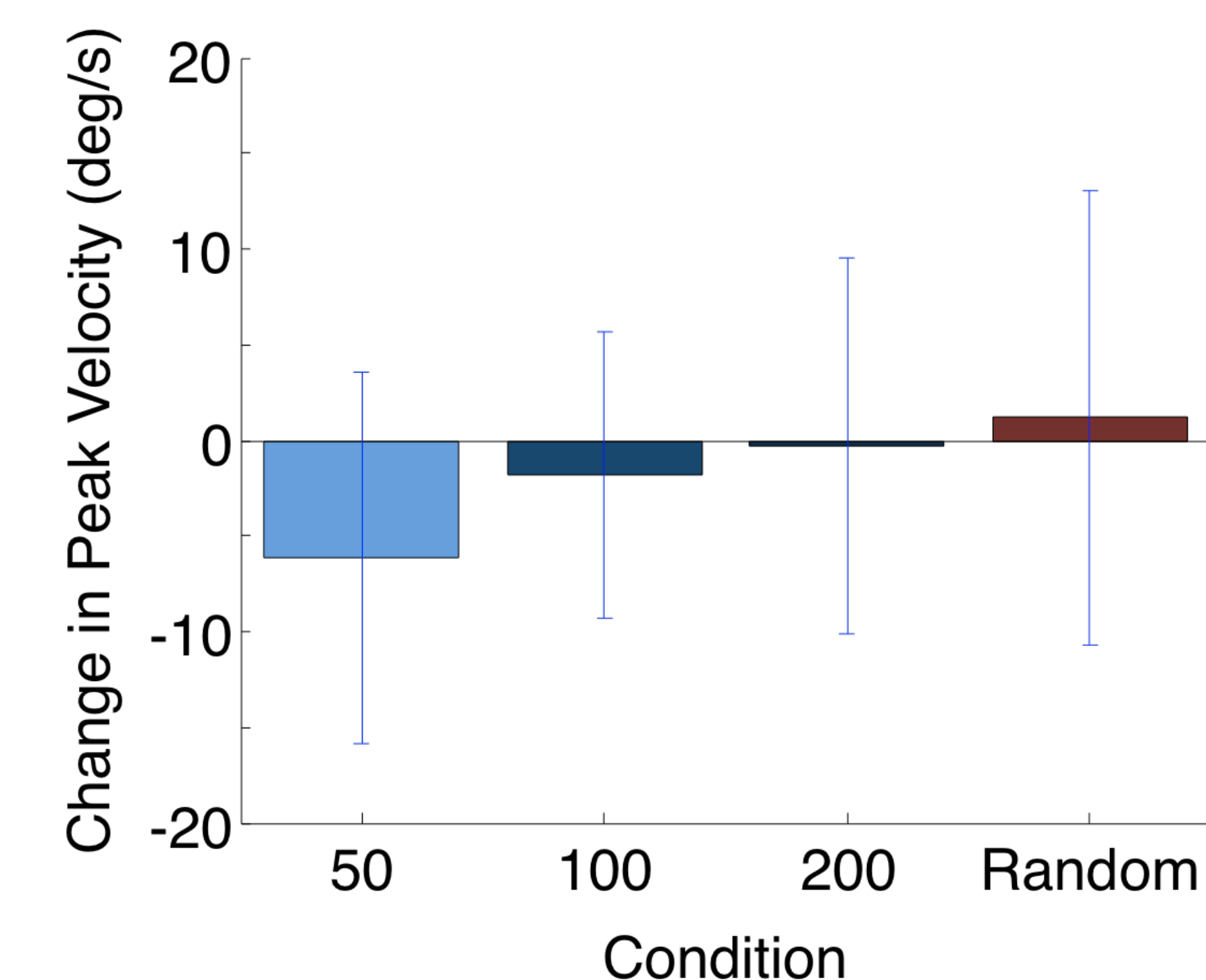
6. Modulation by Temporal Predictability



7. Variability of the Thresholds



8. Change in Peak Velocity



9. Summary of Results

- Sensory consequences of saccades are perceived as expanded in duration
- Duration distortions occur at non-zero delays, complicating an antedating account
- The stronger the association between action and outcome the longer the perceived duration
- Effect depends on the temporal predictability of the post-saccade probe
- No changes in peak saccade velocity across conditions

10. Further Questions

- What distinguishes temporal recalibration in saccades from recalibration in other effectors?
- What other methods/measures can be used to examine saccadic temporal recalibration?
- How to reconcile expanded duration w/ compression and inversion effects? (Morrone, Ross, Burr 2005)

References

Yarrow K., Haggard P., Heal R., Brown P., Rothwell J.C., (2001). Illusory perceptions of space and time preserve cross-saccadic perceptual continuity. *Nature*.

Parsons B.D., Novich S.D., Eagleman D.M. (2013). Motor-sensory temporal recalibration modulates perceived simultaneity of cross-modal events at different distances. *Frontiers in Psychology*.

Cravo A.M, Claessens P.M., Baldo M.V. (2011). The relation between action, predictability, and temporal contiguity in temporal binding. *Acta Psychologica*.

Shadmehr R., de Xivry J.J., Orban, Xu-Wilson M., Shih T.Y. (2010). Temporal discounting of reward and the cost of time in motor control. *Journal of Neuroscience*.

Morrone M.C., Ross J., Burr D.C. (2005). Saccadic eye movements cause compression of time as well as space. *Nature Neuroscience*.