

Elucidating the neural mechanism by which warnings reduce misinformation errors

Background

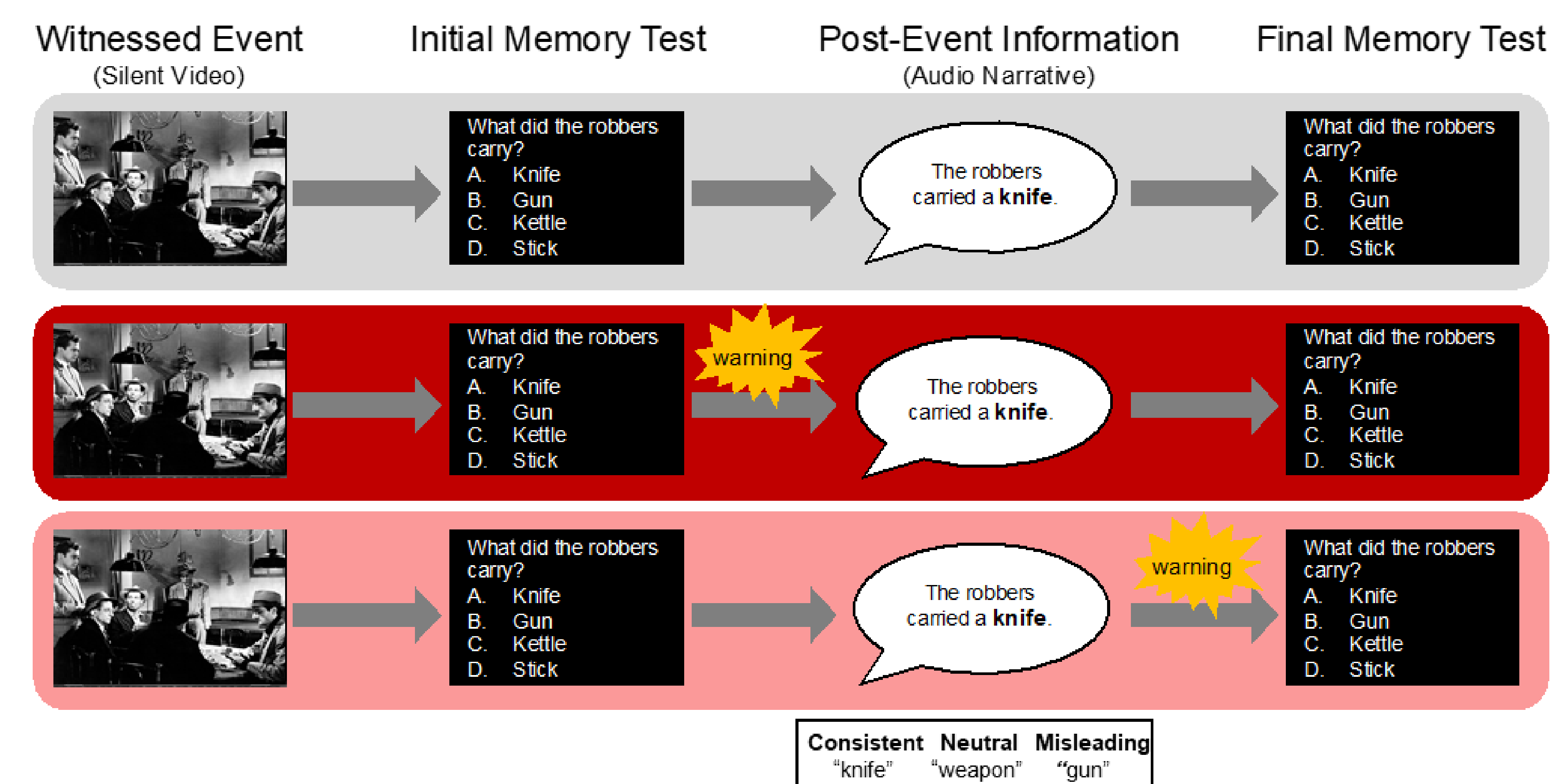
- Eyewitness memory can be distorted by post-event misinformation, and that misinformation effect can be influenced by repeated testing, i.e., Retrieval Enhanced Suggestibility (RES)
- Misinformation errors and RES can be reduced if witnesses are warned about potentially misleading post-event information (Thomas et al. 2010)
- The current study investigated whether warnings reduce misinformation errors by modulating reinstatement of accurate and misleading details during memory retrieval (Stark et al. 2010)
- Witnessed events are seen, while misinformation is heard.

Hypotheses

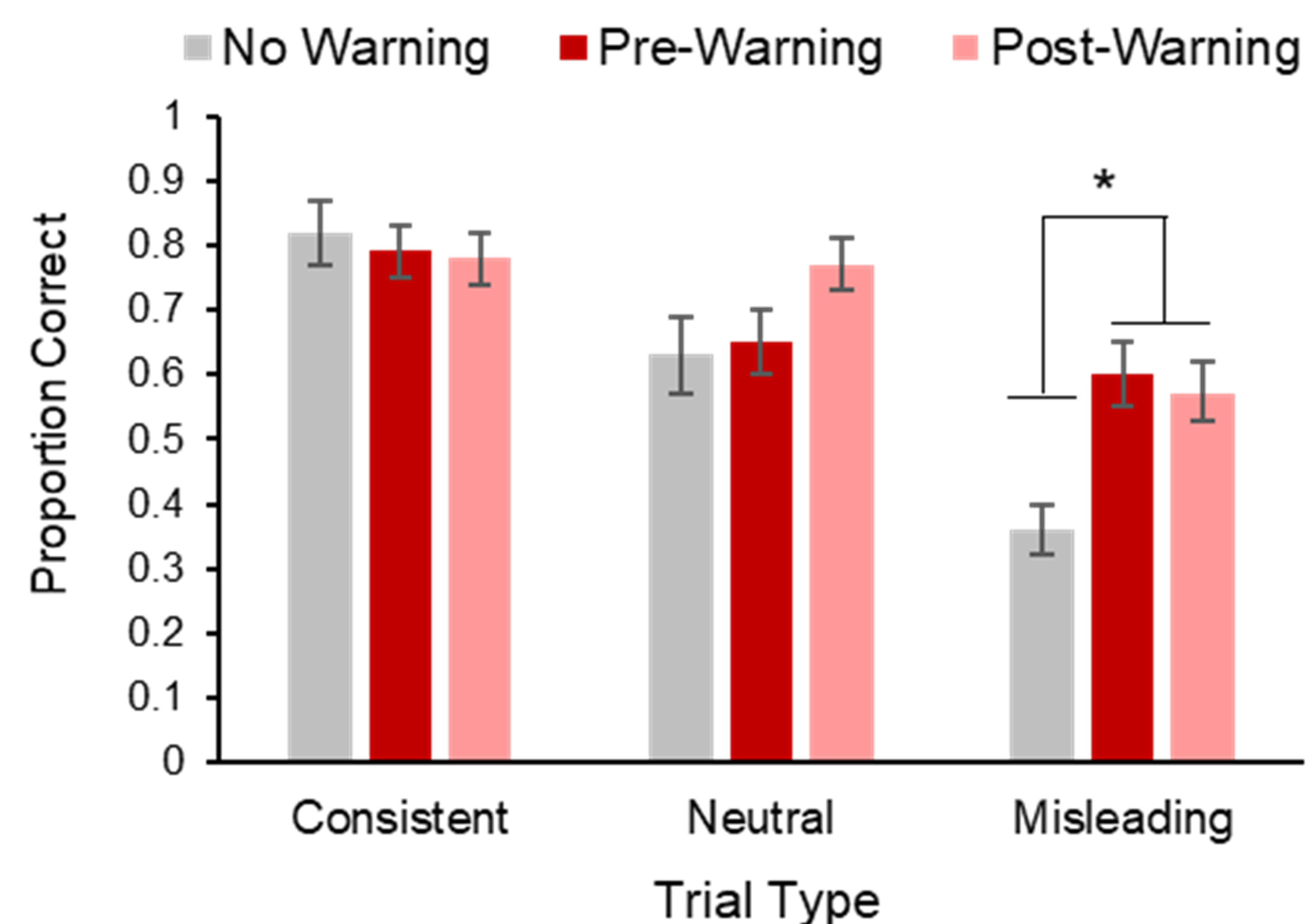
- Warning will be associated with increased reactivation of visual regions associated with initial encoding of the witnessed event
- Warnings will be associated with reduced reactivation of auditory regions associated with initial encoding of the misinformation

Paradigm

■ No Warning ■ Pre-Warning ■ Post-Warning



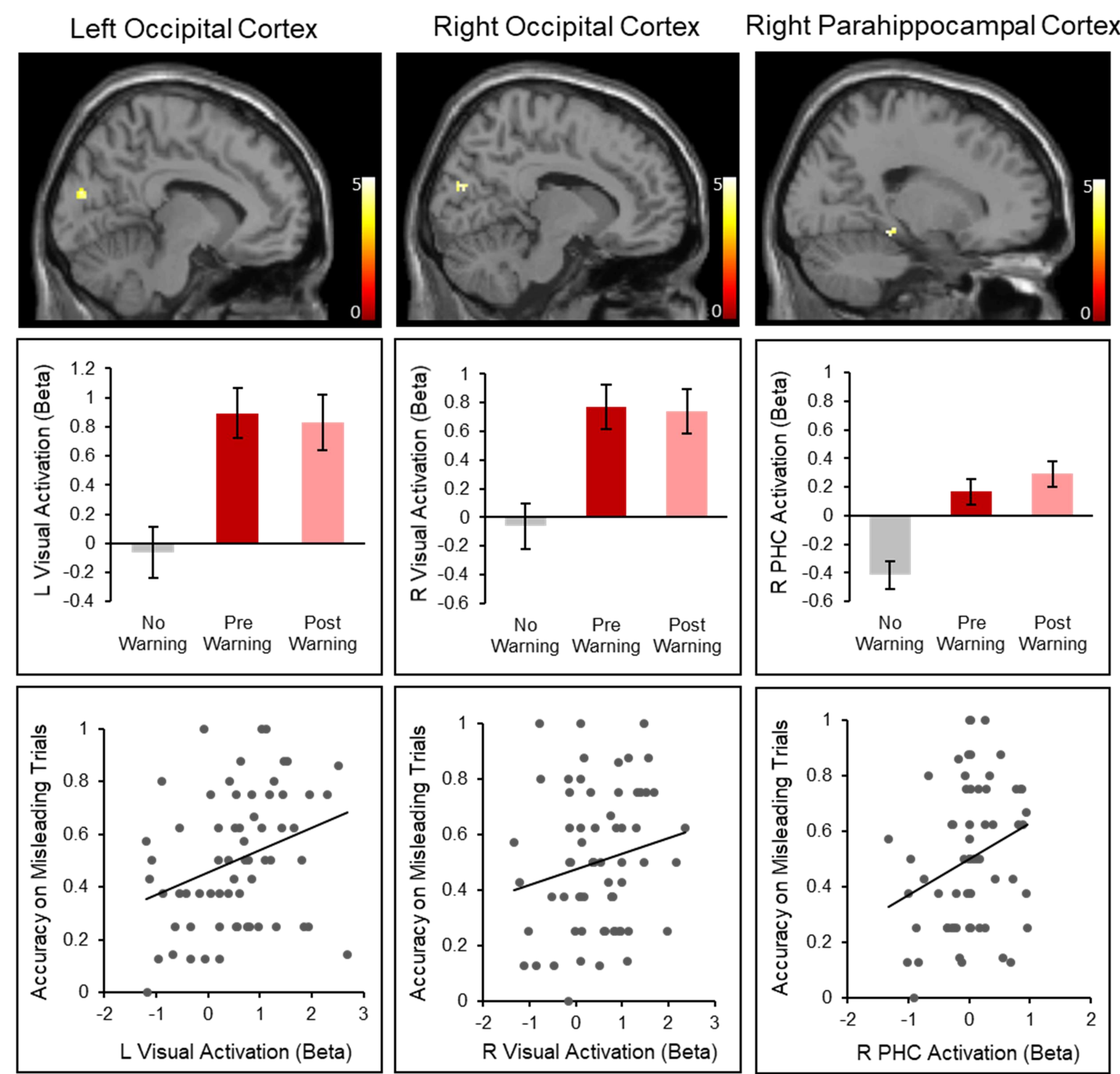
Behavioral Results



- Warning groups performed significantly better on misleading trials, as compared to the no-warning group

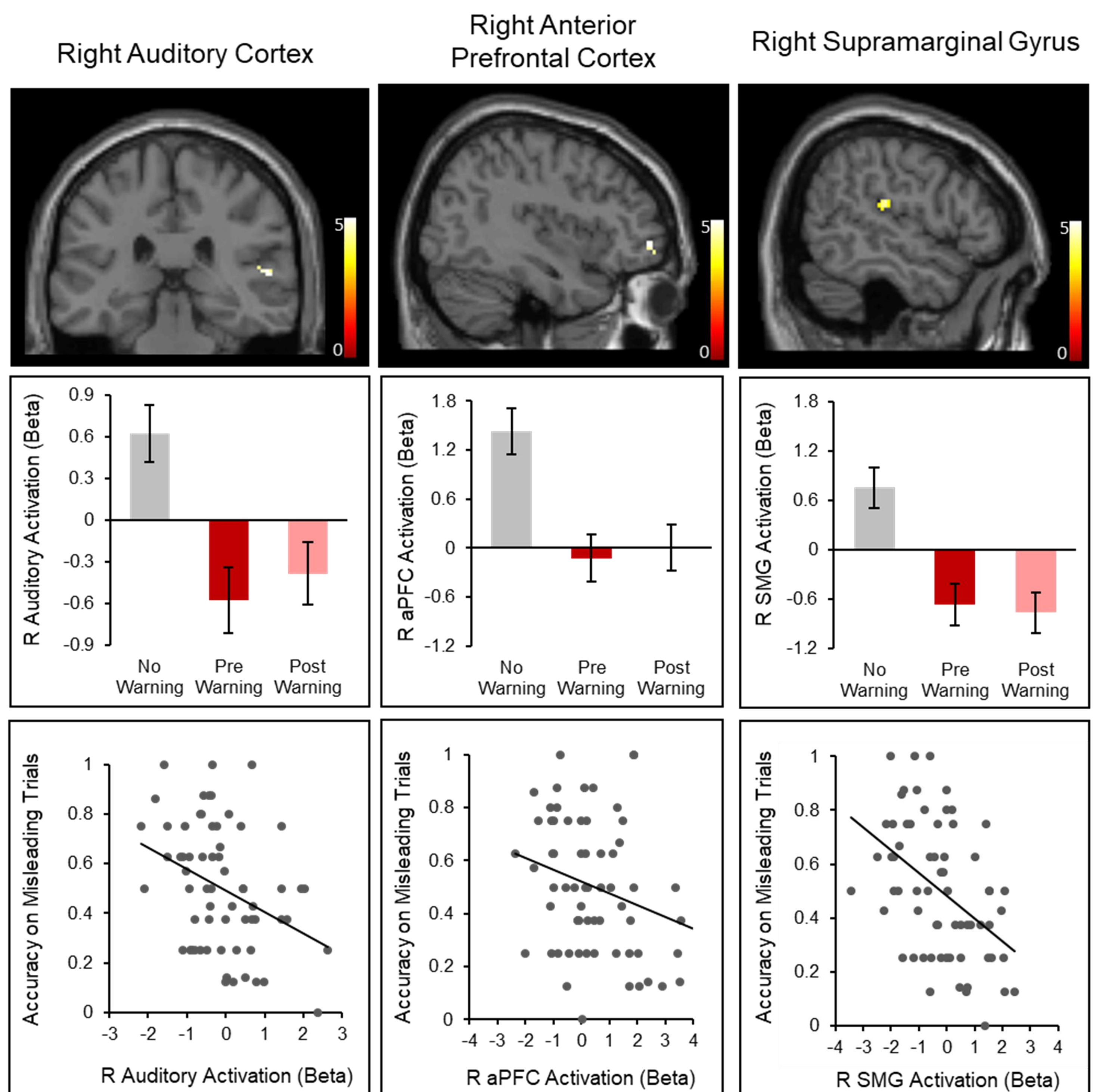
fMRI Results

Warnings Increase Activity in the Visual Regions & Parahippocampal Cortex During Memory Retrieval



- Greater activity in both warning groups (pre, post) during accurate memory (Hits > Misses)
- Activity positively correlates with memory performance on misleading trials

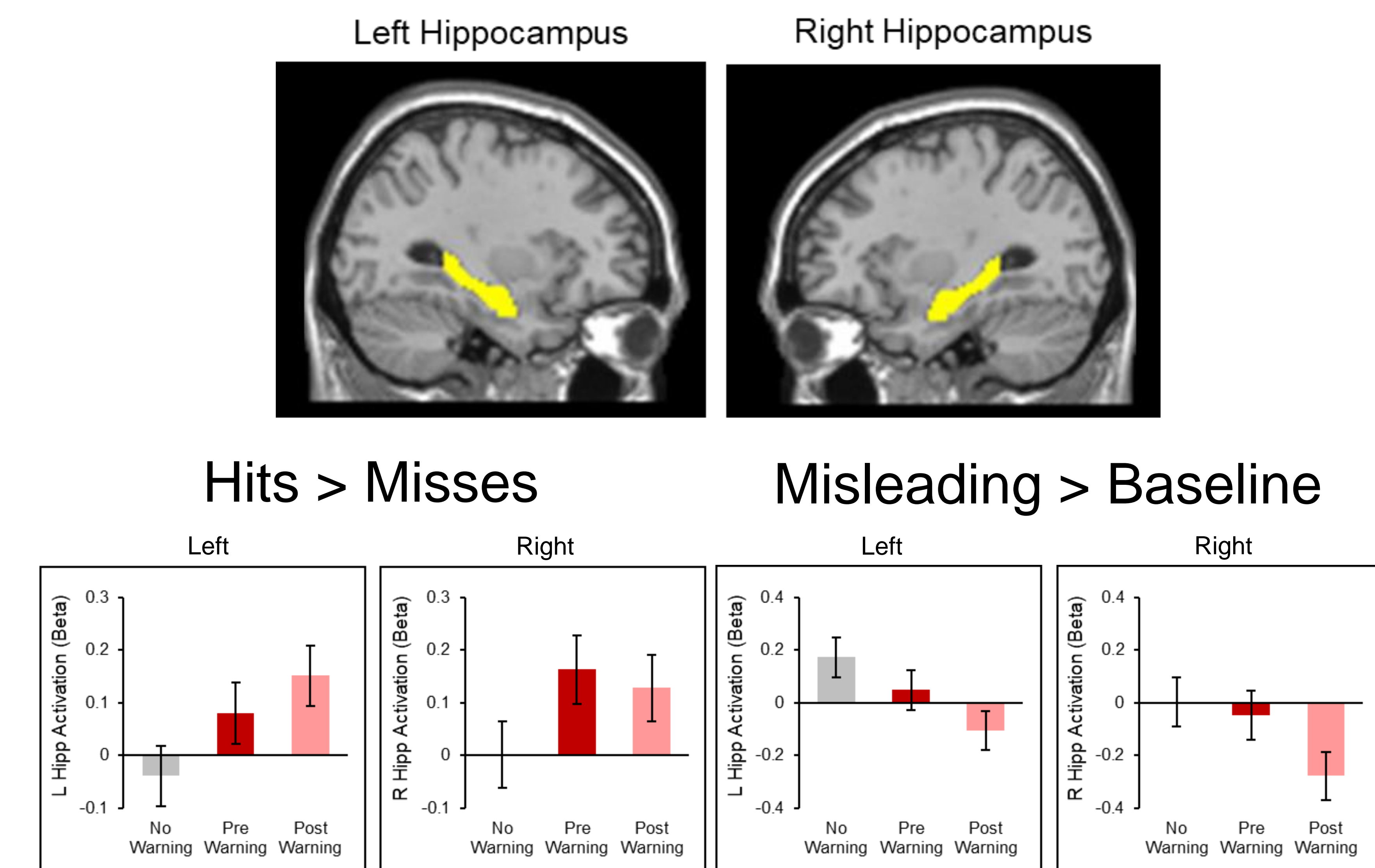
Warnings Decrease Activity in the Auditory Cortex During Memory Retrieval



- Reduced activity in both warning groups (pre, post) during misleading trials (Misleading > Baseline)
- Activity negatively correlates with memory performance on misleading trials

Effects of Warnings on Hippocampal Activity

- Warned participants demonstrated marginally greater hippocampal activity during accurate memory (Hits > Misses)
- Warned participants demonstrate marginally reduced hippocampal activity during misleading trials (Misleading > Baseline)



Discussion

- Both pre-warnings and post-warnings reduce memory errors due to misinformation.
Note: this effect was replicated outside the scanner as well
- Warnings increased reinstatement of sensory activity associated with original event details & decreased reinstatement of sensory activity associated with misleading post-event information
- The strength of the content-specific cortical reactivation in visual and auditory regions predicted behavioral performance and the susceptibility of memory to misinformation.
- While the present hippocampal results only approach significance, results align with prior observations that hippocampal activity during retrieval scales with cortical reinstatement (e.g., Gordon et al., 2016; Horner et al., 2015).
- **These findings reveal that warnings can protect memory from misinformation by modulating reconstructive processes at the time of memory retrieval and have important practical implications for improving the accuracy of eyewitness testimony as well as everyday memory reports.**

References

- Chan, J. C. K., Thomas, A. K., & Bulevich, J. B. (2009). Recalling a Witnessed Event Increases Eyewitness Suggestibility. *Psychological Science*, 20, 66-73.
- Gordon, A.M., Rissman, J., Kiani, R. & Wagner, A.D. (2014). Cortical reinstatement mediates the relationship between content-specific encoding activity and subsequent recollection decisions. *Cerebral Cortex*, 24, 3350-3364.
- Horner, A.J. Bisby, J.A. Bush, D., Lin, W.J., & Burgess, N. (2015) Evidence for holistic episodic recollection via hippocampal pattern completion. *Nature Communications*, 6, 7462.
- Stark, C. E. L., Okado, Y. & Loftus, E. F. (2010). Imagining the reconstruction of true and false memories using sensory reactivation and the misinformation paradigms. *Learning & Memory*, 17, 485-488.
- Thomas, A.K., Bulevich, J. B. & Chan, J.C.K. (2010). Testing promotes eyewitness accuracy with a warning: Implications for retrieval enhanced suggestibility. *Journal of Memory & Language*, 63, 149-157.
- Wulff, A., Karanian, J. M., Race, E., & Thomas, A. K. (2018). How warnings affect eyewitness memory in the presence of misinformation. Poster presented at the Psychonomics Society.