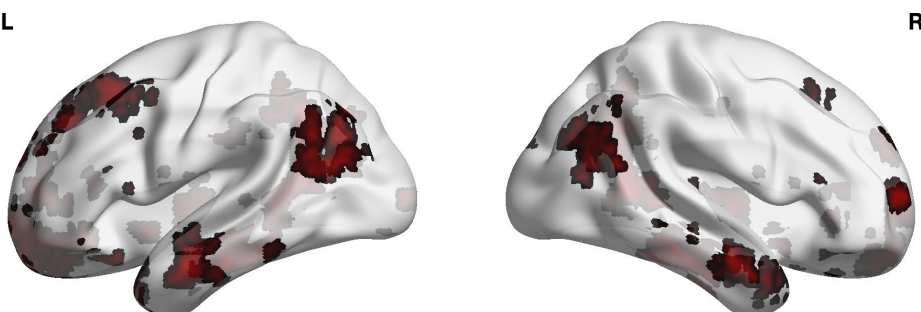


INTRODUCTION

- False memory refers to the distorted or inaccurate recollection of an event, or a memory of an event that happened.⁷
- The **Hippocampal-Cortical Network (HCN)** is a brain network that contributes to the consolidation, encoding and retrieval of memories.¹¹



- Research contributes false memories to HCN dysfunction, suggesting increased activity in the hippocampal dentate gyrus strengthens incorrect associations.^{6, 10}
- Repetitive TMS has shown to improve memory.¹¹
- The **cross-race effect** describes how people have more accurate recognition of same-race faces.¹²
- Previous research has shown implicit factors such as **pupil dilation** and **cross race effect/own-race bias** as predictive factors of false memories.⁴
- The extent that TMS influences false memories, its interaction with pupil dilation in relation to false memories, and its overall effect on pupil dilation remain unclear.
- Additionally, the role of demographics in shaping crime-based memories is not well understood.

RESEARCH QUESTION

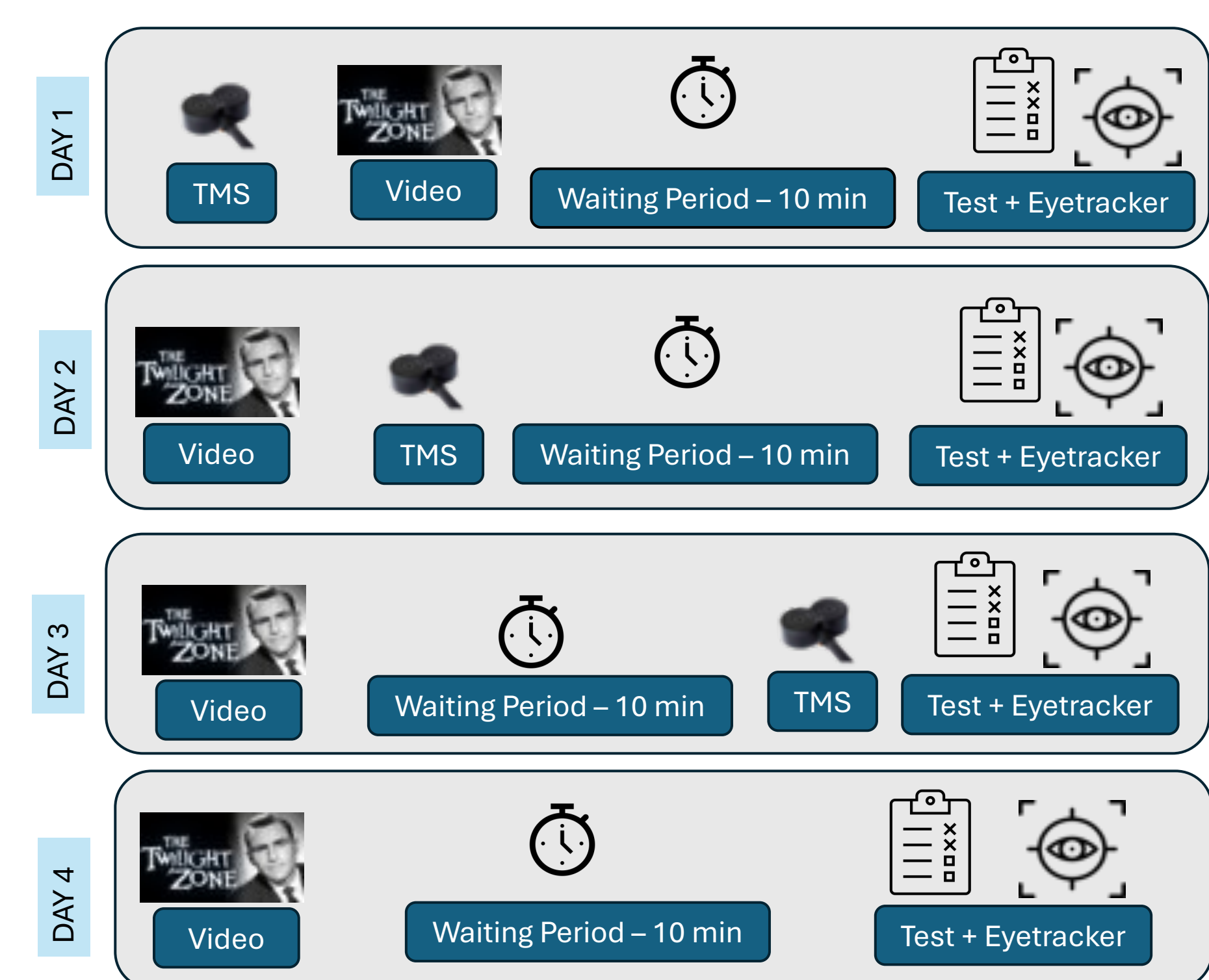
How do implicit factors (demographics and pupil dilation) influence the predictability of true, false, and incorrect memories in naturalistic settings, and what role does TMS play in modulating these memory processes?

HYPOTHESES

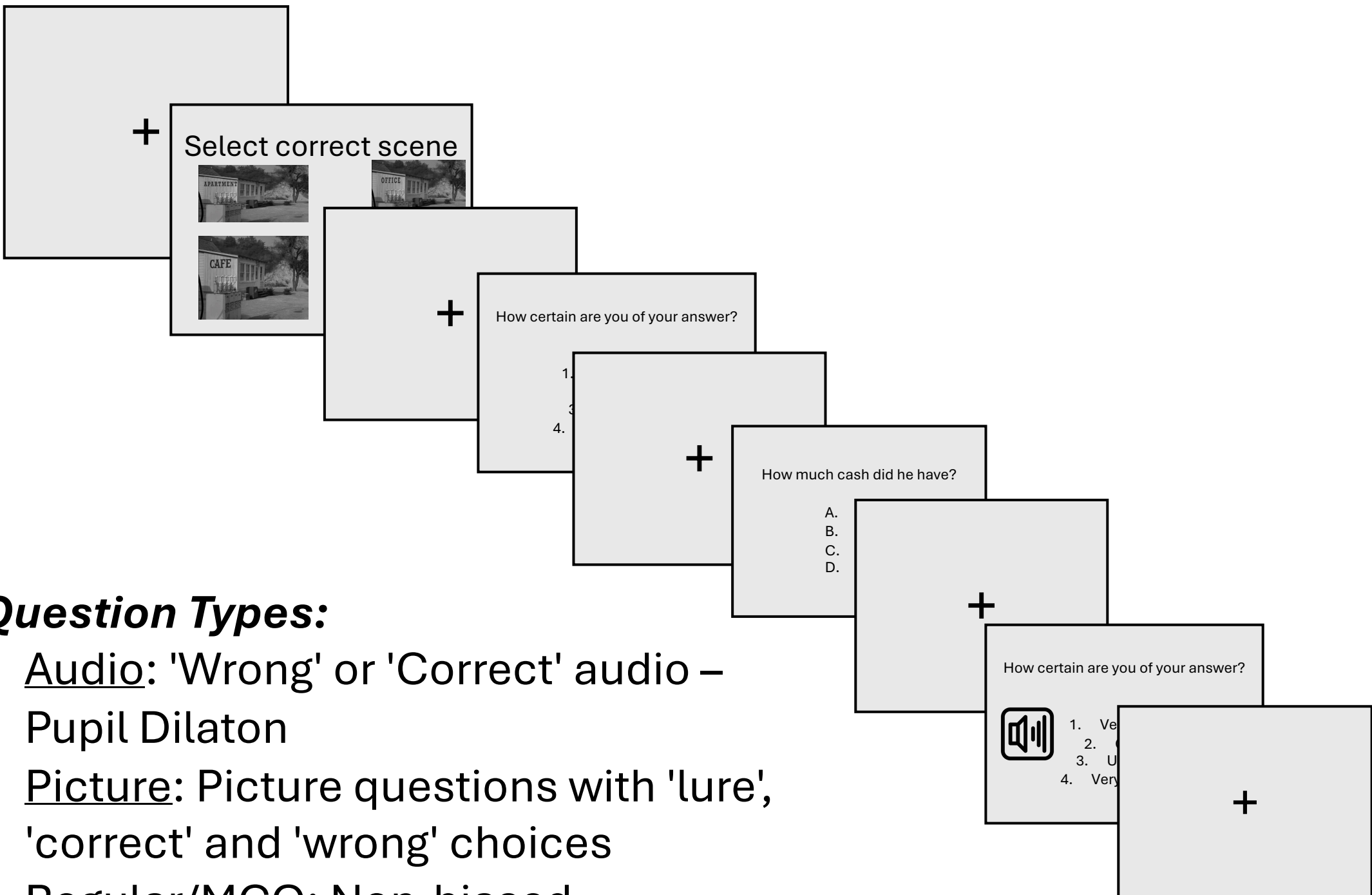
- Eye tracking will show that pupil dilation on lure questions will be higher than false but less than correct questions and enhanced by TMS.
- Own-race faces will more correctly answer personal identification questions compared to different-race faces.
- Stimulation of HCN will result in decreased false memory (lures) and increased correct memory.

TASK DESIGN

- Participants (N=20) will complete a within-subjects design involving 4 sessions (nonconsecutive days) at FSU.
- During each session subjects will complete a task where they view stimuli consistent of one video (~25 minutes) and a memory test consistent of 60 questions (20 regular, 20 audio, 20 picture) with eye tracking.



Test Design:



Question Types:

- Audio:** 'Wrong' or 'Correct' audio – Pupil Dilaton
- Picture:** Picture questions with 'lure', 'correct' and 'wrong' choices
- Regular/MCQ:** Non-biased questions with 'lure', 'correct' and 'wrong' choices.

- Continuous theta-burst (~45 sec) will be delivered at HCN either pre-stimuli, post-stimuli, pre-test, or not at all within the session (counterbalanced per session)
- Lures or wrong choices followed by high confidence levels (1 or 2) are considered "False Memories."

PILOTING DATA

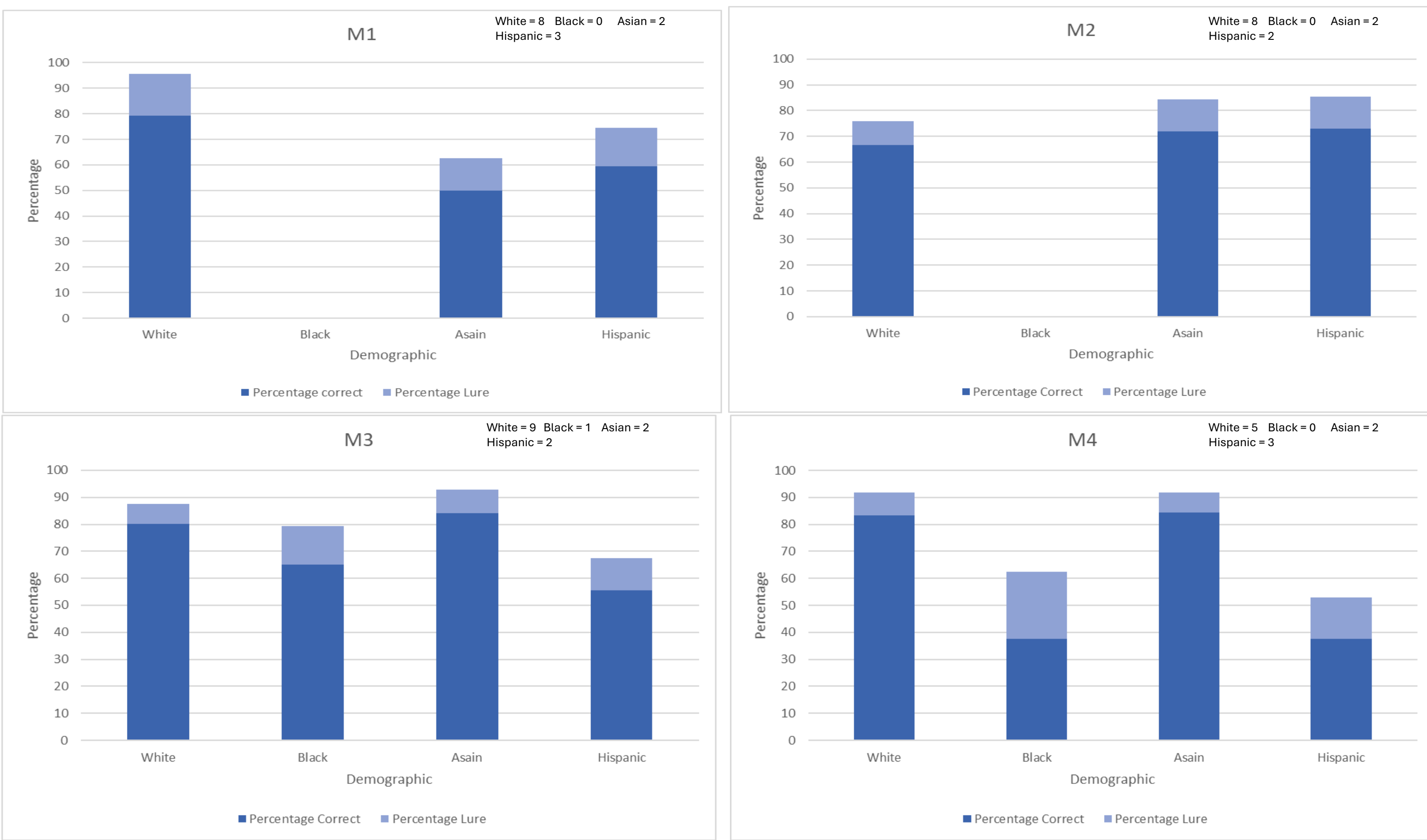
Piloting Task:

- Total participants (N ~ 17): White (N ~ 11), Black (N ~1), Hispanic (N ~ 3), Asian (N ~ 2).
- Completed a two-part task consistent of a video-encoding phase (1-4 videos; counterbalanced) and a test-recall phase.
- During the encoding phase, participants watched videos and identified perceived event boundaries.
- During the test-recall phase, participants:
 - Rated the difficulty of each question.
 - Provided their answer to the question.

Piloting Results:

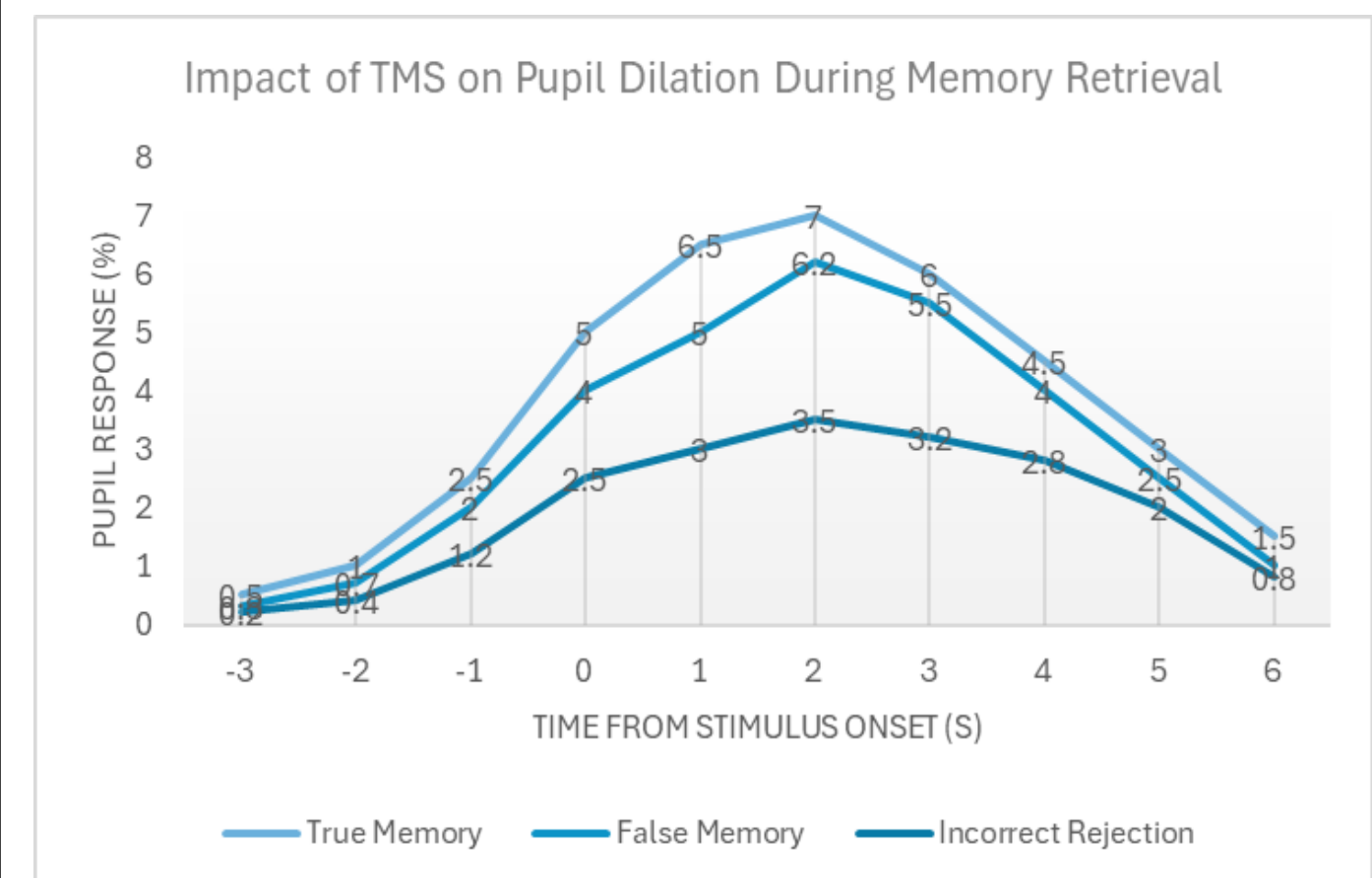
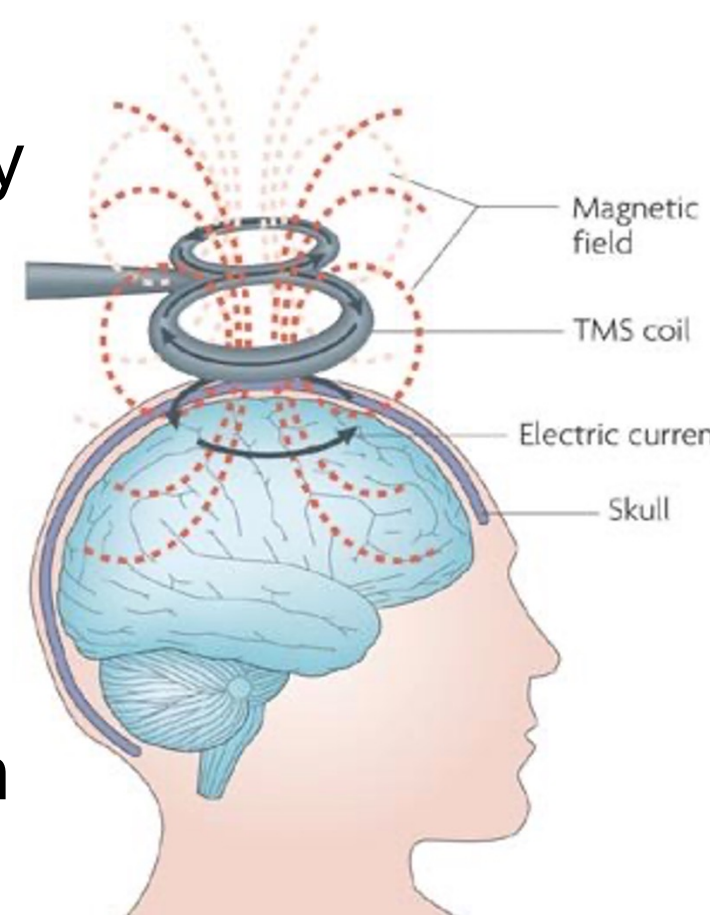
Performance accuracy (Percentage Correct and Percentage Lure) was assessed across demographic groups (White, Black, Asian, Hispanic) for each condition (M1-M4).

- Due to variability in sample sizes across groups -- statistical comparisons were not conducted.
- Visual inspection of the data does not reveal consistent trends or notable differences between demographic groups across conditions. Further analyses with larger and more balanced samples are necessary to draw meaningful conclusions.

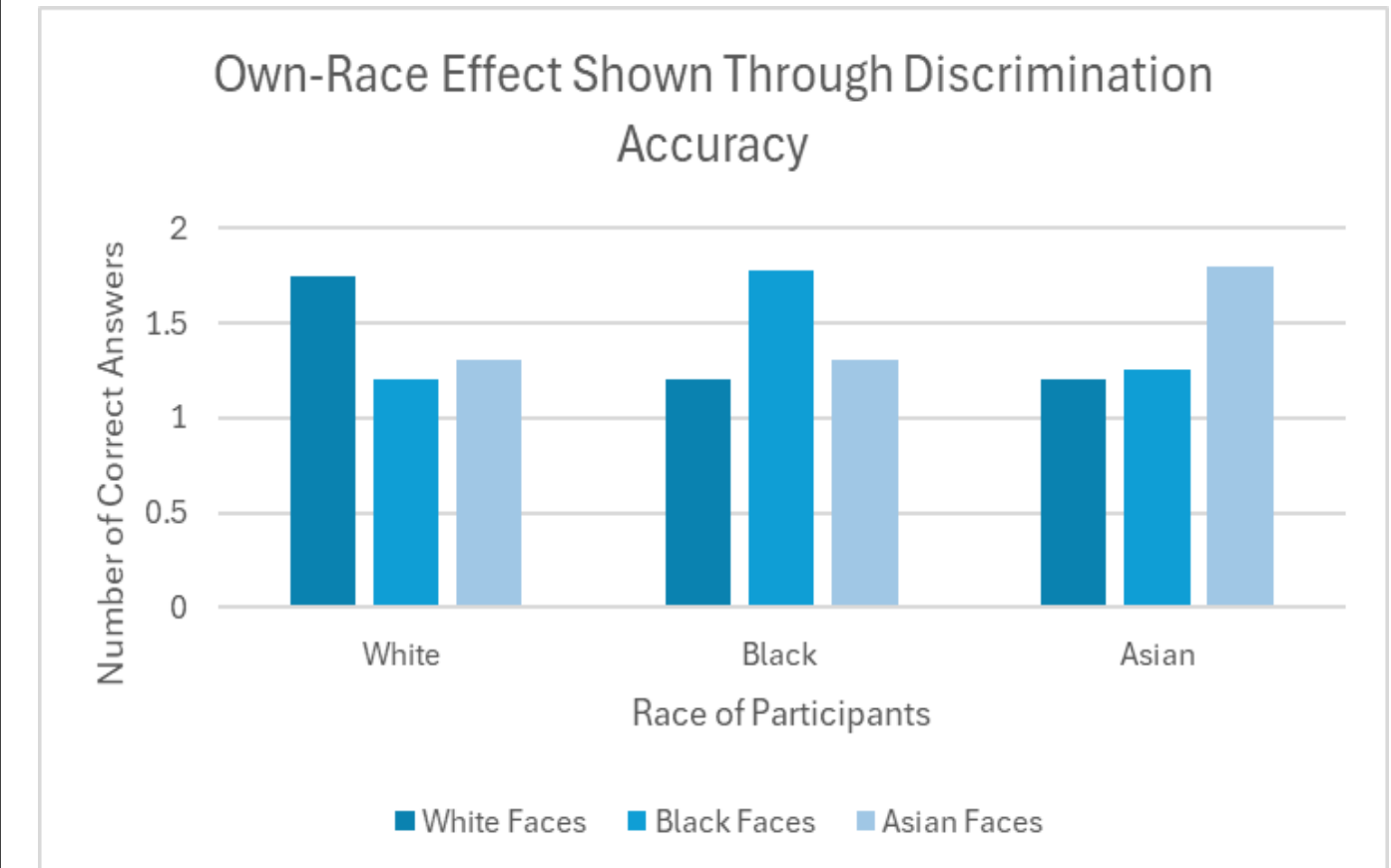


FUTURE DIRECTIONS

- Use Transcranial Magnetic Stimulation (TMS) on the HCN to influence activity during memory formation and determine whether continuous theta burst stimulation (cTBS)-patterned TMS enhances memory performance.¹¹
- Incorporate TMS and eye-tracking technology into the testing stage to see if TMS can improve how people remember events.
- Incorporate fMRI into the experiment, to observe brain activity during TMS application and its effects on false memory formation.
- Measure changes in neural activity along with memory distortion.
- Include more crime-based stimuli– potentially with virtual reality to test more immersive features.



- Highest dilation** for correctly remembered (true) memories
- Intermediate dilation** for false memories (lure questions)
- Lowest dilation** for incorrectly rejected (false negative) memories.



- Own-race faces will more correctly answer personal identification questions compared to different-race faces.

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