

Understanding memory through the lenses of imagination and familiarity

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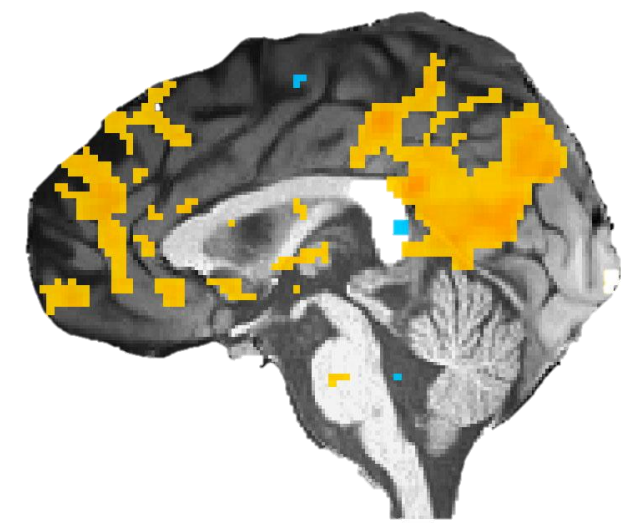
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Introduction

- **Memory and imagination are similar brain processes** and are strongly connected, especially through their association with the medial temporal lobe and broader hippocampal cortical network¹
- Memory can be broken down into episodic (personal) memory and semantic (factual) memory⁵
- Through the many shared brain regions, **imagination has been shown to be processed much like memory** is in the brain⁵
- The Self-Imagination Effect has shown that when individuals imagine scenes involving themselves, as opposed to other people, their subsequent memory performance is higher²
- Continually, the Enactment Effect is an important theory that suggests that **performing an action can strengthen the subsequent memory of the event⁴**



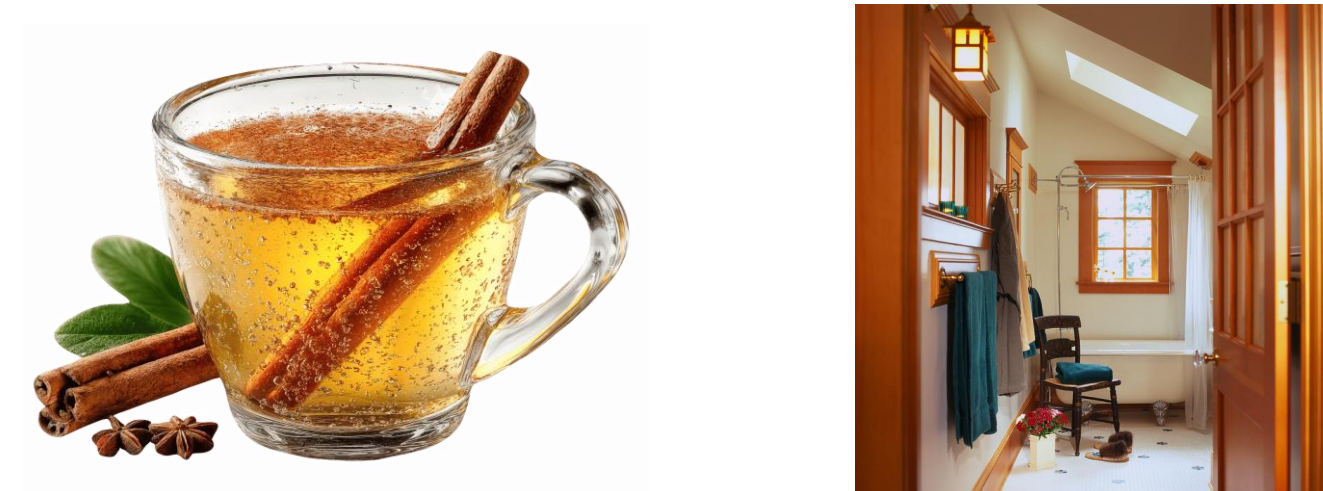
Methods

Healthy, young-adult participants (N = 24) completed the following stages of the task:

Study phase, which can be broken into two trial types:

First-Person Memory-Based

Participants are shown an object and a scene and are prompted to determine, using their memories, what action they would perform in the given scenario

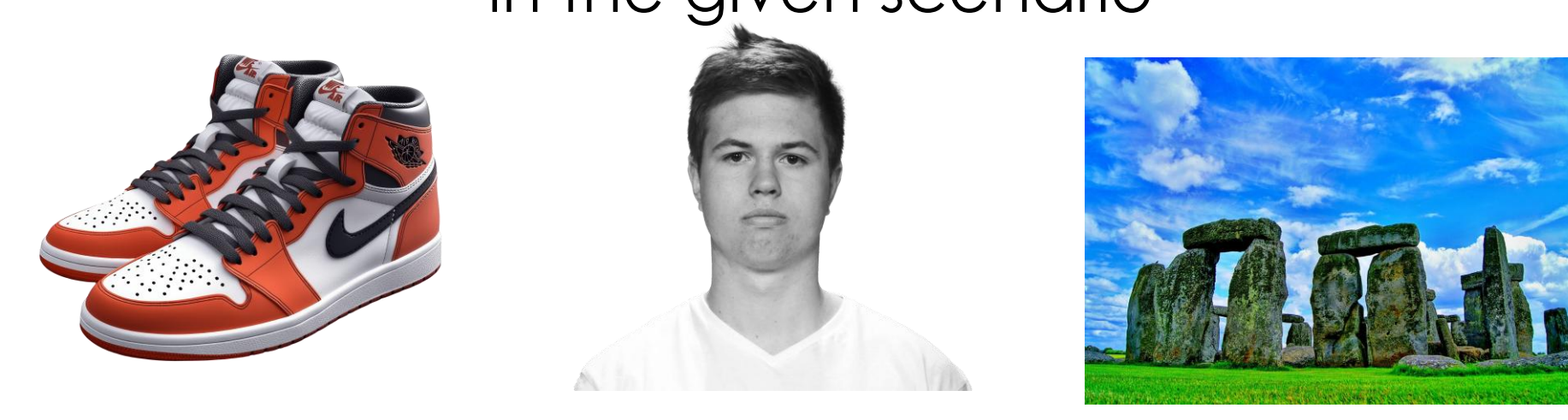


Drink Eat Try on Pick up

They are provided ten seconds to further strengthen their mental creation, and then are asked to rank the vividness

Third-Person Imagination-Based

Participants are shown an object, a scene and a stranger, and are asked to determine, using their imagination, what action the person would perform in the given scenario



Drink Eat Try on Pick up

They are provided ten seconds to further strengthen their mental creation, and then are asked to rank the vividness

Test Phase, which can be broken into two trial types:

Object Memory

- Participants are prompted with an object (either from the study or a lure) and asked whether they remember it, if its familiar, or if they think its new
- Participants must choose whether the object was from a personal or imagined memory
- They must correctly identify the scene (from 4 options)

Scene Memory

- Participants are prompted with a scene (either from the study or a lure) and asked whether they remember it, if its familiar, or if they think its new
- Participants must choose whether the object was from a personal or imagined memory
- They must correctly identify the action (from 4 options)

Conclusions

- **Our results contradicted the previous work, as well as our hypothesis**, and showed no significant increase in accuracy for memory-based trials
- We did see a **significantly higher increase in accuracy of scene memory compared to action memory**, which also contradicts previous work (the Enactment Effect) and our hypothesis
- Participants showed no stronger performance on trials they ranked as highly vivid, which could begin the conclusion that imagery vividness is not associated with later memory performance

Future Directions & Limitations

- Understanding what factors affect later memory performance can help us develop treatments for memory loss conditions
- In the future, having the participants physically perform their chosen action, could help us identify whether there is a significant difference between visualizing an action and performing it.
- Some participants completed a task with errors, where certain lures were shown in the study phase, which could affect memory performance

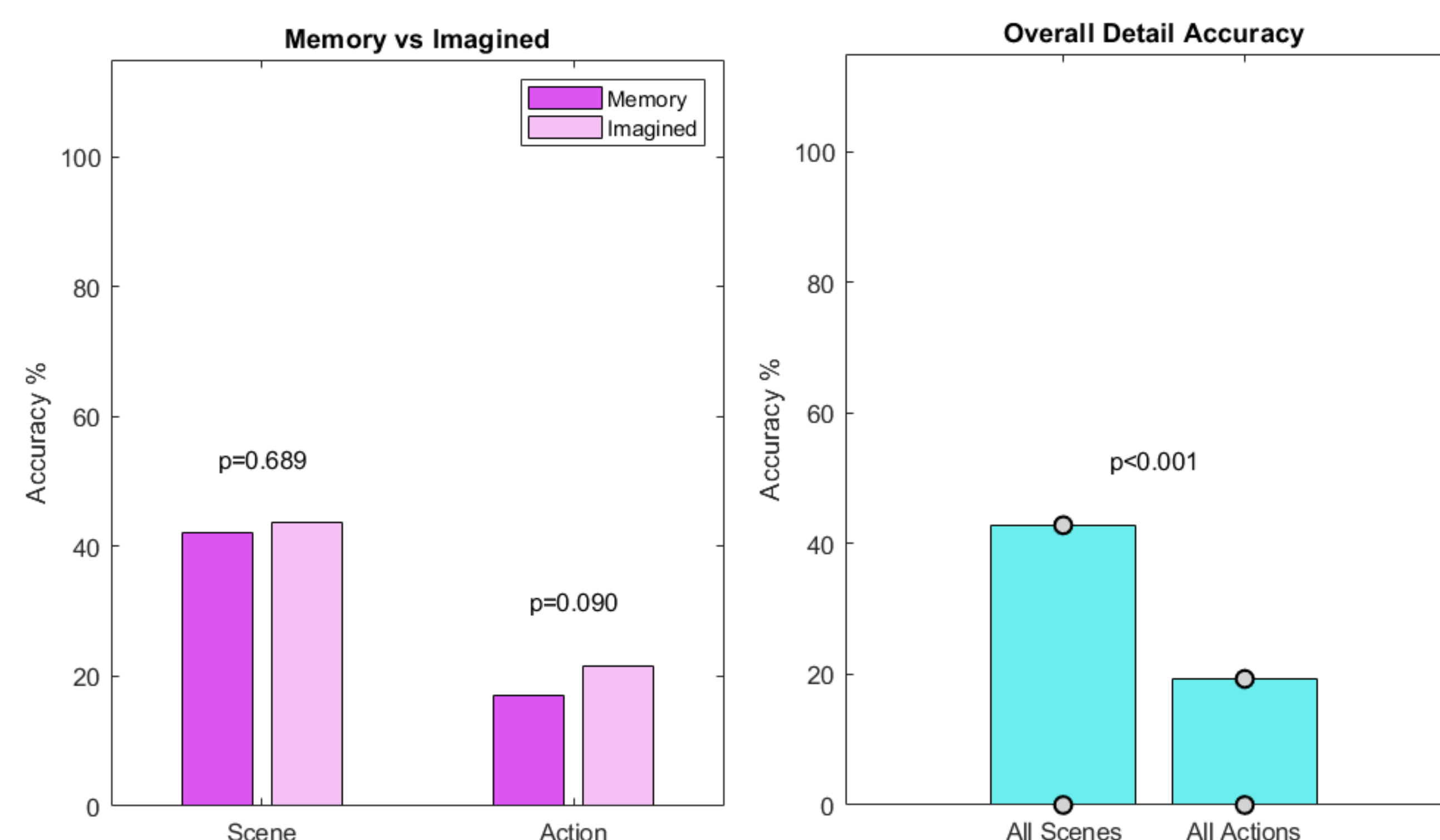
Research Question:

Do first-person memory-based creations show a significantly different recollection rate when compared to third-person imagination-based associations

Hypothesis:

Individuals will have the greatest memory of first-person memory-based creations, especially the action associated with it

Results



- Through paired t-tests, I analyzed whether memory- or imagination-based scenes produced better accuracy, though neither produced significant results ($p > .05$)
- Through another paired t-test, I analyzed the accuracy between all scene trials and all action trials which showed a statistically significant result ($p = <0.001$)
- There were no significant associations between how vivid they ranked a mental creation and their later accuracy

References

1. Cowan (2008). *Progress in Brain Research*
2. Grilli & Glisky (2013). *Clinical Psychological Science*
3. Roberts et al. (2022). *Psychological bulletin*
4. Schacter et al. (2012). *Neuron*
5. Tulving (1987). *Human Neurobiology*