

# Differentiation of Episodic Memories for Natural Scene Images Revealed by Natural Language Processing Methods

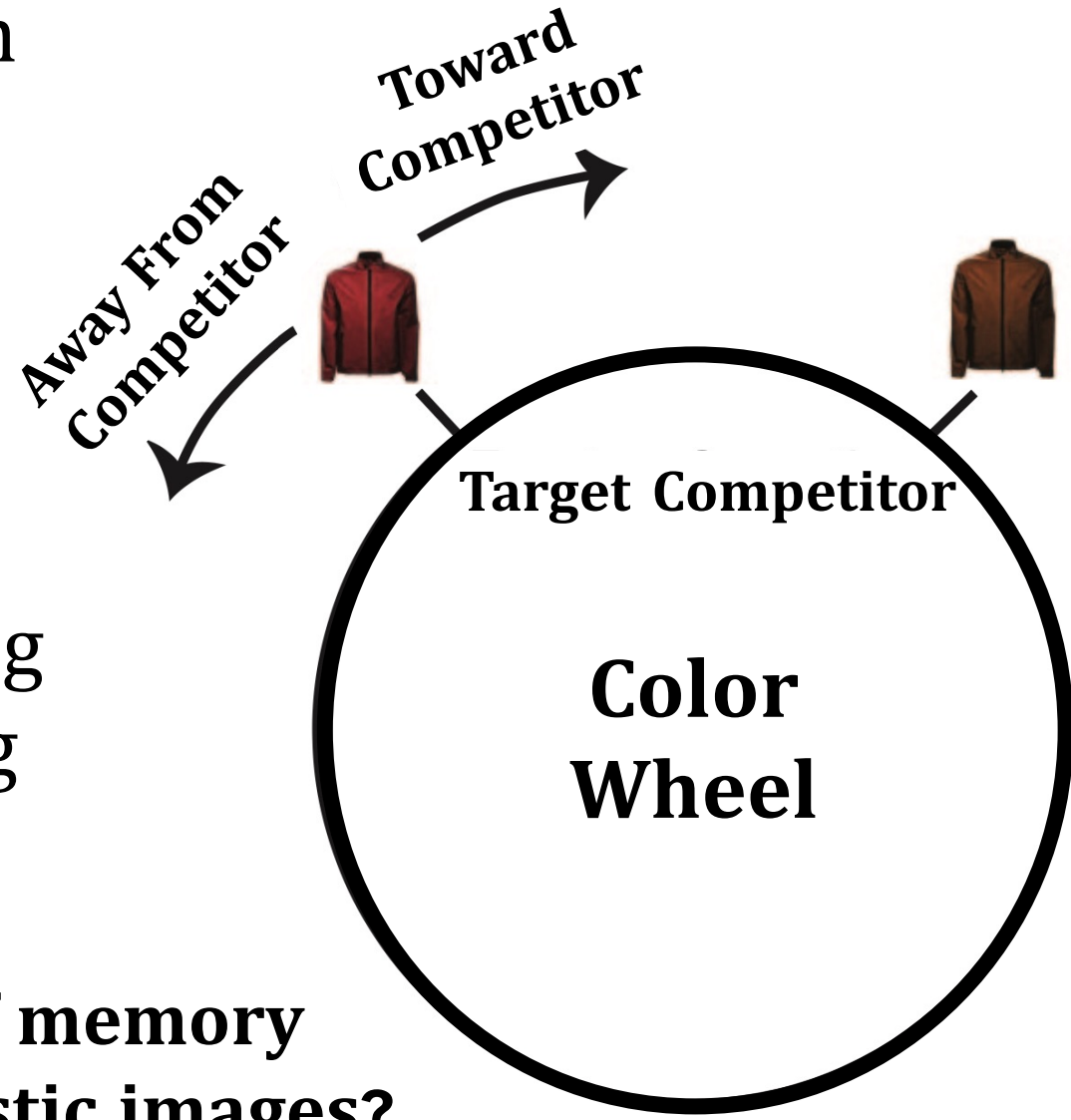
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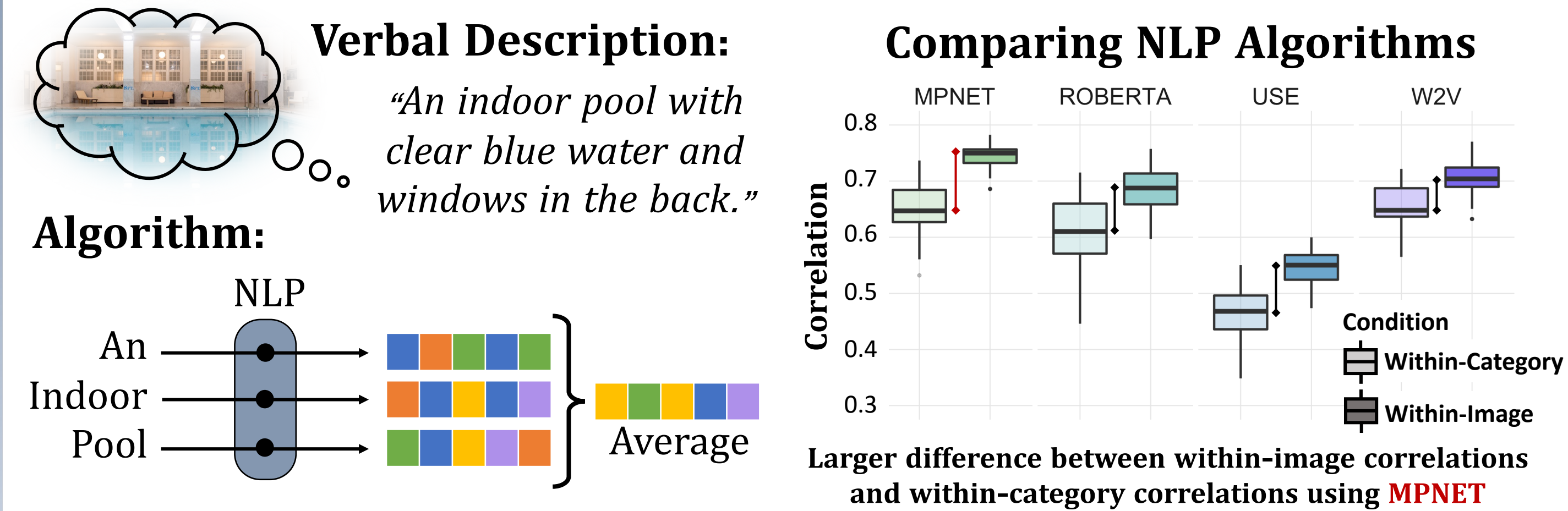
## Background

- ❖ Memory similarity results in competition and interference-related forgetting
- ❖ With practice, the contents of similar memories can change to exaggerate differences<sup>1,2,3</sup>
- ❖ Competition-induced differentiation of memory content has been observed using controlled stimuli and targeted reporting procedures (e.g., color wheel)

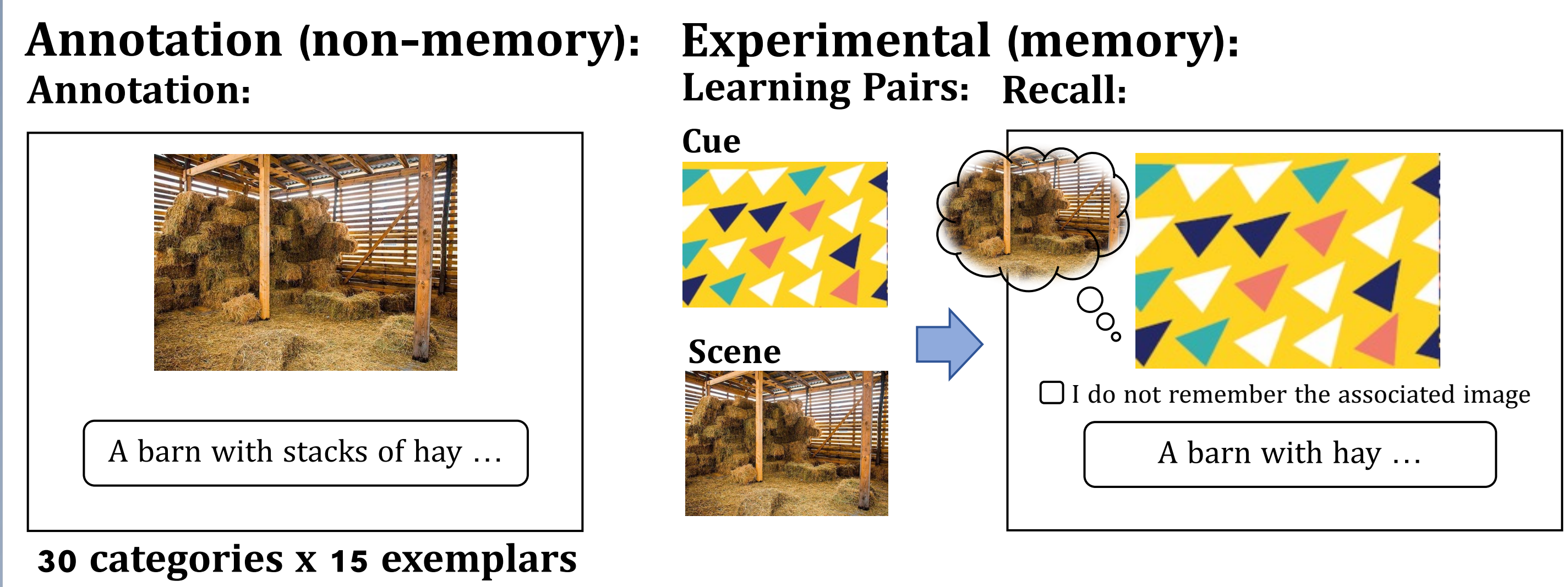


Does competition-induced differentiation of memory content occur when verbally recalling naturalistic images?

## Natural Language Processing



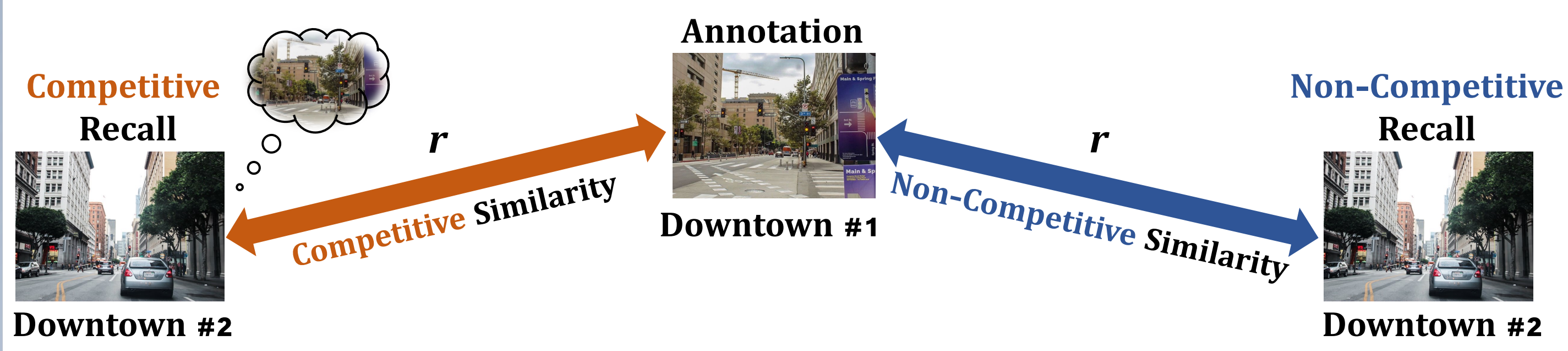
## Pilot Experiment



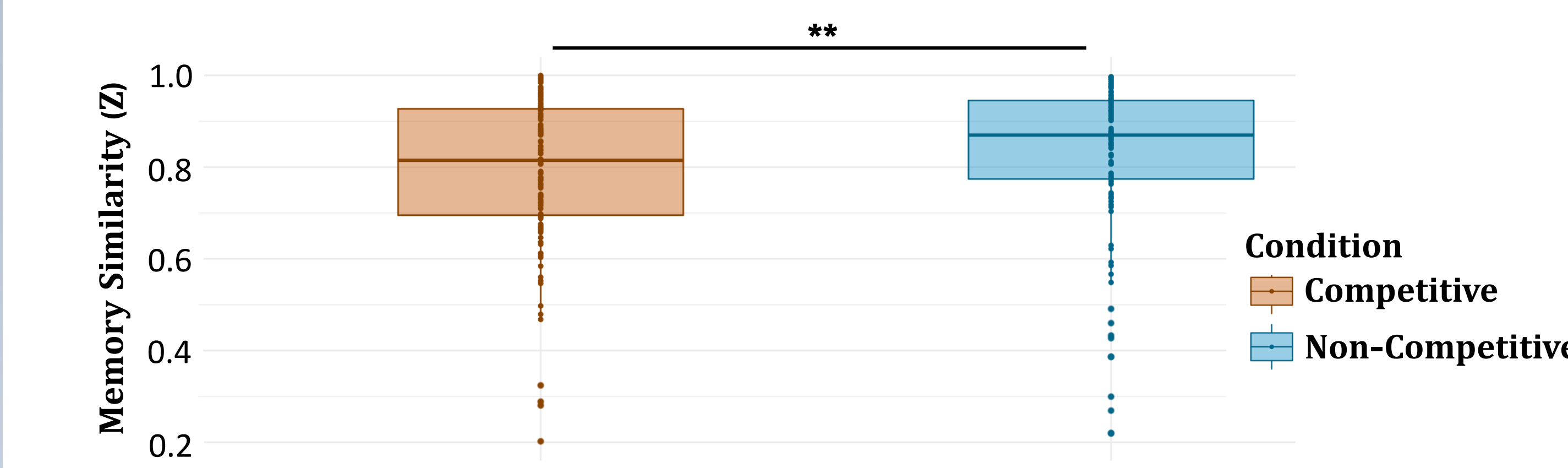
### Experimental Conditions:



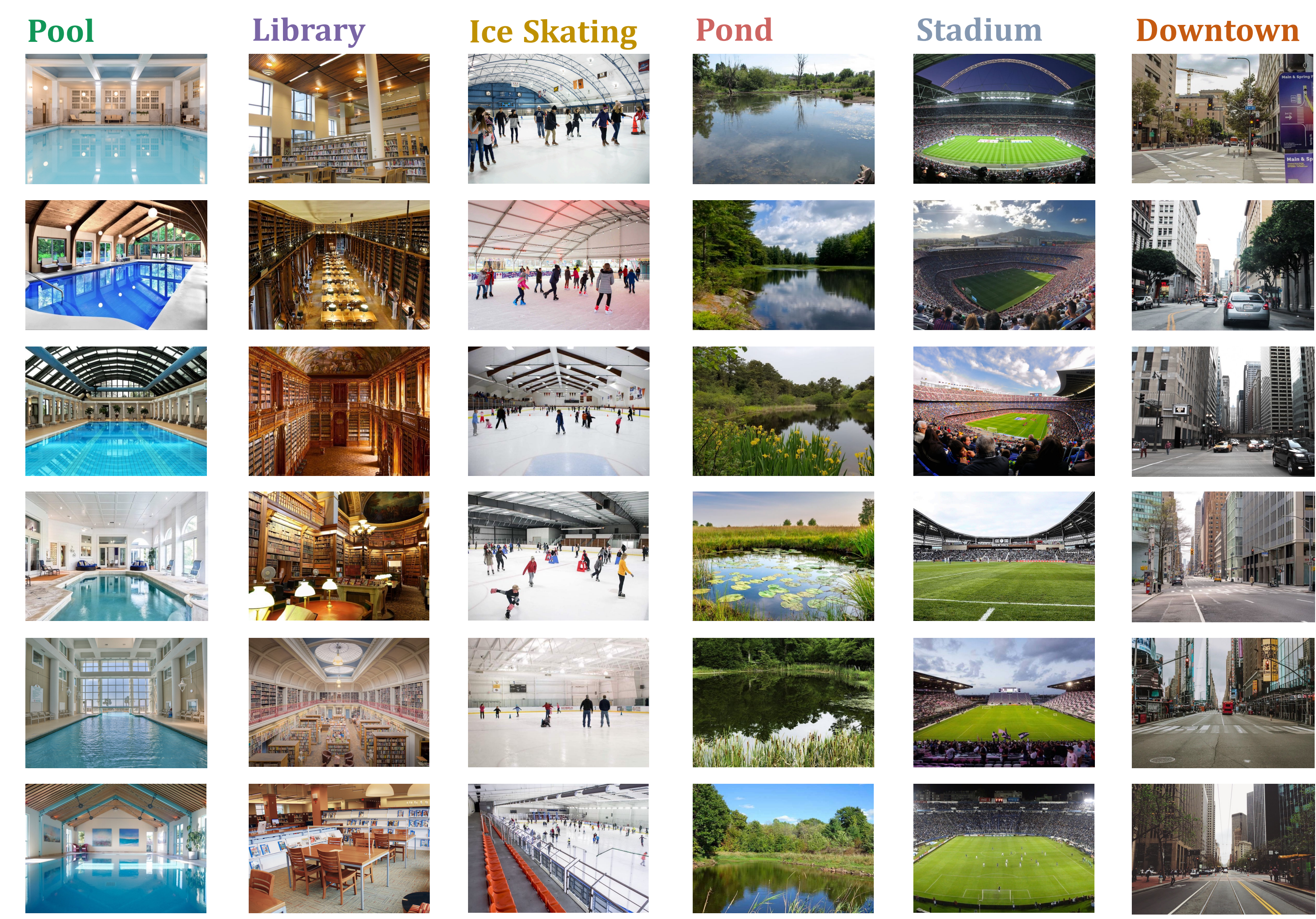
### Measuring Memory Similarity:



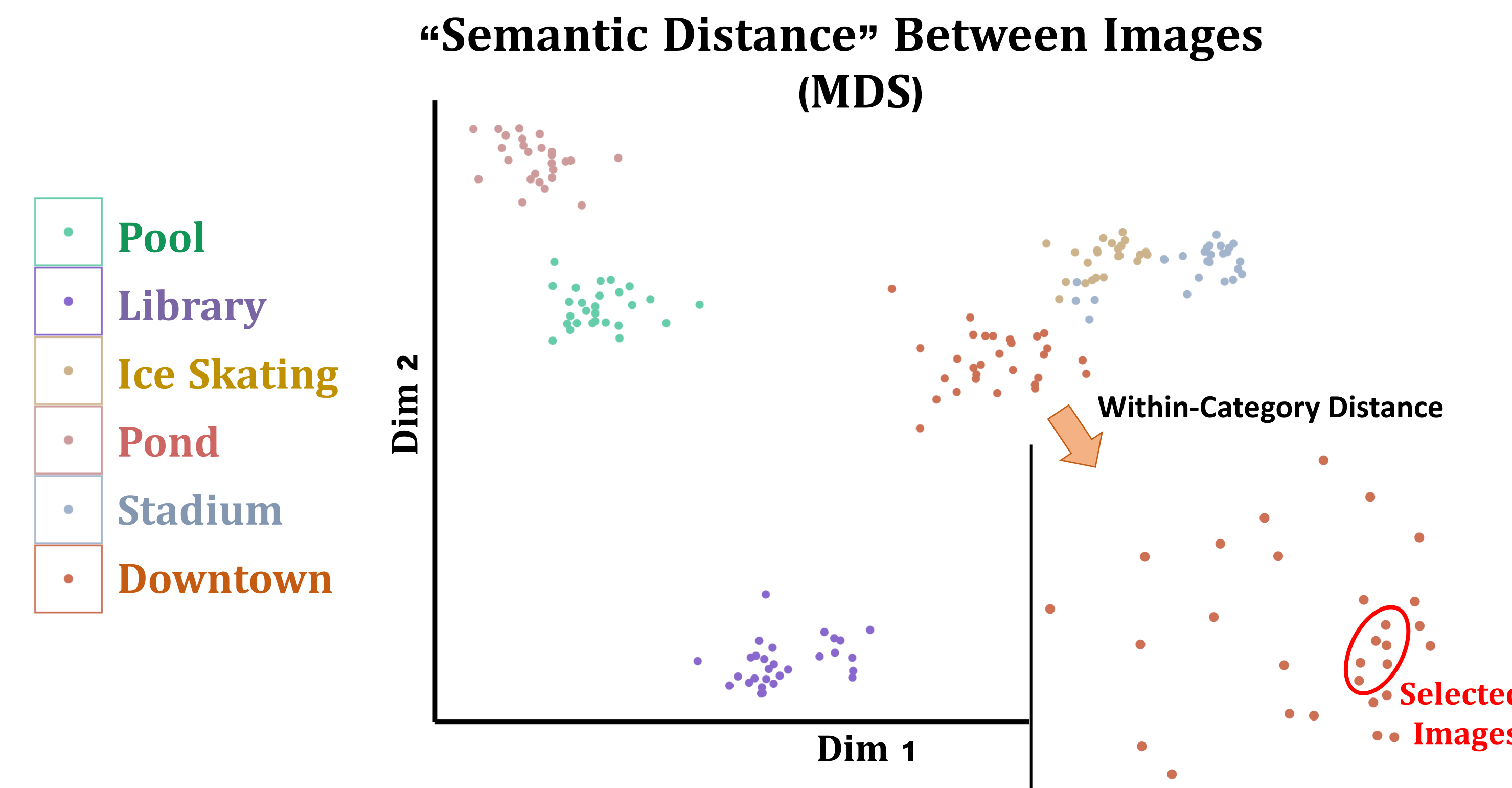
### Competition Reduced Memory Similarity



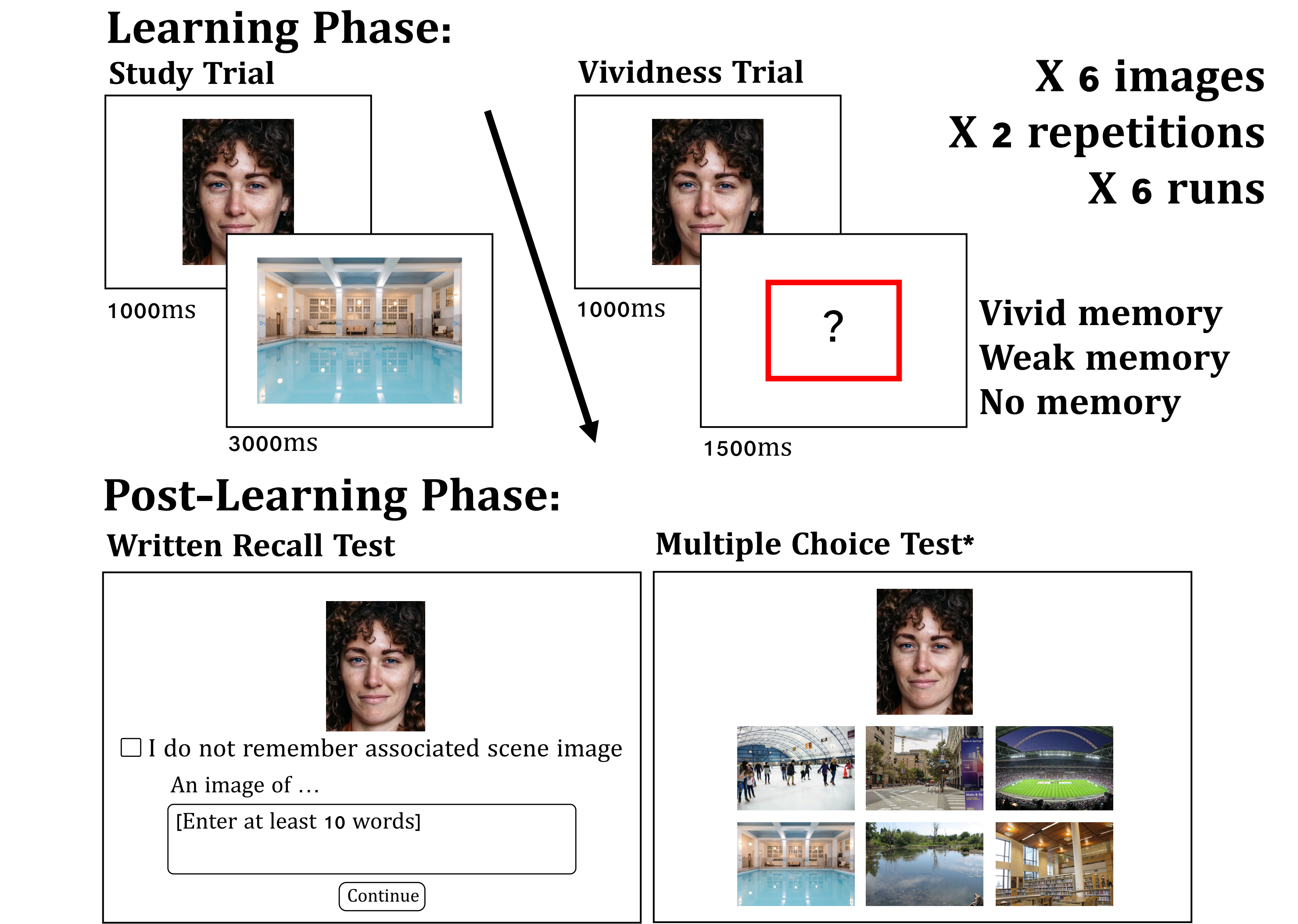
## Stimuli



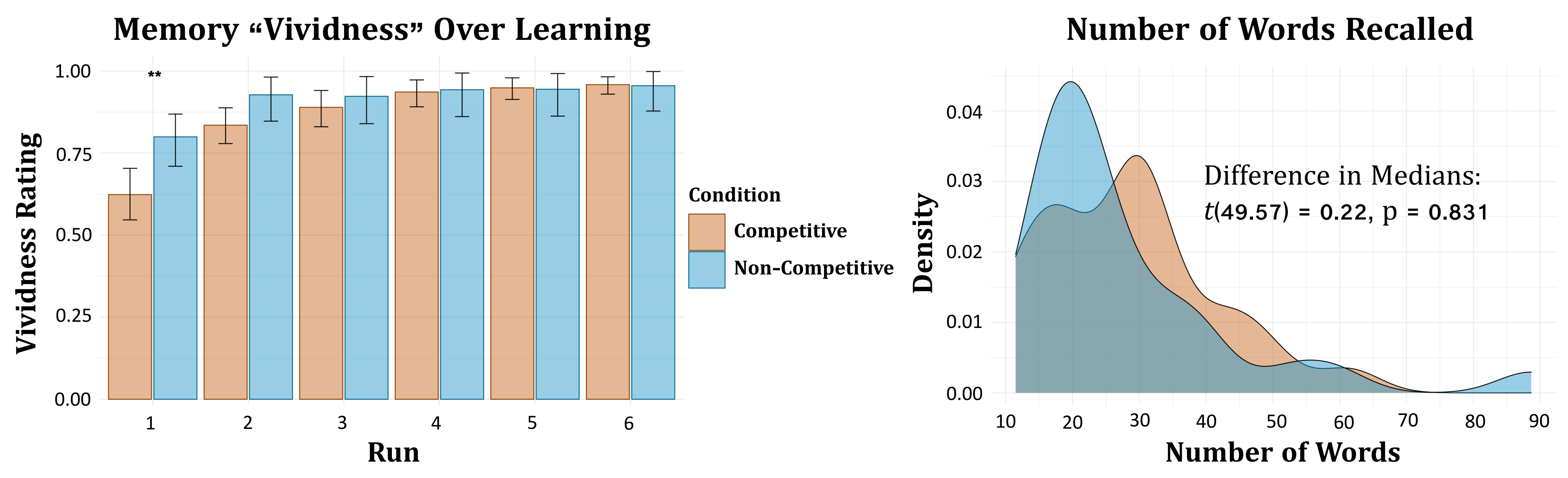
Column: Competitive Condition  
Row: Non-Competitive Condition



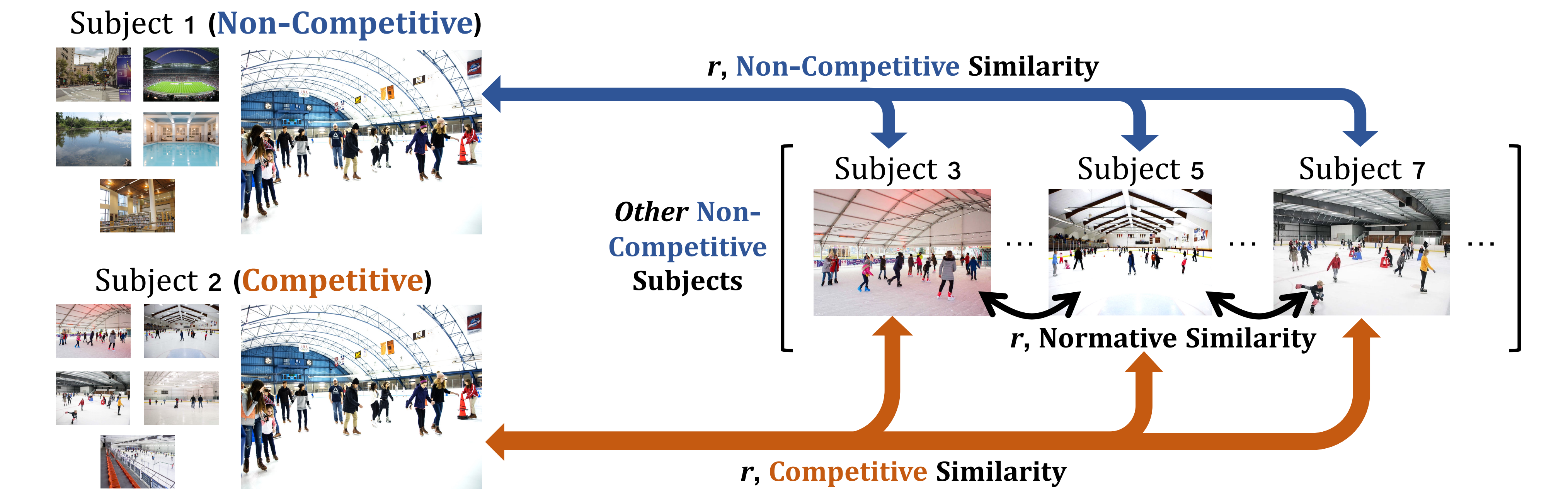
## Paradigm (Current N = 53, Planned N = 120)



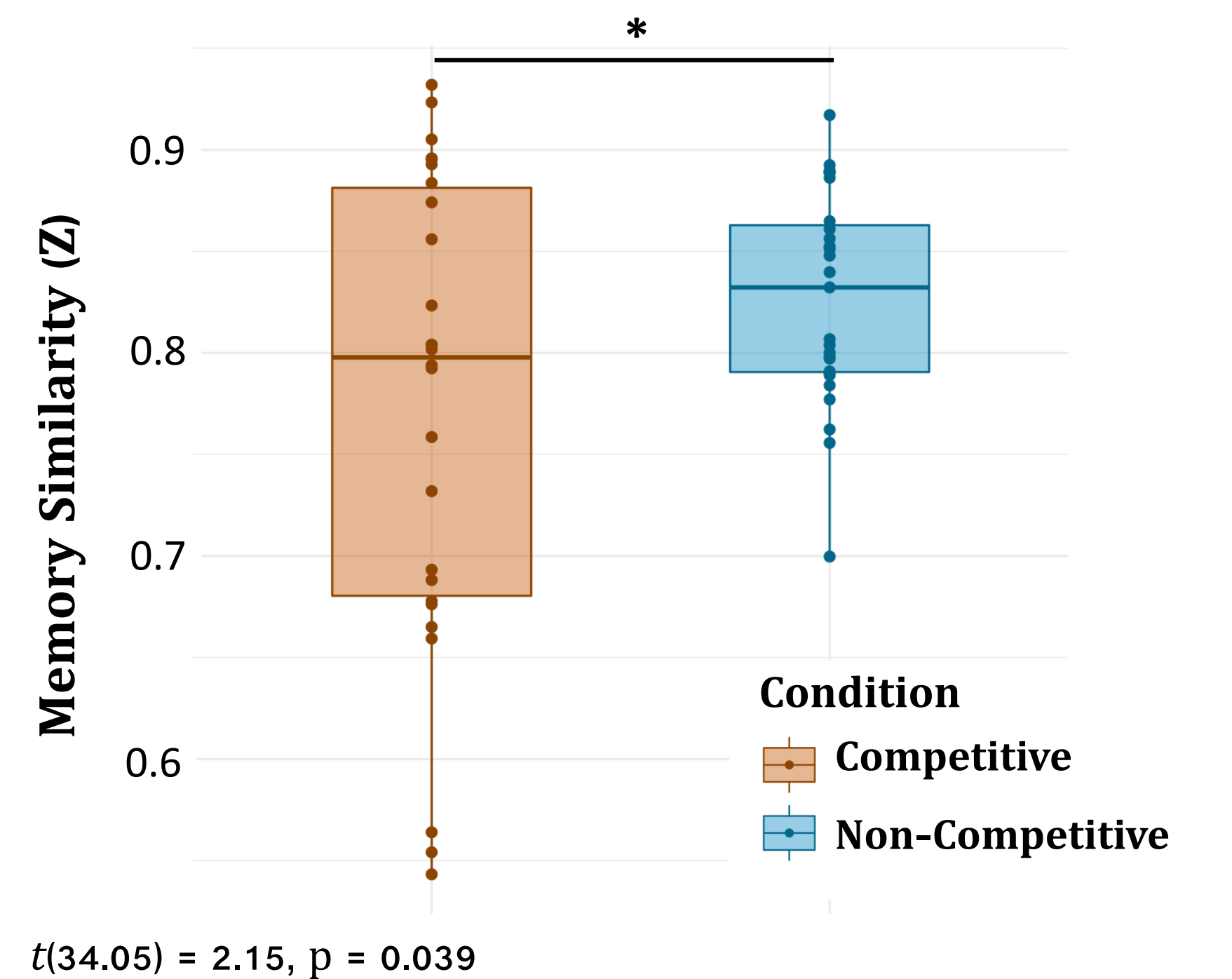
## Results



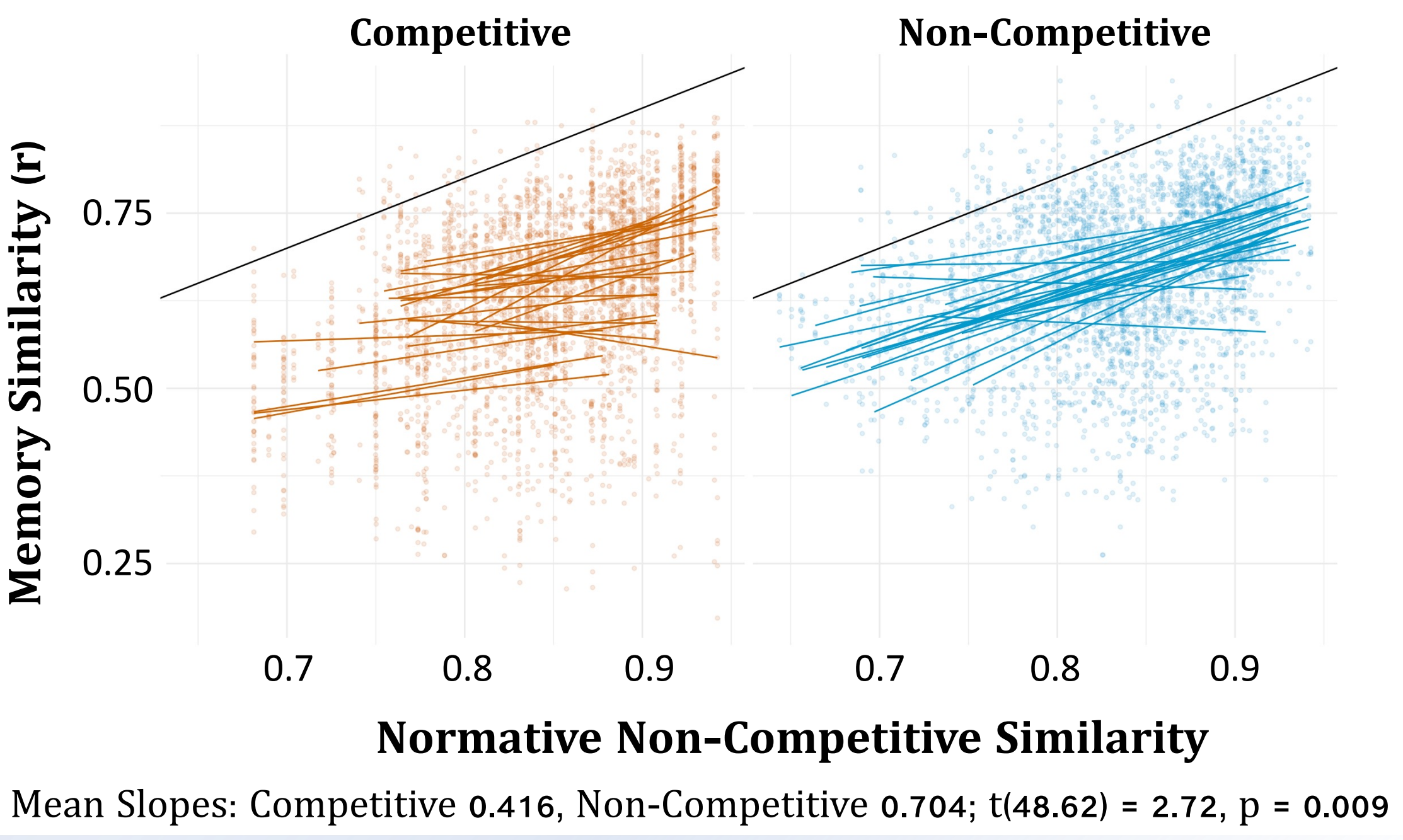
### Measuring Memory Similarity:



### Competition Reduces Memory Similarity



### Memory Similarity as a Function of Normative Non-Competitive Similarity



## Summary

- ❖ Competition between similar memories drives verbal descriptions apart (differentiation) in semantic space
- ❖ Opposite to an interference effect
- ❖ Differentiation increases as a function of memory similarity
- ❖ Natural Language Processing (NLP) can be used to quantify overlap in memories for complex, naturalistic stimuli
- ❖ Future work will test whether differentiation in the semantic content of memories relates to differentiation of hippocampal activity patterns<sup>1,2,3,4,5</sup> and/or content representations in parietal cortex<sup>3</sup>

## References

[1] Chanaleas AJH, Tremblay-McGaw AG, Drascher ML, Kuhl BA. Psychol Sci. 2021 May;32(5):705-720. [2] Drascher ML, Kuhl BA. Psychon Bull Rev. 2022 Oct;29(5):1898-1912. [3] Zhao Y, Chanaleas AJH, Kuhl BA. J Neurosci. 2021 Mar 31;41(13):3014-3024. [4] Hulbert JC, Norman KA. Cereb Cortex. 2015 Oct;25(10):3994-4008. [5] Wammes J, Norman KA, Turk-Browne N. Elife. 2022 Jan 6;11:e68344. Funding: NIH-NINDS 1R01 NS107727, NIH-NINDS 2R01 NS089729