Neural Representation of Relational Memory Types

Mnemology Lab

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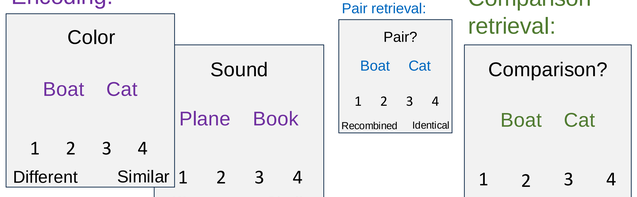
INTRODUCTION

- Semantic relations between concepts are encoded based on distinctions between the relationships themselves, not on the concepts involved.
- The inferior parietal lobe (IPL) – particularly the angular gyrus – forms a convergence zone enabling the formation of abstract representations of perceptual experiences.
- It is not understood ***how*** semantic relationships between objects are encoded in the brain.

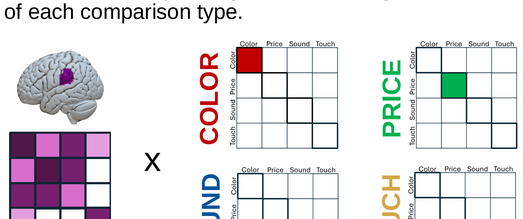
TASK DESIGN

- Research question: **How do we represent different *types* of relational memory?**
- Participants: 21 young adults (13 female), 4 older adults (2 female)
- **Encoding**: Rating the similarity of 2 objects based on one of four comparison types – Color, Price, Sound, or Touch.
- **Pair retrieval** (*not analyzed*): Recalling whether 2 objects had been paired together during encoding.
- **Comparison retrieval**: If 2 objects had truly been paired together, recalling which comparison type had been used.



METHODS

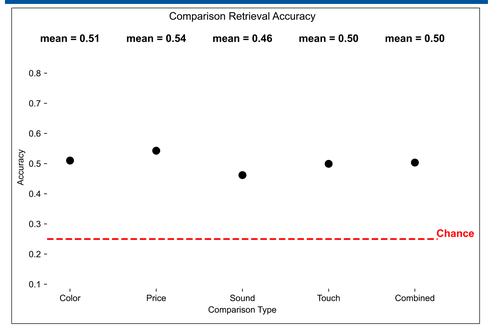
- Correlate neural activity during fMRI **encoding** task with model RDM of each comparison type.

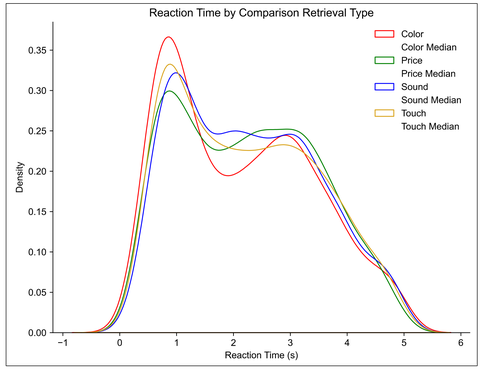


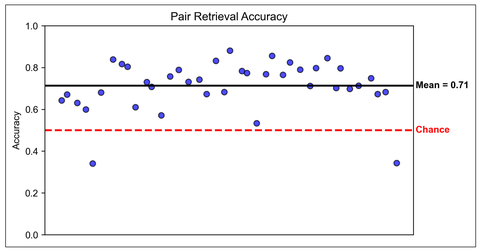
SUMMARY POINTS

- Our results suggest that **the inferior parietal lobe plays a significant role in representing relational memory types**, which is consistent with past findings.
- There was significant hippocampal activity in univariate analysis, which is consistent with the hippocampus' role in the encoding and recollection of memories.

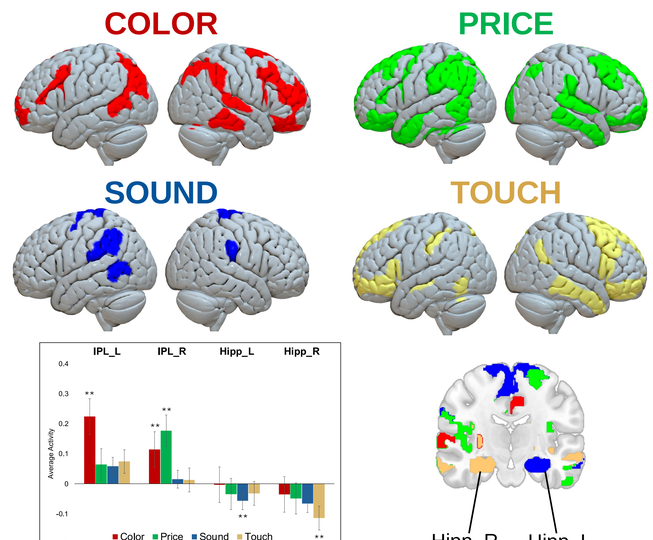
BEHAVIORAL RESULTS



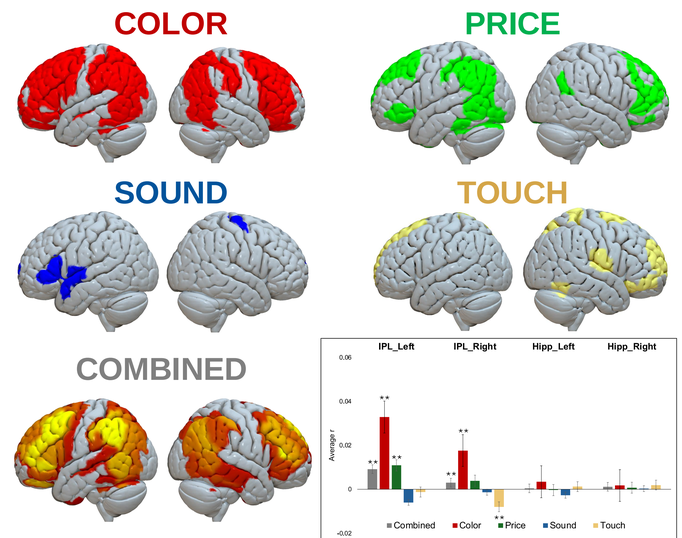




MEMORY-INDEPENDENT UNIVARIATE ANALYSIS

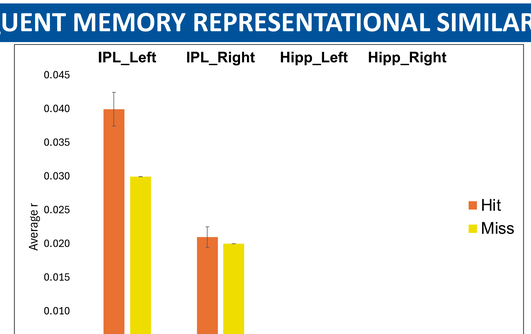


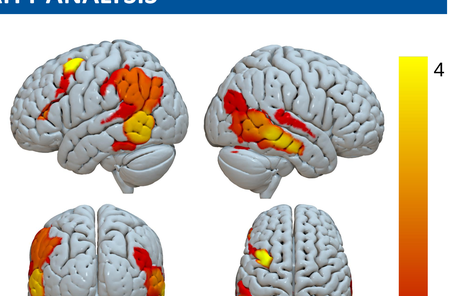
MEMORY-INDEPENDENT REPRESENTATIONAL SIMILARITY ANALYSIS



SUBSEQUENT MEMORY REPRESENTATIONAL SIMILARITY ANALYSIS

- Because there was significant representation in the IPL in memory-independent RSA, we investigated whether there was also a subsequent memory effect based on the **comparison retrieval** task.
- There was a **significant subsequent memory** effect in the IPL for the **Combined** condition, suggesting that IPL representations are predictive of later memory retrieval.





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