Differential effects of content and location overlap on learning and memory

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INTRODUCTION

Overlap with existing memories affects new learning in two well-established yet conflicting ways:

- Overlap of information can lead to interference[1,2,3,4]
- Overlap of information can facilitate new learning[5,6]

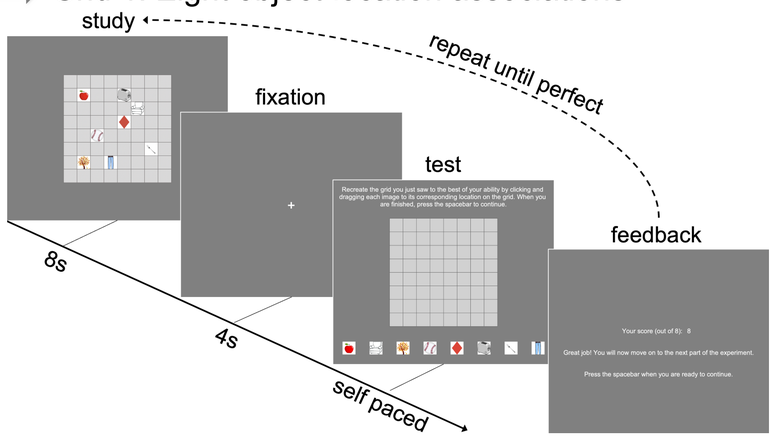
We explored two dimensions of overlap:

- Location overlap (same locations)
- Content overlap (same objects)

Do content overlap and location overlap differentially affect learning and memory?

EXP. 1 GRID TASK (Between-Subjects & Full Reconstruction)

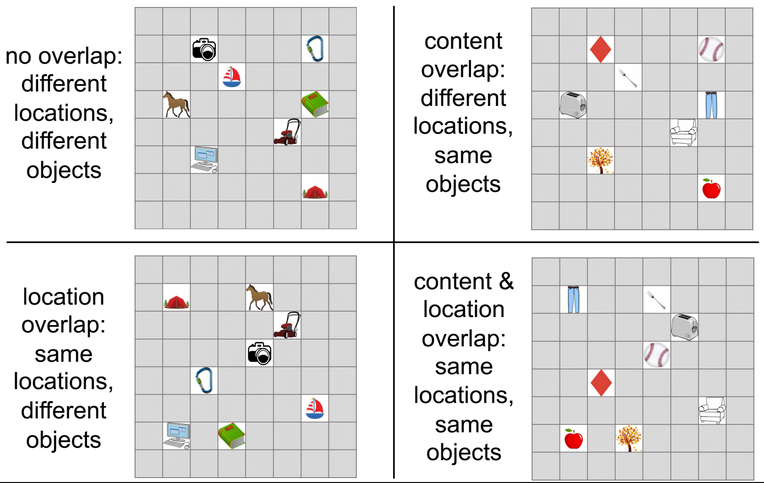
Grid 1: Eight object-location associations



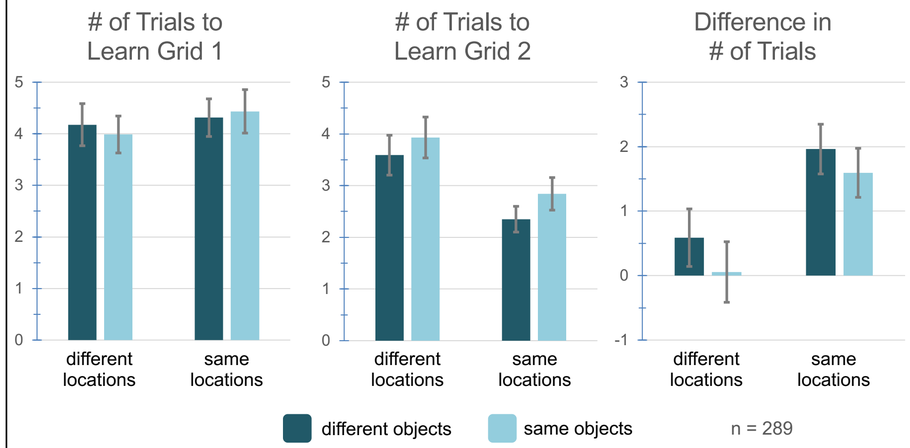
Distractor Math Task: Attention Check and WM Flush

Grid 2: Eight new object-location associations

Second grid differed from first by one of the ways shown below:

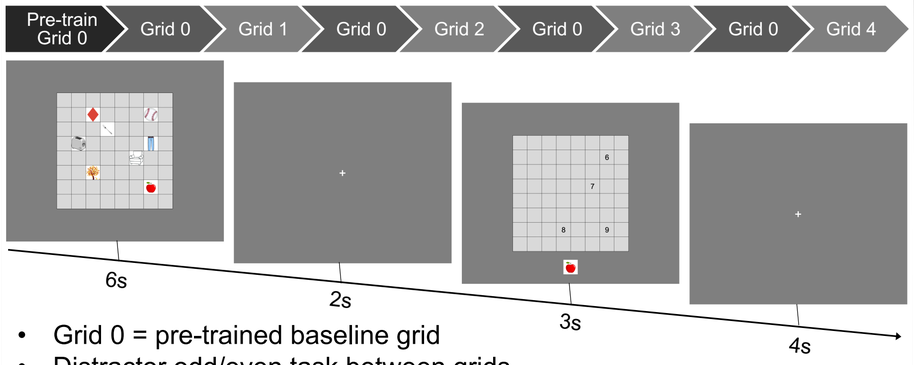


RESULTS: DIFFERENTIAL EFFECTS OF OVERLAP

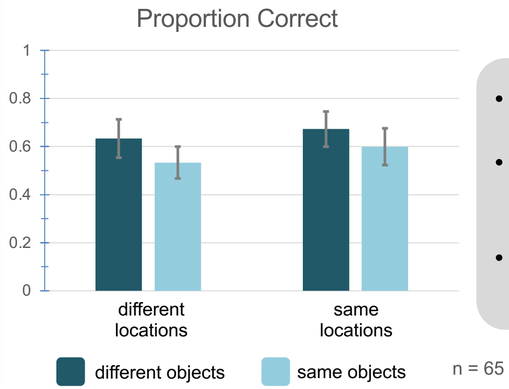


- Location overlap ☞ faster learning of the second grid
- Content overlap ☞ slower learning of the second grid
- No interaction: the effects are independent and additive

EXP. 2 GRID TASK (Within-Subjects & Single Object Probe)

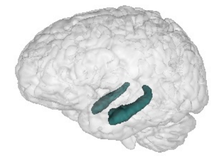


- Grid 0 = pre-trained baseline grid
- Distractor odd/even task between grids



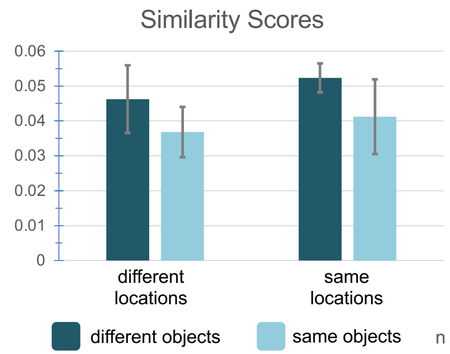
- Conceptually replicates exp. 1
- Location overlap ☞ better memory
- Content overlap ☞ worse memory

PRELIMINARY fMRI: DOES THE BRAIN REPRESENT SOME GRIDS AS MORE SIMILAR THAN OTHERS?



bilateral hippocampus

pattern similarity analysis



- Similarity of hippocampal representations parallel behavior
- Location overlap ☞ greater similarity
- Content overlap ☞ lower similarity (pattern differentiation?)

SUMMARY

- Location overlap can facilitate learning and memory; similar hippocampal representations
- Content overlap can hinder learning and memory; differentiated hippocampal representations

REFERENCES

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