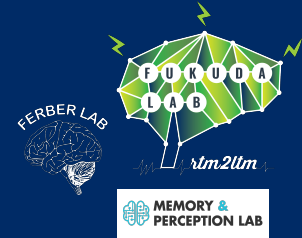


# Perceptual comparisons are necessary and sufficient for the persistence of memory biases across time

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### A. Background & Research Question

Applied research describes **pervasive unreliability of memories** that were compared to novel percepts<sup>1,2</sup>

Test a Witness's Memory of a Suspect Only Once

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Intact Memory

Passive Interference "Ignore the percept"

Comparison-induced bias "Is percept similar to memory?"

Visual percept

Visual working memory

Report Bias

Psychophysical studies show that perceptual comparisons **enhance perceptual interference**<sup>3-5</sup>

Is a single perceptual comparison **necessary & sufficient** to produce biases that persist over time?

### B. Hypotheses

If a single comparison is **necessary**...

1 Bias persistence should be **task-dependent & not purely stimulus-driven**

Working memory

Ignore... Compare!

Report

No Report

Long-term memory

If a single comparison is **sufficient**...

2 Biases should persist even when processes tied to **memory reports are removed**

### References

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### C. Method & Procedure

Time

Day 1

**Encoding**

288 Colored-Object Silhouettes<sup>6</sup>

1500ms

Repeated? (Definitely/Maybe/New)

1500ms

Repeated?

1500ms

Repeated?

1500ms

Repeated? (4x)

**Immediate Test**

Ignore-Search 1  
48 Old | 12 New

Ignore-Report 1  
48 Old | 12 New

Compare-Search 1  
48 Old | 12 New

Compare-Report 1  
48 Old | 12 New

Counterbalanced

**Memory Test**

Remember? (Obj+Col/Obj/New)

Untimed

500ms

Ignore... or Similarity Judgment!

2000ms

blocked

500ms

Confidence? (High/Low/None)

Untimed

Report Color!

Search for Letter!

Find the T!

within block

Counterbalanced

Memory always reported

No probe presented

Day 2

**Delayed Test**

Ignore-Search 2  
48 Re-test | 12 New

Ignore-Report 2  
48 Re-test | 12 New

Compare-Search 2  
48 Re-test | 12 New

Compare-Report 2  
48 Re-test | 12 New

### D. Analysis

**Trial Breakdown**

Failed to complete comparison <1%

High-Confidence (both tests) 23%

Low/No Confidence (either test) 77%

Initial Sample n = 40

Bootstrap Re-samples Each n = 32

1 participant

10k iterations

Bias Estimate

Prop. Bootstraps

\* p < 0.025

\*\* p < 0.001

### E. Are comparisons **necessary** to produce persistent biases?

**Passive Interference** — "Look at, but ignore the probe"

Response Proportion

Probe

Ignore-Report 1

Ignore-Report 2

Ignore-Search 2

Signed Response Error (°)

Bootstrap Proportion

Bias (Mean Signed Response Error)

ns

p = 0.083

p = 0.071

p = 0.090

No evidence of a reliable bias following passive interference across conditions or tests, suggesting that **performing a comparison was necessary!**

### F. Are comparisons **sufficient** to produce persistent biases?

**Perceptual Comparison** — "Is the probe similar to memory?"

Response Proportion

Probe

Compare-Report 1

Compare-Report 2

Compare-Search 2

Signed Response Error (°)

Bootstrap Proportion

Bias (Mean Signed Response Error)

\*

\*\*

ns

p = 0.062

Biases persisted following comparisons, but only when the target was not reported initially, suggesting that **performing a comparison was sufficient!**

### G. Conclusions & Future Directions

- A single perceptual comparison is necessary & sufficient to produce a persistent memory bias, indicating a **bona fide cognitive mechanism** that may contribute to real-world distortions
- Memory reporting **weakens bias persistence**—why? An **updated decision-making prior**? For example:  
Report 1 Bias = Target \* Probe | Report 2 Bias = Target \* Report 1 (\* Probe)