Remembering Thousands of Objects with High Fidelity

Timothy F. Brady Talia Konkle George A. Alvarez Aude Oliva

MIT BCS

Question

What is the capacity of visual long-term memory?

What we know...

... People can remember 1000s of images

Standing 1973

What we don't know...

... what people are remembering about each item

"Gist" Only Sparse Details Highly Detailed

Conclusions

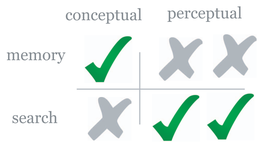
Capacity of LTM

- LTM is both massive and **detailed**

- Details are not by necessity discarded through visual transforms

Structure of LTM

- Memory for "visual" details is linked more to **conceptual knowledge** than perceptual similarity



Massive Memory I

Methods

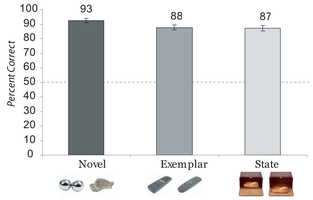
- Showed 2500 categorically unique objects
- 1 at a time, 3 seconds each
- Study session lasted 5.5 hours
- Repeat detection task to maintain focus

- 300 2-AFC tests
- novel, exemplar, state level comparisons

Results

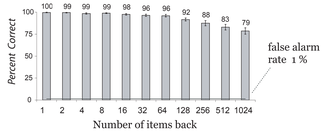
Sample test pairs, and the number of participants out of 14 who correctly identified the studied items

Recognition Memory Performance



LTM can store a large number of items with **surprising fidelity**

Accuracy detecting repeat items during the study session



Online "old" / "new" task also shows a high repeat detection rate

Massive Memory II

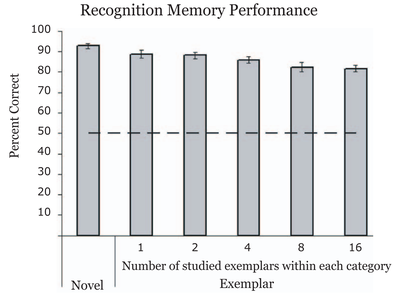
Methods

- Number of objects per category varied from **1 to 16**

- 2560 unique objects
- 480 different object categories
- 1 at a time, 3 seconds each
- Repeat detection task to maintain focus

Results

Recognition Memory Performance



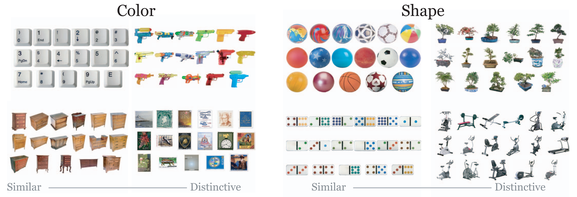
Minimal but reliable interference with additional exemplars

Category Distinctiveness

Aim: Predict which categories are robust/susceptible to interference

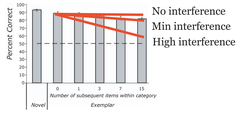
Ranking

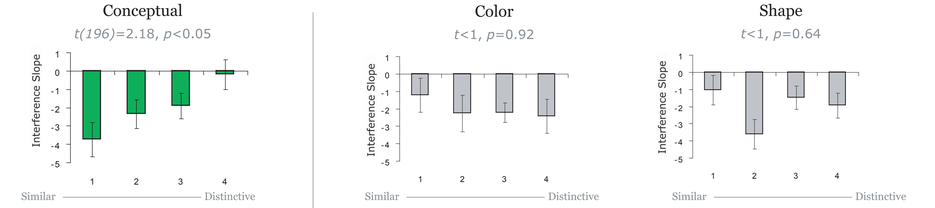
Rate how similar or different these are conceptually and perceptually



Memory

Interference = slope of line computed for each category





Search

Overall RT measured to find target among category distractors