Visual Recollection

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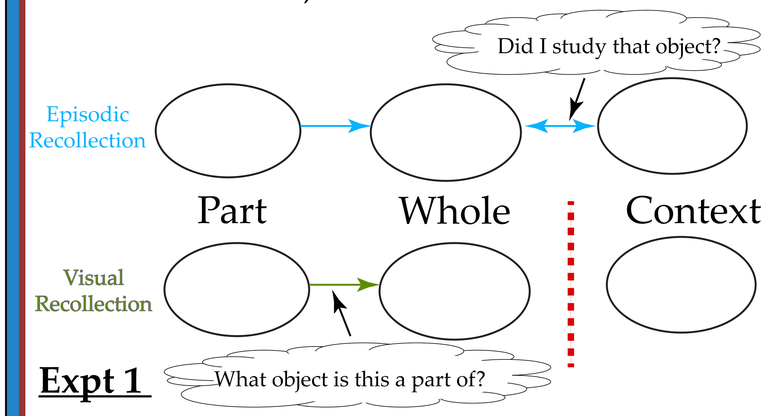
Introduction

- Episodic memory has been described as the product of dual processes, recollection and familiarity (Yonelinas 1994).
- However, a confound exists whereby most demonstrations of recollection rely on stimuli with associative components, whereas familiarity is manipulated via perceptual manipulations.
- Recent theories (Cowell, Bussey and Saksida 2010) propose that recollection is a general process of pattern completion that can be performed on many different kinds of stimuli.

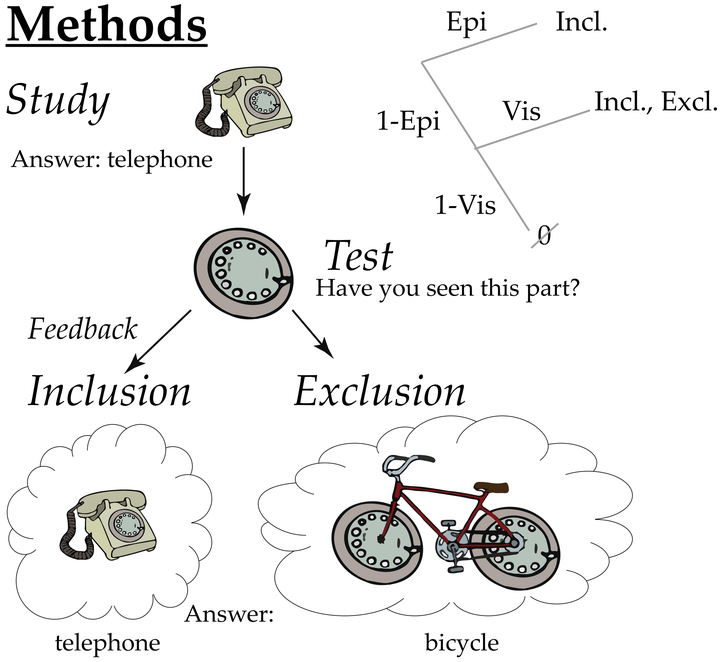
Goal: Demonstrate a behavioral measure of non-associative, visual recollection.



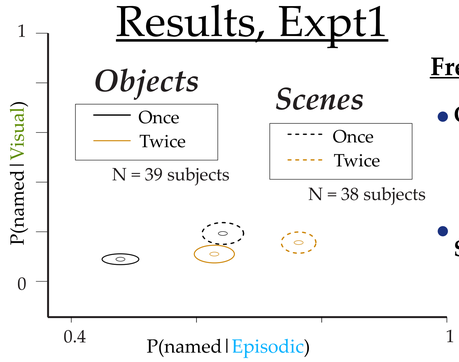
Expt 1

Goal: *demonstrate canonical effect of study frequency to selectively influence episodic recollection.*

Methods



Results, Expt1



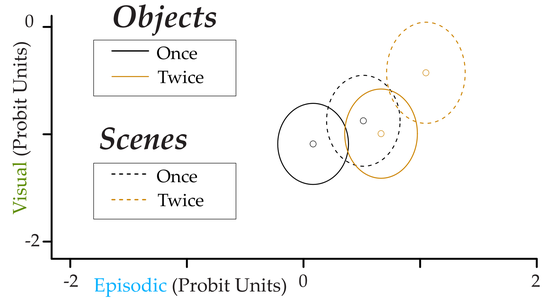
Frequentist

- **Objects:** selective influence of study frequency on episodic ($p<<0.001$), but no discernable effect on visual ($p=0.59$).
- **Scenes:** Study frequency affected episodic ($p=0.003$) but not visual ($p=0.45$).

- *Bayesian hierarchical model used to address potential aggregation-induced, correlation biases.* ~Rouder et al. 2008

Bayesian

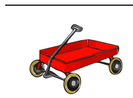
- For both **Objects** and **Scenes**, studying twice selectively increased episodic recollection.



Expt 2

Goal: *Demonstrate independence of these types of recollection by differentially influencing both of them.*

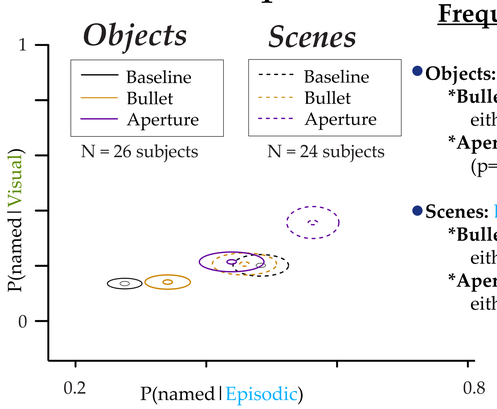
Methods

Study1	Study2	Test	Prediction*	
X	X	Foil		
	X	Baseline		
		Bullethole	Epi ↑	Vis —
		Aperture	Epi ↑	Vis ↑

* ***Bullethole:*** should strengthen the link between only whole and context. This link is only necessary for successful episodic recollection, so only episodic recollection should increase.

Aperture: should strengthen only the link between part and whole. Because both types of recollection would require this link, both should increase.

Results, Expt2

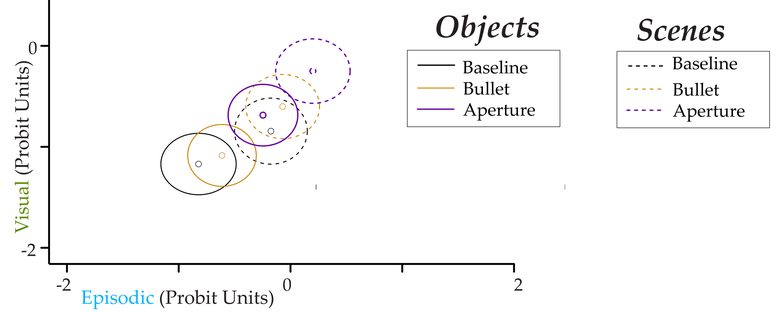


Frequentist

- **Objects:** Epi: ($F(2,75) = 4.67$), Vis: ($F(2,75) = 2.51$)
  - ***Bulleholes:** no significant difference in either episodic ($p=0.44$) or visual ($p=0.99$).
  - ***Apertures:** significant increase in episodic ($p=0.01$) but not visual ($p=0.12$).
- **Scenes:** Epi: ($F(2,69) = 1.54$), Vis: ($F(2,69) = 3.6$)
  - ***Bulleholes:** no significant difference in either episodic ($p=0.91$) or visual ($p=0.99$).
  - ***Apertures:** no significant increase in either episodic ($p=0.41$) or visual ($p=0.054$).

Bayesian

- For both **Objects** and **Scenes**, apertures increased episodic and visual recollection with respect to baseline, but the bulletholes did not.



General Discussion

- The use of the PDP on this novel set of pictorial stimuli measured two kinds of recollection that tended to behave in accordance with intentional and automatic memory (Expt 1).
  - ∗ Frequentist and bayesian analyses suggest that study frequency selectively increases episodic and not visual recollection.
- State Trace analyses did not provide any evidence for independence of episodic and visual recollection (Expt 2). However, this is could still be consistent with the hierarchical model we propose, in which the two processes are different kinds of a more general process of pattern completion. The counter-intuitive finding that the apertures condition produced greater episodic and visual recollection, even though it provided less information at study than the bulletholes condition, is also consistent with the visual pattern completion account provided by the hierarchical model.
- Using fMRI, future projects will hope to demonstrate hippocampal-independent recollection.