Memory for Pictures is Influenced by Verbal Labels and Encoding Strategy

Gary Lupyan[1,2] [lupyan@sas.upenn.edu] | David J.M. Kraemer[2] | Ranjani Prabhakaran[2] | Sharon L. Thompson-Schill[1,2]

Institute for Research in Cognitive Science (1); Center for Cognitive Neuroscience (2). University of Pennsylvania | www.psych.upenn.edu/stslab/

How detailed is memory for images?
(or is that the wrong question?)

Memory for images is remarkably good (Standing, 1973), and participants can discriminate studied items from extremely similar foils with high accuracy (Brady et al., 2008).

This may mean that images are stored in memory with very high fidelity—a surprising finding considering the ease with which false memories can be created (e.g., Loftus & Hoffman, 1989) and with failures to notice large-scale visual changes (e.g., Rensink, 2000).

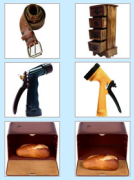
Alternatively, the ability to discriminate targets from similar foils may be a function of the effectiveness of the retrieval cue given the "cognitive environment" during study (Tulving & Thomson, 1973). On such an account, the ability to reject foils similar to targets speaks more to encoding specificity rather than storage capacity, which for images, may be limitless (Standing, 1973).

Test Types:

Novel

Exemplar-Change

State-Change



stimuli from Brady et al., 2008

Main Questions:

Keeping the study set constant, how do subtle retrieval-cue manipulations and encoding instructions affect within-category recognition memory?

What is the effect of showing the item's name at test?
The name (label) as retrieval cue may help more verbally oriented people and impair more visually oriented people—an instance of transfer-appropriate processing.

Does instructing people to label images at study improve or hurt performance?

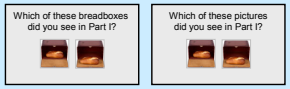
Possibility 1: *Labeling may encourage coarser/categorical storage impairing later recognition of studied items (Lupyan, 2008).*

Possibility 2: *When all study images are categorically distinct, basic-level labeling may create a temporary association between the label and the specific instance of the category presented at study.*

Experiment 1:

Study: 315 unique categories images (3 s each). Subjects perform repeat-detection task as in Brady et al., 2008.

Test: Randomized 2AFC. Half of the trials display the *label* of the targets (2s) prior to displaying the alternatives:

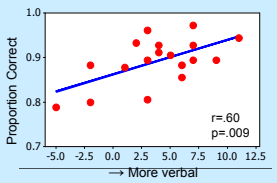


Label Retrieval Cue No Label Retrieval Cue

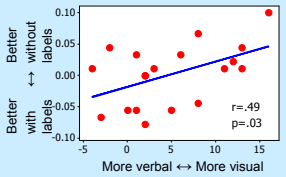
Cognitive Style measure: Verbal-Visual Orientation Measure (VVQ; Kirby et al., 1988) – see also Posters 1173, 4073

Experiment 2: Identical to Exp. 1 except participants were instructed to label the study images out loud using their basic-level names (e.g., "accordion" instead of "instrument" or "large green accordion")

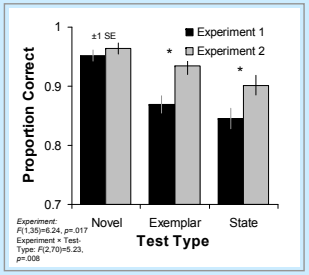
Results

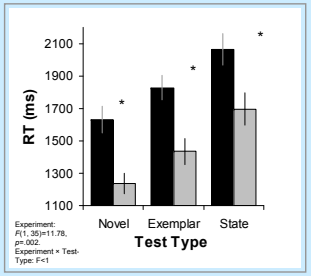


More verbally oriented participants performed better, overall (*on all types of test trials*).



Presenting a basic-level label at test helped the more verbal participants and impaired the more visual participants.



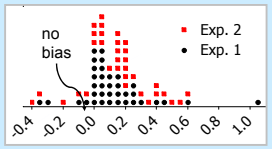


Instructing participants to label at study dramatically improved recognition performance.

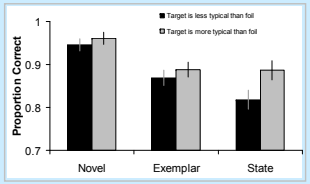
In spite of overall better performance in Experiment 2, individual encoding differences related to the visual-verbal orientation remained More verbal participants were *faster* when presented with a label retrieval cue. More visual participants were *slower* when presented with a label retrieval cue, r=-.548, p=.023

Recognition errors are not random: *a typicality bias in memory?*

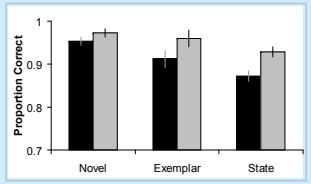
Accuracy is higher when the target is more typical than the foil.



Experiment 1



Experiment 2



Summary

Label cues presented at test led to better performance for verbally-oriented participants and worse performance for visually oriented participants (Exp. 1). Performance was dramatically improved by instructing all participants to label objects during study.

Labeling categorically distinct items improves memory even though labels (e.g., "toaster") do not capture state or exemplar-level information.

The effect of labels depends on the strategy or *orientation* participants bring to the task. These results are compatible with encoding-specificity/transfer-appropriate processing models of recognition memory and show that visual recognition depends on encoding strategies and is sensitive to subtle manipulations of retrieval cues.

Additionally, there appears to be a typicality bias in picture memory: Participants are more likely select the more typical item as the target. The locus of the effect (retrieval or encoding) remains unclear.

A cautionary note regarding attempts to compute memory capacity (e.g., Brady, Konkle, Alvarez, & Oliva, 2008).

"the lower bound on our estimate of the representational capacity of long-term memory [is] $2^{17.8}$, or 228,000." (Brady et al., 2008. p. 14328).
The performance of a capacity-based memory system is sensitive to size of the study set. However, even though our study set was almost 10 times smaller than that used by Brady et al. (2008), our accuracy data are identical to theirs. This finding reaffirms the position that memory for images is not subject to capacity limitations (Standing, 1973).

Moreover, in reporting raw (uncorrected) accuracy scores, the authors claims of "massive memory" over-estimate true performance (which, particularly for state- and exemplar- type trials remains quite high).

Test Type	*Brady et al., 2008 Raw % Correct 2AFC—2500 items)*	*Exp. 1 Raw % Correct 315 items*	*Brady et al. Corrected for guessing (2*Acc-1)*	Replication with 315 items using old/new judgments
Novel	92.5	95.2	85.0	H: 76.7 FA: 5.0
Exemplar	87.6	86.8	75.2	H: 72.7 FA: 11.4
State	87.2	85.0	74.4	H: 75.4 FA: 17.1

References

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A PDF of this poster is available at
http://www.sas.upenn.edu/~lupyan/pictureMem.pdf

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