



Cognition: Methods and Models

PSYC 2040

L8: Memory II

Part 2



recap: Apr 4, 2023



- what we covered:
 - memory tasks
 - memory phenomena
- your to-dos were:
 - *finish*: L8 reading
 - *post*: conceptual reflection
 - *work on*: project milestone #4



today's agenda

- memory phenomena (contd.)
- memory processing principles
- project milestone discussion/questions

fan effect

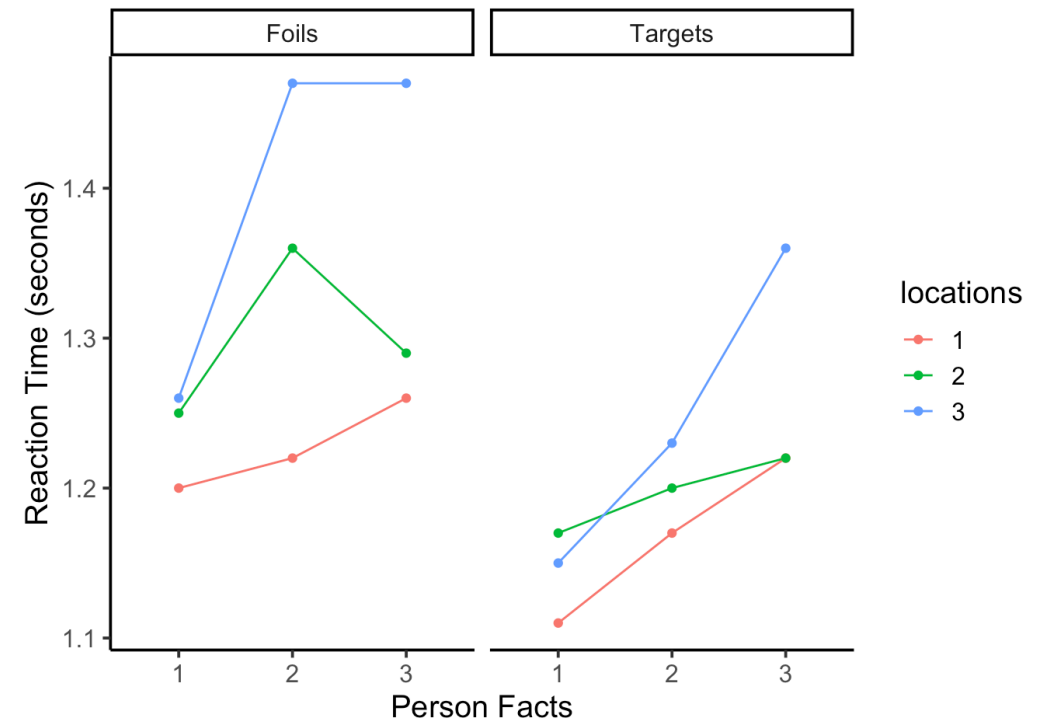
Table 1

Examples of Experimental Material in the Fan Experiment of J.R. Anderson (1974)

Material studied	Target probes	Foil probes
A hippie is in the park.	3-3. A hippie is in the park.	3-1. A hippie is in the cave.
A hippie is in the church.	1-1. A lawyer is in the cave.	1-3. A lawyer is in the park.
A hippie is in the bank.	1-2. A debutante is in the bank.	1-1. A debutante is in the cave.
A captain is in the park.	---	2-2. A captain is in the bank.
A captain is in the church.	---	---
A debutante is in the bank.	---	---
A fireman is in the park.	---	---
A lawyer is in the cave.	---	---
---	---	---
---	---	---
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Note. Dashes indicate more items.

- claim: items with greater number of associates (higher fan) are recognized slower than items with lower number of associates (lower fan)
- evidence: Anderson (1974)
 - participants studied concepts (persons and locations) with 1, 2, or 3 facts (fan)
 - test featured target and foil probes and recognition or rejection time was measured



generation, production, enactment

- claim: **generating information** can improve memory performance
- evidence: Slamecka and Graf (1978)
 - participants either **generated (lamp-L???)** or **read words**
 - generation was achieved via different methods:
 - associate (lamp-light)
 - category (ruby-diamond)
 - opposite (long-short)
 - synonym (sea-ocean)
 - rhyme (save-cave)
 - probability of recognizing a word was higher for generated words, compared to words that were read for all types of words
- **production**: read out loud vs. silently
- **enactment**: acted/imagined vs. not

directed forgetting

- claim: specific instructions to “forget” items can lead to poorer memory performance
- evidence: Geisselman (1974)
 - participants read one sentence at a time and were told if they would be tested on the sentence (TBR) or they could forget (TBF) the sentence
 - TBF sentences produced lower recall than TBR sentences in most tests

Table 1
Probability of Sentence Retention as a Function
of Sentence Type and Type of Test

Sentence Type	Test Type			
	Free Recall (Cued)	Free Recall (Control)	Sentence Completion	Multiple Choice
TBR	.74	.57	.87	.95
TBF	.40	–	.75	.92

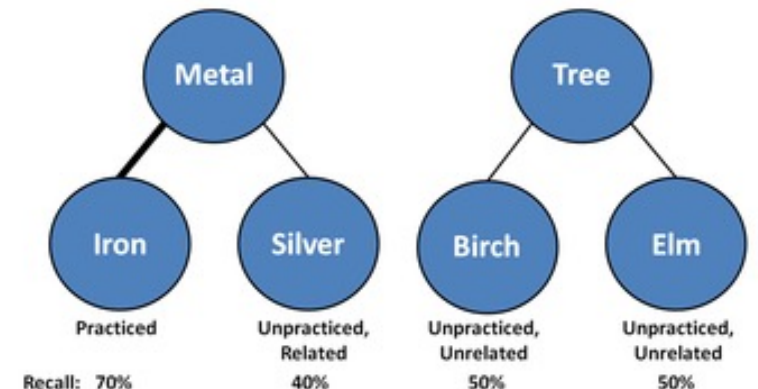
retrieval-induced forgetting

- claim: remembering causes forgetting of other information in memory
- evidence: Anderson, Bjork, & Bjork (1994)
 - study phase: participants first study pairs of category labels and words (METAL-iron, METAL-silver, TREE-birch, TREE-elm)
 - retrieval practice phase: a subset of items are tested (e.g., METAL-ir???)
 - test phase: all items are recalled/recognized
 - unpracticed but related items are forgotten more than the unpracticed unrelated items

METAL-iron
TREE-birch
METAL-silver
TREE-elm

METAL-ir????

METAL-ir??
TREE-bi??
METAL-si??
TREE-e??





RIF: explain it to each other!

activity

- class will be divided into two groups
- everyone will read a passage and then try to write down whatever you remember from the passage
- close your eyes until I tell you to open them!

meaningfulness: context

- claim: meaningful context cues improve comprehension and recall
- evidence: Bransford & Johnson (1972)
 - tested participants on comprehension and recall of different passages by providing no or some context before/after the passage was read
 - providing context **before** encoding produced the highest recall and comprehension scores

TABLE 1
MEAN COMPREHENSION RATINGS AND MEAN NUMBER OF IDEAS RECALLED, EXPERIMENT I

	No context (1)	No context (2)	Context after	Partial context	Context before	Maximum score
Comprehension	2.30 (.30) ^a	3.60 (.27)	3.30 (.45)	3.70 (.56)	6.10 (.38)	7
Recall	3.60 (.64)	3.80 (.79)	3.60 (.75)	4.00 (.60)	8.00 (.65)	14

^a Standard error in parentheses.

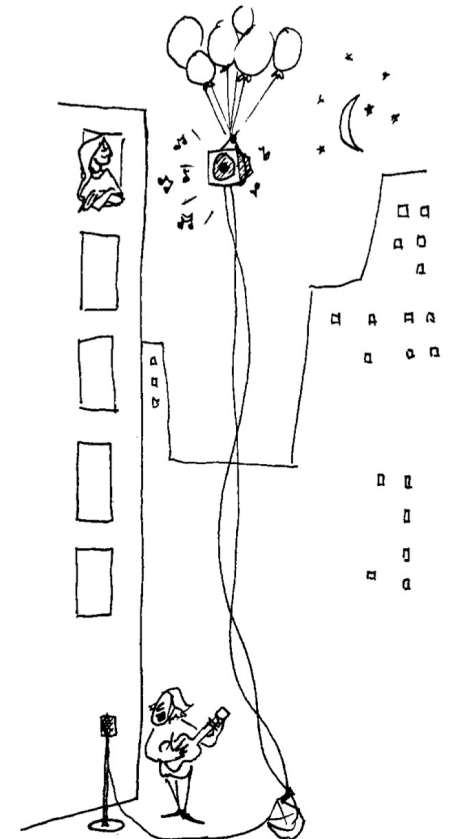


FIG. 1. Appropriate context picture for Experiment I.

environmental context

- claim: similar encoding/retrieval contexts can improve memory
- evidence: Godden & Baddeley (1975)
 - divers learned words before they went for a dive (dry) or after (wet), and then recalled words in dry or wet conditions
 - the divers recalled more words when the encoding and retrieval (learning and recall) environments matched

Table 1. *Mean number of words recalled in Expt. 1 as a function of learning and recall environment*

Learning environment	Recall environment				Total
	Dry		Wet		
	Mean recall		Mean recall		
	score	S.D.	score	S.D.	
Dry	13.5	5.8	8.6	(3.0)	22.1
Wet	8.4	3.3	11.4	(5.0)	19.8
Total	21.9	—	20.0	—	—

test seating and context independence

- I thought that the passage on context-dependent memory (specifically environmental) was very interesting, as I remember that my AP Psychology teacher last year specifically made sure that we took our exams in the same seats/room that we had been learning in so that we could access context-based cues. It makes me wonder, should all teachers be capitalizing on this phenomena? Are teachers setting up students to do at least somewhat poorly when they have students take exams in different rooms? This also makes the idea of take home exams very interesting, as there may be different context-dependent memory cues of a topic created during lecture style classroom learning as opposed to at home studying/work.

Memory & Cognition
1985, 13 (6), 522-528

Context effects: Classroom tests and context independence

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Contextual dependence has been hypothesized to influence classroom test performance such that taking a test away from the lecture room should lead to lower test scores (Abernethy, 1940). We studied the performances of students who took typical college tests in rooms different from the lecture rooms and made comparisons to classmates who remained in the lecture rooms. No statistically reliable effects were found in 21 such comparisons in seven courses. Although contextual dependence has been produced under laboratory control, college classes induce students to decontextualize information. The theoretical utility of contextual associations is based on simpler, more tightly controlled conditions, and generalization to representative situations is an empirical matter.

key memory principles

- we have discussed a range of memory phenomena
- a broader claim is that some key principles may underlie several of these mini-claims

key memory principles

- **levels of processing**: Craik and Lockhart proposed the idea that the strength and quality of encoding determine later memory
- **cue vs. context-dependent**: context matters during encoding and retrieval
 - encoding: formation of mental representations includes elements of surrounding context
 - retrieval: a “cue” initiates retrieval of information within a given context
 - the match of encoding and retrieval context can benefit memory performance
- **encoding specificity**: Tulving and Thompson (1973) proposed that the specific manner in which information was encoded was critical to retrieval
- **transfer-appropriate processing**: cognitive processing at both encoding AND retrieval matters for memory

activity: which principle-phenomena?

- in groups of 3, discuss how the principles may account for memory phenomena
- below is a list of some phenomena we have discussed
 - generation/production/enhancement
 - frequency effect
 - distinctiveness effect
 - self-reference effect
 - environmental context effect
 - meaningful context effect
 - directed forgetting
 - retrieval-induced forgetting
 - proactive/retroactive interference

an experiment

- go to <https://72bswqmgq1.cognition.run>
- do the experiment
- come back and discuss
 - what you think the independent and dependent variable(s) might be
 - what you think the pattern of results may be
- I will compile your results

TIP/TAP > levels of processing

- claim: the tasks performed at encoding and retrieval take precedence over the nature of processing (shallow vs. deep)
- evidence: Morris, Bransford, and Franks (1977)
 - participants encoded words in a semantic or rhyming context
 - the test phase was either a standard recognition test or a rhyming-based recognition test

acquisition mode

The ____ flew in the sky

EAGLE

____ rhymes with legal.

EAGLE

standard
recognition

EAGLE

OLD

NEW

LAUGH

OLD

NEW

rhyming
recognition

REGAL

OLD

NEW

LAUGH

OLD

NEW

TIP/TAP > levels of processing

- claim: the tasks performed at encoding and retrieval take precedence over the nature of processing (shallow vs. deep)
- evidence: Morris, Bransford, and Franks (1977)
 - on standard test, recognition was higher for semantic vs. rhyme words
 - on rhyme test, recognition was higher for rhyme vs. semantic words
- in groups, discuss and draw a graph that captures these findings

other principles

- **task-appropriate processing/probe dependency**: memory performance is influenced by the nature of the task and whether a particular cue is actively generated or provided
- **resource demands**: increasing the cognitive demands during encoding/retrieval can influence retention and performance

conceptual question #frequency

- something from our discussion of memory phenomena that interested me was the word frequency effect. It makes sense to me that low-frequency words are better recognized than high-frequency words, but I would expect this to be the same for a recall task. I know that studies have begun to explain this paradox, but why do manipulations of word frequency influence memory performance in different ways depending on the task?



big takeaways

- get in groups of 3 and report key takeaways from today
- [takeaways document](#)



project milestone #4 discussion

next class



- **before** class:
 - *finish*: L8 quiz/assignments
 - *work on*: project milestone #4
- **during** class:
 - cognitive models! (reading up on Canvas)
 - **NOTE**: readings will be posted on Canvas going forward