Cognition

PSYC 2040

L9: Memory II

logistics

- SPARK summary
  - review sample SPARK
- March extra credit survey
  - Canvas, due Apr 9
- QALMRI summary candidates
  - 5 candidates, due Apr 14

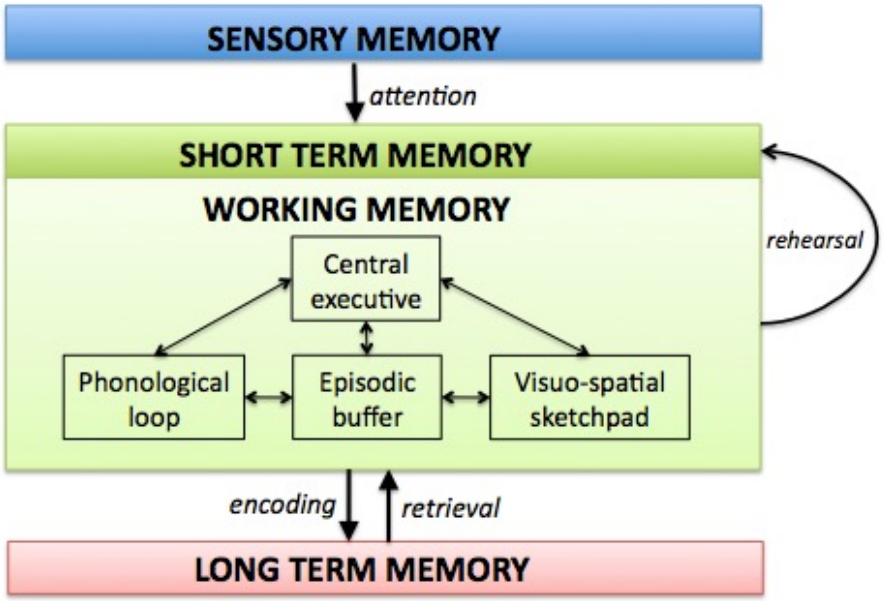
11	Wednesday, April 3, 2024	L9: Memory II
11	Friday, April 5, 2024	L9 continued…
12	Monday: April 8, 2024	**Research Summary [SPARK] due**
12	Wednesday, April 10, 2024	L10: Language
12	Friday, April 12, 2024	L10 continued…
13	Tuesday: April 16, 2024	**Monthly Quiz 2**
13	Wednesday, April 17, 2024	L11: Judgment and Decision Making
13	Friday, April 19, 2024	L11 continued…
14	M: April 22, 2024	**Research Summary [QALMRI] due**
14	Wednesday, April 24, 2024	L12: Social Cognition
14	Friday, April 26, 2024	L12 continued…
15	Monday: April 30, 2024	**Monthly Quiz 3**
15	Wednesday, May 1, 2024	L0-L12 review!
15	Friday, May 3, 2024	**Final**
16	Wednesday, May 8, 2024	Wrapping up!
16	M: May 13, 2024	**Research Reflection due**

recap: memory processes

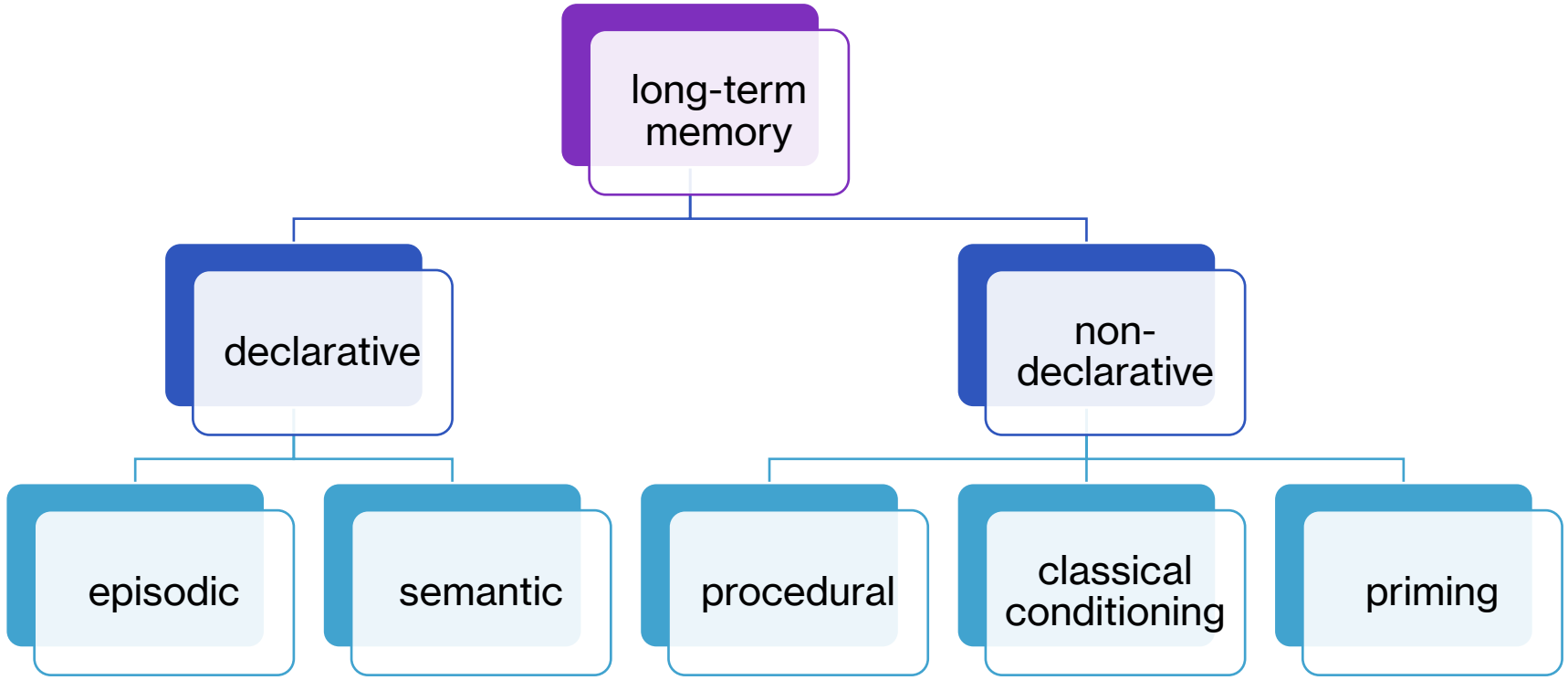
encoding
- perceiving
- recognizing
- processing

storage
- representing
- transferring

retrieval
- searching
- retrieving
- producing



long term memory



Squire, 1986

episodic vs. semantic memory

episodic

- memory for specific events
- situated in a time and place
- “I remember this”

semantic

- general knowledge about the world and its entities
- decontextualized
- “I know this”

memory phenomena

- what counts as a memory phenomenon?
- several phenomena have roots in associationism and/or behaviorism
- we will learn about these phenomena in claim-evidence fashion
- you should add on our general format when you review (IV/DV/finding/inference)!

frequency

- claim: more frequent stimuli are better remembered
- evidence: Hintzman (1969)
  - participants studied words with different exposure (two vs three times)
  - frequency did not affect recognition accuracy
    - ceiling effects: performance is extremely high or perfect
    - floor effects: performance is extremely low or at zero
  - frequency affected recognition times, i.e., more frequently encountered words were recognized faster

frequency: recall vs. recognition

- claim: the effect of frequency can vary based on the retrieval context
- evidence: Balota and Neely (1980)
  - tested participants on high and low-frequency words via recognition or recall
  - the word frequency effect/paradox
    - recall: HF words are better recalled than LF words
    - recognition: LF words are better recognized than HF words

Frequency effects in recognition and recall

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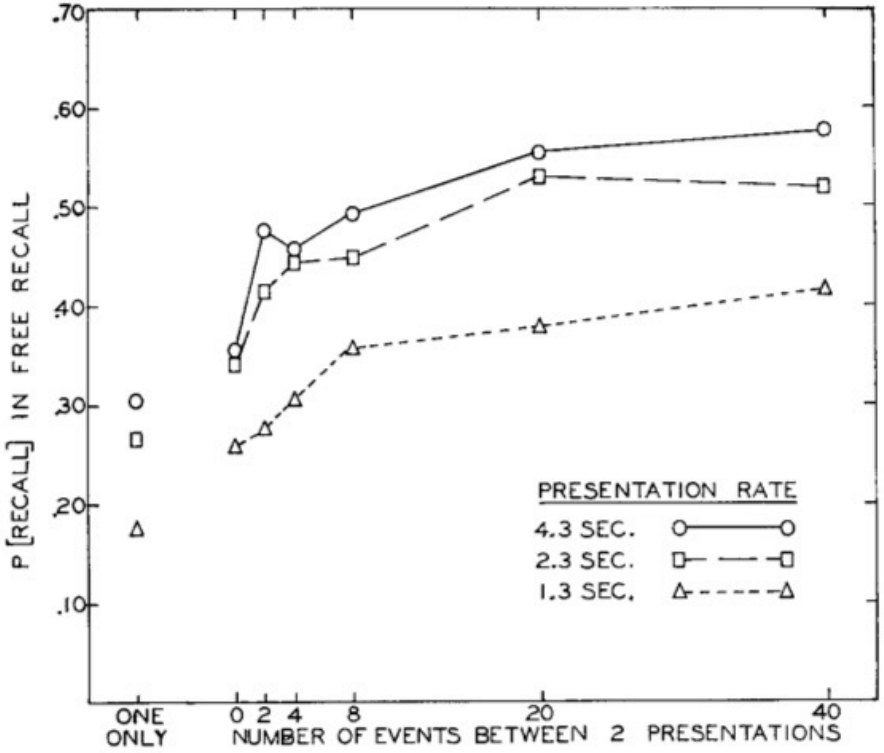
Abstract

Stimulus frequency, which is often evaluated using normative word frequency, is among the variables that have the most diverse and puzzling effects on memory. Word frequency can either facilitate or impair memory performance depending on the study and testing conditions. Understanding why and under what conditions frequency has positive or negative effects on performance is crucial for understanding basic properties about the human memory system. As a result, the study of word frequency has led to the development of multiple memory models. This chapter summarizes the current knowledge concerning word frequency effects on item recognition, associative recognition, free recall, cued recall, serial recall and source memory. We also discuss how word frequency interacts with manipulations concerning presentation rate, list-composition, age of the participants, memory load, midazolam injections, response deadlines and remember-know judgements. This review of frequency effects in memory identified four major classes of empirical findings, which can be further subdivided into a total of 21 key phenomena that any theory should account for. Based on these phenomena, we identify three high-level principles that characterize the diverse effects of frequency on memory – the probe dependency principle, the dual process principle, and the resource demands principle.

Popov, V., & Reder, L. (2020). Frequency effects in recognition and recall.

presentation rate and spacing

- claim: repetitions and spacing improve memory retention
- evidence: Melton (1970)
  - participants studied words at different presentation rates (1.3, 2.3, and 4.3 seconds), and spaced repetitions (0, 2, 4, 8, 20, 40)
  - recall improved with longer presentations, more repetitions, and greater spacing between repetitions

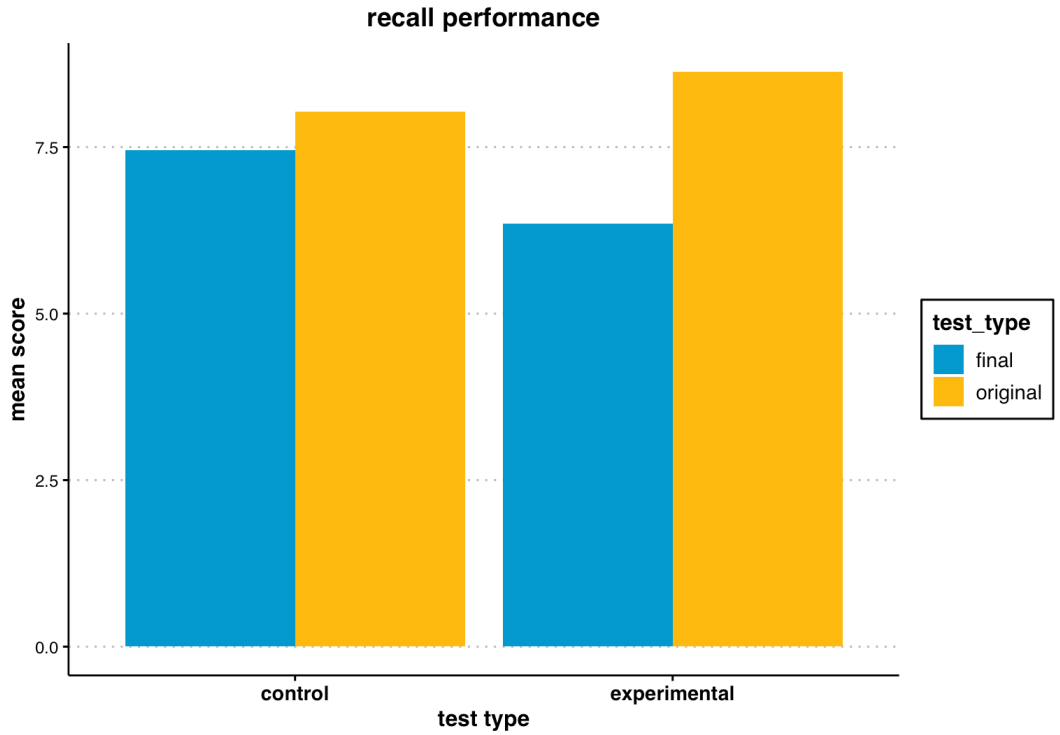


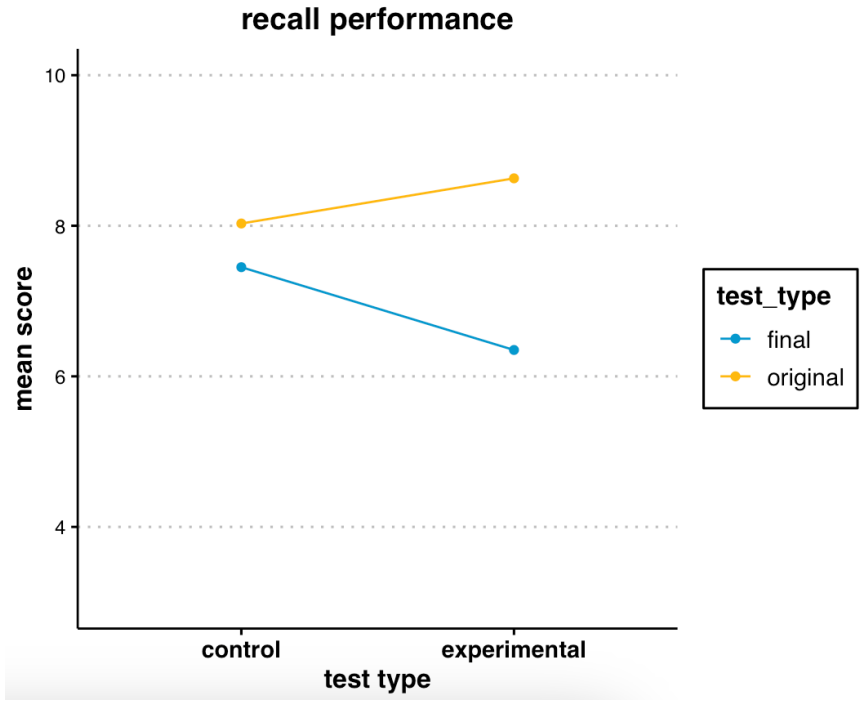
retroactive interference

- claim: newer events influence prior learning
- evidence: Postman (1952)
  - original learning: participants encoded 24 nonsense syllables and were tested
  - interpolated learning: 24 new nonsense syllables (experimental group) OR New Yorker magazine (control group)
  - final phase: participants were tested on original syllables
  - participants were better on original test than final test
  - experimental group showed more forgetting than control group, due to interference from the second list of nonsense syllables
- activity in pairs: what would a plot of these findings look like?

retroactive interference: bar vs line plot 1

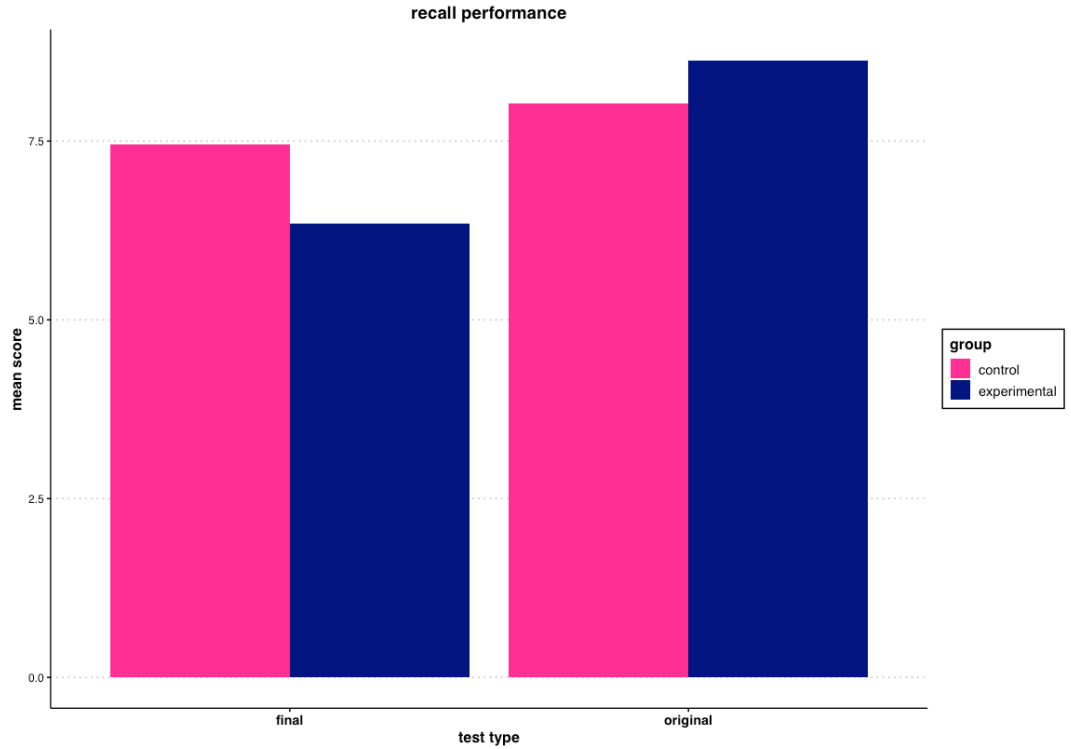
- claim: newer events influence prior learning

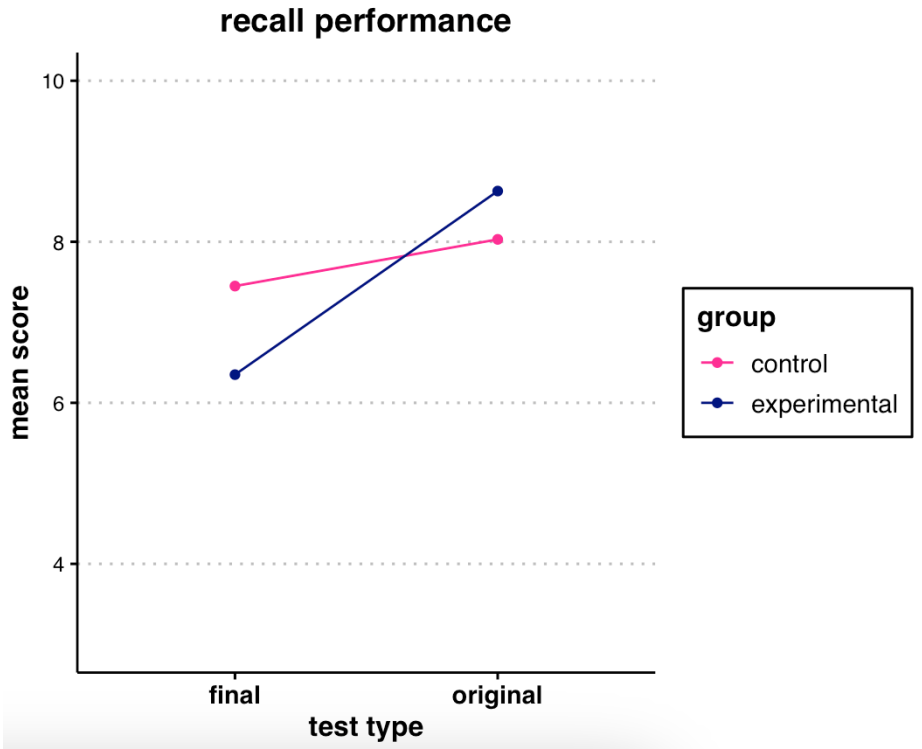




retroactive interference: bar vs line plot 2

- claim: newer events influence prior learning





proactive interference

- claim: prior learning influences new learning
- evidence: Underwood (1957)
  - a “meta-analysis” of several studies
  - y-axis: percent of items recalled from a current list
  - x-axis: number of previous lists learned
  - recall was worse as more lists were learned before current list

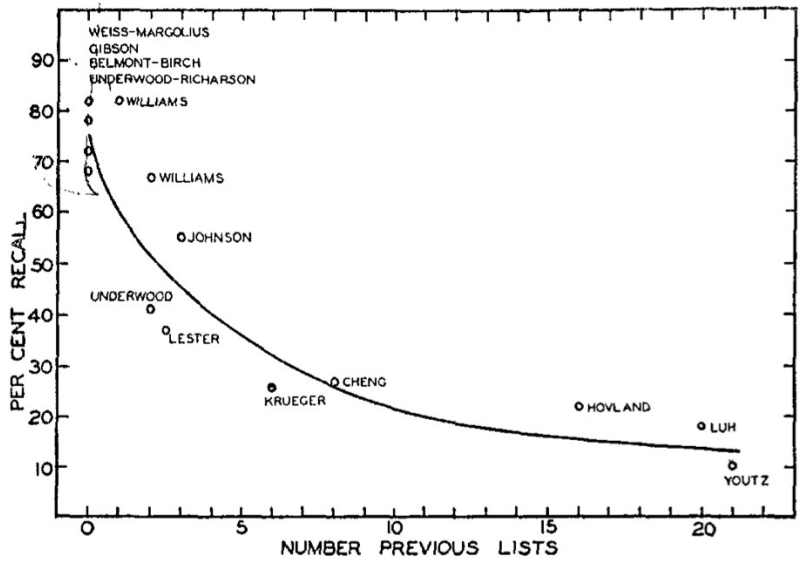
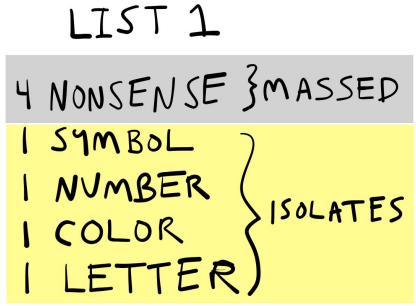


FIG. 3. Recall as a function of number of previous lists learned as determined from a number of studies. From left to right: Weiss and Margolius (35), Gibson (9), Belmont and Birch (3), Underwood and Richardson (33), Williams (36), Underwood (27, 28, 29, 30), Lester (17), Johnson (14), Krueger (16), Cheng (6), Hovland (11), Luh (18), Youtz (37).

distinctiveness: Von Restorff

```
laf -- rig
  # -- +
dok -- pir
 89 -- 46
red square -- green square
zül -- dap
  S -- B
tög -- fem
```

- claim: memory is better for distinctive items
- evidence: Von Restorff (1933)
  - participants were tested on 5 lists
  - lists used counterbalancing to ensure that effects were not influenced by the characteristics of items of order, but only the composition of the list (context)
  - "isolated" pairs were better remembered than massed items across all lists, i.e., distinctive pairs were better remembered



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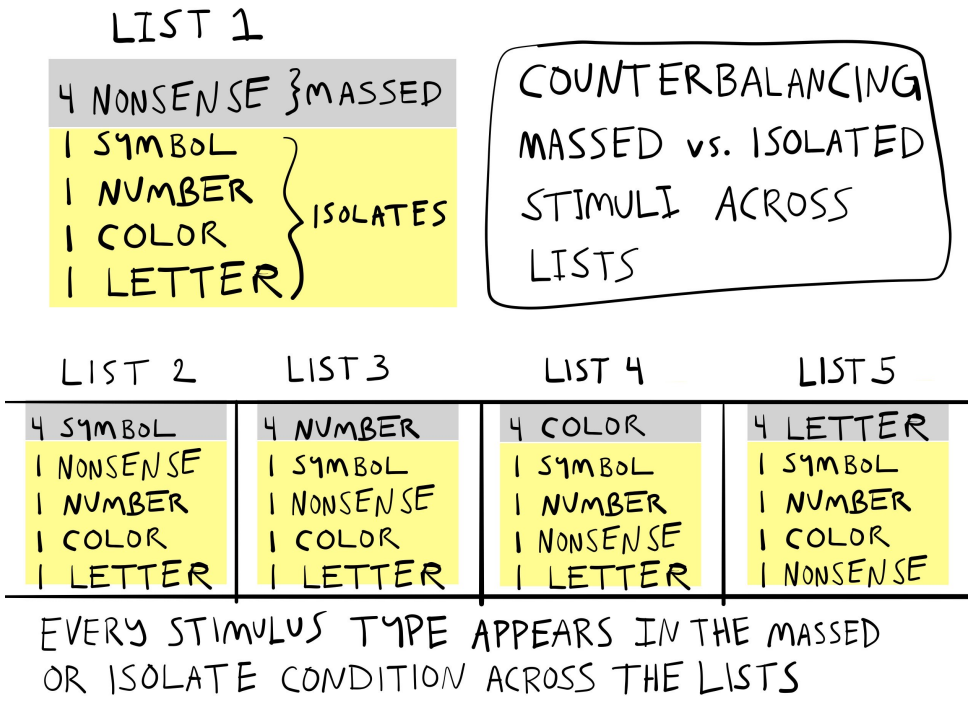


meaningfulness: self-reference

- claim: relating information to yourself improves retention
- evidence: Rogers et al. (1977)
  - participants encoded lists of adjectives via 4 conditions (structural, phonemic, semantic, and self-reference)
  - recall for adjectives was highest for the self-reference condition

Table 1
Examples of the Rating Tasks

Task	Cue question	Manipulation
Structural	Big letters?	The adjective was either presented in the same size type as the question or twice as large.
Phonemic	Rhymes with XXXX?	XXXX was a word that either rhymed or did not rhyme with the adjective.
Semantic	Means same as YYYY?	YYYY was either a synonym or unrelated word to the presented adjective.
Self-reference	Describes you?	Subjects simply responded *yes* or *no* to indicate the self-reference quality of the presented adjective.

	Rating task				
Rating	Structural	Phonemic	Semantic	Self-reference	
	Mean recall				Total
yes	.28	.34	.65	1.78	3.05
no	.06	.34	.68	1.06	2.14
Total	.34	.68	1.33	2.84	5.19

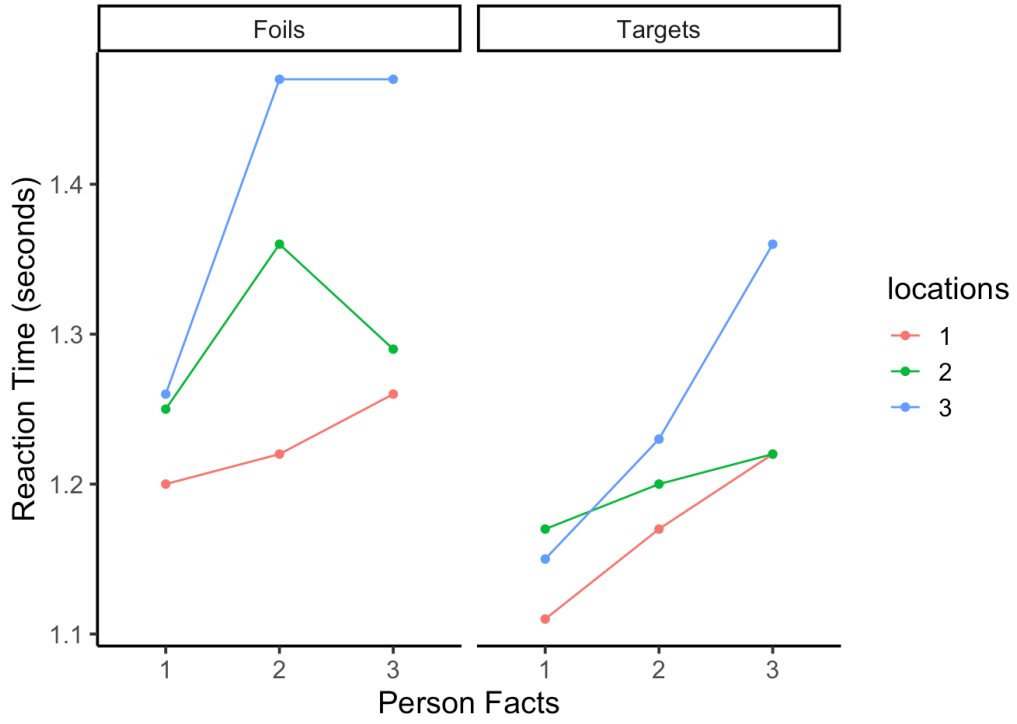
fan effect

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.		
—		
—		
—		

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
  - targets took longer to recognize if the person/location had a greater fan
  - foils took longer to reject than targets but also longer for sentences with concepts with larger fans



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

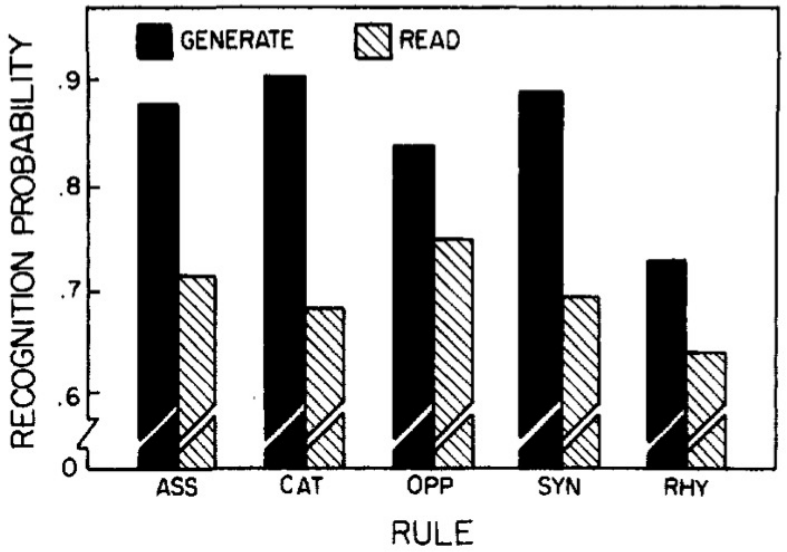


Figure 1. Mean recognition probabilities for each condition for each rule of Experiment 1. (ASS = associate; CAT = category; OPP = opposite; SYN = synonym; RHY = rhyme.)

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

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

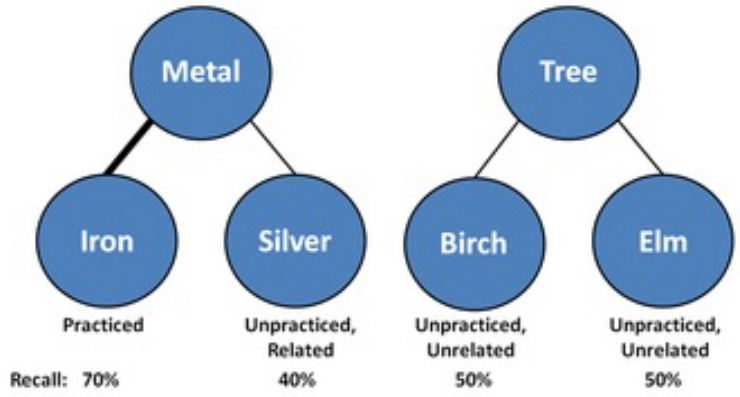
retrieval-induced forgetting

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

- claim: retrieval 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-ir????

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



RIF: explain it to each other!

activity

- class will be divided into two groups
  - group 1: last names from A-L
  - group 2: last names from M-Z
- 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!

group 1

The procedure is actually quite simple. First you arrange items into different groups. Of course, one pile may be sufficient depending upon how much there is to do. If you have to go somewhere else due to lack of facilities that is the next step; otherwise, you are pretty well set. It is important not to overdo things. That is, it is better to do too few things at once than too many. In the short run, this may not seem important but complications can easily arise. A mistake can be made as well. At first, the whole procedure will seem complicated. Soon, however, it will become just another facet of life. It is difficult to foresee any end to the necessity for this task in the immediate future, but then, one never can tell. After the procedure is completed one arranges the materials into different groups again. Then they can be put into their appropriate places. Eventually they will be used once more and the whole cycle will have to be repeated. However, that is part of life.

group 1 close your eyes

group 2 open your eyes

- you will now read a passage about washing clothes

group 2

The procedure is actually quite simple. First you arrange items into different groups. Of course, one pile may be sufficient depending upon how much there is to do. If you have to go somewhere else due to lack of facilities that is the next step; otherwise, you are pretty well set. It is important not to overdo things. That is, it is better to do too few things at once than too many. In the short run, this may not seem important but complications can easily arise. A mistake can be made as well. At first, the whole procedure will seem complicated. Soon, however, it will become just another facet of life. It is difficult to foresee any end to the necessity for this task in the immediate future, but then, one never can tell. After the procedure is completed one arranges the materials into different groups again. Then they can be put into their appropriate places. Eventually they will be used once more and the whole cycle will have to be repeated. However, that is part of life.

both groups open your eyes

- write down everything you remember about the passage

score yourself per sentence

The procedure is actually quite simple. First you arrange items into different groups. Of course, one pile may be sufficient depending upon how much there is to do. If you have to go somewhere else due to lack of facilities that is the next step; otherwise, you are pretty well set. It is important not to overdo things. That is, it is better to do too few things at once than too many. In the short run, this may not seem important but complications can easily arise. A mistake can be made as well. At first, the whole procedure will seem complicated. Soon, however, it will become just another facet of life. It is difficult to foresee any end to the necessity for this task in the immediate future, but then, one never can tell. After the procedure is completed one arranges the materials into different groups again. Then they can be put into their appropriate places. Eventually they will be used once more and the whole cycle will have to be repeated. However, that is part of life.

group 1: report your score!

Nobody has responded yet.

Hang tight! Responses are coming in.

group 2: report your score!

Nobody has responded yet.

Hang tight! Responses are coming in.

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.

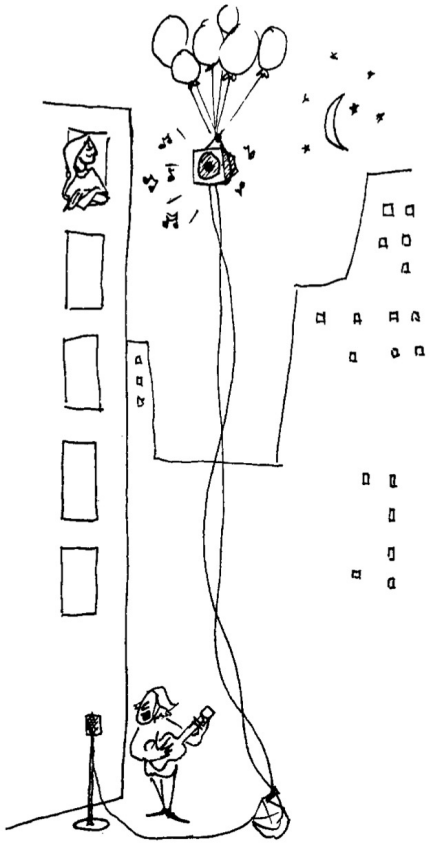


FIG. 1. Appropriate context picture for Experiment I.

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 and retrieval (learning and recall) environments matched

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

Learning environment	Recall environment: Dry — Mean recall score	Dry — S.D.	Wet — Mean recall score	Wet — S.D.	Total
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

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

Context effects: Classroom tests and context independence

WILLIAM H. SAUFLEY, JR., SANDRA R. OTAKA, and JOSEPH L. BAVARESCO
University of California, Berkeley, California

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.

big takeaways

- jot down key takeaways from today

next class

- **before** class:
  - *finish:* L9 readings
  - *work on:* SPARK summary
- **during** class:
  - memory principles
  - semantic memory + priming