PSYC 5303: Theories of Learning

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Lecture 5: Human associative learning

Verbal learning

Verbal learning is the acquisition and retention of verbal information.

Two basic tasks:

- Serial learning – learning to reproduce the items in a list in their original order
  - e.g., learning the letters of the alphabet
- Paired-associate learning – learning to make a verbal response when a specific stimulus is presented
  - e.g., Dutch word *zwaart* $\longrightarrow$ English word ?????

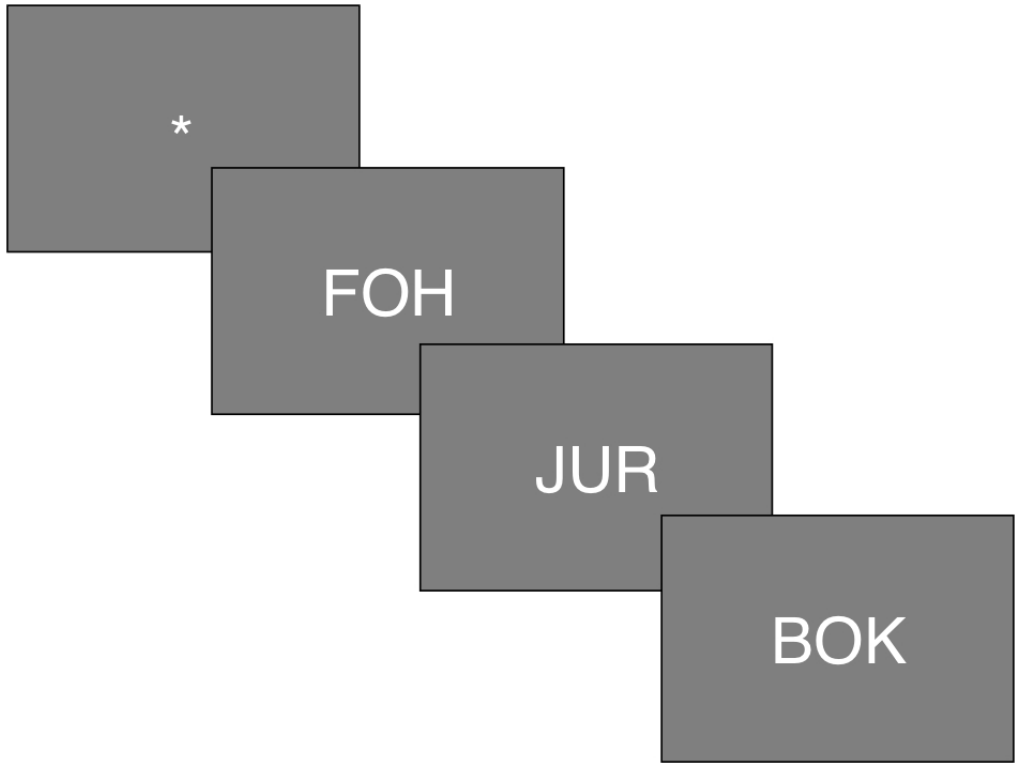
Serial learning

Ebbinghaus (1885) – learning of nonsense syllables

- "serial anticipation" procedure
- wrote nonsense syllables (CVC) on cards and randomly shuffled them
- Phase 1: looked at each one in order first time through
- Phase 2: tried to guess what next one would be (cued recall)

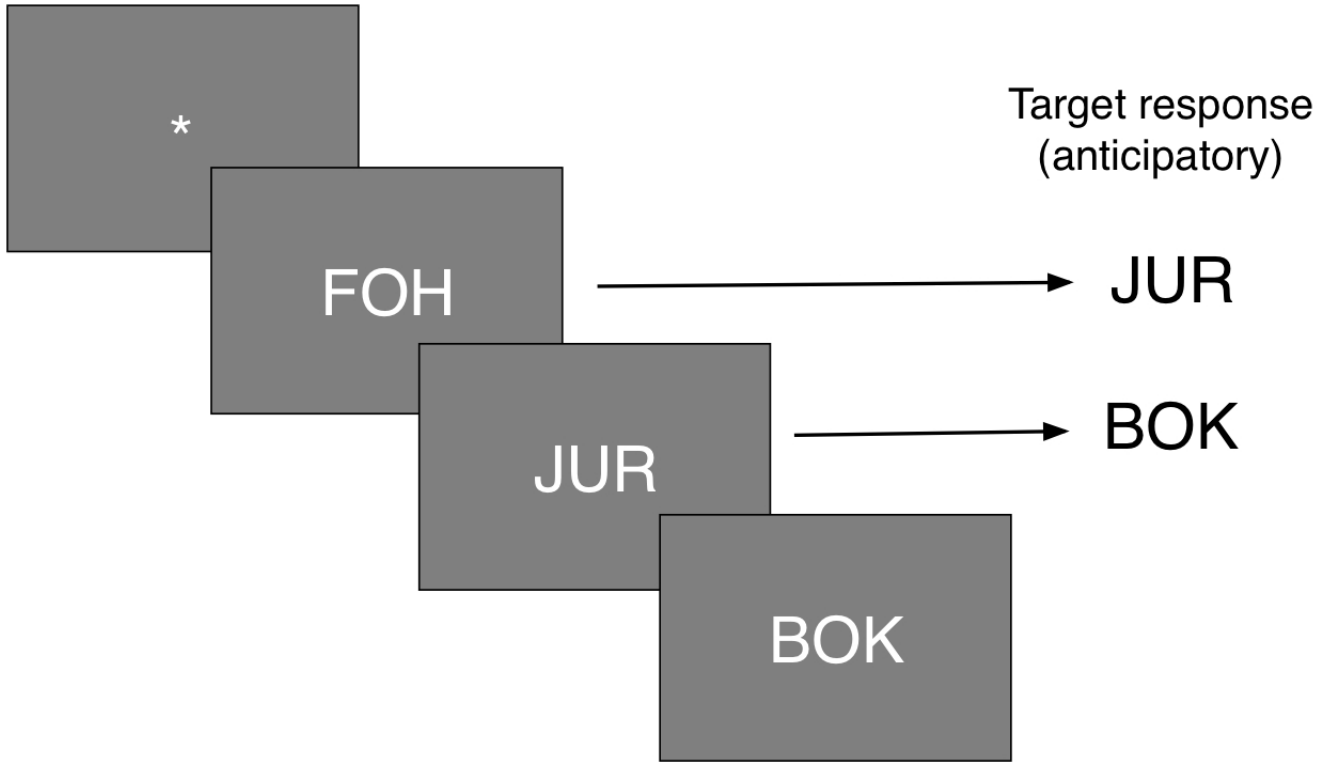
Serial learning

Phase 1: initial presentation



Serial learning

Phase 2: serial anticipation



Serial learning

Ebbinghaus (1885) – learning of nonsense syllables

- Learning phase finished when he could go through list perfectly 2x
  - recorded how many trials this required (L)
- Test phase – after some time interval
  - recorded how many trials needed to relearn (R)
- Savings score – a measure of memory retention

$$\frac{L - R}{L} \times 100$$

Serial learning

Ebbinghaus (1885) – learning of nonsense syllables

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- Example: suppose it took him 12 trials to learn a list. Then, 24 hours later, it took him 4 trials to relearn it. The savings score would be:

Serial learning

Ebbinghaus (1885) – learning of nonsense syllables

- Savings score – a measure of memory retention

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- Example: suppose it took him 12 trials to learn a list. Then, 24 hours later, it took him 4 trials to relearn it. The savings score would be:

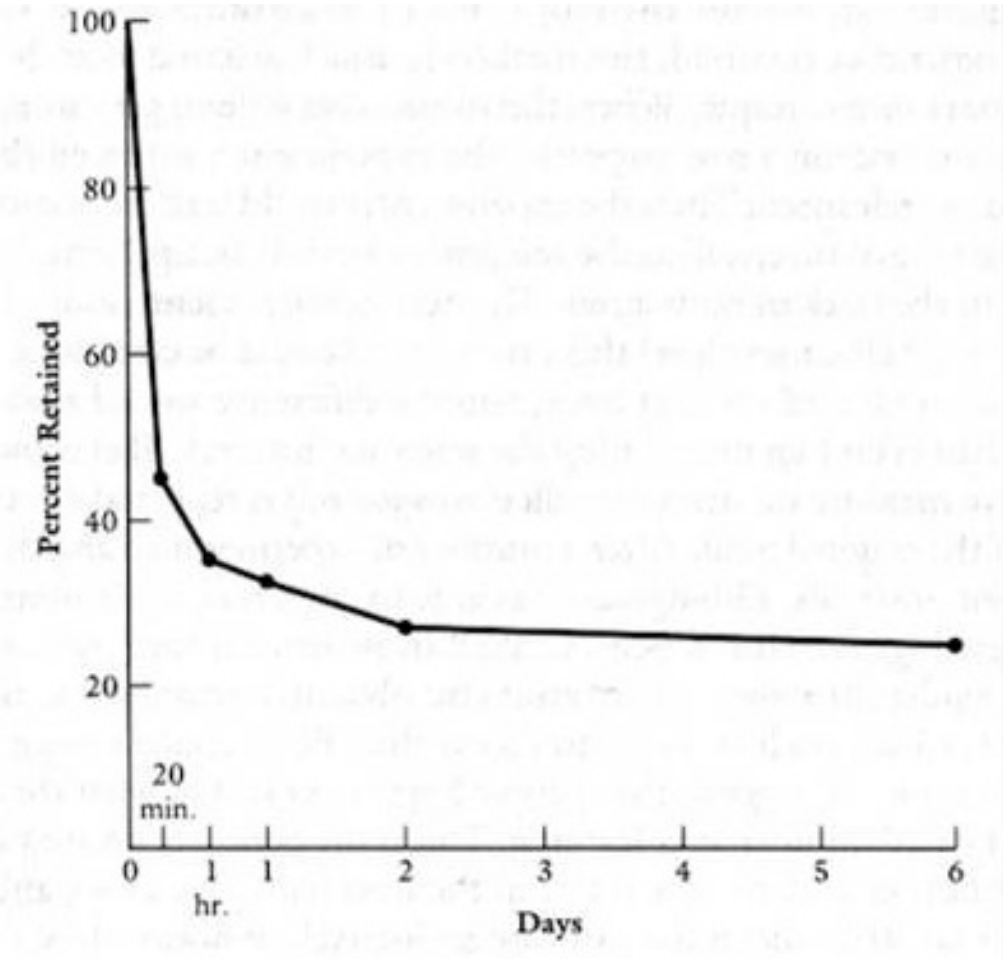
$$\frac{12 - 4}{12} \times 100 = \frac{8}{12} \times 100 = 67\%$$

- Meaning: 67% of original information was retained (saved) during the interval between learning and testing.

Serial learning

Ebbinghaus (1885) – learning of nonsense syllables

- "forgetting curve"



Why do we forget?

Two theories:

- McGeoch (1932): forgetting = decay through disuse
- Underwood (1957): forgetting = interference

Forgetting = Decay?

- McGeoch proposed that forgetting is due to physiological changes in the memory engram due to lack of periodic retrieval ("fades from memory?")
- Jenkins & Dallenbach (1924) – taught subjects a list of nonsense syllables
  - recall of list tested 1, 2, 4, or 8 hours later
  - half of subjects awake during retention interval, half asleep
- Predictions:
  - if memory = decay, then both groups should experience equivalent forgetting curve over retention intervals

Forgetting = Decay?

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- Results:

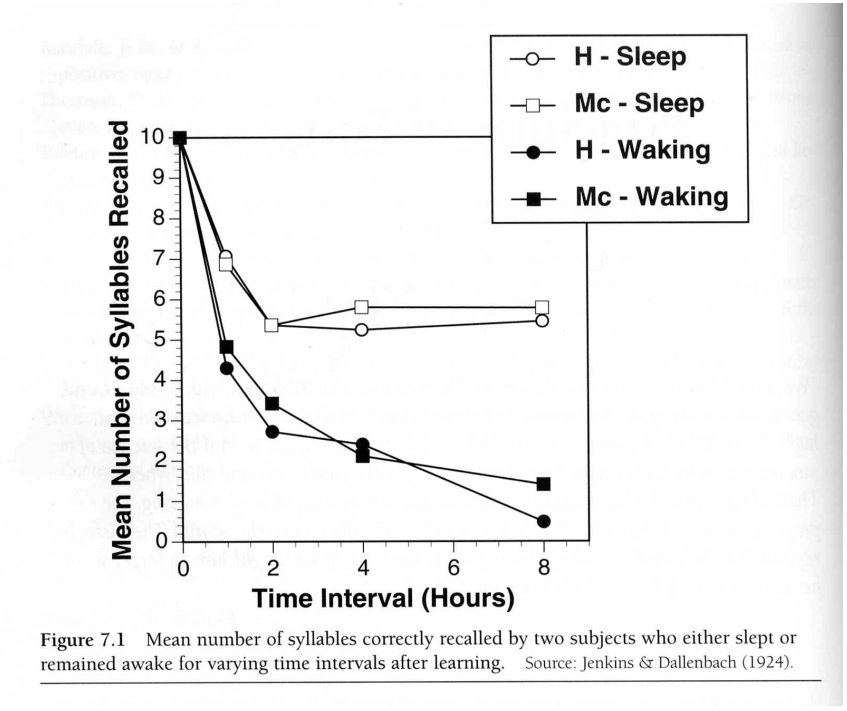

Figure 7.1 Mean number of syllables correctly recalled by two subjects who either slept or remained awake for varying time intervals after learning. Source: Jenkins & Dallenbach (1924).

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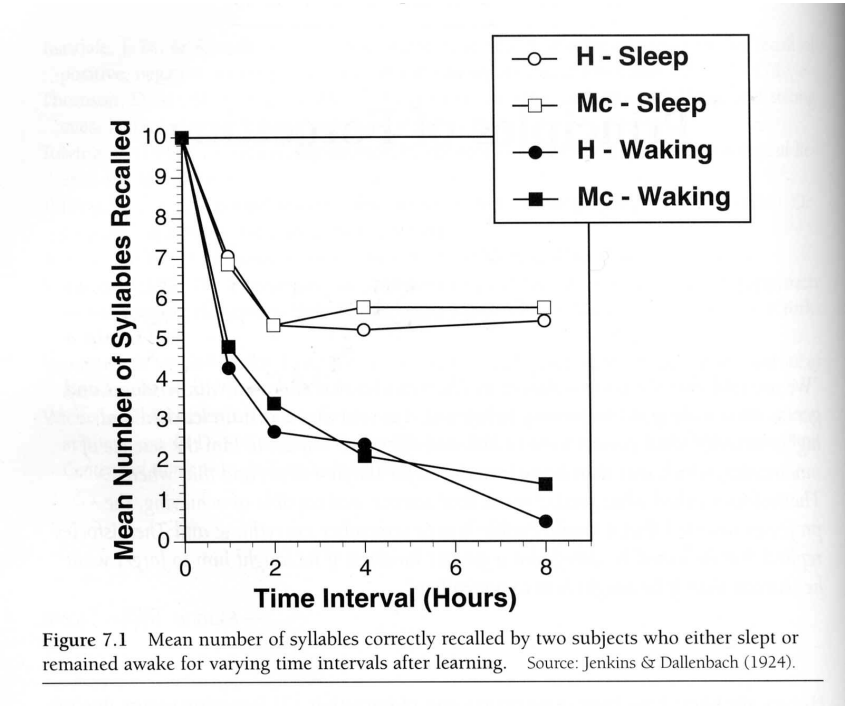

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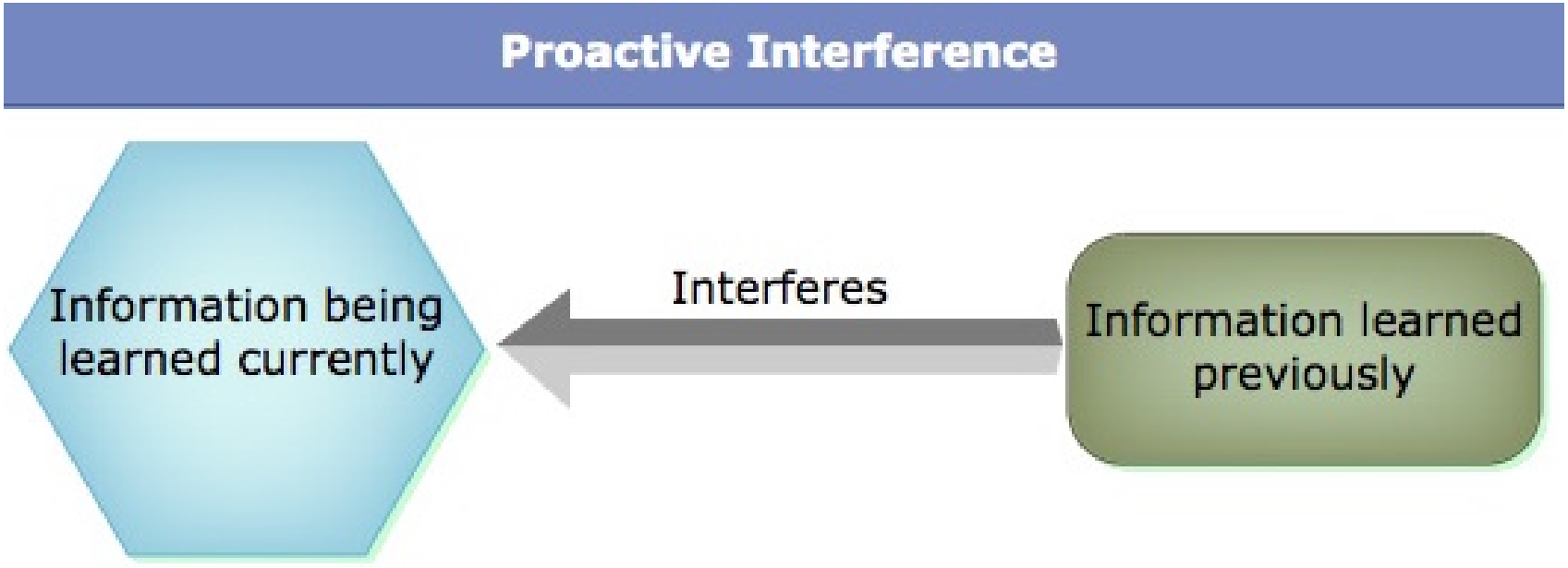
Interpretation:

- subjects who were awake forgot more
- increased activities during retention interval contributed to forgetting (interference?)

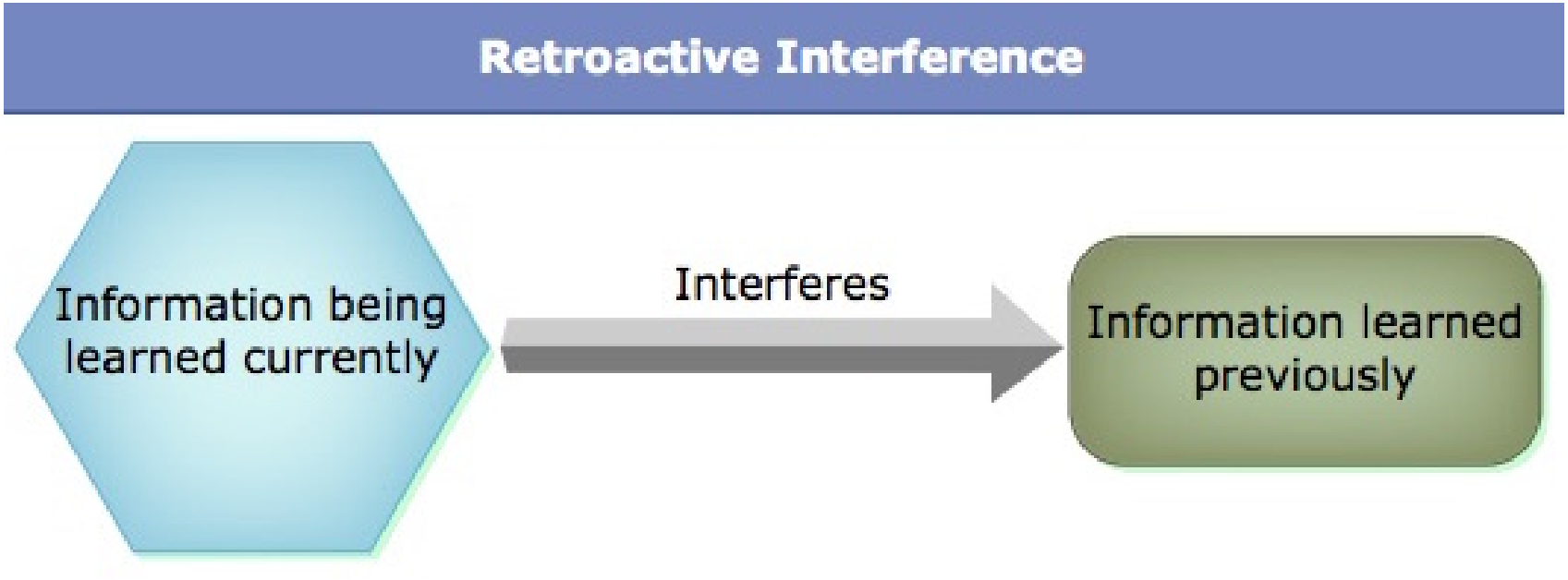
Forgetting = interference?

Proactive interference (PI) = inability to recall recent experiences because of memory of past experiences



Forgetting = interference?

Retroactive interference (RI) = inability to recall older experiences because of memory of recent experiences



Theories of Interference

Original version: interference = response competition

- Suppose you learn A-B and A-C lists. What response does an element from list A trigger?
  - both responses (B and C) compete
  - Error = incorrect response was stronger

Theories of Interference

For example, suppose you are given two paired-associate lists to memorize. The stimuli are identical, but the responses are different:

- List 1: bok $\rightarrow$ xiz
- List 2: box $\rightarrow$ taw

Some time after you memorize List 2, you are given a test on List 1. This is a test for _____

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Theories of Interference

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- List 1: bok $\rightarrow$ xiz
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Response competition $\rightarrow$ if you don't say xiz, then you will say taw.

- A response from List 2 competed with a response from List 1 and won. This is called an intrusion error.
- Prediction: amount of RI = number of intrusion errors

Theories of Interference

Melton & Irwin (1940) – tested the claim that RI = intrusion errors

- Phase 1: all subjects received 5 trials on a list of nonsense syllables
- Phase 2:
  - Control group = rest
  - Experimental group = second list of nonsense syllables to memorize for either 5, 10, 20, or 40 practice trials
- Phase 3: all subjects tested on List 1

Theories of Interference

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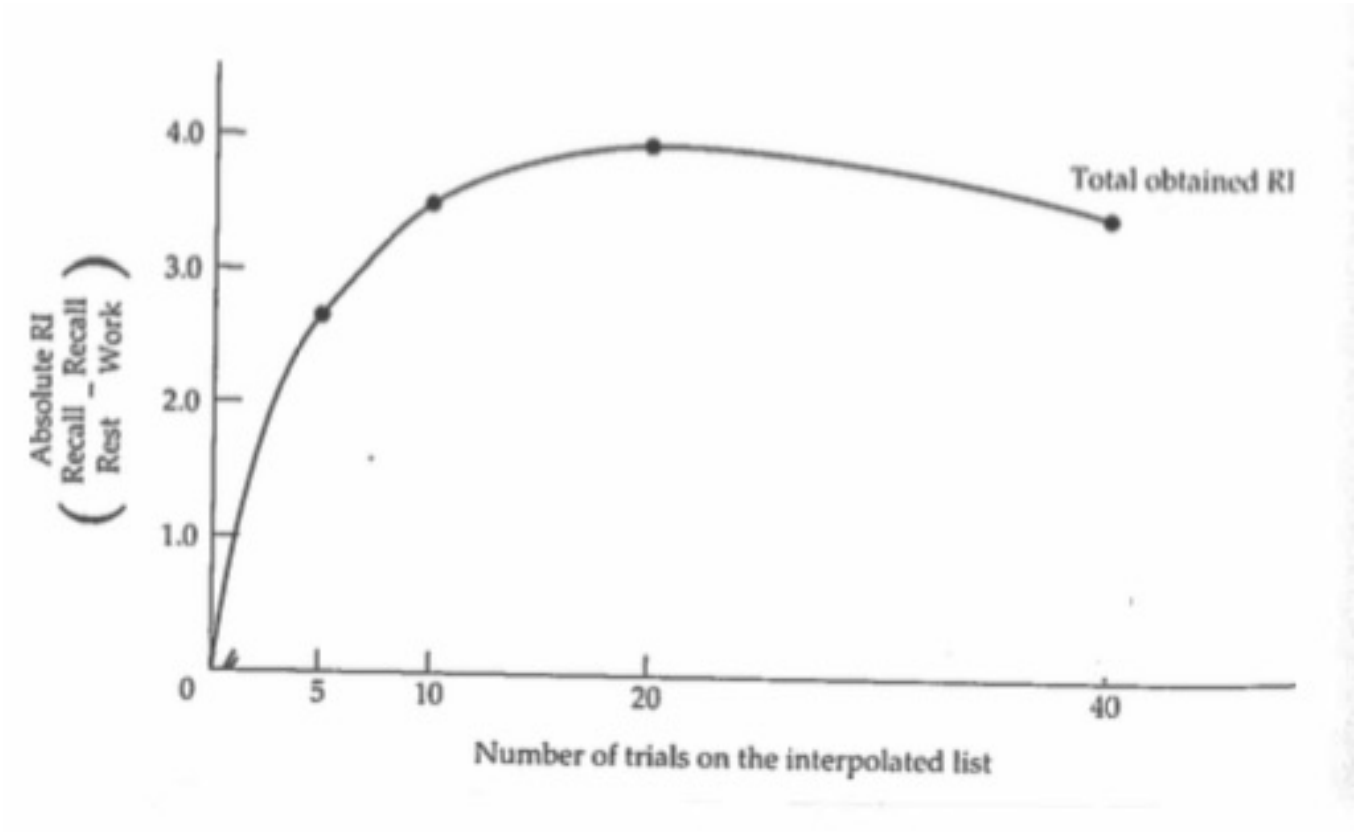

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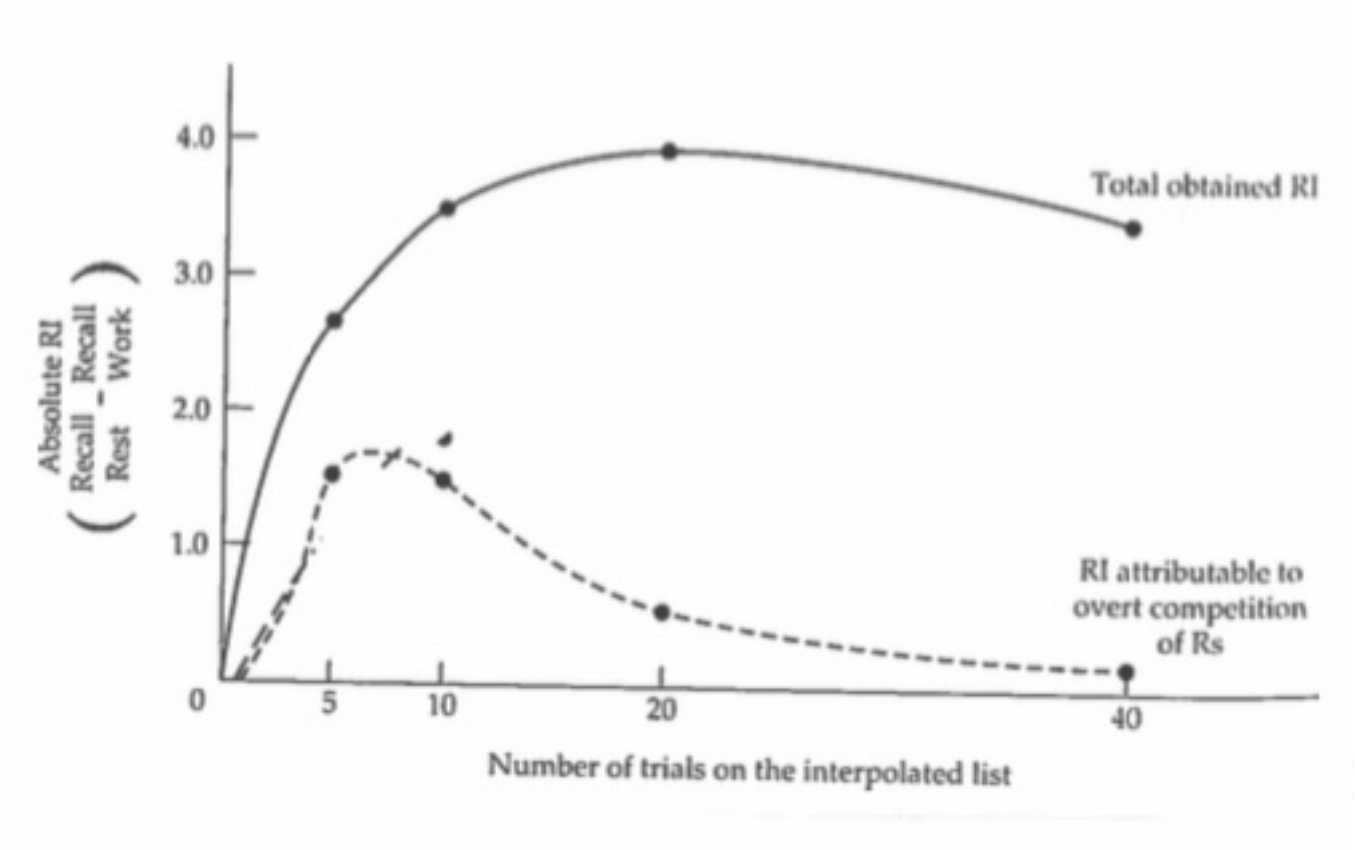

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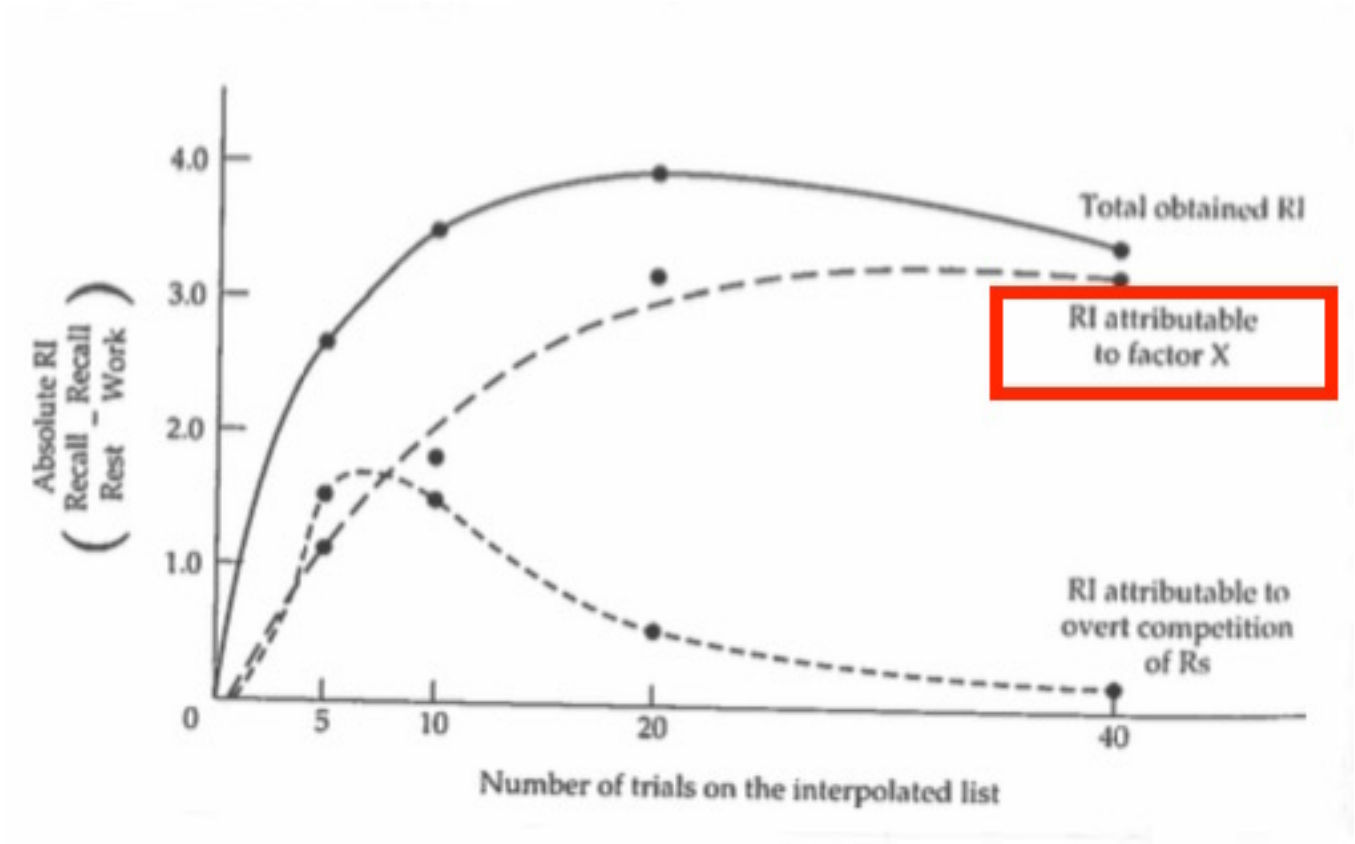

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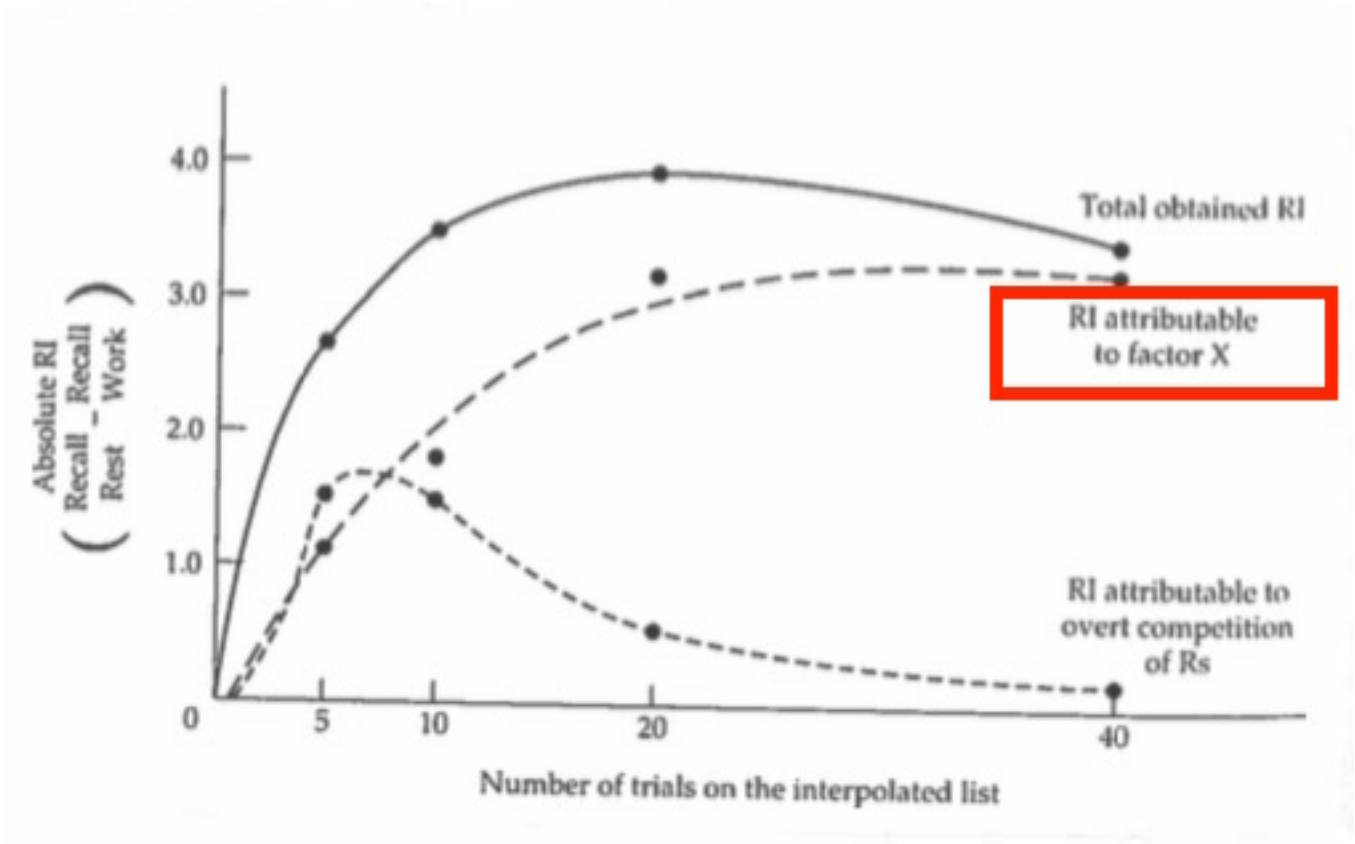

Melton & Irwin called this factor unlearning

Theories of Interference

Barnes & Underwood (1959) – evidence for unlearning

- we'll hear about this tonight in one of our student presentations!