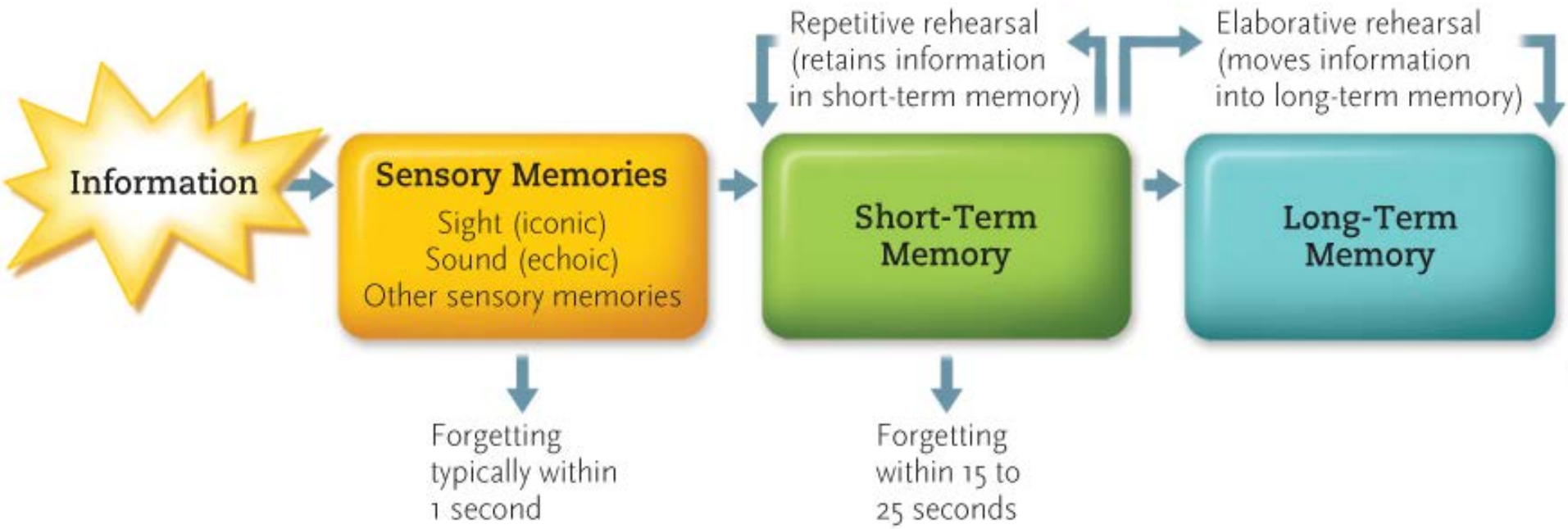
#08
MEMORY

Forgetting and false memory can be traced back to how memory is formed.

MEMORY FORMATION



Multi-store model of memory
(Atkinson & Shiffrin, 1968)

- Sensory memory
  - Records sensory information briefly and immediately
  - Like a holding bin, it retains all sensory information accurately but briefly until we select information for attention
  - Unattended information fades away in about 1 second

- Short-term memory
  - Retains a limited amount of information for a limited duration
  - Information attended to in sensory memory is now stored in short term memory for further processing

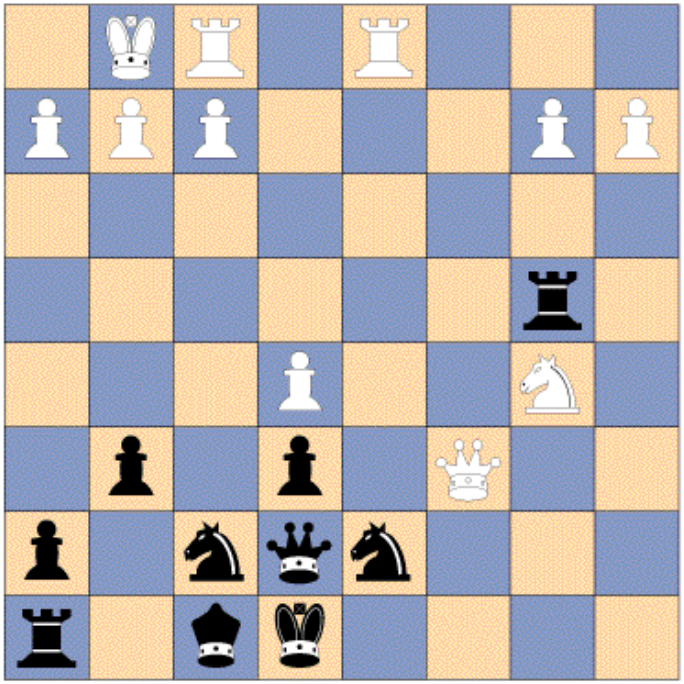
- Short-term memory
  - Repetitive rehearsal: Repetitively thinking or verbalizing about the information
  - When repetitive rehearsal is disrupted, information will be lost after seconds (estimation varies from 5 to 20 seconds)

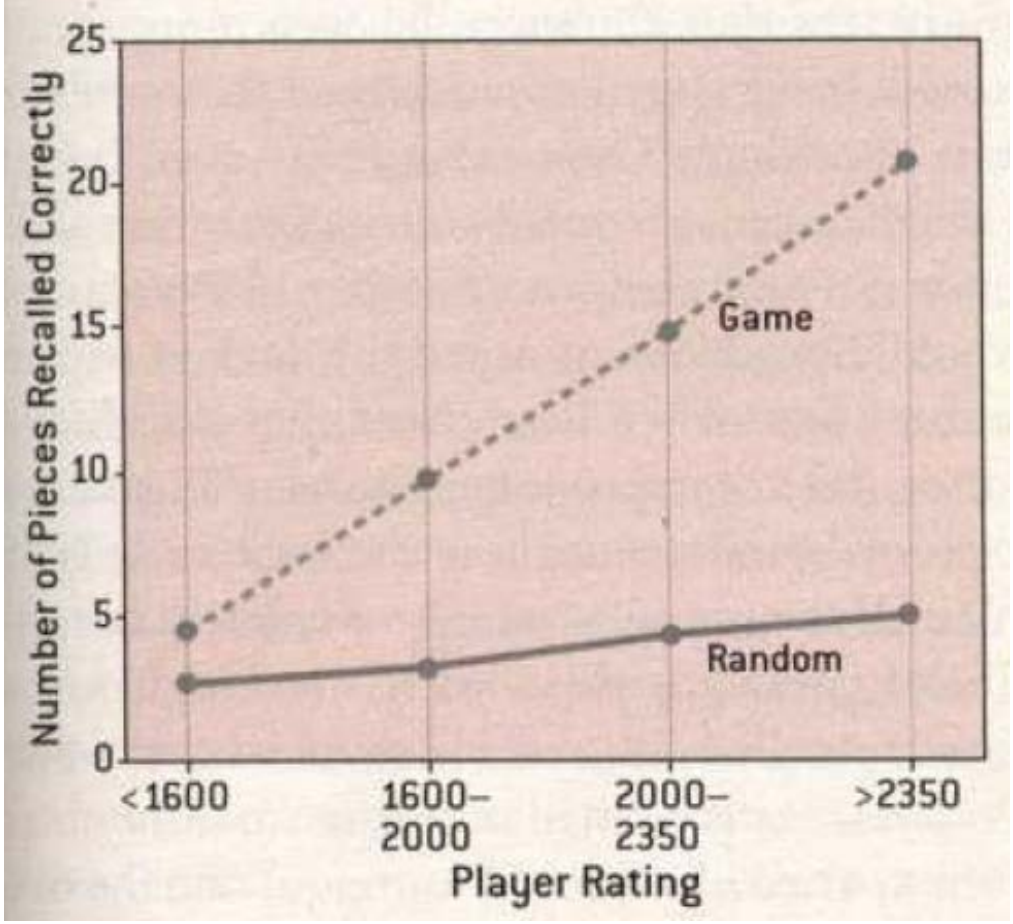
- Short-term memory
  - Capacity of short-term memory also depends on the use of chunking (organizing information items into meaningful, manageable units; often occurs automatically)

“Mary had a little lamb”

1 unit / 5 units / 18 units of information

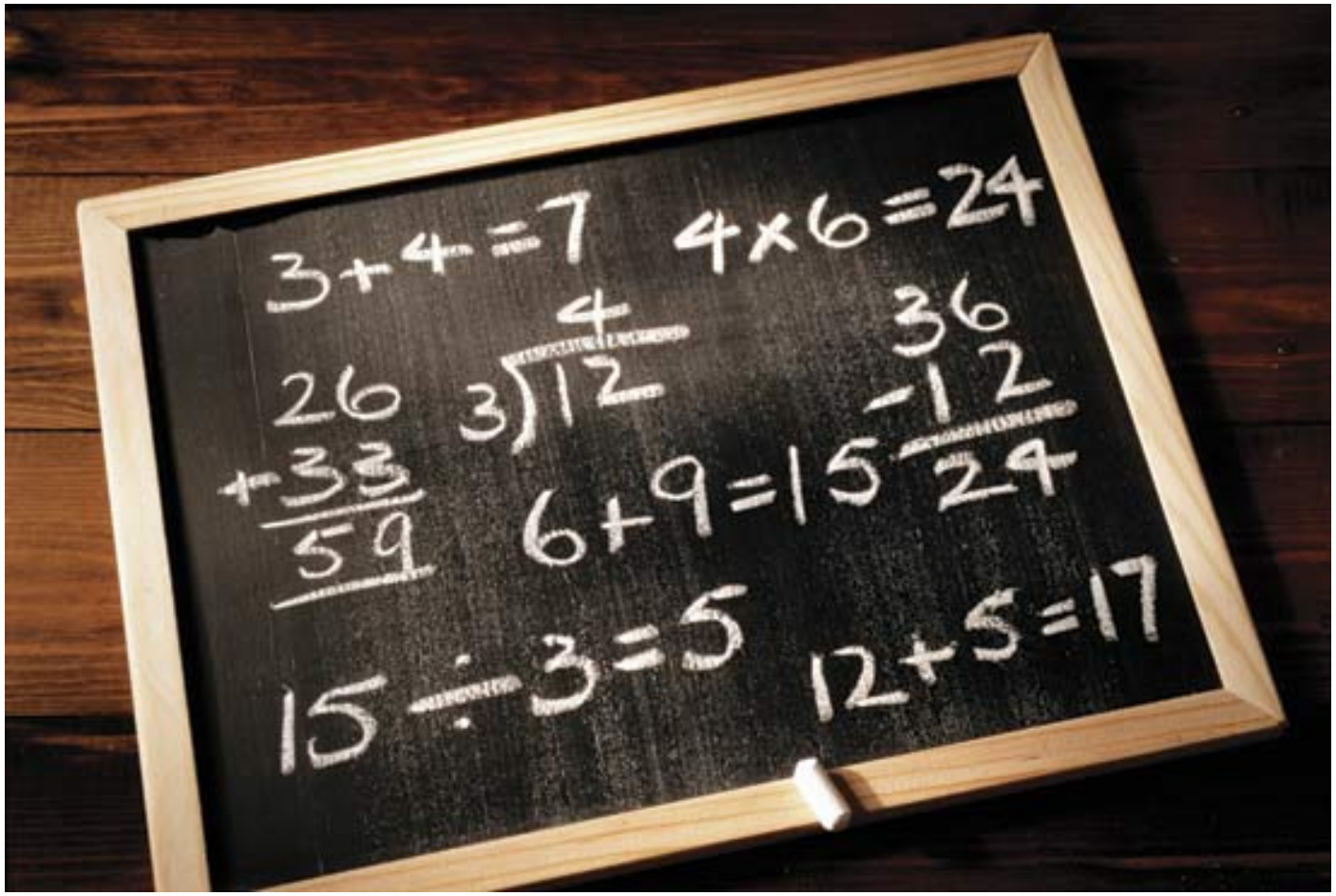
To most of us, this sentence is just one unit of information. But for people who do not know of the song, there are five units, and for a beginner English learner, there are 18 units of information.





Most people find it extremely difficult to memorize these game positions, but chess masters have no difficulty. They rely on a vast store of knowledge of game positions, which makes chunking possible. It is estimated that chess masters have approximately 50000 to 100000 chunks available. But their superior performance virtually disappears when the positions are just random, not real.

- Working memory
  - An alternative view of short-term memory
  - Assumed to play a more active role, managing both new information from sensory memory and old information from long-term memory



When we do mental operations such as arithmetic, we need to hold both new information (the numbers) and old information (arithmetic rules) in our working memory.

- Long-term memory
  - A relatively permanent and limitless store
  - Elaborative rehearsal: The process of considering and organizing information in short-term memory in some meaningful fashion

- Long-term memory
  - Levels of processing: The degree to which new information is analyzed
  - Determines how much of the information can be remembered

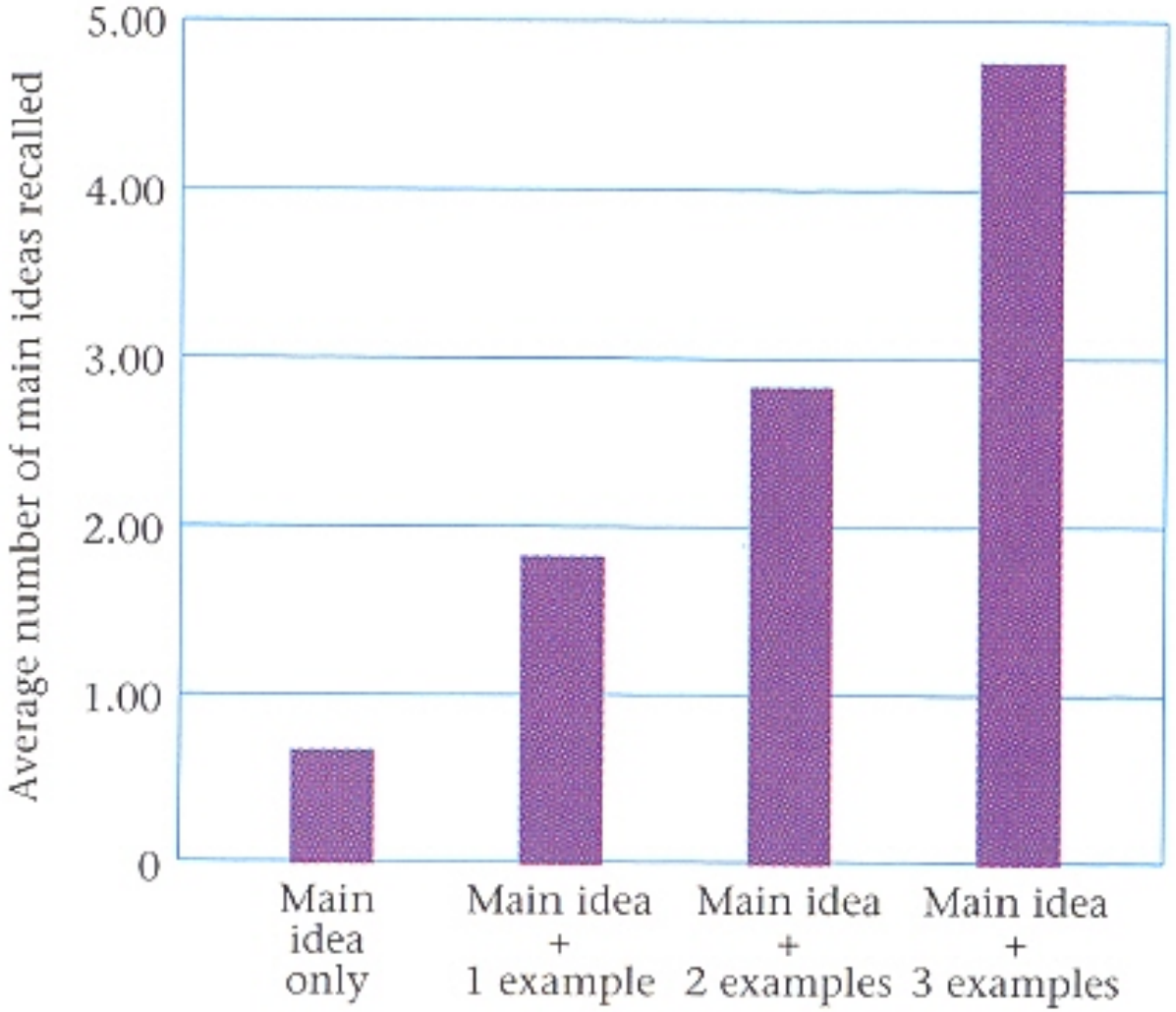
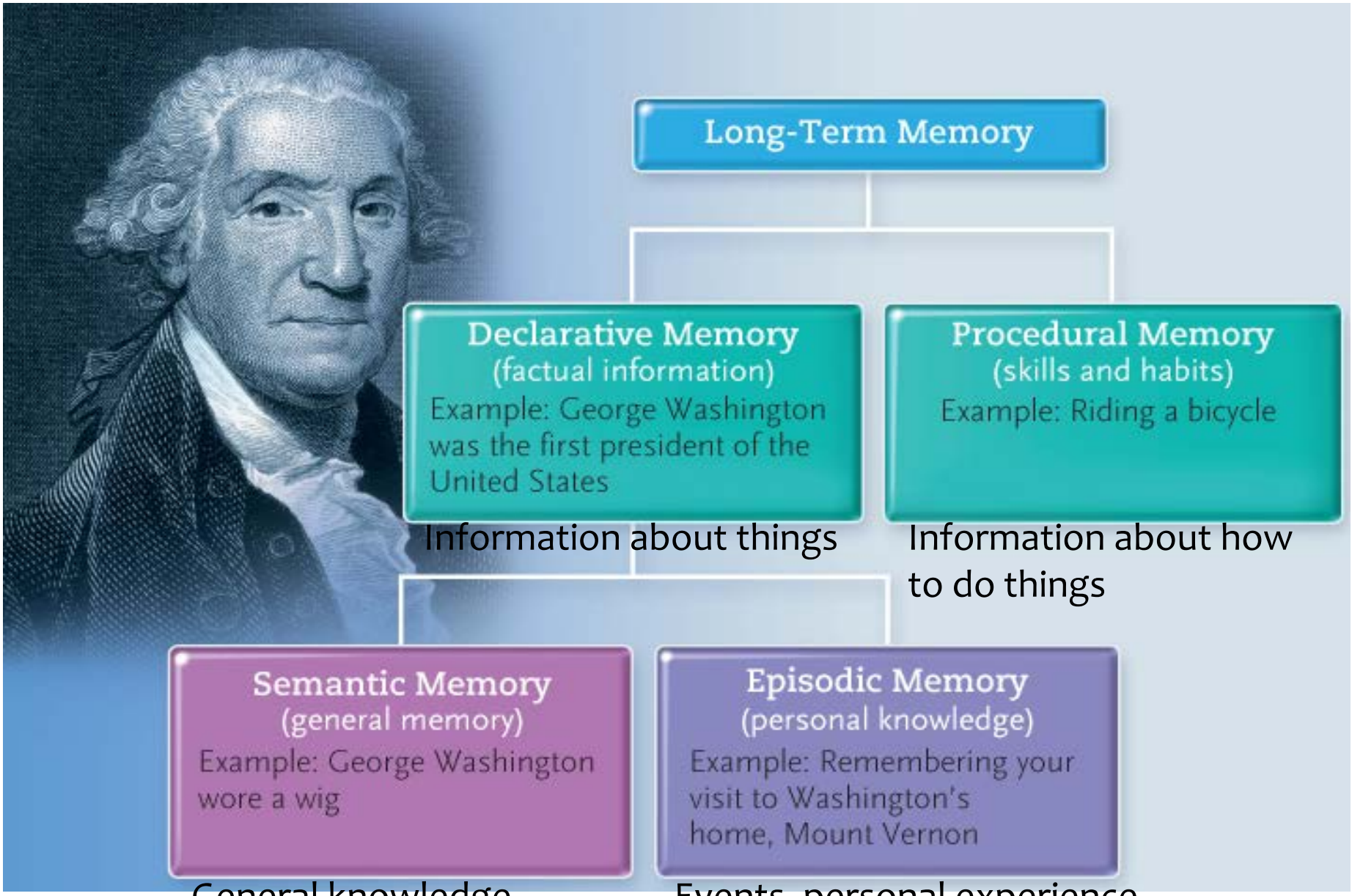


Figure 7.6
Effects of examples on retention of ideas.
Palmere et al. (1983) manipulated the number of examples provided to illustrate the main idea of various paragraphs. As the number of examples increased from none to three, so did subjects' retention of the main ideas. (Data from Palmere et al., 1983)

Using examples when studying a main idea enhanced memory of the main idea (Palmere et al., 1983),

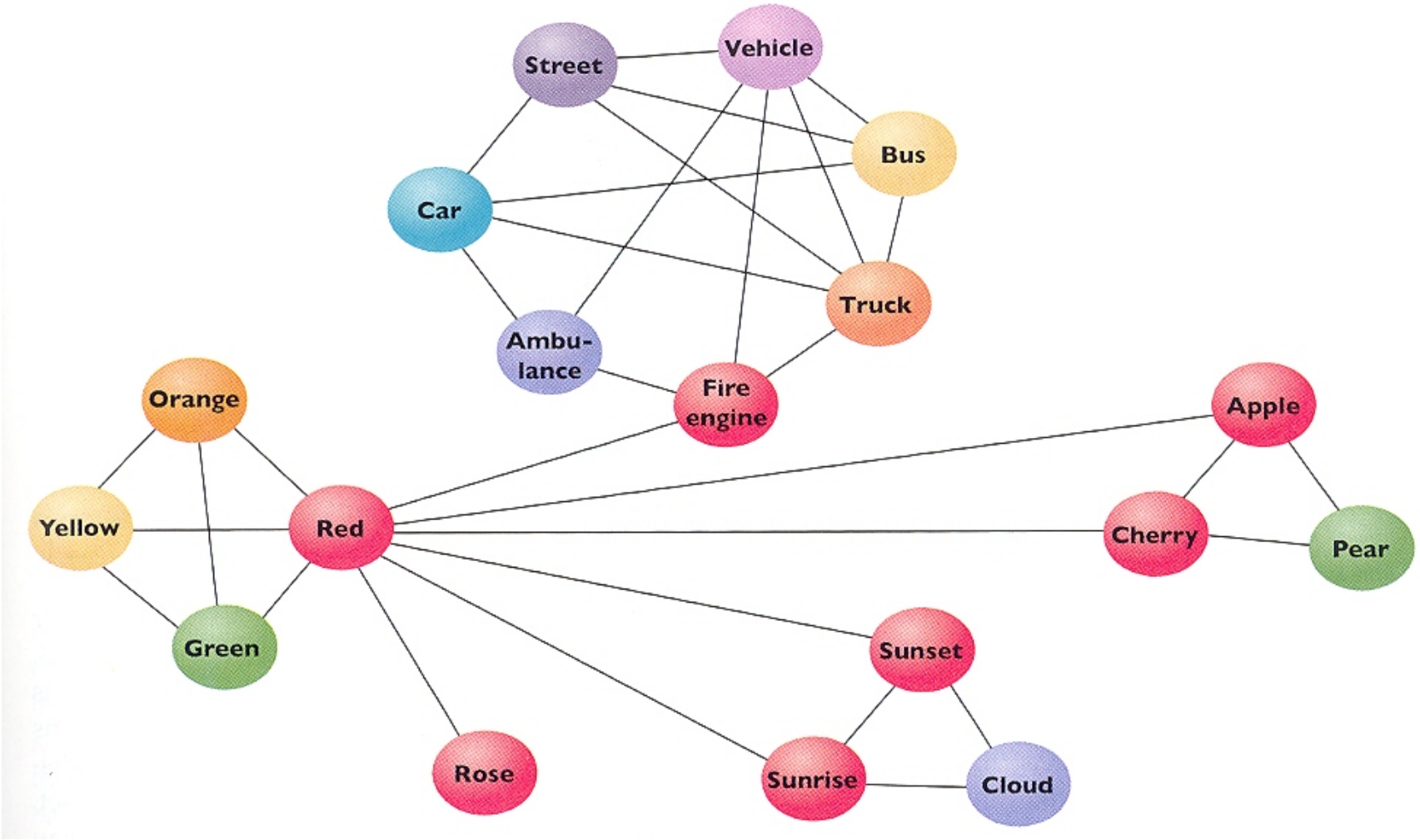


Information about things

Information about how to do things

General knowledge, facts about the world

Events, personal experience



The spreading activation theory suggests that memories are organized based on people's personal experiences. Memories that share semantic meanings or similar experiences are more strongly connected to each other, so that thinking about one memory will activate nearby memories (Collins & Loftus, 1975).

FORGETTING

Computer information processing is often used as a metaphor for understanding human memory processes. Forgetting results from problems in any of these three stages.

- Lack of attention
  - We are often blind to simple and obvious facts, simply because we do not pay enough attention to them.

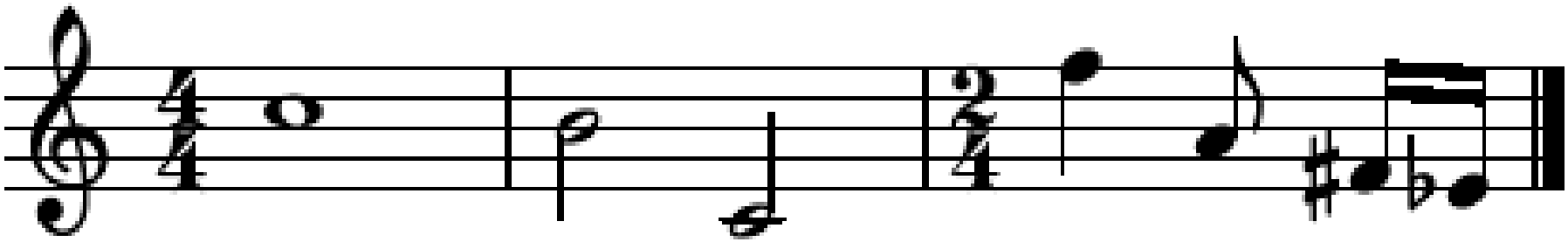
- Mnemonics
  - Some formal elaborative rehearsal strategies for organizing information in meaningful ways in order to facilitate memory of it

FARM B.

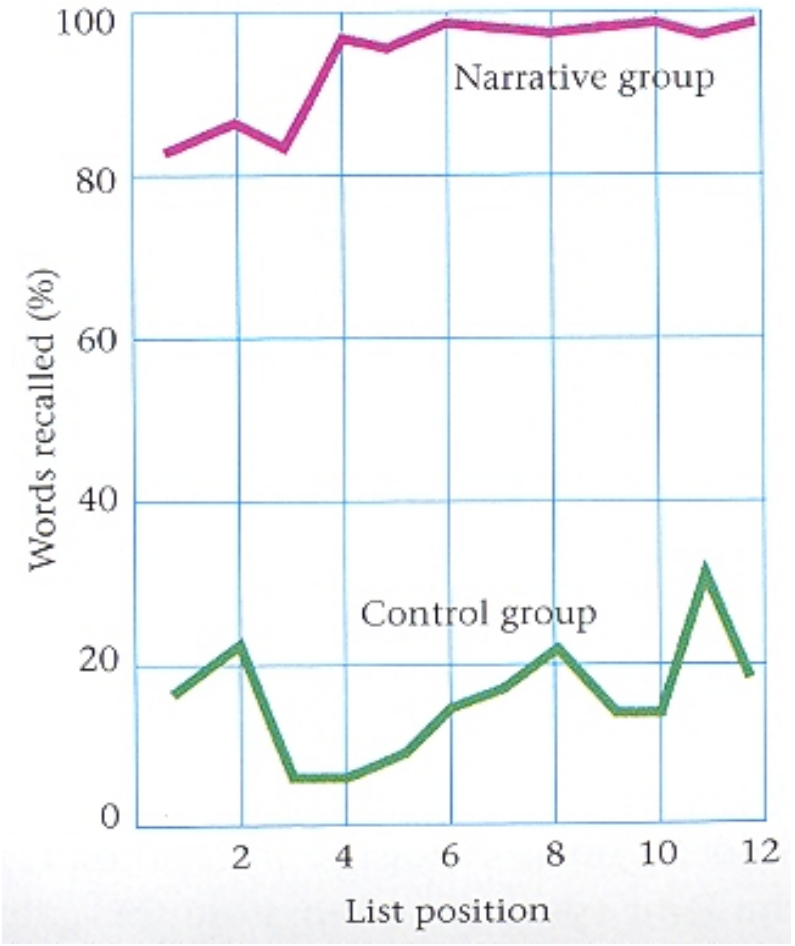
Fish - Amphibians - Reptiles - Mammals - Birds

F A C E

Everything Good Boy Does Fine



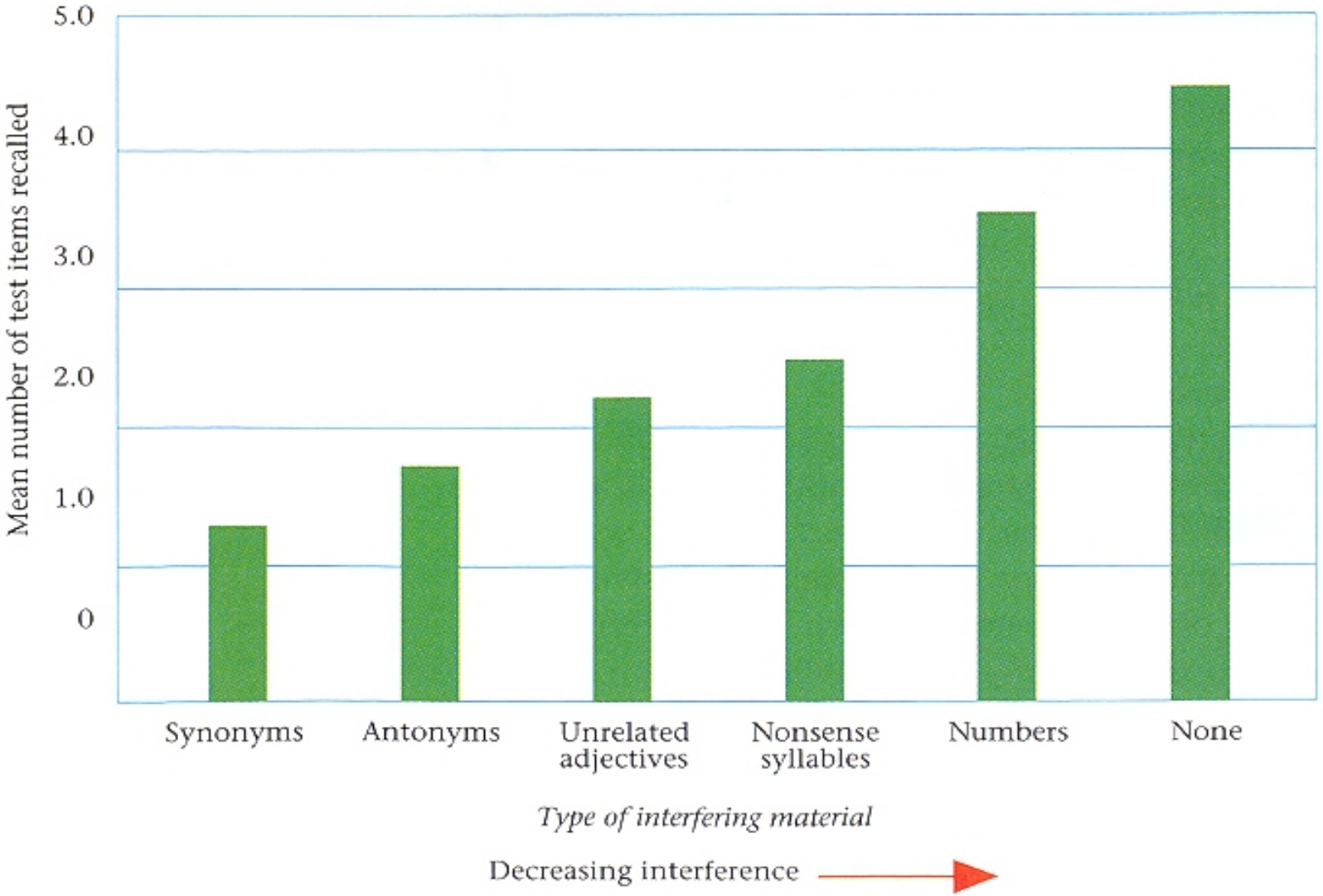
Word lists	Stories
Bird	A man dressed in a *Bird*
Costume	*Costume* and wearing a
Mailbox	*Mailbox* on his *Head* was
Head	seen leaping into the *River*.
River	A *Nurse* ran out of a nearby
Nurse	*Theater* and applied *Wax* to
Theater	his *Eyelids*, but her efforts
Wax	were in vain. He died and
Eyelid	was tossed into the
Furnace	*Furnace*.



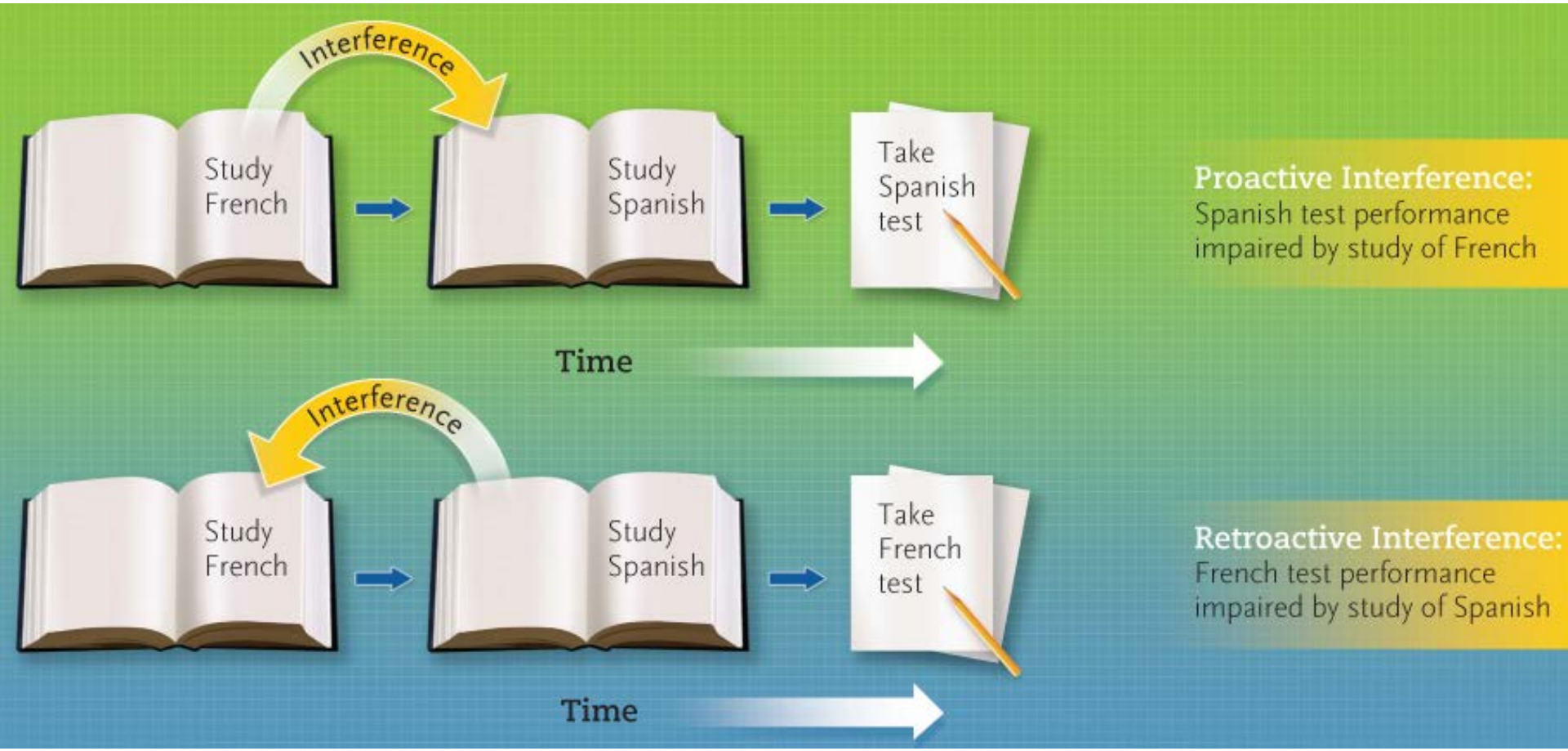
Using narrative methods like constructing a story enhances memory (Bower & Clark, 1969).

- Decay
  - Loss of information in memory through its nonuse
  - The relation between skill retention and the length of the nonpractice or nonuse interval is negative (Arthur et al., 1998)

- Interference
  - The phenomenon by which information in memory disrupts the recall of other information
  - More interference from competing information should produce more forgetting



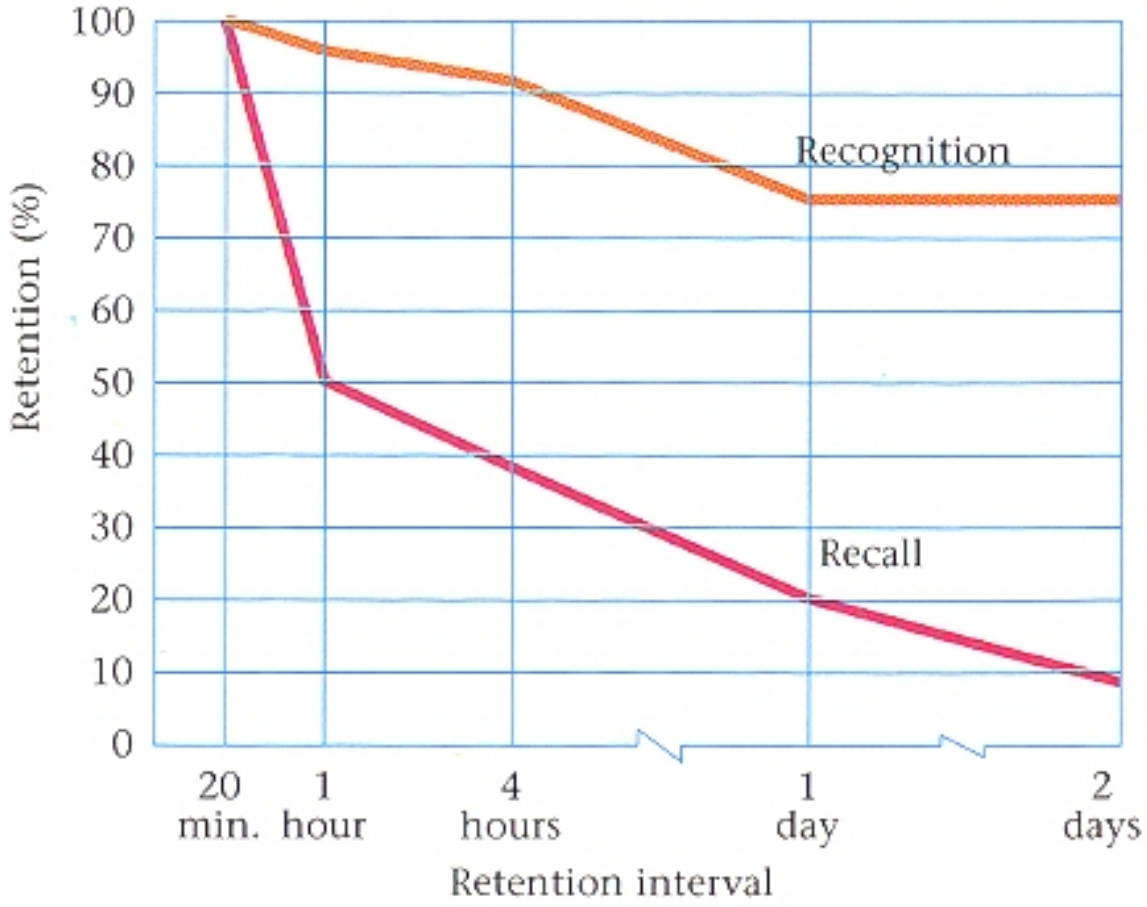
Participants studied a list of words, then read another list (of synonyms, antonyms, unrelated words, nonsense syllables, or numbers). Recall of the first list was worst when there was interference from synonyms (McGoech & McDonald, 1931).



Proactive interference and retroactive interference

- Tip-of-the-tongue phenomenon
  - The inability to recall information that one realizes one knows
  - Occurs when there are insufficient retrieval cues to rekindle information that is in memory

Figure 7.21
Recognition versus recall in the measurement of retention. Luh (1922) had subjects memorize lists of nonsense syllables and then measured their retention with either a recognition test or a recall test at various intervals up to two days. As you can see, the forgetting curve for the recall test was quite steep, whereas the recognition test yielded much higher estimates of subjects' retention.



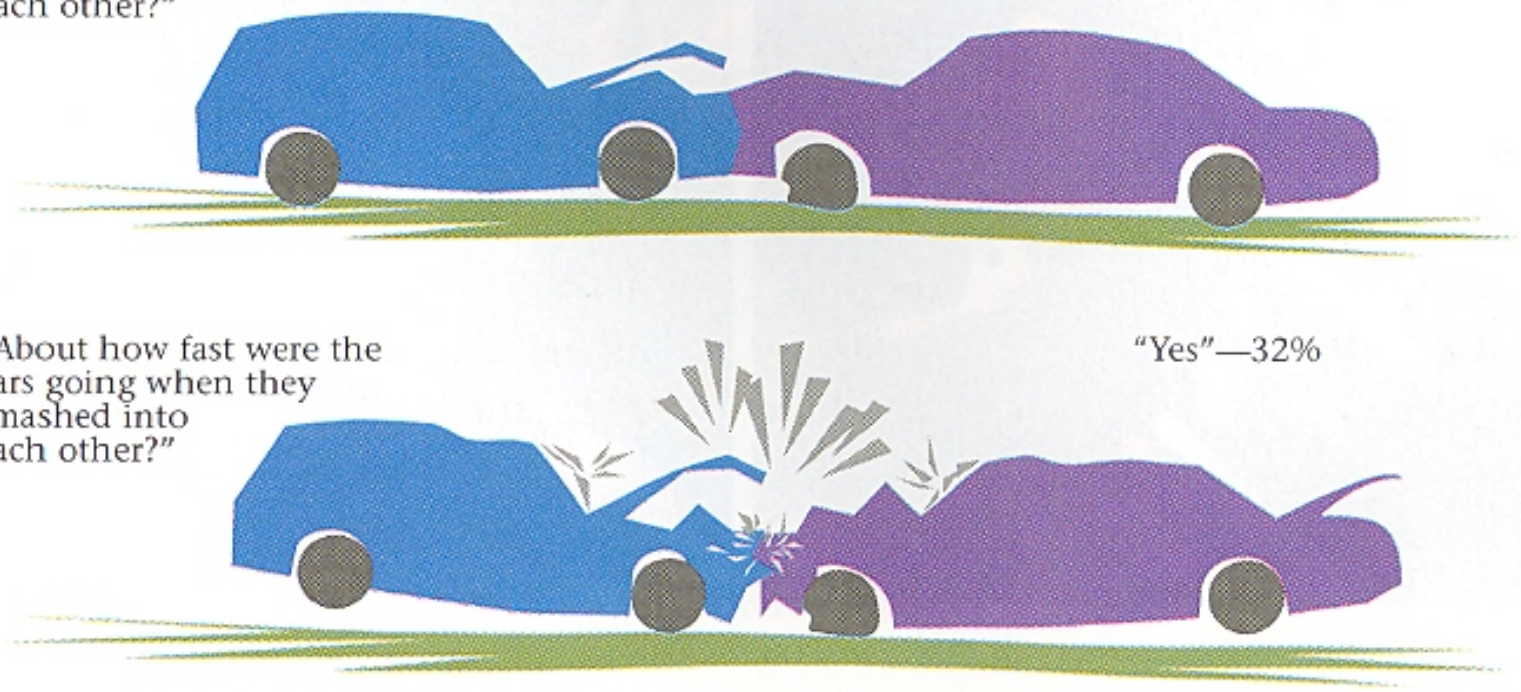
Recognition is easier than recall.

FALSE MEMORY

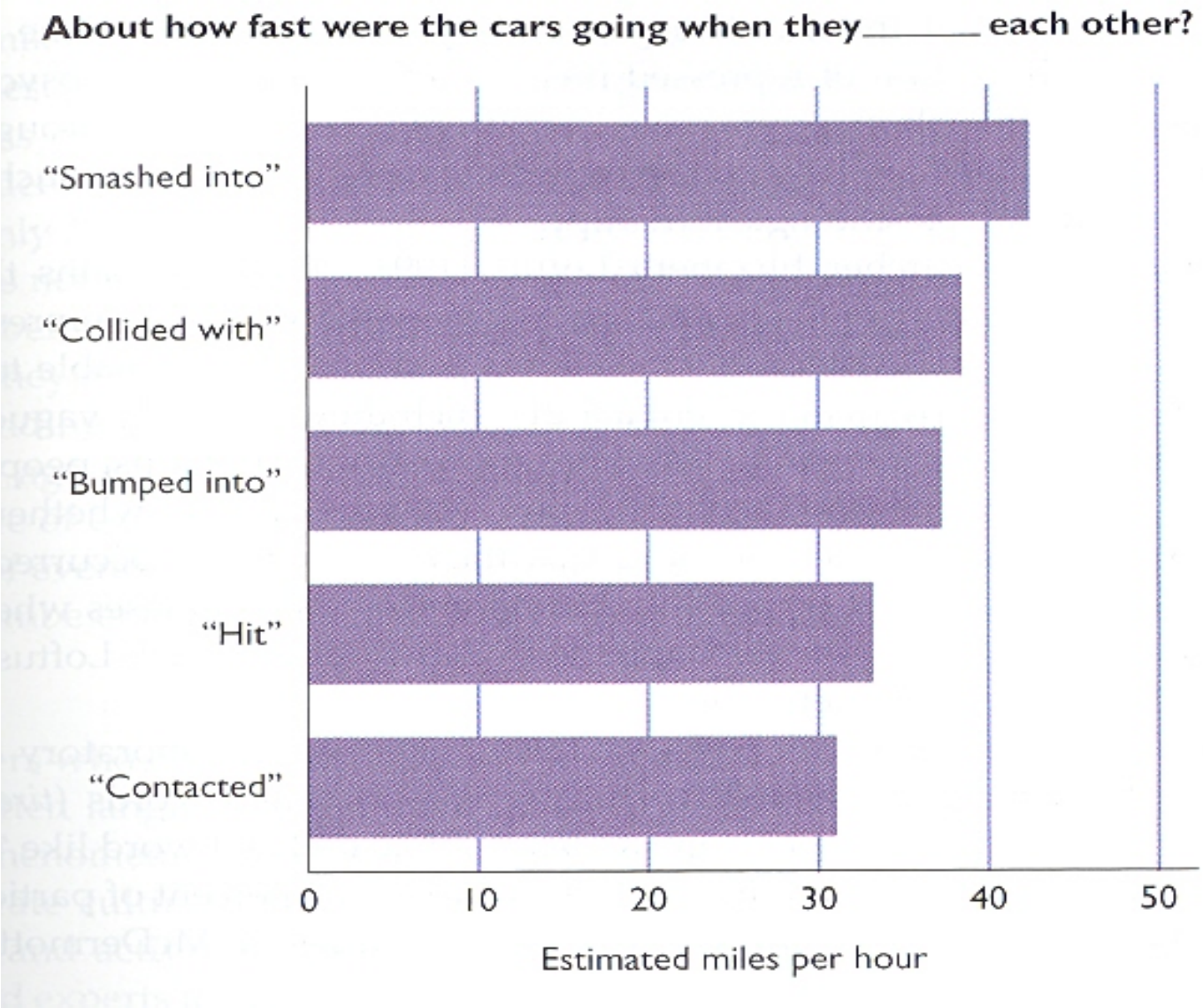
- False memory
  - Many accept recovered memories at face value
  - Memory research has shown that it is possible to create memories of events that never happened

- False memory
  - Memory is not always accurate
  - Our memory of an event is reconstructed based on not only traces of the event in our memory but also what we later read, see, expect, and imagine

Leading question asked during witness testimony	Possible schemas activated	Response of subjects asked one week later, "Did you see any broken glass?" (There was none.)
"About how fast were the cars going when they hit each other?"		"Yes"—14%
"About how fast were the cars going when they smashed into each other?"		"Yes"—32%



Participants viewed a video tape of a car accident. They were more likely to report having seen broken glass when the question involved a "stronger" word, suggesting a more serious accidence. Findings like this illustrate misinformation effect, the incorporation of misleading information into one's memory of an event (Loftus & Palmer, 1974).



Participants estimated a higher speed of the cars in the accident when the question involved a "stronger" word (Loftus & Palmer, 1974).

Researchers altered photos from a family album to show some family members taking a balloon ride. After viewing the photos, child participants reported more false memories; interviewed several days later, they reported even richer details of the rid (Strange et al., 2007).

Participants were asked to imagine certain childhood events, such as breaking a window with their hand. One out of four participants later recalled the imagined event as something that had really happened (Garry et al., 1996).