# STM VS. LTM

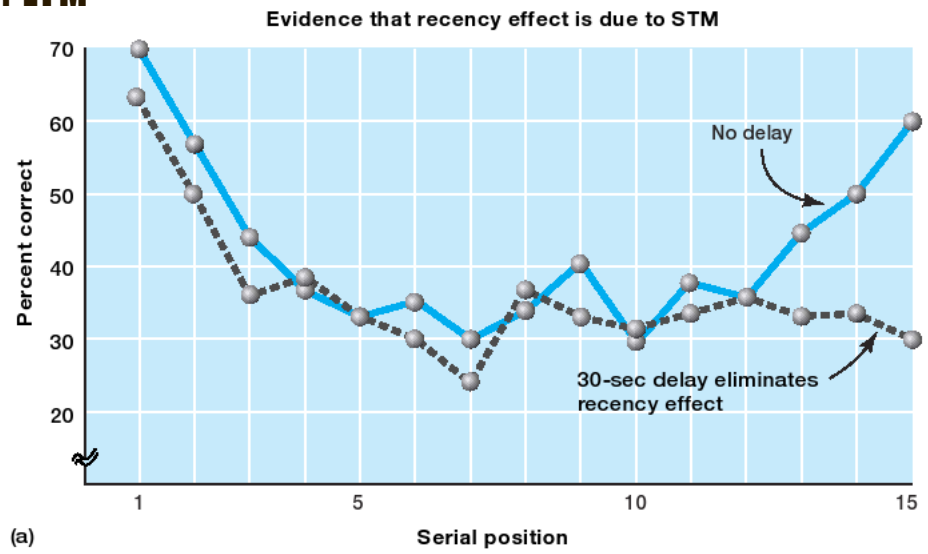



Figure 5.9 Result of Glanzer and Cunitz's (1966) experiment. (a) The serial-position curve has a normal recency effect when the memory test is immediate (solid line), but no recency effect occurs if the memory test is delayed for 30 seconds (dashed line).



31

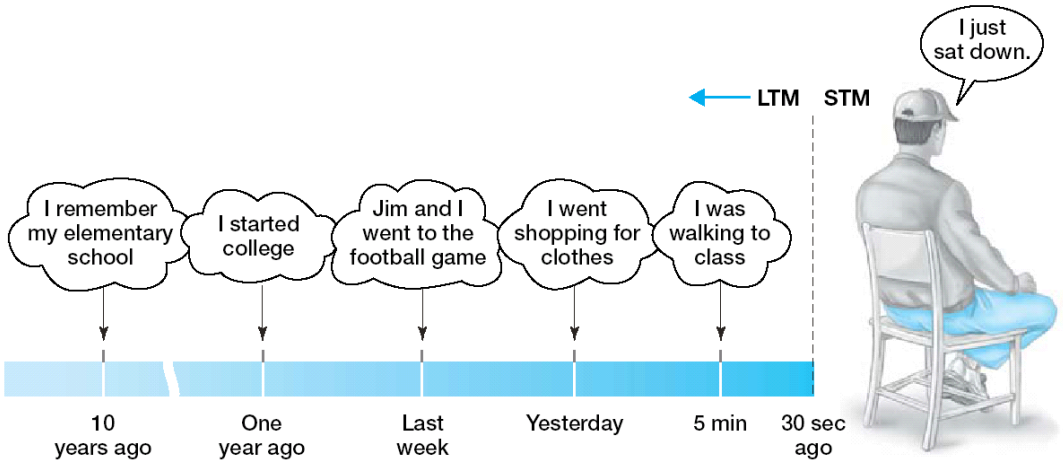
# RECALL

- Encoding Techniques
- Sensory memory
- Serial Position Effect
- Why eye-witness testimony is not a good practice – evaluate the process from memory perspective



32

## STM VS. LTM




Long-term memory covers a span that stretches from about 30 seconds ago to your earliest memories. Thus, all of this student's memories, except the memory "I just sat down," would be classified as long-term memories.



33

## IF IT FAILS SO EASILY, HOW DO WE CONSTRUCT MEMORIES FOR CURRENT AND PAST EVENTS?




34

# What is the natural limit of STM?

Asked to recall strings like – DBX; HLM etc., after a varying retention interval

I will say some letters and then a number. Your task will be to remember the letters. When you hear the number, repeat it and begin counting backwards by 3s from that number. For example, if I say ABC 309, then you say 309, 306, 303, and so on, until I say "Recall." When I say "Recall," stop counting immediately and say the three letters you heard just before the number.

Journal of Experimental Psychology

VOL. 58, NO. 3 SEPTEMBER, 1959

SHORT-TERM RETENTION OF INDIVIDUAL VERBAL ITEMS [1]

LLOYD R. PETERSON AND MARGARET JEAN PETERSON
*Indiana University*

It is apparent that the acquisition of verbal habits depends on the effects of a given occasion being carried over into later repetitions of the situation. Nevertheless, textbooks separate acquisition and retention into distinct categories. The limitation of discussions of retention to long-term characteristics is necessary in large part by the scarcity of data on the

that a verbal stimulus produces a strong predictable response prior to the experimental session and this is not true of the originally neutral stimulus in eyelid conditioning.

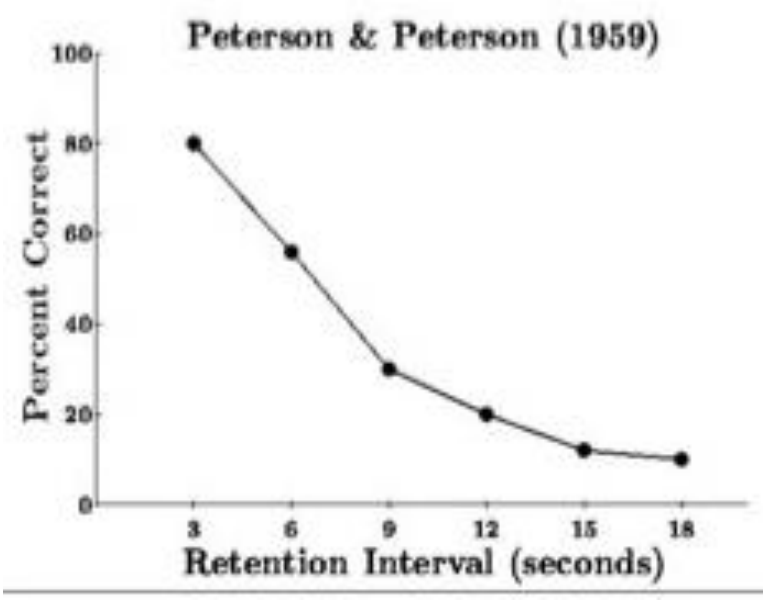
Two studies have shown that the effects of verbal stimulation can decrease over intervals measured in seconds. Pillsbury and Sylvester (1940) found marked decrement with

| | | |
|---|---|---|
| Trial 1: | F Z L | 45 |
| Trial 2: | B H M | 87 |
| Trial 3: | X C G | 98 |
| Trial 4: | Y N F | 37 |
| Trial 5: | M J T | 54 |
| Trial 6: | Q B S | 73 |
| Trial 7: | K D P | 66 |
| Trial 8: | R X M | 44 |
| Trial 9: | B Y N | 68 |
| Trial 10: | N T L | 39 |





## Contd.




**what if 15 – 20 seconds is not enough time? What if we need the information for a while longer?**

**Can "Rehearsal" be used as a technique to save Forgetting?**

**Wasn't this just about "How Long", i.e. "duration limits", what about "How Much", i.e. "capacity limits" ? –**

- **Shepard et al. (1961)**
- **Display:** List of sequence of 200 three-digits numbers;
- **Task:** identify whenever the number is repeated;
- **Question:** how the ability to recognize the repeated number changes as a function of 'number of the intervening items'

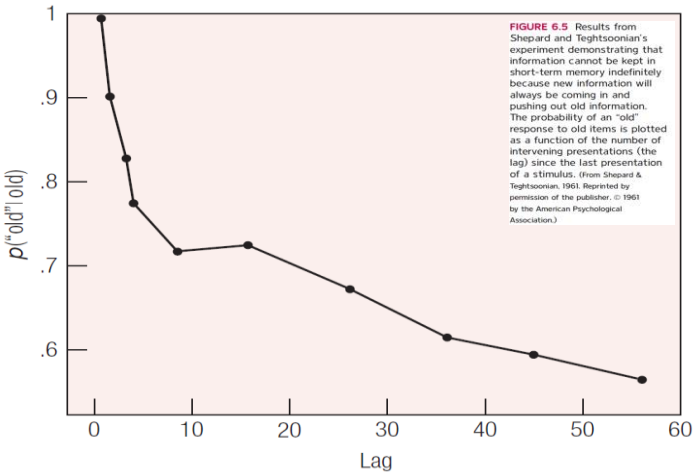



FIGURE 6.5 Results from Shepard and Teghtsoonian's experiment demonstrating that information cannot be kept in short-term memory indefinitely because new information will always be coming in and pushing out old information. The probability of an "old" response to old items is plotted as a function of the number of intervening presentations (the lag) since the last presentation of a stimulus. (From Shepard & Teghtsoonian, 1961. Reprinted by permission of the publisher. © 1961 by the American Psychological Association.)



37

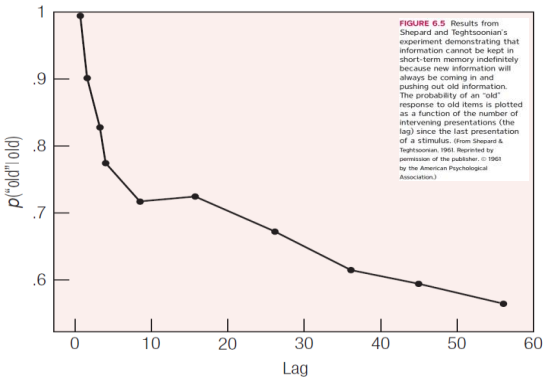
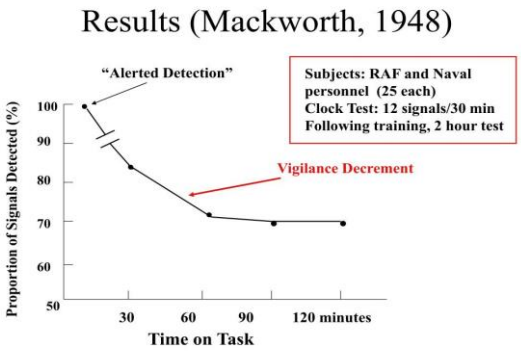
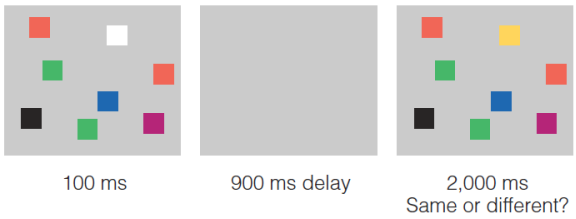



FIGURE 6.5 Results from Shepard and Teghtsoonian's experiment demonstrating that information cannot be kept in short-term memory indefinitely because new information will always be coming in and pushing out old information. The probability of an "old" response to old items is plotted as a function of the number of intervening presentations (the lag) since the last presentation of a stimulus. (From Shepard & Teghtsoonian, 1961. Reprinted by permission of the publisher. © 1961 by the American Psychological Association.)

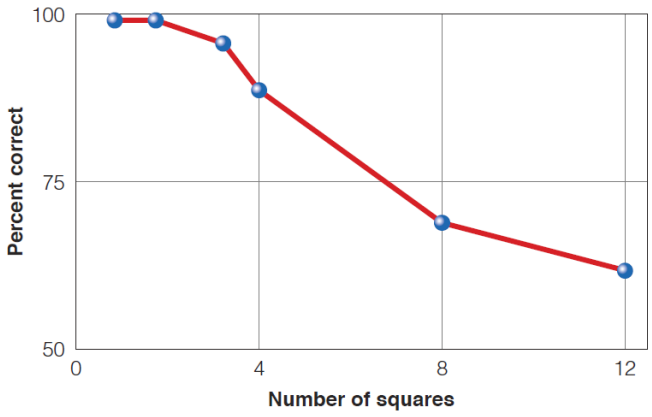





38




● **FIGURE 5.8** (a) Stimuli used by Luck and Vogel (1997). The participant sees the first display and then indicates whether the second display is the same or different. In this example, the color of one square is changed in the second display. (b) Result of the experiment, showing that performance began to decrease once there were 4 squares in the display. (Source: Adapted from E. K. Vogel, A. W. McCollough, & M. G. Machizawa, "Neural Measures Reveal Individual Differences in Controlling Access to Working Memory," *Nature 438*, 500–503, 2005.)




39

39

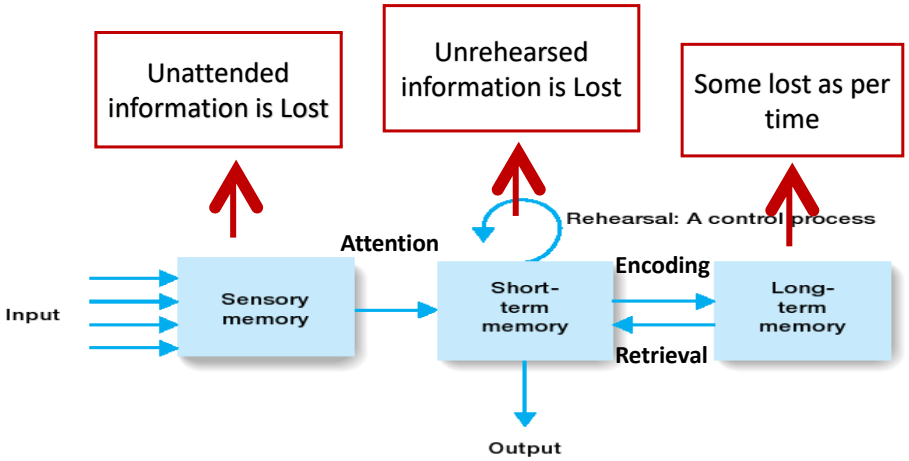



Figure 5.3 Flow diagram for Atkinson and Shiffrin's (1968) model of memory. This model, which is described in the text, is called the *modal model* because of the huge influence it has had on memory research.

40

40

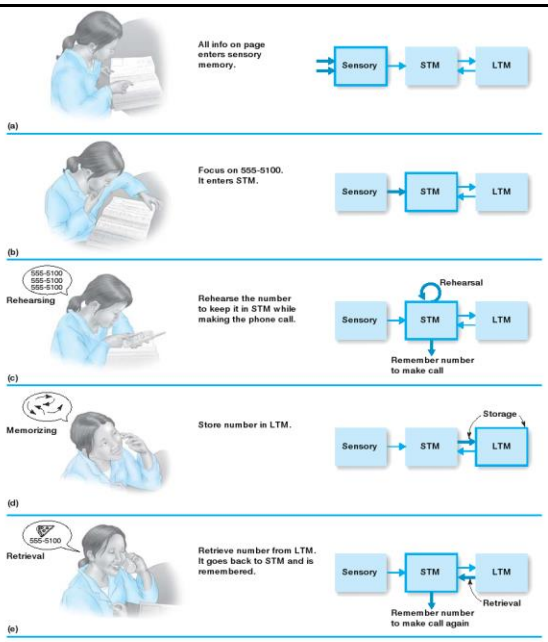



Figure 5.4 What happens in different parts of Rachel's memory as she is (a and b) looking up the phone number, (c) calling the pizza shop, and (d) memorizing the number. A few days later, (e) she retrieves the number from long-term memory to order pizza again. Darkened parts of the modal model indicate which processes are activated for each action that Rachel takes.

41

41

**Is just a rehearsal or semantics/ association/ meaning responsible for transfer of information ?**
**Style *versus* Meaning**

1. When you score your results, do nothing to correct your answers but mark carefully those answers which are wrong.
2. When you score your results, do nothing to correct your answers but carefully mark those answers which are wrong.
3. When you score your results, do nothing to your correct answers but mark carefully those answers which are wrong.
4. When you score your results, do nothing to your correct answers but carefully mark those answers which are wrong.

Wanner, 1968

42

42

**Is just a rehearsal or semantics/ association/ meaning responsible for transfer of information ?**
**Style *versus* Meaning**

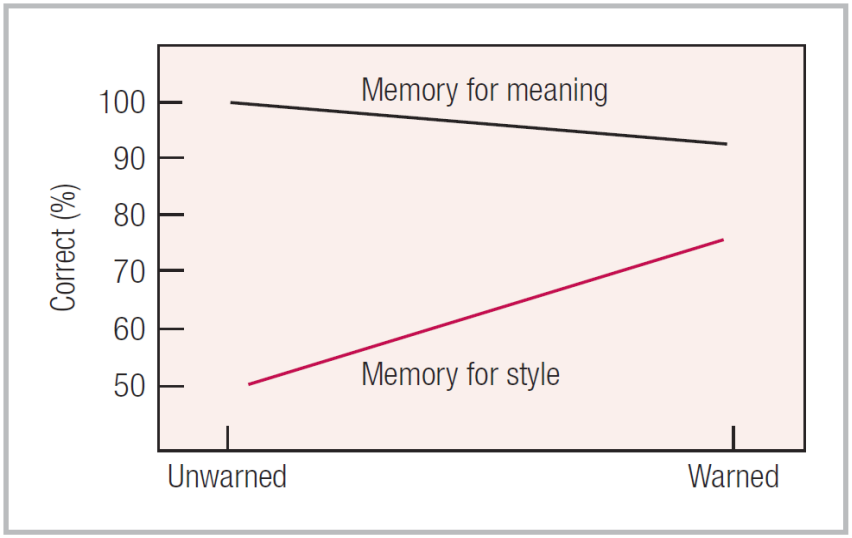
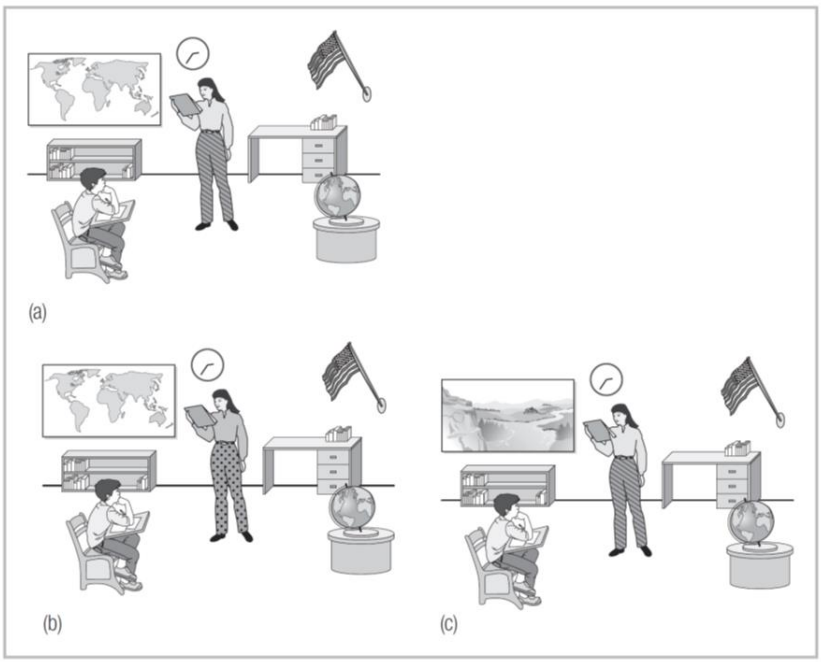



FIGURE 5.2 Results from Wanner's experiment to determine circumstances in which people do and do not remember information about exact wording. The ability of participants to remember a wording difference that affected meaning versus one that affected only style is plotted as a function of whether or not the participants were warned that they would be tested on their ability to recall particular sentences. (After Wanner, 1968. Adapted by permission of the author.)

43

43




**Is just a rehearsal or semantics/ association/ meaning responsible for transfer of information ?**

**Token *versus* Type Change**

FIGURE 5.3 Pictures similar to those used by Mandler and Ritchey in their experiment to demonstrate that people distinguish between the meaning of a picture and the physical picture itself. Participants studied the target picture (a). Later they were tested with a series of pictures that included the target (a) along with token distracters such as (b) and type distracters such as (c). (After Mandler & Ritchey, 1977. Adapted by permission of the publisher. © 1977 by the American Psychological Association.)

Mandler and Ritchey, 1977

44

44

## Is just a rehearsal or semantics/ association/ meaning responsible for transfer of information ?
## Token *versus* Type Change

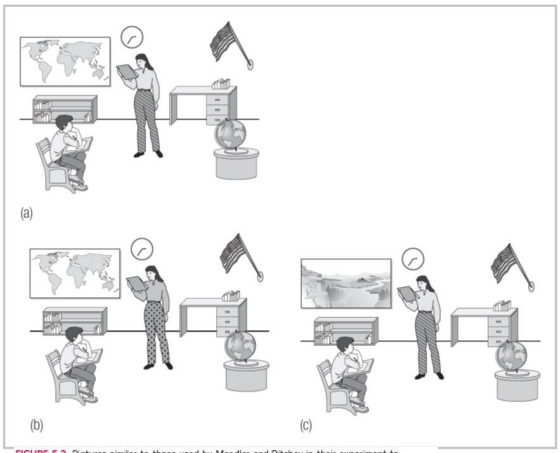



FIGURE 5.3 Pictures similar to those used by Mandler and Ritchey in their experiment to demonstrate that people distinguish between the meaning of a picture and the physical picture itself. Participants studied the target picture (a). Later they were tested with a series of pictures that included the target (a) along with token distracters such as (b) and type distracters such as (c). (After Mandler & Ritchey, 1977. Adapted by permission of the publisher. © 1977 by the American Psychological Association.)

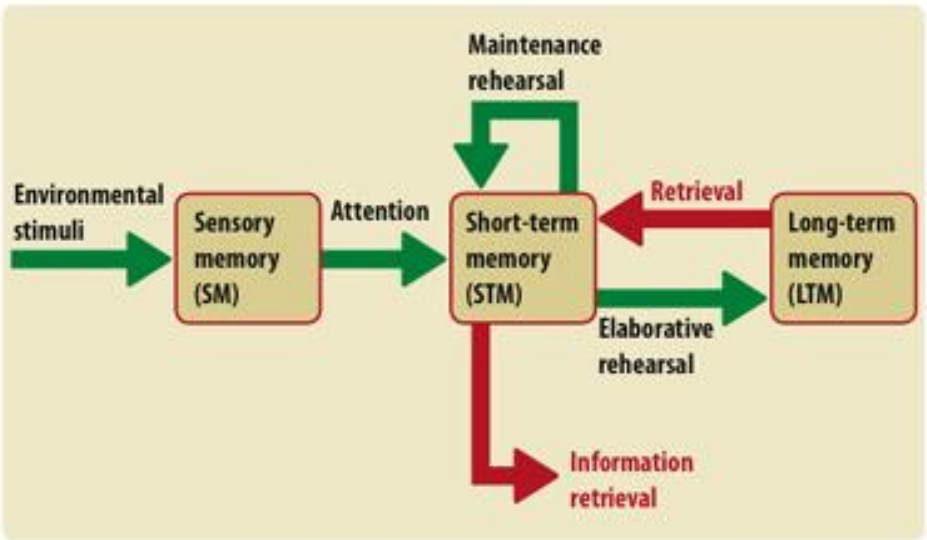
All eight pictures shown to participants contained possible token changes and type changes. In each case, the type change involved a more important alteration to the picture's meaning than did the token change. There was no systematic difference in the amount of physical change involved in a type change versus a token change. Participants were able to recognize the original pictures 77% percent of the time and to reject the token distracters only 60% of the time, but they rejected the type distracters 94% of the time.

Mandler and Ritchey, 1977

45

45

## It is semantics/ association/ meaning that transform the STM to LTM?

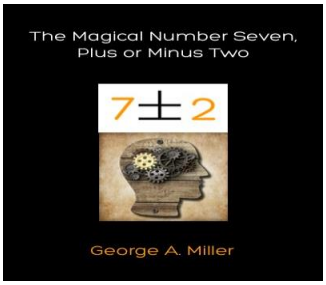


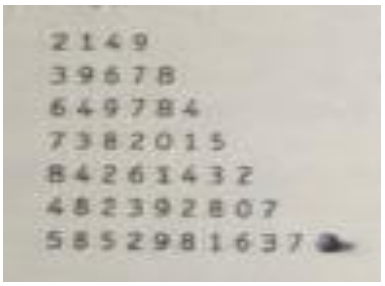

Craik and Lockhart, 1972

46

46

## Chunking




4408675309
(440) 867-5309

***Is this limited to Numbers or it is beyond that ?***

F-B-I-T-W-A-C-I-A-I-B-M

FBI TWA CIA IBM
4 chunks



**Recall Activity:**
**Divide into three groups,**
**Ask only the active group look at the screen, rest close their eyes**

Monkey , child, ringtail, zoo, jumped, city, young , wildly

Ringtail monkey, young child, city zoo, wildly jumped

The *ringtail monkey jumped wildly* for the *young child* at the *city zoo. Miller (1956)*

## STM- STORAGE CAPACITY (CHUNKING)- *RECALL*

- Monkey , child, ringtail, zoo, jumped, city, young , wildly
- Ringtail monkey, young child, city zoo, wildly jumped
- The *ringtail monkey jumped wildly* for the *young child* at the *city zoo.*

*Miller (1956)*

1. Recall *vs.* Recognition
2. Free *vs.* Cued Recall



49

## CONTD.

- Literally, sustainable development refers to maintaining development over time, although by the early 1990s, more than 70 definitions of sustainable development were in circulation, definitions that are important, despite their number, because they are the basis on which the means for achieving sustainable development in the future can be built.



50

- Rephrasing sentence
  - Literally, sustainable development refers to maintaining development over time.
  - By the early 1990s, more than 70 definitions of sustainable development were in circulation.
  - These definitions that are important, despite their number, because they are the basis on which the means for achieving sustainable development in the future can be built.
- Literally, sustainable development refers to maintaining development over time. However, by the early 1990s, more than 70 definitions of sustainable development were in circulation. Despite their number, these definitions are important because they are the basis on which the means for achieving sustainable development in the future can be built.



51

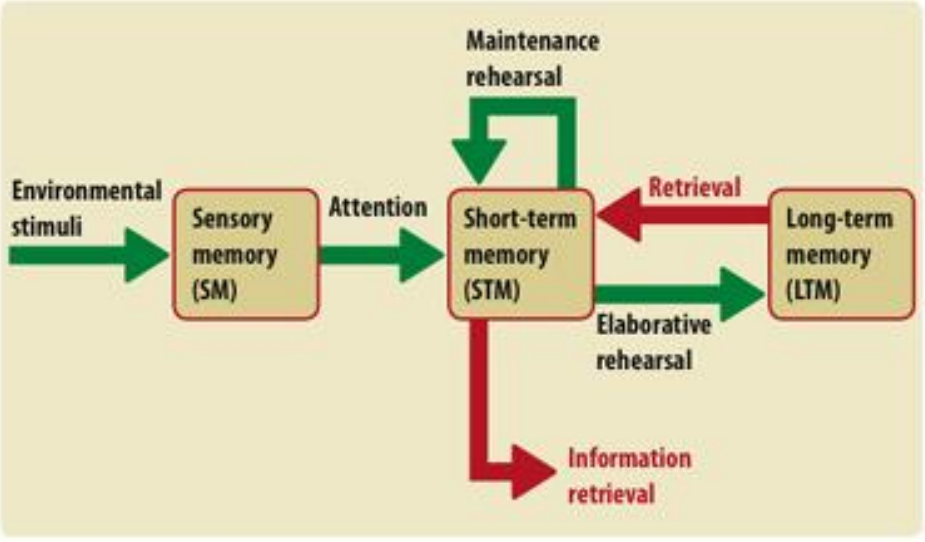






52

**It is semantics/ association/ meaning that transform the STM to LTM?**

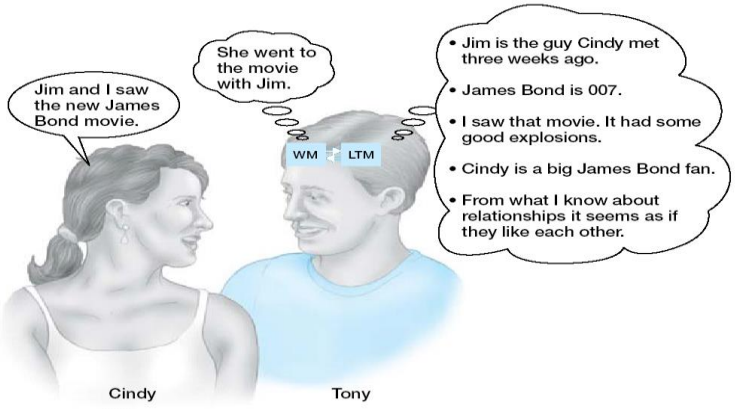



Craik and Lockhart, 1972

53

53

## CONTD.




Tony's STM, which is dealing with the present, and his LTM, which contains knowledge relevant to what is happening, work together as Cindy tells him something.



54

# WORKING MEMORY

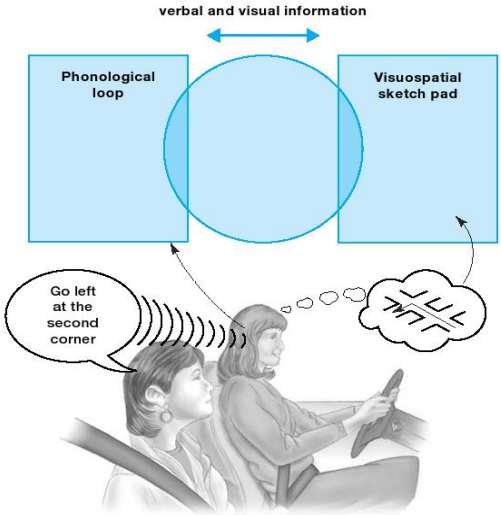
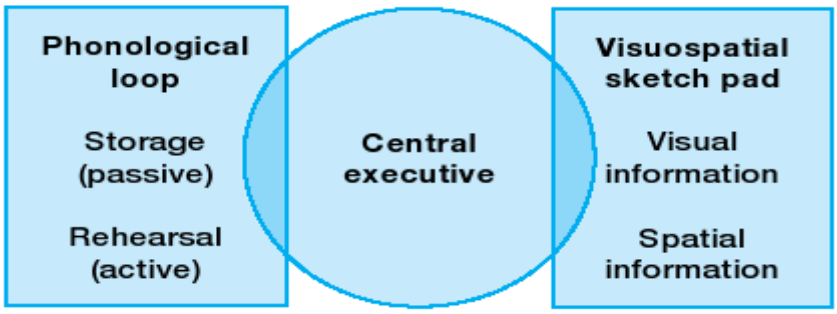



Figure 5.17 Tasks processed by the phonological loop (hearing directions) and visuospatial sketch pad (visualizing the route) being coordinated by the central executive.



55

# WORKING MEMORY




Baddeley's working memory model

Figure 5.15 Diagram of the three main components of Baddeley and Hitch's (1974; Baddleley, 2000) model of working memory: the phonological loop, the visuospatial sketch pad, and the central executive.



56

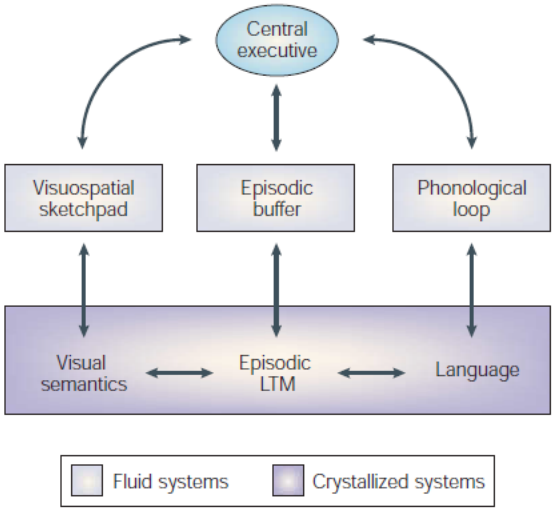


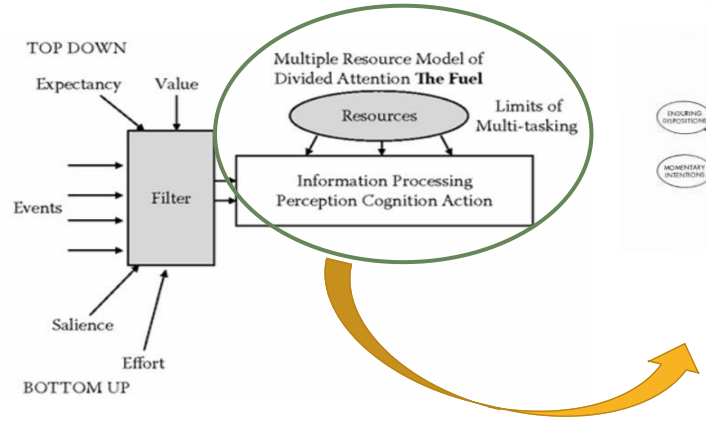

Figure 5 | **The multi-component working memory revision.** The dark purple areas represent long-term or crystallized knowledge. The episodic buffer provides an interface between the sub-systems of working memory and long-term memory (LTM)[125].

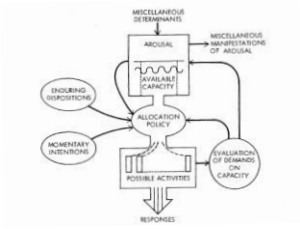
57

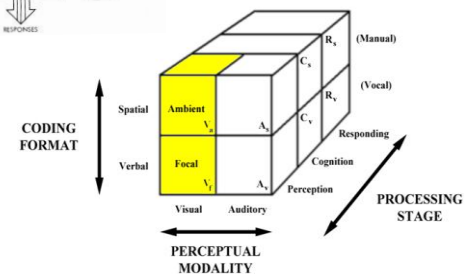
57

# Model of Attentional Resource

Single versus Multiple Resource Theory






Different attention resources help shifting attention/ switching attention from one task/ concept to another.

58

58