

Psychology: From Inquiry to Understanding 2/e

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Chapter Seven Memory: Constructing and Reconstructing our Pasts

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Lecture Preview

- How memory operates
- The three processes of memory
- False memories

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Memory

- The retention of information over time
- In a very real sense, we are our memories
- Our memories are surprisingly good in some situations, and surprisingly bad in others
 - Give examples of good and bad memories
- The *paradox of memory*

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Paradox of Memory

- The same mechanisms that serve us well most of the time can cause us problems in others
- Researchers showed that our memories are astonishingly accurate
 - College students 2560 photos of various objects for a few seconds each
 - Three days later participants identified correct photographs 93% of the time, when presented with a new photograph
 - In another study participants identified line-drawings better than chance 17 years after

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Kim Peek, the "real Rain Man" (who passed away in 2009), exhibited phenomenal memory despite low overall intelligence.



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Paradox of Memory

- Some individuals with infantile autism have astonishing memories
 - Kim Peek, the real “Rain Man”
 - Peek’s IQ was 87
 - He memorized 12000 books word by word
 - He was also a calendar calculator

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Figure 7.1 Rajan’s Demonstration Sheet of Digits of Pi. Rajan’s feats demonstrate the uppermost end of the capacity of human memory.



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Paradox of Memory

- Ordinary people may show astonishing memory capacities
 - Rajan Mahadeva memorized 38,811 digits of π
 - It took three hours at a rate of about 3 digits per second

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Paradox of Memory

- But memory is also surprisingly easy to be influenced

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Put down your pen and read these lists:

- | | | |
|--------|-----------|-------|
| Sour | Nice | Candy |
| Honey | Sugar | Soda |
| Bitter | Chocolate | Good |
| Heart | Taste | Cake |
| Tooth | Tart | Pie |

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- Count backwards by 3 from 270.
- Start from beginning when you make a mistake.

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Write down all the words you can remember

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Paradox of Memory

- Sour
- Nice
- Honey
- Heart
- Tooth
- Sugar
- Chocolate
- Tart
- Pie
- Candy
- Soda
- Bitter
- Good
- Cake
- Taste

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Paradox of Memory

- Did you include the word “sweet”?
- If so, this is a **memory illusion**: false but forceful feeling of remembrance
- Our brains will often go beyond the available information to make sense of the world
 - Generally adaptive, but makes us prone to errors

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Reconstructive Memory

- When remembering, we *actively reconstruct* memories, not *passively reproduce them*
 - We actively *reconstruct* our memories using the cues and information available to us
 - We don’t passively reproduce our memories (like memory of a computer, or downloading from web)

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Reconstructive Memory

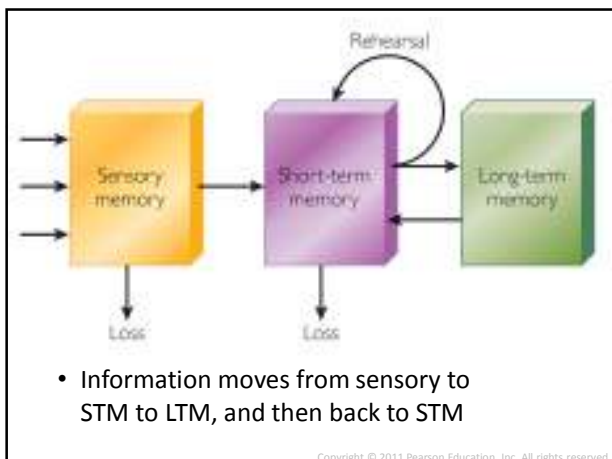
- Close your eyes. Picture your most recent walk along a beach, lake or pond.
 - *field memory*
 - *observer memory*. Existence proof of reconstructive memory
- Most people believe that our memories operate like video cameras or DVDs and every think we learn is permanently stored in the mind
- What’s the structure of memory?

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Three Systems of Memory

- Sensory, short-term, and long-term memory
- Differ in terms of
 - *span* How much information each system can hold
 - *duration* How long a period of time that system can hold information

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Sensory Memory

- Brief storage of perceptual information before it is passed to short-term memory
 - “Buffer” area of sensory information before passing on to next memory system
- Each sense has its own form of memory
- **Iconic** (visual) lasts only 1 second; **echoic** (auditory) can last 5-10 seconds

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Figure 7.3 Display of Twelve Letters as Used in Sperling's 1960 Study. Sperling's partial report method demonstrated that all displayed letters were held in sensory memory, but decayed rapidly before all of them could be transferred to short-term memory. (Source: Sperling, 1960)

S	D	F	G
P	W	H	J
X	C	V	N

- Letters were seen only 1/12 of a second
- Most participants could only remember 4-5 letters
- When a tone cued which line to report, all participants responded correctly

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Photographic Memory

- Do you claim to have photographic memory?
 - Here is a challenge for you

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Figure 7.4 Alice with Cheshire Cat. Memory psychologists have used variations of this drawing from Lewis Carroll's *Alice's Adventures in Wonderland* to test for eidetic imagery. To find out if you have eidetic memory, look for no longer than 30 seconds at the drawing and then cover it with a sheet of paper. Do that now before reading on. Now, can you remember how many stripes were on the cat's tail? Few adults can remember such details (Gray & Gummerman, 1975), although eidetic memory is much more prevalent among elementary school children (Haber, 1979).

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Short-term Memory

- Memory system that retains information for limited durations
- Related to *working memory* (our ability to hold on to information we're currently thinking about, attending to, or processing actively)
- Very brief in duration, 5-20 seconds

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Short-term Memory

- We can lose information in our STM due to two different processes
- **Decay** – fades over time
- **Interference** – loss of information due competition of new incoming information

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Types of Interference

- **Retroactive** happens when learning new information hampers earlier learning
- **Proactive** happens when earlier learning gets in the way of new learning
- Both are more likely to occur when old and new stimuli are similar

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Short-term Memory

- The span of STM in adults is 7 ± 2 pieces of information
- New findings challenged this idea. The true capacity may be as low as 4.

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Short-term Memory

- Strategies to extend capacity of STM: chunking and rehearsal

- **Chunking**

K A C F J N A B I S B C F U I

vs.

C I A U S A F B I N B C J F K

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Short-term Memory

- **Rehearsal**, repeating information in STM, extends the duration of it
- **Maintenance rehearsal** is simply repeating the stimuli in the same form
 - Repeating friend's telephone number
- **Elaborative rehearsal** links stimuli to each other in a meaningful way

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Short-term Memory

- Elaborative is usually more effective, consistent with **levels-of-processing** model
- Three levels: visual, phonological (sound-related), and semantic (meaning-related)
- Visual is the most shallow, phonological somewhat less, and semantic the deepest

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Rehearsal



- dog-shoe
- tree-pipe
- key-monkey
- kite-president
- Maintenance rehearsal vs. elaborative rehearsal
- Elaborative rehearsal works better than maintenance rehearsal
 - Why do you think so?
- Rote memorization is not the best means of memory!
 - **To remember complex information, it is always better to connect that information with things you already know than to merely keep repeating it!**

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