

**MODULE 31 STUDYING AND BUILDING MEMORIES**

**STUDYING MEMORY**

- MEMORY is the persistence of learning over time through the encoding, storage, and retrieval of information.
- INFORMATION-PROCESSING MODELS are analogies that compare human memory to a computer's operations. ENCODING is to get information into our brain; STORAGE retains that information; and RETRIEVAL later enables you to get the information back out.
- PARALLEL PROCESSING is the processing of many aspects of a problem simultaneously; the brain's natural mode of information processing for many functions.
- Every time you learn something new, your brain's neural connections change, forming and strengthening pathways that allow you to interact with and learn from your constantly changing environment.
- Richard Atkinson and Richard Shiffrin created a different model: 1. We first record to-be-remembered information as a fleeting SENSORY MEMORY. 2. From there, we process information into SHORT-TERM MEMORY, where we encode it through rehearsal. 3. Finally, information moves into LONG-TERM MEMORY.
- STM is a small, brief storage space for recent thoughts and experiences. Also coincides with working memory. WORKING MEMORY is a newer understanding of short-term memory that focuses on conscious, active processing of incoming auditory and visual-spatial information, and of information retrieved from long-term memory.
- Without focused attention, your information in sensory memory fades.

**BUILDING MEMORIES: ENCODING**

- Atkinson's and Shiffrin's model focused on how we process our EXPLICIT MEMORIES, or memory of facts and experiences that one can consciously know and "declare" (declarative memory). EFFORTFUL PROCESSING is encoding that requires attention and conscious effort.
- Behind the scenes, the AUTOMATIC PROCESSING, which happens without our awareness, produces IMPLICIT MEMORIES (nondeclarative memory).
- Our implicit memories include procedural memory for automatic skills and classically conditioned associations among stimuli. You automatically process space, time, and frequency. Learning to read wasn't automatic but with experience and practice, your reading became automatic.
- How does sensory memory work? Momentarily holds scenes or echoes of sounds. George Sperling's experiment suggested two sensory memory ideas: I(eyes)CONIC MEMORY is a fleeting sensory memory of visual stimuli. Our visual screen clears quickly. E(ears)CHOIC MEMORY is a momentary sensory memory of auditory stimuli; if attention is elsewhere, sounds and words can still be recalled within 3 or 4 seconds.

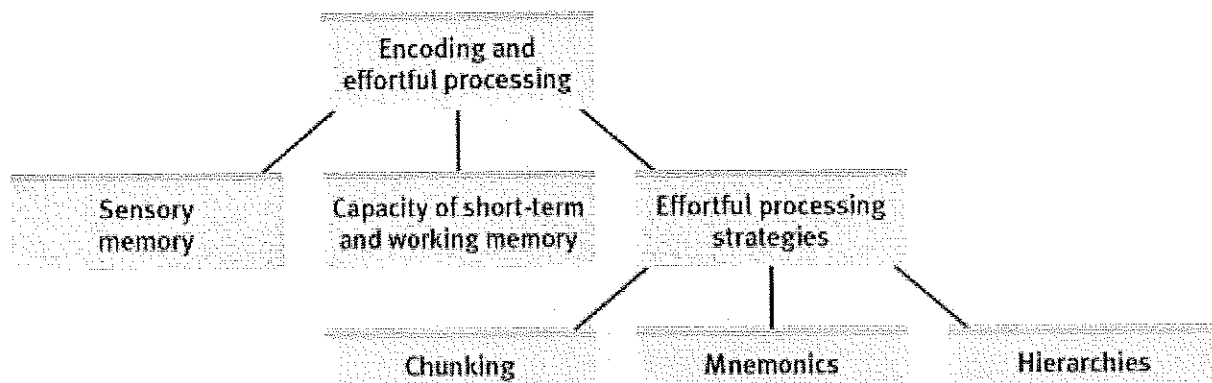
- What is the capacity of our short-term and working memory? George Miller proposed that short-term memory can retain about seven information bits plus or minus 2.

### EFFORTFUL PROCESSING STRATEGIES

- **CHUNKING** is organizing items into familiar, manageable units; often occurs automatically.
- Ancient Greek scholars and orators also developed **MNEMONICS** which are memory aids, especially those techniques that use vivid imagery and organizational devices. Can be acronyms.
- Organizing knowledge in hierarchies helps us retrieve information efficiently.

## *Effortful Processing Strategies* Hierarchies/Categories

We are more likely to recall a concept if we encode it in a **hierarchy**, a *branching/nested set of categories and sub-categories*. Below is an example of a hierarchy, using some of the concepts we have just seen.



### DISTRIBUTED PRACTICE

- More than 300 experiments over the last century have consistently revealed the benefits of the **SPACING EFFECT**, or the tendency for distributed study or practice to yield better long-term retention than is achieved through massed study or practice. Massed practice (cramming) can produce speedy short-term learning and a feeling of confidence.

But to paraphrase pioneer memory researcher Hermann Ebbinghaus, those who learn quickly also forget quickly.

- Distributed practice produces better long-term recall.
- **TESTING EFFECT** enhances memory after retrieving, rather than simply rereading information. Also sometimes referred to as a retrieval practice effect or test-enhanced learning.

### **LEVELS OF PROCESSING**

- **SHALLOW PROCESSING** encodes on a very basic level, such as a word's letters or, at a more intermediate level, a word's sounds.
- **DEEP PROCESSING** encodes semantically, based on the meaning of the words. When meaning is behind the words, you are more inclined to remember over words without meaning. Information deemed "relevant to me" is processed more deeply and remains more accessible.
- The amount remembered depends both on the time spent learning and on your making it meaningful for deep processing.

**BE ABLE TO ANSWER:** Memory includes (in alphabetical order) long-term memory, sensory memory, and working/short-term memory. What's the correct order of these three memory stages?

What would be the most effective strategy to learn and retain a list of names of key historical figures for a week? For a year?

**PRACTICE FRQ:** To remember something, we must get information into our brain, retain the information, and later get the information back out. Making sure you use the terms for these three steps of the process, explain how this system would apply if you needed to learn the name of a new student who just enrolled in your school today.