

## **Memory**

### **Chapter 9**

#### **Sensory Memory Store**

- Function - holds information long enough to be processed for basic physical characteristics
- Capacity - large
  - can hold many items at once
- Duration - very brief retention of images
  - .3 sec for visual info
  - 2 sec for auditory info

#### **Sensory Memory Store**

- Divided into two subtypes:
  - iconic memory - visual information
  - echoic memory - auditory information
- Visual or iconic memory was discovered by Sperling in 1960

#### **Sensory Memory Store**

- Sperling's Experiment
  - Presented matrix of letters for 1/20 seconds
  - Report as many letters as possible
  - Subjects recall only half of the letters

#### **Sperling's Experiment**

- Sperling showed people can see and recall ALL the letters momentarily
- Sounded low, medium or high tone immediately after matrix disappeared
  - tone signaled 1 row to report
  - recall was almost perfect
- Memory for image fades after 1/3 seconds or so, making report of entire display hard to do

#### **Sensory Memory Store**

- Sensory memory forms automatically, without attention or interpretation
- Attention is needed to transfer information to working memory

#### **Working Memory**

- Seat of conscious thought - our awareness
- Like a computer, we can create new 'files' (from sensory memory) or access formerly created 'files' (from long-term memory)
- We can access only a few items at once
  - Verbally: Phonological loop (what you can repeat in 2 seconds)
  - Visually: Visuospatial sketchpad

### **Working Memory**

- Function - conscious processing of information
  - where information is actively worked on
- Capacity - limited (holds 7 +/- 2 items)
- Duration - brief storage (about 30 seconds)
- Code - often based on sound or speech even with visual inputs

### **Working Memory**

- What happens if you need to keep information in working memory longer than 30 seconds?
- Maintenance rehearsal - Allows information to remain in working memory longer than the usual 30 seconds

### **Working Memory Model**

- Visuospatial sketch pad - holds visual and spatial info
- Phonological loop - holds verbal information
- Central executive - coordinates all activities of working memory; brings new information into working memory from sensory and long-term memory
- How Information is Organized in Memory
- Chunking – grouping lower level units into higher level, meaningful units

### **Hierarchical organization**

- Scheme by which lower level units are grouped
- Chunking occurs in real-time in working memory and is influenced by top-down process in long-term memory

### **Hierarchical Organization**

- Related items clustered together to form categories
- Related categories clustered to form higher-order categories
- Remember list items better if list presented in categories
  - poorer recall if presented randomly
- Even if list items are random, people still organize info in some logical pattern

### **Long-Term Memory Store**

- Once information passes from sensory to working memory, it can be encoded into long-term memory

### **Long-Term Memory Store**

- Function - organizes and stores information
  - more passive form of storage than working memory
- Unlimited capacity
- Duration - thought by some to be permanent
- Long-Term Memory Store
- Encoding - process that controls movement from working to long-term memory store
- Retrieval - process that controls flow of information from long-term to working memory store

### **Elaboration**

- Focus on meaning of information to encode it into LTM
  - don't simply repeat items over and over
  - tie item to other info in memory
  - also called elaborative rehearsal

### **Ways to Use Elaboration**

- Actively question new information
- Think about its implications
- Relate information to things you already know
- Generate own examples of concepts
- Don't highlight passage as you read
  - focus on the ideas in the text

### **Elaboration and Levels of Processing**

- Elaboration leads to better recall than shallow processing
  - Deep Processing
    - Example Stimulus: "She was wearing a red dress."
    - Process: What was she wearing?
    - Result: About 88% of words correctly recalled
  - Shallow-Acoustic Processing
    - Example Stimulus: "She was wearing a red dress."
    - Process: Name a word that rhymes with dress
    - Result: About 59% of words correctly recalled
  - Shallow-Visual Processing
    - Example Stimulus: "She was wearing a red dress."
    - Process: What letter is capitalized in dress?
    - Result: About 14% of words recalled

### **Brain Mechanisms in Encoding into LTM**

- Anterograde Amnesia (temporal-lobe amnesia)
  - Loss of capacity to form long-term memories
  - Activity in the hippocampus is essential for the formation of at least some types of long-term memory
- Retrograde Amnesia
  - Loss of memories of events that occurred before a brain injury
  - Is time-graded: RA is greatest for memories acquired just prior to injury
    - Suggests two forms of LTM
      - Labile form – memories are easily disrupted
      - Stable form – not easily disrupted
  - The process by which long-term memories are converted from a labile to a stable form is called **consolidation**