

## **MODULE 32 MEMORY STORAGE AND RETRIEVAL**

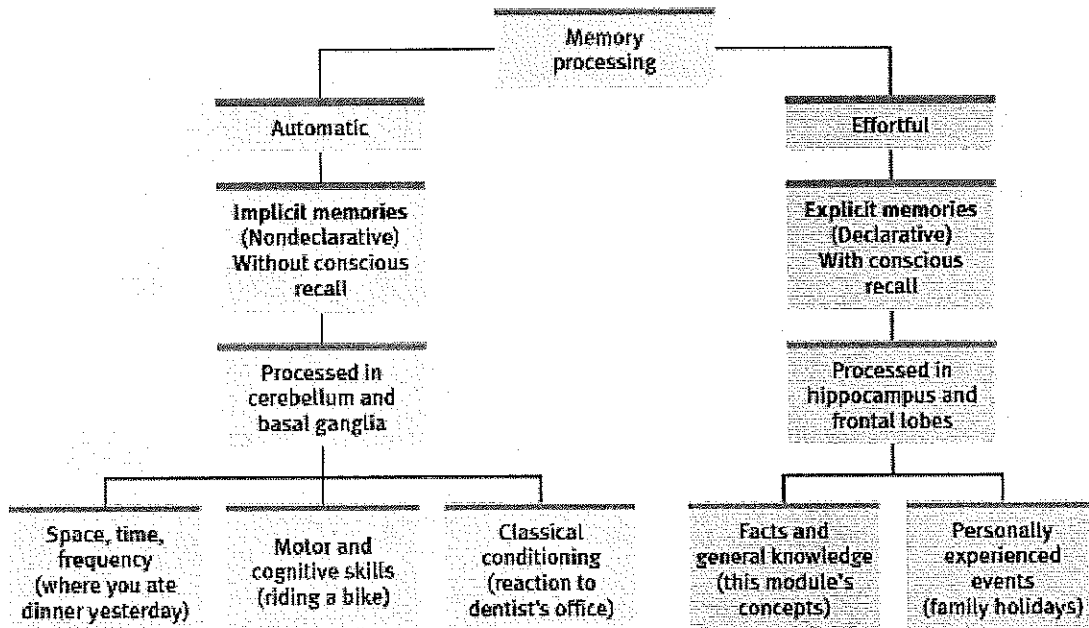
### **MEMORY STORAGE**

- Despite the brain's vast storage capacity, we do not store information as libraries store their books, in discrete, precise locations. Instead, many parts of the brain interact as we encode, store, and retrieve the information that forms our memories.
- Memory requires brain networks. Explicit memories for facts and episodes includes your frontal lobes and hippocampus. Cognitive neuroscientists have found that the **HIPPOCAMPUS**, a temporal-lobe neural center located in the limbic system, is the brain's equivalent of a "save" button for explicit memories. Memories are not permanently stored in the hippocampus. This structure is a loading dock remembering smell, feel, sound, and location. During sleep, the greater the hippocampus activity the better the next day's memory will be.
- Your hippocampus and frontal lobes are processing sites for your explicit memories. The cerebellum plays a key role in forming and storing the implicit memories created by classical conditioning. With a damaged cerebellum, people cannot develop certain conditioned reflexes.
- The basal ganglia, deep brain structures involved in motor movement, facilitate formation of our procedural memories for skills (riding a bike, playing a sport).
- Infantile amnesia is the blank experiences during the first three years of life. Two reasons as to why this is: 1. We index much our explicit memory using words that nonspeaking children have not learned. 2. Hippocampus is one of the last brain structures to mature.
- Stress hormones provoke the amygdala (emotion-processing clusters) to initiate a memory. Emotions often persist without our conscious awareness of what caused them.
- **FLASHBULB MEMORIES** is a clear memory of an emotionally significant moment or event. Usually vivid and confident with which we recall memories.

### **SYNAPTIC CHANGES**

- **LONG-TERM POTENTIATION** is an increase in a cell's firing potential after brief, rapid stimulation. Believed to be a neural basis for learning and memory. After LTP has occurred, passing an electric current through the brain won't disrupt old memories.
- When a football player or boxer is momentarily knocked unconscious typically have no memory of the event due to their working memory had no time to consolidate the information into long-term memory before the lights went out.
- Effective study techniques followed by adequate sleep is the best way to push memories into LTM.

## Our Two Memory Systems



### RETRIEVAL: GETTING INFORMATION OUT

- Three measures of retention: **RECALL** is a measure of memory in which the person must retrieve information learned earlier, as on a fill-in-the-blank test. **RECOGNITION** is a measure of memory in which the person need only identify items previously learned, as on a multiple-choice test. **RELEARNING** is a measure of memory that assesses the amount of time saved when learning material again.
- Tests of recognition and of time spent relearning demonstrate that we remember more than we can recall.
- **RETRIEVAL CUES** is the association with other bits of information about your surroundings, mood, seating position, and so on.
- Often our associations are activated without our awareness. **PRIMING** is the activation, often unconsciously, of particular associations in memory. Ever been in a location where a flashbulb memory occurs? The context where you experienced something can prime your memory retrieval. State-dependent memory is whether you are drunk or sober may be more easily recalled when back in that same state. Lose your keys when drunk, have to be drunk again in order to remember where you placed them.

- **MOOD-CONGRUENT MEMORY** is the tendency to recall experiences that are consistent with one's current good or bad mood. In a good or bad mood, we persist in attributing to reality our own changing judgments, memories, and interpretations.
- **SERIAL-POSITION EFFECT** is our tendency to recall best the last (a recency effect) and first items (a primacy effect) in a list.

**BE ABLE TO ANSWER:** Your friend tells you that her father experienced brain damage in an accident. She wonders if psychology can explain why he can still play checkers very well but has a hard time holding a sensible conversation. What can you tell her?

You have just watched a movie that includes a chocolate factory. After the chocolate factory is out of mind, you nevertheless feel a strange urge for a chocolate bar. How do you explain this in terms of priming?

**PRACTICE FRQ:** Consider an explicit memory, such as a memory of what happened in your science class yesterday. Explain the process that allows memory to occur at the synaptic level. Explain the role of two parts of the brain in your memory of the class.