

Lesson 12 (Memory)

The Mind's Storehouse

Assignments

Reading: Chapter 9, “Memory” in *Psychology* by David Myers (Modules 24, 25, 26, 27, and 28 in the modular version of *Psychology*)

Video: Episode 12, “The Mind's Storehouse”

LEARNING OUTCOMES

Familiarize yourself with the Learning Outcomes for this lesson before you begin the assignments. Return to them to check your learning after completing the Steps to Learning Success. Careful work on these materials should equip you to accomplish the outcomes.

The Phenomenon of Memory (Module 24)

1. Describe examples and cases that illustrate the extremes of memory and forgetting.
2. Explain encoding, storage, and retrieval and discuss the relationships among these processes.
3. Summarize the basic features of the three-stage information processing model developed by Atkinson and Shiffrin.

Encoding: Getting Information In (Module 25)

4. Distinguish between automatic and effortful information processing, and provide examples of each.
5. Explain how rehearsal influences ability to remember, and discuss how rehearsal is involved in overlearning, the next-in-line effect, the spacing effect, and the serial position effect.
6. Distinguish between visual, acoustic, and semantic encoding and compare their influence on ability to remember.
7. Review evidence on the impact of mnemonic devices, imagery, and organization on memory.

Storage: Retaining Information (Module 26)

8. Compare the capacity and duration of storage for iconic and echoic sensory memory, short-term memory, and long-term memory, and describe the relationship between these processes.
9. Summarize evidence relating memory to neural processes, brain areas, and hormones.
10. Describe and compare implicit and explicit memory, and offer examples of each.

Retrieval: Getting Information Out (Module 27)

11. Distinguish between recall, recognition, and relearning tests of memory, and provide examples of each.
12. Identify and discuss retrieval cues, context effects, and state-dependent and mood-congruent memory.
13. List and explain the mechanisms involved in forgetting, providing examples and evidence for each.

Memory Construction (Module 28)

14. Explain memory construction and reconstruction, and describe how misinformation, suggestibility, and source amnesia can contribute to memory distortion.
15. Discuss evidence bearing on the controversial claim that memory for traumatic experiences may be repressed and then later recovered in therapy.
16. Demonstrate your familiarity with how-to-study tips that are based on memory research.

ACTIVE REVIEW

Each item in this section is based on material presented in the video or the textbook assignment for this lesson, or both. Complete this section, referring as needed to your notes or the source materials themselves. Answers are provided at the end of this lesson.

The Phenomenon of Memory

1. In the opening of the video episode, Elizabeth Loftus makes the point that memory (*is / is not*) just a literal recording and playback.
2. People who were old enough at the time of the assassination of John F. Kennedy may remember an array of tiny details about where they were and what they were doing at the time they heard the news. In

the textbook, memory for such incidental details surrounding an experience that has high emotional impact is called _____.

3. The framework used to organize ideas for this lesson is based on Atkinson's and Shiffrin's _____ - _____ **processing model of memory**. Fill in the first column of the table below, listing the stages of processing suggested by the Atkinson and Shiffrin model. Place these stages in the proper order, from when information stimulates the senses to its more permanent storage. Then complete the remaining two columns, comparing the storage duration and capacity for each of the memory stages listed.

Name of Stage	Duration	Capacity

4. Just as computers first take in data and store it in coded form before the information can be accessed, human memory can be viewed as involving three different phases. The process of getting information into memory is called _____. The process of holding or retaining information over a period of time is known as _____. After information has been encoded and stored, the process of getting it back out of storage is termed _____.

6. In addition to the amount of effort applied in repeated rehearsal, what are some of the factors that enhance the ability to remember information?

7. Researchers have found that **massing** of study time (studying in long uninterrupted periods, as students do when they “cram” for a test) is (*more / less*) effective than spacing studying over time. Furthermore, studying information twice in the same place (*is / is not*) as effective as studying it in two different locations.

Encoding: Getting Information In

5. Ebbinghaus conducted some of the earliest studies of memory. Among other things, his studies of his own memory for **nonsense syllables** demonstrated that the more he practiced, the (*stronger / weaker*) was his memory for the list of nonsense syllables. In repeating the nonsense syllables over and over to himself, Ebbinghaus was engaging in _____, a type of (*effortful / automatic*) processing.

Storage: Retaining Information

8. Memories are thought to be recorded in the brain through changes at **synapses**, which are the points of communication between individual (*neurotransmitters / neurons / nerves*). Research with the California sea

Lesson 12 (Memory) The Mind's Storehouse

slug, *Aplysia*, has demonstrated that when learning takes place, certain synapses are repeatedly activated. This repeated activation promotes a process known as _____, which makes those particular synapses easier to activate for a time after this repeated stimulation.

- The middle part of the (*parietal / temporal / occipital*) **lobe** has been found to be extremely important in memory—especially an area known as the (*hippocampus / corpus callosum / hypothalamus*).
- Surgery patient **H.M.** had brain surgery to treat his very severe (*amnesia / epileptic seizures / schizophrenia*). After the surgery, H.M.'s IQ and language were (*normal / deficient*), his memories for previous experiences were mostly (*normal / impaired*), and his ability to make new **explicit memories** was (*normal / impaired*). This case reveals that the hippocampus (*is / is not*) the place where memories are located, because H.M. was observed to have fairly (*good / poor*) memory for his childhood after damage to the hippocampus.
- Clive Wearing had a form of brain damage that was (*similar to / different from*) H.M.'s, which in Clive Wearing's case resulted from **encephalitis**. Summarize the major features of Clive Wearing's case (as shown in the video and described by Deborah, Clive's wife). _____

- Despite the critical importance of the **hippocampus** to (*explicit / implicit*) memory, different brain areas, for example the (*prefrontal cortex / postcentral gyrus / hypothalamus*), hold on to the information needed for working memory. Other subcortical structures—for example, the amygdala—allow us to interact with the world emotionally. Still other brain areas within the

(*cerebrum / cerebellum / corpus callosum*) are important in storing memories for learned responses such as the conditioned eyeblink response, which is a type of (*explicit / implicit*) memory.

- Hormonal activity is also important to memory. Interesting or emotionally exciting events activate the **amygdala** (located in the _____ **lobe**) and prompt the release of stress hormones such as **adrenalin** and _____, which course through the bloodstream and can instruct the brain to store information more permanently. But too high a level of **glucocorticoid** hormones can interfere with functioning of the hippocampus, impairing memory under (*higher / moderate / lower*) levels of emotional arousal.

Retrieval: Getting Information Out

- When we can remember a conversation we have had and can describe it a few hours later, this would qualify as a demonstration of (*explicit / implicit*) memory. When our performance reveals that we can still ride a bicycle or ski down a slope, or when we seem to know what to do in a driving emergency, we are exhibiting (*explicit / implicit*) memory, which is also sometimes called **procedural memory**.
- One way to test the strength of memory is through tasks that require a reconstruction of previously presented information, as in an essay or a fill-in test item. Such tasks test our (*recall / recognition / relearning*). Another method of testing memory, exemplified by multiple-choice or matching tests, requires the person to select the previously learned information from an array of choices. This would be the (*recall / recognition / relearning*) method of testing memory. A major difference between recall and recognition testing is that recognition testing provides (*more / fewer*) **retrieval cues**.
- Forgetting** is sometimes based on **encoding failure**—a failure in getting information (*into / out of*) memory storage. On other occasions, we forget be-

Inside Out Course Study Guide

cause we lack essential retrieval cues that are needed to bring information (*into / out of*) memory storage.

17. List several examples of the types of cues that can help us to bring information out of our memories.

18. Another explanation for forgetting is **interference**. Previously established memories may interfere with the ability to remember more recent experiences, a phenomenon known as _____. When more recent memories inhibit the ability to remember previously established memories, it is termed _____. For example, a mother who wants to call her 5-year-old child in from the back yard, but at first mistakenly calls out her 7-year-old child's name, has momentarily experienced _____ interference. Someone unable to remember a previous phone number several years after thoroughly learning a newer phone number, has experienced _____ interference.

Memory Reconstruction

19. In the past several decades, considerable research attention has been focused on issues surrounding the **accuracy of eyewitness testimony** and claims of **recovered memories**. This research has revealed that established memories (*can / cannot*) be contaminated, distorted, transformed, or supplemented by new input. According to comments in the video made by memory researcher **Elizabeth Loftus**, it is (*relatively easy / difficult / impossible*) to contaminate someone's memory—to change details or to plant entirely false scenarios into their minds. In other words, memories, once formed, are quite (*stable / subject to change*) and (*literal / reconstructive*).
20. In a classic study on memory reconstruction, Loftus and Palmer (1974) showed films of traffic collisions, and afterwards asked the viewers to estimate how fast the cars were going at the time of impact. Even though all participants had viewed the same film footage, participants who were asked how fast the cars were going when they “smashed into each other” tended to give (*higher / lower*) estimates of speed than did those who were asked about the speed when the cars “hit each other.”
21. It was Sigmund _____ who advanced the idea that a person could undergo traumatic events such as severe abuse or witnessing a murder, and then actively prevent any memory of the emotionally painful events from coming to consciousness. He called this kind of forgetting _____. In the video, Elizabeth Loftus and James McGaugh assert that available scientific evidence (*does / does not*) support the idea of massive **repression** of extremely unpleasant memories.
22. Several prominent legal cases have been built around the claim that a person can repress the memory of a traumatic event and then much later recover that memory during, for example, psychotherapy. According to memory researcher Elizabeth Loftus, techniques such as **hypnosis**, “**truth serum**,” **guided imagery**, or **dream interpretation** can (*increase / decrease*) suggestibility and make contamination of memories and beliefs (*easier / more difficult*).
23. Describe the **case of Gary Ramona** and his daughter **Holly Ramona**, and relate this case to skeptics' challenges regarding the **recovered memory** phenomenon and research on the **misinformation effect**. _____
-
-
-
-
-
-

SELF TEST

Read each question and circle the letter of the best answer. When you have completed the Self Test, check your answers against the key at the end of this lesson. If you have answered any items incorrectly, review the appropriate materials to correct misunderstandings and cement your knowledge.

1. Flashbulb memory refers to the tendency to remember clearly a collection of details that might otherwise be forgotten, based on
 - a. an emotionally striking experience or event.
 - b. numerous repetitions of a particular experience or event.
 - c. the misinformation effect.
 - d. effortful processing.
2. Which of the following represents the appropriate sequence for the basic phases of the memory process?
 - a. Storage, retrieval, encoding
 - b. Storage, encoding, retrieval
 - c. Retrieval, encoding, storage
 - d. Encoding, storage, retrieval
3. One way to keep information available in short-term memory is to continue repeating it mentally, a process known as
 - a. reinstatement.
 - b. recall.
 - c. rehearsal.
 - d. relearning.
4. Which of the following represents the order of information flow in Atkinson and Shiffrin's classic three-stage model of memory processing?
 - a. Maintenance rehearsal, elaborative rehearsal, retrieval
 - b. Episodic memory, semantic memory, procedural memory
 - c. Implicit memory, explicit memory, plicit memory
 - d. Sensory memory, short-term memory, long-term memory
 - e. Recognition, relearning, recall
5. In the video episode, James McGaugh refers to very early memory research published in 1885 by Ebbinghaus, which demonstrated that
 - a. memory is a literal recording of events we have experienced.
 - b. studying a particular subject always in the same place improves ability to remember what has been studied.
 - c. basic memory ability cannot be improved upon, even with extensive practice and use of what might seem to be helpful memory strategies.
 - d. the more fully something is learned, the longer it will be remembered.
6. Research on the "spacing effect" has demonstrated that we are likely to retain information more successfully when we study repeatedly and
 - a. gradually reduce the amount of time between study sessions.
 - b. gradually increase the amount of time between study sessions.
 - c. study in a relaxed way, while "spacing out"—paying only minimal attention to what we are studying.
 - d. study in the same space at the library over and over, rather than varying the location of study.
7. Leon was at a social gathering where he was introduced to eight unfamiliar people who were standing together in a group. Although he listened carefully and repeated each name after he heard it, a short time later he realized that he could recall only the first two names and the last three names, but could not remember the names of the people in the middle of the group. Leon's experience seems to reflect a typical
 - a. flashbulb memory.
 - b. serial position effect.
 - c. mnemonic strategy.
 - d. spacing effect.
8. Which type of encoding listed below involves associating information with its meaning?
 - a. Visual encoding
 - b. Semantic encoding
 - c. Acoustic encoding
 - d. Shallow processing

Inside Out Course Study Guide

9. Iconic memory
 - a. is one type of sensory memory.
 - b. occurs after brief presentation of a visual stimulus.
 - c. holds information more briefly than echoic memory.
 - d. all of the above.
 - e. none of the above.
10. According to the experts interviewed in the video episode, which of the following factors can enhance memory under certain conditions?
 - a. Repetition or increased duration of exposure to information
 - b. Emotional impact or significance
 - c. Meaningfulness or understanding of the information
 - d. All of the above
 - e. None of the above
11. In a research study conducted by Penfield (1969), certain neurosurgery patients reported complex sensory experiences (hearing a mother calling her little boy, for example) when electrical stimulation was applied to specific regions of the cerebral cortex. Scientists reviewing Penfield's results have recently concluded that such sensory experiences probably represent
 - a. echoic memories.
 - b. the most common outcome for patients treated with this kind of electrical stimulation.
 - c. memories of experiences stored in the brain long ago and reactivated by the electrical stimulation.
 - d. dream-like states induced in the patient rather than literal memories of real past experiences.
12. After extensive research on the effects of damage to the cerebral cortex in rats that had previously learned the path through a maze, Karl Lashley (1950) concluded that
 - a. memory depends entirely on the functioning of a single, specific area of the frontal cortex.
 - b. memory does not involve the cerebral cortex.
 - c. memories are not located in any one specific region of the cortex.
 - d. destruction of even one tiny area of the cortex, regardless of its location, results in a complete loss of memory.
13. Recent research has suggested that _____ is a physical process in the brain that may be critical to the formation of new memories.
 - a. long-term potentiation
 - b. short-term potentiation
 - c. subliminal perception
 - d. operant conditioning
14. According to the comments of Michael Rugg in the video, implicit memory generally involves
 - a. skills or procedures we know how to do but can't actually capture in a verbal description.
 - b. information that is retrieved with effort and with conscious awareness that the information was present in our memory.
 - c. retrieval failure.
 - d. information that is stored in long-term memory that has never previously been stored in short-term memory.
15. David Myers describes neurologist Oliver Sacks' patient Jimmie, who suffered brain damage that resulted in extreme difficulties in his memory for events he experienced after the brain injury. Patients such as Jimmie have been found to have greater deficits in their _____ memory than in their _____ memory.
 - a. explicit ... implicit
 - b. implicit ... explicit
 - c. long-term ... short-term
 - d. procedural ... episodic
16. Various experts in the video episode spoke about the critical role of the brain area called the hippocampus, which
 - a. serves as the actual storage site for newly formed memories.
 - b. facilitates the storage of newly acquired explicit information in other areas of the brain.
 - c. allows us to retrieve our implicit memories, including information about how to perform new sequences of skilled movements.
 - d. does all of the above.
17. According to descriptions given in the video, after his brain surgery in 1953, patient H.M was never again able to
 - a. ride a bicycle.
 - b. form new explicit memories.
 - c. remember anything about his childhood.
 - d. remember the face of a new person he met, even though he displayed normal ability to remember their names and their voices.

Lesson 12 (Memory) The Mind's Storehouse

18. According to Michael Rugg, very high concentrations of the stress hormones known as glucocorticoids can
 - a. interfere with the functioning of the hippocampus, and therefore can interfere with memory under high arousal levels.
 - b. improve the ability to establish memories.
 - c. heighten arousal levels but do not affect memory.
 - d. improve long-term memory without affecting short-term memory.
19. Infantile amnesia
 - a. occurs only in children who have been severely abused in infancy.
 - b. can be treated successfully if a psychotherapist uses the technique of hypnosis to recover lost childhood memories.
 - c. may occur because of the immaturity of the cerebellum during the first few years of life.
 - d. may occur because of the immaturity of the hippocampus during the first few years of life.
20. During the last hour of the day at his office, Louis thought of several work-related tasks he would need to complete while at home that same evening. But when he arrived at his house after the 20-minute drive, he found himself having quite a lot of trouble remembering the tasks he had thought of at the office. Because of the shift in the setting from office to home, perhaps the most reasonable explanation for Louis' failure to recall his list of tasks is that
 - a. retrieval cues that were available at his office are not available in the context of his home.
 - b. proactive interference has occurred.
 - c. the method of loci has prevented recall from occurring.
 - d. his arrival at home has primed him to forget.
21. When given a series of pictures to choose from, a surprising number of people have difficulty recognizing the correct pattern of elements that make up a common object such as a penny. Errors in correctly recognizing objects we encounter on a daily basis suggests that many instances of failure to remember may be traced to
 - a. storage decay.
 - b. repression.
 - c. encoding failure.
 - d. retroactive interference.
22. Elizabeth Loftus' research on eyewitness testimony has demonstrated that
 - a. the testimony of an eyewitness is always highly inaccurate.
 - b. once a memory has been encoded through the witnessing of an event, the memory tends to be quite durable and resistant to change.
 - c. wording of questions can have a significant effect on what an eyewitness reports about an incident.
 - d. children can provide much more accurate eyewitness testimony than adults.
 - e. the only important factor affecting the accuracy of eyewitness testimony is the amount of time that has passed between the witnessing of the event and the report that is made.
23. When a previously formed memory interferes with the ability to recall a more recently formed memory, the process is known as
 - a. proactive interference.
 - b. repression.
 - c. retroactive interference.
 - d. long-term potentiation.
24. According to the author of the textbook, one of the best strategies you can use to improve your memory for information you study in textbooks is to
 - a. simply read and then repeatedly reread the assigned material.
 - b. test your ability to recall what you have read as you study, to become aware of what you already know and what you do not yet know.
 - c. aim to recognize the information instead of trying to recall it.
 - d. use speed-reading techniques to get through the material as quickly as possible.
 - e. give yourself a pep-talk, because it is very important to feel confident even when your understanding of the material is somewhat weak.
25. Elizabeth Loftus and John Palmer (1974) conducted research in which they first showed people films of automobile accidents. Later, participants' "eyewitness" reports revealed
 - a. equally serious distortions of fact in all groups, regardless of the wording of the questions.
 - b. highly detailed and remarkably accurate reports in over 98 percent of the cases.
 - c. higher estimates of the speed of the vehicles when the questions asked about seeing the cars "smash" into each other than when asked about seeing the cars "hit" each other.
 - d. a lower likelihood of saying they saw broken glass if they had been asked about seeing the cars "smash" (instead of "hit") each other.

ANSWER KEY FOR THE ACTIVE REVIEW EXERCISES

1. is not; [2] Video 12
2. flashbulb memory; [1] Textbook
3. three-stage; Sensory store (sensory memory) / Very brief – several hundred milliseconds / Very large; Short-term store (short-term memory) / Up to about 30 seconds or so / Very limited (only a few items—about 5–9 random digits, for example); Long-term store (long-term memory) / Up to many years / Essentially unlimited; [3] Textbook, Video 12
4. encoding; storage; retrieval; [2] Textbook, Video 12
5. stronger; rehearsal; effortful; [4] Textbook
6. *Your answer should mention factors such as* attention, emotional impact, meaning, imagery, organization of the information, and/or mnemonic devices; [5, 6, 7] Textbook, Video 12
7. less; is not; [5] Video 12
8. neurons; long-term potentiation; [8, 9] Textbook
9. temporal; hippocampus; [9] Textbook, Video 12
10. epileptic seizures; normal, normal, impaired; is not, good [8, 9, 10] Textbook, Video 12
11. similar to; As a result of encephalitis, British musician Clive Wearing had damage to the hippocampus. The result was a very serious impairment of memory, leading to a constant state of confusion because newly registered information all fades very rapidly. (For example, after ten minutes spent sitting on a park bench with his wife, he doesn't remember how he got there or how long he has been there.) Still, he remains fully able to recognize his wife, to use language normally, and to conduct musical works that he learned before his brain damage. [9] Video 12
12. explicit; prefrontal cortex; cerebellum; implicit memory [9, 10] Textbook, Video 12
13. temporal; cortisol; higher; [9] Textbook, Video 12
14. explicit; implicit; [10] Textbook, Video 12
15. recall; recognition; more; [11, 12] Textbook
16. into; out of; [12, 13] Textbook
17. *Your list should include items such as:* context cues that match the conditions under which we encoded the memory (for example, the weather or the colors or items of furniture in the room); a physiological state that matches the state under which we encoded the memory (for example, being influenced by caffeine if caffeine was in the body during encoding); and a mood while trying to retrieve information that matches the mood we were in during encoding (as shown in studies of mood-congruent memory). [12] Textbook, Video 12
18. proactive interference, retroactive interference, proactive, retroactive; [13] Textbook
19. can; relatively easy; subject to change; reconstructive; [14] Textbook, Video 12
20. higher; [14] Textbook
21. Freud; repression; does not; [15] Textbook, Video 12
22. increase; easier; [15] Textbook, Video 12
23. Holly Ramona, daughter of winery executive Gary Ramona, entered therapy while in college. As her therapy proceeded, Holly became convinced that her father had sexually abused her during her childhood, but that she had repressed the memories of the abuse until recently. After Gary Ramona had been accused of child sexual abuse, sustaining considerable damage to his family, his reputation, and his career, he responded by suing Holly's therapist, accusing her of planting false memories in his daughter's mind. Gary Ramona won this lawsuit and was awarded half a million dollars in damages.
Psychologists acknowledge that abuse happens. But today, instead of simply accepting Freud's largely unsubstantiated idea that memories of extremely painful episodes are routinely repressed, memory researchers have reason to consider an alternative explanation for the recovered memory phenomenon, acknowledging research showing that suggestibility can be involved in reshaping peoples' memories, and that misinformation provided to a person can lead to the development of false memories. [15] Video 12

ANSWER KEY FOR THE SELF TEST

Item #	Answer	Learning Outcome #	Source	Item #	Answer	Learning Outcome #	Source
1.	a	1	Textbook	14.	a	10	Video 10
2.	d	2	Textbook, Video 10	15.	a	9, 10	Textbook
3.	c	4	Textbook	16.	b	9, 10	Video 10, Textbook
4.	d	3, 8	Textbook, Video 10	17.	b	9, 10	Video 10
5.	d	4, 5	Textbook, Video 10	18.	a	9	Video 10, Textbook
6.	b	5, 16	Textbook, Video 10	19.	d	9, 10	Textbook
7.	b	5	Textbook	20.	a	12, 13	Textbook, Video 10
8.	b	6	Textbook	21.	c	13	Textbook
9.	d	8	Textbook	22.	c	14	Textbook, Video 10
10.	d	4, 6, 7	Textbook, Video 10	23.	a	13	Textbook
11.	d	9	Textbook	24.	b	16	Textbook
12.	c	9	Textbook	25.	c	14, 15	Textbook
13.	a	9	Textbook				