

# STUDY GUIDE – ANSWERS

## 7A: Memory

### The Phenomenon of Memory and Information Processing

1. memory
2. information-processing; encoding; storage; retrieval; connectionism; neural networks
3. three-stage processing; sensory memory; short-term; encoded; long-term
4. directly; automatically; conscious
5. working; active; stimuli; long-term
6. serial; parallel; automatic processing; practice

Automatic processing includes the encoding of information about space, time, and frequency. It also includes well-learned information, such as words in your native language.

7. effortful processing
8. rehearsal
9. Hermann Ebbinghaus; fewer; overlearning
10. spacing effect
11. serial position effect
12. recency; better; primacy
13. semantic; acoustic; visual
14. semantic; self.-reference
15. imagery
16. better
17. semantically; visually
18. rosy retrospection
19. mnemonic
20. peg-word
21. chunks; acronym
22. hierarchies
23. sensory
24. about half; more; iconic
25. echoic; less; 3 or 4 seconds
26. rehearsal; active
27. 7; George Miller
28. digits; letters; better
29. 2
30. unlimited (limitless)
31. Karl Lashley; cortices; remembered
32. memory trace; synapses
33. serotonin
34. less; receptor sites; long-term potentiation; drug; enzyme; LTP; faster
35. will not; will
36. facilitate
37. amygdala; limbic
38. disrupt
39. flashbulb; can
40. amnesia; is not

43. temporarily; do; slow-wave; frontal; temporal
44. implicit; eyeblink
45. infantile; hippocampus
46. recall
47. recall; recognize
48. relearn; more
49. encode
50. priming
51. the same

The *déjà vu* experience is most likely the result of being in a context similar to one that we have actually been in before. If we have previously been in a similar situation, though we cannot recall what it was, the current situation may present cues that subconsciously help us to retrieve the earlier experience.

52. state-dependent
53. mood-congruent

When happy, for example, we perceive things in a positive light and recall happy events; these perceptions and memories, in turn, prolong our good mood.

54. rejecting, punitive, 'and guilt-promoting; have never suffered depression

### Forgetting

1. forget
2. forgetting; distortion; intrusion
3. encoding
4. enters the memory system
5. encoding; less
6. soon
7. storage decay; memory trace
8. retrieval
9. interference
10. proactive interference; retroactive interference
11. better
12. positive transfer
13. repression
14. less

### Memory Construction

1. construction
2. misinformation effect; can; imagination inflation; vivid imaginations

When people viewed a film of a traffic accident and were quizzed a week later, phrasing of questions affected answers; the word "smashed," for instance, made viewers mistakenly think they had seen broken glass.

4. cannot
5. does not; details; durable
6. is not
7. hypnosis
8. are; questioned
9. neutral;-non-leading
10. are not
11. 3; infantile amnesia

## Improving Memory

1. Survey; Question; Read; Rehearse; Review

Suggestions for improving memory include rehearsing material over many separate and distributed study sessions with the objective of overlearning material. Studying should also involve making the material meaningful rather than mindlessly repeating information. Using mnemonic devices that incorporate vivid imagery is helpful, too. Frequent activation of retrieval cues, such as the context and mood in which the original learning occurred, can also help strengthen memory. Studying should also be arranged to minimize potential sources of interference. And, of course, sleep more, so the brain has a chance to organize and consolidate information. Finally, self-tests in the same format (recall or recognition) that will later be used on the actual test are useful.

## Progress Test 1

### Multiple-Choice Questions

1. d. is the answer. Information must be encoded, or put into appropriate form; stored, or retained over time; and retrieved, or located and gotten out when needed. (p. 257)
2. a. is the answer. Iconic memory is our fleeting memory of visual stimuli. (p. 266)
  - b. Echoic memory is auditory sensory memory.
  - c. There is no such thing as photomemory.
  - d. Semantic memory is memory for meaning, not a form of sensory memory.
3. d. is the answer. Echoic memories last 3 to 4 seconds. (p. 266)
4. d. is the answer. Retrieval refers to the process of remembering. (p. 274)
5. c. is the answer. (p. 266)
6. d. is the answer. (p. 263)
  - a. There is no such term as "consolidation techniques."
  - b. & c. Imagery and encoding strategies are important in storing new memories, but mnemonic device is the general designation of techniques that facilitate memory, such as acronyms and the peg-word system.

- b. Organization does enhance memory, but it does so through hierarchies, not grouping.
- c. Encoding refers to the processing of information into the memory system.
8. c. is the answer. Kandel and Schwartz found that when learning occurred in the sea slug *Aplysia*, serotonin was released at certain synapses, which then became more efficient at signal transmission. (pp. 268-269)
9. b. is the answer. In essence, we construct our memories, bringing them into line with our biases and assumptions, as well as with our subsequent experiences. (p. 285)
  - a. If this were true, it would mean that memory construction does not occur. Through memory construction, memories may deviate significantly from the original experiences.
  - c. There is no evidence that such chemical transfers occur.
  - d. Many long-term memories are apparently unlimited in duration.
10. d. is the answer. In general, being in a context similar to that in which you experienced something will tend to help you recall the experience. (pp. 276,277)
  - a. & b. The learning environment per se-and its familiarity or exoticness-did not affect retention.
11. a. is the answer. (p. 260)
  - b. & d. The text does not suggest that there is an optimal interval between encoding and retrieval.
  - c. Learning increases the efficiency of synaptic transmission in certain neurons, but not by altering the size of the synapse.
12. c. is the answer. (p. 268)
13. d. is the answer. When asked to recall all the letters, participants could recall only about half; however, if immediately after the presentation they were signaled to recall a particular row, their recall was near perfect. This showed that they had a brief photographic memory-so brief that it faded in less time than it would have taken to say all nine letters. (p. 266)
14. b. is the answer. Because amnesia victims lose their fact (explicit) memories but not their skill (implicit) memories or their capacity to learn, it appears that human memory can be divided into two distinct types. (pp. 271-272)
  - d. As studies of amnesia victims show, memory losses following damage to the hippocampus are quite predictable.
15. d. is the answer. (p. 272)
  - a. & b. Explicit memory (also called declarative memory) is memory of facts and experiences that one can consciously know and declare.
  - c. There is no such thing as prime memory.
16. d. is the answer. (p. 276)

- a. State-dependent memory is the phenomenon in which information is best retrieved when the person is in the same emotional or physiological state he or she was in when the material was learned.
  - b. Encoding failure occurs when a person has not processed information sufficiently for it to enter the memory system.
  - c. Priming is the process by which a memory is activated through retrieval of an associated memory.
17. b. is the answer. When the words were organized into categories, recall was two to three times better, indicating the benefits of hierarchical organization in memory. (p. 265)
18. a. is the answer. (p. 257)
- b. Herman Ebbinghaus conducted pioneering studies of verbal learning and memory.
  - c. Loftus and Palmer conducted influential research studies of eyewitness memory. d.. George Sperling is known for his research studies of iconic memory.
19. d. is the answer. It is in both encoding and retrieval that we construct our memories, and as Loftus' studies showed; leading questions affect people's memory construction. (p. 288)
- a. The memory encoding occurred at the time of the event in question, not during questioning by the hypnotist.
  - b. State-dependent memory refers to the influence of one's own emotional or physiological state on encoding and retrieval, and would not apply here.
  - c. Proactive interference is the interfering effect of prior learning on the recall of new information.
20. b. is the answer. (p. 273)
- a. The hippocampus is a temporary processing site for explicit memories.
  - c. & d. These areas of the brain are not directly involved in the memory system.
21. b. is the answer. Blocking is an example of retrieval failure. Each of the others is an example of a "sin of distortion," in which memories, although inaccurate, are retrieved. (p. 279)

#### **Matching Items**

- |               |                |                |
|---------------|----------------|----------------|
| 1. n (p. 266) | 6. c (p. 260)  | 11. g (p. 282) |
| 2. o (p. 257) | 7. e (p. 263)  | 12. j (p. 287) |
| 3. l (p. 263) | 8. f (p. 264)  | 13. h (p. 279) |
| 4. a (p. 284) | 9. i (p. 282)  | 14. k (p. 279) |
| 5. m (p. 278) | 10. b (p. 274) | 15. d (p. 279) |

#### **Progress Test 2**

##### **Multiple-Choice Questions**

1. c. is the answer. As Ebbinghaus and Bahrick both showed, most of the forgetting that is going to occur happens soon after learning. (pp. 280-281)
2. d. is the answer. (p. 282)
- a. & b. This study did not find evidence that memories fade (decay) with time.
- c. When one is awake, there are many more potential sources of memory interference than when one is asleep.
3. a. is the answer. A test of recall presents the fewest retrieval cues and usually produces the most limited retrieval. (p. 274)
4. d. is the answer. (pp. 271-272)
5. d. is the answer. According to the serial position effect, items at the beginning and end of a list tend to be remembered best. (p. 260)
6. a. is the answer. (p. 260)
  - b. In the serial position effect, the items in the middle of the list-always show the poorest retention.
  - c. & d. Delayed recall erases the memory facilitation for items at the end of the list.
7. c. is the answer. Processing a word in terms of its meaning (semantic encoding) produces much better retention than does visual or acoustic encoding. (p. 262)
8. d. is the answer. Surprisingly, Lashley found that no matter where he cut, the rats had at least a partial memory of how to solve the maze. (p. 268)
  - a. & b. Lashley's studies did not investigate the significance of the interval between learning and cortical lesioning.
9. a. is the answer. A blow to the head wipes out recent experiences because information in STM did not have time to consolidate into LTM. (p.270)
  - b. Such injuries disrupt the formation, rather than the retrieval, of memories.
  - c. Although nutrition plays an important role in neural functioning, the effects of such injuries are independent of nutrition.
10. d. is the answer. (p. 269)
11. c. is the answer. According to Freud, we repress painful memories to preserve our self-concepts. (p.284)
  - a. & b. The fact that repressed memories can sometimes be retrieved suggests that they were encoded and have not decayed with time.
12. d. is the answer. When misled by the phrasings of questions/ subjects incorrectly recalled details of the film and even "remembered" objects that weren't there. (pp. 285-286)

13. c. is the answer. Speed reading, which entails little active rehearsal, yields poor retention. (pp. 293-294)
14. b. is the answer. (p. 257)
- a. Encoding is the process of getting information into memory.
  - c. Rehearsal is the conscious repetition of information in order to maintain it in memory.
  - d. Storage is the maintenance of encoded material over time.
15. b. is the answer. Amnesia patients typically have suffered damage to the hippocampus, a brain structure involved in processing explicit memories for facts. (p. 272)
- a. Amnesia patients do retain implicit memories for how to do things; these are processed in the cerebellum.
  - c. & d. Amnesia patients generally do not experience impairment in their iconic and echoic sensory memories.
16. b. is the answer. (p. 266)
- a. Information in short-term memory has already been encoded.
  - c. Iconic and echoic are types of sensory memory.
  - d. Retrieval is the process of getting material out of storage and into conscious, short-term memory. Thus, all material in short-term memory has either already been retrieved or is about to be placed in storage.
17. c. is the answer. By breaking concepts down into subconcepts and yet smaller divisions and showing the relationships among these, hierarchies facilitate information processing. Use of main heads and subheads is an example of the organization of textbook chapters into hierarchies. (p. 265)
- a. Mnemonic devices are the method of loci, acronyms, and other memory techniques that facilitate retention.
  - b. Chunks are organizations of knowledge into familiar, manageable units.
  - d. Recognition is a measure of retention.
18. d. is the answer. (p. 288)
19. c. is the answer. Short-term recall is slightly better for information we hear rather than see, because echoic memory momentarily outlasts iconic memory. (p. 267)
- a. Meaningful stimuli, such as words, are usually remembered more easily than meaningless stimuli, such as random letters.
  - b. Iconic memory does not last as long as echoic memory in short-term recall.
  - d. Although context is a powerful retrieval cue, there is no general facilitation of memory in an unusual context.
20. c. is the answer. Loftus and Palmer found that eyewitness testimony could easily be altered when questions were phrased to imply misleading information. (p. 286)
- a. Although memories are constructed during encoding, the misinformation effect is a retrieval, rather than an encoding, phenomenon.
  - b. & d. In fact, just the opposite is true.
21. d. is the answer. (p. 279)
- a. This defines absent-mindedness.
  - b. This is misattribution..

## Psychology Applied

### *Multiple-Choice Questions*

1. d. is the answer. (p. 274)
  - a. & b. In order to correctly answer either type of question, the knowledge must have been encoded and stored.
  - c. With fill-in-the-blank questions, the answer must be recalled with no retrieval cues other than the question. With multiple-choice questions, the correct answer merely has to be recognized from among several alternatives.
2. d. is the answer. (p. 276)
  - a. & b. A serial position effect would presumably occur whether the study and retrieval contexts were the same or different.
  - c. As researchers found, when recall is delayed, only the first items in a list are recalled more accurately than the others. With immediate recall, both the first and last items are recalled more accurately.
3. d. is the answer. That all four mistakes are based on a sound confusion suggests that the letters were encoded acoustically. (p. 261)
  - a. Memorizing a list of letters would involve effortful, rather than automatic, processing.
  - b. The mistakes do not involve letters that are similar in appearance.
  - c. Semantic encoding would have been suggested by errors based on similarities in meaning.
4. b. is the answer. Retroactive interference is the disruption of something you once learned by new information. (p. 282)
  - a. Proactive interference occurs when old information makes it difficult to correctly remember new information.
  - c. & d. Interference produces forgetting even when the forgotten material was effectively encoded and stored. Janice's problem is at the level of retrieval.
5. b. is the answer. (pp. 282-283)

- a., c., & d. Involvement in other activities, even just eating or listening to music, is more disruptive than sleeping.
6. c. is the answer. Susan's memories are affected by her bad mood. (p. 278)
- Priming refers to the conscious or unconscious activation of particular associations in memory.
  - Memory construction refers to changes in memory as new experiences occur.
  - Although Susan's difficulty in recalling the good could be considered retrieval failure, it is caused by the mood-congruent effect, which is therefore the best explanation.
7. a. is the answer. Priming is the conscious or unconscious activation of particular associations in memory. (p. 275)
- Déjà vu is the false impression of having previously experienced a current situation.
  - That Martina is able to retrieve her former classmates' names implies that they already have been encoded.
  - Relearning is a measure of retention based on how long it takes to relearn something already mastered. Martina is recalling her former classmates' names, not relearning them.
8. b. is the answer. Being back in the context in which the original experiences occurred triggered memories of these experiences. (p. 276)
- The memories were triggered by similarity of place, not mood.
  - Retroactive interference would involve difficulties in retrieving old memories.
  - Echoic memory refers to momentary memory of auditory stimuli.
9. a. is the answer. Time and space-and therefore sequences of events-are often automatically processed. (p. 259)
- That she had little difficulty indicates that the processing was automatic, rather than effortful.
  - & d. State-dependent memory and priming have nothing to do with the automatic processing of space and time.
10. d. is the answer. Flashbulb memories are unusually clear memories of emotionally significant moments in life. (p. 270)
11. a. is the answer. Proactive interference occurs when old information makes it difficult to recall new information. (p. 282)
- If Carlos were having trouble remembering the old extension, this answer would be correct.
  - & d. Carlos has successfully encoded and stored the extension; he's just having problems retrieving it.
12. a. is the answer. (p. 272) b., c., & d. Explicit memory of facts that one can consciously "declare." Nondeclarative memory is what Mr. Flanagan has retained.
13. b. is the answer. (p. 259)
- Your failure to recall the answer indicates that it was never encoded semantically.
  - Spatial information, such as the location of an answer (but not the actual answer) on a textbook page, is often encoded automatically.
14. c. is the answer. (p. 282)
- & b. The name of your homeroom teacher, which you probably heard at least once each day of school, was surely processed into memory (encoded) and maintained there for some time (stored).
  - State-dependent memory is the tendency to recall information best in the same emotional or physiological state as when it was learned. It is unlikely that a single state was associated with learning your homeroom teacher's name.
15. a. is the answer. Short-term memory capacity is approximately seven digits. (p. 266)
- Because iconic memory lasts no more than a tenth of a second, regardless of how much material is experienced, this cannot be the explanation for Brenda's difficulty.
  - The final four digits should be no more difficult to organize into chunks than the first five digits of the address code.
  - Memory for digits is an example of explicit, rather than implicit, memory.
16. a. is the answer. (p. 284)
- Although Lewis' difficulty in recalling these memories could be considered retrieval failure, it is caused by repression, which is therefore the best explanation.
  - This answer is incorrect because it is clear that Lewis fails to remember these experiences because they are painful memories and not because he is in a different emotional or physiological state.
  - Flashbulb memories are especially vivid memories for emotionally significant events. Lewis has no memory at all.
17. d. is the answer. (p. 286)
- This is an example of proactive interference.
  - This is an example of the disruptive effects of depressant drugs, such as alcohol, on the formation of new memories.
  - This is mood-congruent memory.
18. d. is the answer. (p. 272)
- b., & c. Damage to the right side, not the left side, of the hippocampus would cause these types of memory deficits.

19. c. is the answer. Blows to the head usually disrupt the most recent experiences, such as this one, rather than long-term memories like those in choices a. and b., or new learning such as that in choice d. (p. 270)
20. c. is the answer. The hippocampus is involved in processing new facts for storage. (p. 272) a., b., & d.- Studies of amnesia victims with hippocampal damage show that neither classical conditioning nor skill memory are impaired, indicating that these aspects of memory are controlled by other regions of the brain.
21. d. is the answer. In this example, the questions Frank was asked to answer created misinformation that later became part of his memory. (p. 279)
- a. This answer would have been correct if Frank had been molested by the counselor but had failed to encode it in his memory.
- b. This answer would have been correct if Frank had been molested but the memory trace had faded with time.

### **Key Terms**

1. Memory is the persistence of learning over time through the storage and retrieval of information. (p.255)
2. Encoding is the first step in memory; information is translated into some form that enables it to enter our memory system (p. 257)
3. Storage is the process by which encoded information is maintained over time. (p. 257)
4. Retrieval is the process of getting information out of memory storage. (p. 257)
5. Sensory memory is the immediate, very brief recording of sensory information in the memory system. (p. 257)
6. Short-term memory is activated memory, which can hold about seven items for a short time. (p.257)
7. Long-term memory is the relatively permanent and unlimited capacity memory system into which information from short-term memory may pass. It includes knowledge, skills, and experiences. (p. 257)
8. Working memory is the newer way of conceptualizing short-term memory as a work site for the active processing of incoming auditory and visual-spatial information, and of information retrieved from long-term memory. (p. 258)
9. Parallel processing refers to the human brain's ability to process several aspects of a problem at the same time. (p. 258)
10. Automatic processing refers to our unconscious encoding of incidental information such as space, time, and frequency and of well-learned information. (p. 258)
11. Effortful processing is encoding that requires attention and conscious effort. (p. 259)
12. Rehearsal is the conscious, effortful repetition of information that you are trying either to maintain in consciousness or to encode for storage. (p. 259)
13. The spacing effect is the tendency for distributed study or practice to yield better long-term retention than massed study or practice. (p. 260)
14. The serial position effect is the tendency for items at the beginning and end of a list to be more easily retained than those in the middle. (p. 260)
15. Visual encoding is the use of picture images to process information into memory. (p. 261)
16. Acoustic encoding is the processing of information into memory according to its sound. (p. 261)
17. Semantic encoding is the processing of information into memory according to its meaning. (p. 261)
18. Imagery refers to mental pictures ar.4can be an important aid to effortful processing; (p. 263)

- c. Misattribution might have occurred if Frank had witnessed another camper being molested and later recalled himself as the actual victim.

### ***Essay Question***

Experts agree that child abuse is a real problem that can have long-term adverse effects on individuals. They also acknowledge that forgetting of isolated events, both good and bad, is an ordinary part of life. Although experts all accept the fact that recovered memories are commonplace, they warn that memories "recovered" under hypnosis or with the use of drugs are unreliable, as are memories of events before age 3. Finally, they agree that memories can be traumatic, whether real or false.

19. Mnemonics are memory aids (acronyms, pegwords, etc.), which often use vivid imagery and organizational devices. (p. 263)
20. Chunking is the memory technique of organizing material into familiar, meaningful units. (p. 264)
21. Iconic memory is the visual sensory memory consisting of a perfect photographic memory, which lasts no more than a few tenths of a second. (p. 266)

Memory aid: Icon means "image" or "representation." Iconic memory consists of brief visual images.

22. Echoic memory is the momentary sensory memory of auditory stimuli, lasting about 3 or 4 seconds. (p. 266)
23. Long-term potentiation (LTP) is an increase in a synapse's firing potential following brief, rapid stimulation. LTP is believed to be the neural basis for learning and memory. (p. 269)
24. A flashbulb memory is an unusually vivid memory of an emotionally important moment or event. (p. 270)
25. Amnesia is the loss of memory. (p. 271)
26. Implicit memories are memories of skills, preferences, and dispositions. These memories are evidently processed, not by the hippocampus, but by a more primitive part of the brain, the cerebellum. They are also called nondeclarative memories. (p. 272)
27. Explicit memories are memories of facts, including names, images, and events. They are also called declarative memories. (p. 272)
28. The hippocampus is a temporal lobe neural center located in the limbic system that is important in the processing of explicit memories for storage. (p. 272)
29. Recall is a measure of memory in which the person must retrieve information, with few retrieval cues, information learned earlier. (p. 274)
30. Recognition is a measure of memory in which one need only identify, rather than recall, previously learned information. (p. 274)
31. Relearning is also a measure of memory in that the less time it takes to relearn information, the more that information has been retained. (p. 274)
32. Priming is the activation, often unconsciously, of a web of associations in memory in order to retrieve a specific memory. (p. 275)
33. Déjà vu is the false sense that you have already experienced a current situation. (p. 276)
34. Mood-congruent memory is the tendency to recall experiences that are consistent with our current mood. (p. 278)
35. Proactive interference is the disruptive effect of something you already have learned on your efforts to learn or recall new information. (p. 282)
36. Retroactive interference is the disruptive effect of new learning on the recall of old knowledge. (p. 282)

Memory aid: Retro means "backward." Retroactive interference is "backward-acting" interference.

37. Repression is an example of motivated forgetting in that painful and unacceptable memories are prevented from entering consciousness. In psychoanalytic theory, it is the basic defense mechanism. (p. 284)
38. The misinformation effect is the tendency of eyewitnesses to an event to incorporate misleading information about the event into their memories. (p. 286)
39. At the heart of many false memories, source amnesia refers to attributing an event to the wrong source. (p. 287)