



PART 2

Read the text below and answer questions 14–26.

THE NEUROSCIENCE OF MEMORY FORMATION AND RETRIEVAL

Memory is frequently treated as a personal archive: experiences are filed away, and later retrieved intact. Neuroscience, however, portrays remembering as a dynamic biological process rather than a fixed record. At the moment of learning, the brain selects and compresses information, privileging what appears relevant to current goals. Later, new experiences and expectations can reshape what is retained. When a memory is recalled, it is assembled from partial traces and contextual hints, producing a coherent narrative that feels stable even when its details have shifted.

A foundational distinction separates short-term or working memory from long-term memory. Working memory holds information briefly while it is manipulated—such as keeping intermediate results during mental arithmetic or maintaining a sequence of instructions. Contemporary models further divide working memory into components, including an episodic buffer that binds diverse inputs into a temporary, integrated representation. Long-term memory, by contrast, includes semantic knowledge (facts and concepts), episodic recollections (events situated in time and place), and procedural learning (skills and habits). These categories are supported by partially distinct neural circuits, which is why injury or disease can disrupt one form while sparing another.

Encoding—the transformation of experience into a neural trace—depends strongly on attention. When attention is divided, fewer features are selected for robust storage, and later recall becomes less reliable. This is not merely a psychological observation: divided attention reduces the coordinated firing patterns that promote synaptic consolidation, the activity-dependent strengthening of connections that stabilises learning at the cellular level. Emotional arousal also modulates encoding. Under moderate arousal, neuromodulators can amplify the registration of central details, yet the same arousal can narrow attentional scope, leaving surrounding context under-specified. In practical terms, people may vividly remember a crucial moment while misremembering peripheral conditions such as the exact sequence of nearby events.

Sleep plays a complementary role after learning. During sleep, especially slow-wave and REM stages, reactivation of recently encoded patterns can stabilise memory traces and integrate them with prior knowledge. Rather than simply “saving” information, the sleeping brain appears to reorganise it, linking new material to existing schemas and extracting regularities. This helps explain why a problem may seem clearer after rest, and why



knowledge sometimes generalises beyond the original learning episode. In this sense, sleep supports both consolidation and the construction of meaning.

The hippocampus is central to forming new episodic memories. It functions as a rapid-binding system that associates who, what, where, and when into a coherent event representation. Over time, many memories become less dependent on the hippocampus and more distributed across hippocampal-cortical networks, as cortical regions gradually acquire the capacity to support retrieval with reduced hippocampal input. Exactly how this transition unfolds remains debated, but evidence from patients with hippocampal damage is compelling: they may retain older knowledge while struggling to acquire new episodes, indicating that intact hippocampal processing is essential for new learning.

Retrieval is not a mechanical playback but a reconstruction guided by cues. According to the principle of encoding specificity, recall succeeds when the retrieval conditions reinstate aspects of the original encoding context. A smell, a word, a melody, or a familiar setting can reactivate associated networks and provide the scaffolding from which the remembered scene is rebuilt. Because reconstruction is inferential, memories can be distorted. Repeated exposure to misleading suggestions can strengthen false elements, and confidence can rise even when accuracy does not. Such errors do not imply that memory is pointless; they suggest that the system is tuned for adaptive interpretation—generating a usable model of the past to guide decisions in the present.

Forgetting, therefore, is not simply failure. It can be adaptive, preventing the mind from being overwhelmed by irrelevant detail and allowing efficient access to information that matters. One mechanism is interference, in which similar memories compete. Proactive interference occurs when older learning disrupts acquisition or recall of new information, while the reverse pattern is often described as retroactive interference. Separately, stress can influence retrieval by altering attention and neurochemical state, sometimes making stored information harder to access even when it was encoded well. Crucially, these influences may co-occur in everyday life, but they are not the same phenomenon and need not depend on one another.

A newer line of research examines reconsolidation. When a memory is retrieved, it can enter a reconsolidation window in which the trace is temporarily unstable and can be updated before being stored again. This property suggests both opportunity and risk: therapeutic interventions might reduce the emotional impact of traumatic memories, yet altering a memory trace raises ethical and practical questions, and translating laboratory findings into safe treatments is challenging. Overall, memory formation and retrieval arise from interacting systems—attention, emotion, sleep, and distributed neural networks—whose goal is flexibility rather than perfect recording.



Questions 14–18

Complete the summary below. Choose **ONE WORD ONLY** from the text for each answer.

The Neuroscience of Memory

Neuroscience views remembering as a **14** **biological process** rather than a fixed record. One type, working memory, keeps information **15** for tasks such as mental arithmetic. In contrast, long-term encoding depends on attention; if attention is divided during learning, later recall may be less **16** Regarding episodic memories, new ones initially depend heavily on the **17** Finally, during recall, retrieval is a reconstruction guided by **18** such as a smell or familiar setting.

Questions 19–22

Select the correct answer.

19 What does the passage suggest about emotional arousal during encoding?

- A** It strengthens memory for contextual detail more than for central detail
- B** It may enhance key elements while weakening memory for surrounding context
- C** It prevents sleep from stabilising memories after learning
- D** It produces accurate recall even when misleading information is introduced

20 Why can people become confident in false details, according to the passage?

- A** Recall reconstructs the past and can be shaped by repeated exposure to misinformation
- B** Episodic memories are stored only in working memory and quickly disappear
- C** Consolidation removes uncertainty by replaying experiences exactly
- D** Retrieval cues guarantee that associated networks are activated correctly

21 What point is made about forgetting?

- A** It mainly reflects damage to neural systems supporting long-term memory
- B** It occurs only when a person fails to pay attention during learning
- C** It is evidence that human memory is not designed for learning
- D** It can be adaptive by preventing the mind being overloaded with irrelevant detail

22 What does the passage suggest about reconsolidation?

- A** It shows that retrieved memories cannot be altered without erasing them
- B** It proves that consolidation stops once a memory enters long-term storage
- C** It indicates that recall can place a memory in a state where it may be updated
- D** It suggests that stress reliably improves access to stored information



Questions 23–26

Choose **TRUE** if the statement agrees with the information given in the text, choose **FALSE** if the statement contradicts the information, or choose **NOT GIVEN** if there is no information on this.

23 The passage suggests that long-term memory includes both factual knowledge and learned skills.

24 The passage states that divided attention during encoding always results in complete loss of stored detail.

25 The passage suggests that sleep stabilises memories and integrates them with prior knowledge.

26 The passage states that retroactive interference is more common than proactive interference.

Answer Key

14. dynamic

15. briefly

16. reliable

17. hippocampus

18. cues

19. B

20. A

21. D

22. C

23. TRUE

24. FALSE

25. TRUE

26. NOT GIVEN