

2.5 Storing Memories

Name: _____ Class: _____ Date: _____ **Total: 18 marks**

KEY WORDS serial position effect 系列位置效应 • episodic 情景 • semantic 语义
• consolidation 巩固 • long-term potentiation 长时程增强

Objective

Build the skills to answer exam questions on how memories are **stored** 储存.

You must be able to:

- distinguish **episodic** 情景 from **semantic** 语义 memory
- describe the role of the **hippocampus** 海马 and of the **cerebellum** 小脑
- explain **long-term potentiation** 长时程增强 in outline
- state what **consolidation** 巩固 is and when it happens

1 Worked examples

Study these first. Each one shows the method for a task used later.

■ Episodic and semantic

Episodic memory stores personally experienced events, with a time and place. **Semantic** memory stores facts and general knowledge, usually without any memory of learning them.

■ Where storage depends

The **hippocampus** is essential for forming new explicit memories; damage prevents new learning while leaving old memories and skills intact. Skill memory depends more on the **cerebellum** and basal ganglia.

■ Long-term potentiation

Repeated stimulation of a neural connection makes it fire more readily afterwards. This strengthening of specific synapses is the leading physical account of how a memory is stored.

■ Consolidation

A new memory is initially fragile and becomes stable over hours and days, a process supported by sleep. Interference or injury during this window disrupts the memory more than it would later.

2 Practice

2.1 State the difference between episodic and semantic memory, with an example of each. [2]

2.2 Explain what long-term potentiation describes. [2]

2.3 A patient with hippocampal damage learns a new motor skill but cannot remember practising it.

(a) State which structure supports the skill learning. [1]

(b) State what this dissociation shows. [1]

3 Exam-style questions

3.1 Knowing that Paris is the capital of France without recalling learning it is [1]

- **A** episodic memory
- **B** semantic memory
- **C** implicit memory
- **D** sensory memory

3.2 A head injury erases memories of the hour before it but not of the previous year. This is best explained by [1]

- **A** retrieval failure
- **B** disrupted consolidation
- **C** the spacing effect
- **D** proactive interference

3.3 Sleep after study improves recall.

- (a) Name the process this supports. [1]
- (b) Explain why the improvement is greater than for equal time awake. [2]

3.4 Applied research task. Students learned a 30-item word list. Group A studied it for 40 minutes in one sitting. Group B studied it for 10 minutes on each of four days. Both groups were tested a week later. Group B recalled far more. Within both groups, words from the start and the end of the list were recalled better than words from the middle.

- (a) Name the effect that explains Group B's advantage, and explain why it works. [2]

- (b) Name the effect shown by the position of the words in the list, and name its two parts. [2]

- (c) Explain the two parts using the multi-store model of memory. [2]

- (d) A student concludes "the best way to study is always to space it out". State **one** limitation of drawing that conclusion from this study. [1]

Solutions

2.1 episodic: a personally experienced event with a time and place, e.g. a birthday;
semantic: a general fact, e.g. that water boils at 100 degrees.

2.2 repeated stimulation strengthens a specific synaptic connection; so it fires more readily afterwards, which is the leading physical account of storage.

2.3 (a) the cerebellum (and basal ganglia). (b) explicit and implicit memory depend on different systems, so one can be lost while the other works.

3.1 B. it is a fact without an accompanying memory of the episode.

3.2 B. recent memories were still consolidating and were therefore vulnerable.

3.3 (a) consolidation. (b) sleep supports consolidation directly and also reduces interference from new incoming material.

3.4 (a) The **spacing effect** — distributed practice beats massed practice (1). Each new session requires the material to be retrieved again after partial forgetting, and that effortful retrieval strengthens the memory trace far more than re-reading it while it is still fresh (1).

(b) The **serial position effect** (1), made up of the **primacy** effect for early items and the **recency** effect for late items (1).

(c) Primacy — the first words were rehearsed most and had time to be encoded into **long-term memory** (1). Recency — the last words were still in **short-term memory** at the moment of testing, so they could be reported directly (1).

(d) The study used one kind of material — an unrelated word list — tested by recall after one week; it does not show that spacing helps equally for skills, comprehension, or over other intervals (1).