

Exercise walk-through

The Brain ■ 1.4

eXercise

You must be able to

- match a brain region to a function it supports
- explain what **plasticity** 可塑性 means and when it is greatest
- describe what **hemispheric specialisation** 半球特化 does and does not imply
- state what each main imaging or recording method measures

Method — Regions and functions

The **brainstem** controls basic survival functions such as breathing. The **cerebellum** coordinates balance and practised movement. The **limbic system** — including the **amygdala** and **hippocampus** — supports emotion and memory formation. The **cerebral cortex** supports higher processing, divided into four lobes.

Method — Plasticity

The brain reorganises in response to experience and injury. Plasticity is greatest in childhood but continues throughout life, which is why some function can be recovered after damage.

Method — Hemispheric specialisation

The left hemisphere is typically more involved in language, the right in spatial processing. This is a difference of **degree**, not a division into two separate people: the hemispheres are connected and work together in almost every task.

Method — What each method measures

EEG records electrical activity with excellent timing but poor location. **fMRI** infers activity from blood flow, with good location but slower timing. A **lesion** study infers function from what is lost after damage.

Practice 2.1 ■ 2 marks

State one function of the cerebellum and one of the amygdala.

Solution 2.1

Method: Regions and functions

Worked steps

cerebellum: coordinates balance and practised movement **B1**; amygdala: supports emotional processing, especially fear **B1**.

Practice 2.2 ■ 2 marks

Explain what is meant by plasticity.

Solution 2.2

Worked steps

the brain's capacity to reorganise its structure and connections in response to experience or injury **B1**; greatest in childhood but continuing across life **B1**.

Practice 2.3 ■ 1 mark

A patient recovers some speech after damage to a language area.

- (a) State the property of the brain that makes this possible.
- (b) State one reason recovery is usually more complete in a child.

Solution 2.3

Method: Plasticity

Worked steps

(a) plasticity **B1**. (b) a child's brain reorganises more readily, so other regions can take over the function **B1**.

Exam-style 3.1 ■ 1 mark

A researcher needs millisecond timing of a brain response. The best method is

A fMRI

B EEG

C a lesion study

D a case study

Solution 3.1

A fMRI

B EEG



C a lesion study

D a case study

Worked steps

B. EEG records electrical activity directly, with excellent temporal resolution.

Exam-style 3.2 ■ 1 mark

The claim that people are “left-brained” or “right-brained” is best described as

- A** well supported by hemispheric specialisation
- B** an oversimplification of a difference of degree
- C** true only for language
- D** a finding from fMRI

Solution 3.2

Method: Hemispheric specialisation

- A well supported by hemispheric specialisation
- B an oversimplification of a difference of degree** 
- C true only for language
- D a finding from fMRI

Worked steps

B. specialisation is a difference of degree between connected hemispheres.

Exam-style 3.3 ■ 1 mark

A patient with hippocampal damage can hold a conversation but cannot recall it an hour later.

- (a) State the memory function the hippocampus supports.
- (b) Explain what this case shows about how memory is organised.

Solution 3.3

Method: Regions and functions

Worked steps

(a) forming new long-term memories **B1**. (b) memory is not a single system **B1**: the ability to form new memories can be lost while immediate conversation and older memories remain intact **B1**.