

Exercise walk-through

Interaction of Heredity and Environment ■ 1.1

eXercise

You must be able to

- state what the **nature-nurture** 先天与后天 question actually asks
- explain what **twin** 双生子 and **adoption** 收养 studies are designed to separate
- define **heritability** 遗传率 and say what it does **not** mean
- describe how the **evolutionary** 进化 perspective explains a behaviour

Method — What nature-nurture asks

It does not ask whether heredity or environment causes a trait. Both always contribute. It asks how much of the **variation between people** in a population comes from each source, and how the two **interact**.

Method — Why twin and adoption studies exist

Identical twins share nearly all their genes; **fraternal twins** share about half. Twins raised apart share genes but not environment; adopted children share environment but not genes with their adoptive family. Comparing these groups separates the two influences that ordinary families confound.

Method — Heritability, precisely

Heritability is the proportion of the **variation in a trait within a population** attributable to genetic differences. It is a statement about a population, not an individual, and it can change if the environment changes. A heritability of 0.5 does not mean half of one person's trait is genetic.

Practice 2.1 ■ 2 marks

State the question the nature-nurture debate actually asks.

Solution 2.1

Method: What nature-nurture asks

Worked steps

how much of the variation between people comes from genes and how much from environment **B1**; and how the two interact, since both always contribute **B1**.

Practice 2.2 ■ 2 marks

Explain why identical twins raised apart are useful to researchers.

Solution 2.2

Method: Why twin and adoption studies exist

Worked steps

they share (nearly) all their genes but not their environments **B1**; so a similarity between them points to a genetic influence rather than a shared upbringing **B1**.

Practice 2.3 ■ 1 mark

A researcher reports that height has a heritability of 0.8 in a population.

- (a) State what this figure describes.
- (b) State one thing it does **not** mean.

Solution 2.3

Method: Heritability, precisely

Worked steps

(a) the proportion of variation in height **within that population** attributable to genetic differences **B1**. (b) it does not mean 80% of any one person's height is caused by genes **B1**.

Exam-style 3.1 ■ 1 mark

Fraternal twins share on average what proportion of their genes?

- A** all of them
- B** about three-quarters
- C** about half
- D** none

Solution 3.1

Method: Why twin and adoption studies exist

A all of them

B about three-quarters

C about half



D none

Worked steps

C. fraternal twins are ordinary siblings who share a birth, so about half.

Exam-style 3.2 ■ 1 mark

A trait's heritability estimate rises after a population's schooling becomes uniform. The best explanation is

- A** the genes changed
- B** environmental variation fell, so remaining variation is more genetic
- C** heritability is fixed and the study is wrong
- D** the trait became learned

Solution 3.2

Method: Heritability, precisely

- A the genes changed
- B environmental variation fell, so remaining variation is more genetic** 
- C heritability is fixed and the study is wrong
- D the trait became learned

Worked steps

B. heritability is a ratio; reducing environmental variation raises the genetic share without any genetic change.

Exam-style 3.3 ■ 1 mark

An evolutionary psychologist studies why humans prefer sweet and fatty foods.

- (a) State the kind of explanation this perspective gives.
- (b) State one limitation of that kind of explanation.

Solution 3.3

Worked steps

(a) it explains the preference as an adaptation that raised survival or reproduction in ancestral environments **B1**. (b) such explanations are hard to test directly, since the ancestral environment cannot be observed **B1**.