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INTERNATIONAL AS PSYCHOLOGY

Unit 2 Biopsychology, Development and Research Methods 1

Thursday 16 January 2025 07:00 GMT Time allowed: 1 hour 30 minutes

Materials

For this paper you must have:

- a calculator, which you are expected to use where appropriate.

Instructions

- Use black ink or black ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- All working must be shown.
- If you need extra space for your answer(s), use the lined pages at the end of this book. Write the question number against your answer(s).
- Do all rough work in this book. Cross through any work you do not want to be marked.

Information

- The marks for questions are shown in brackets.
- The maximum mark for this paper is 90.

For Examiner's Use	
Question	Mark
A	
B	
C	
TOTAL	



J A N 2 5 P S 0 2 0 1

Section A: BiopsychologyAnswer **all** questions in the spaces provided.Only **one** answer per question is allowed.

For each multiple-choice question completely fill in the circle alongside the appropriate answer.

CORRECT METHOD



WRONG METHODS



If you want to change your answer you must cross out your original answer as shown.



If you wish to return to an answer previously crossed out, ring the answer you now wish to select as shown.

**0 1**

Using your knowledge of hemispheric lateralisation, identify the brain centres which are usually only located in the left hemisphere.

Shade **one** box only.**[1 mark]****A** Language centres**B** Motor centres**C** Somatosensory centres**D** Visual centres**0 2**

Describe what is meant by inhibition in the process of synaptic transmission.

[3 marks]

Inhibition is when a neurotransmitter released into the synapse binds to receptors on the post-synaptic neuron and decreases its neural activity.

The post-synaptic membrane becomes more negatively charged

(hyperpolarised), so it is less likely that an action potential will be

triggered and the neuron is less likely to fire. Neurotransmitters such as serotonin and GABA have an inhibitory effect.



0 3

Noor is crossing a road, when suddenly a speeding car nearly hits her. Noor's breathing becomes fast and shallow and her heart beats quicker. Noor's legs are shaking.

A few minutes later, Noor's breathing slows down again and she feels calmer.

Use your knowledge of the autonomic nervous system to explain Noor's experiences.

[6 marks]

Noor's experiences are due to the actions of the sympathetic and parasympathetic branches of her autonomic nervous system (ANS).

When Noor sees the speeding car, her hypothalamus detects a threat and her ANS activates the sympathetic branch, which triggers the fight or flight response. The adrenal medulla releases adrenaline into her

bloodstream, which brings about the physical changes she experiences.

Her breathing becomes fast and shallow to increase the oxygen supply to her muscles, so that she can respond to the approaching car. Her

heart beats quicker to pump the oxygenated blood and glucose rapidly to her muscles to fuel a physical response. Her legs shake because of the

increased energy supply to her muscles. All of this mobilises energy so

Noor can act quickly, for example by jumping away from the car.

Extra space *A few minutes later the threat is over because Noor has not*

been hit by the car. The parasympathetic branch of her ANS restores

her body to normal ('rest and digest'). Her breathing slows down and

her heart rate decreases because her body no longer needs to pump

extra oxygen to her muscles, so she feels calmer.

Turn over for the next question



0 4

Describe and evaluate research into plasticity **and** functional recovery after trauma.**[20 marks]**

Plasticity refers to the ability of the brain to change and adapt its structure and function in the light of experience, including learning and trauma. Functional recovery is a form of plasticity: it refers to the ability of the brain to reinstate (recover) functions lost after brain damage, for example after a stroke or accident.

Maguire et al. (2000) used MRI scans to compare the brains of London taxi drivers with matched non-taxi drivers. Taxi drivers must learn 'The Knowledge' of London's streets. They had significantly more grey matter in the posterior hippocampus, an area involved in spatial memory, and the longer they had been taxi drivers the larger this area was. This shows that the brain changes in response to experience. Blakemore and Mitchell (1973) reared kittens in an environment containing only vertical stripes. Neurons in their visual cortex later responded only to vertical lines, showing that the development of the visual cortex is shaped by early experience.

After trauma, the brain can recover through several mechanisms. In the short term, swelling of the damaged brain tissue reduces, allowing nearby areas to work again. Axonal sprouting occurs, where new nerve endings grow from surviving neurons and connect with other undamaged neurons, forming new pathways. Neurogenesis, the growth of new neurons, may also occur, and similar areas in the opposite hemisphere can be recruited to take over lost functions, for example language moving to the right hemisphere.

Villablanca and Hovda (2000) found that when one damaged hemisphere was removed (hemispherectomy) soon after birth, the remaining



hemisphere could take over many of its functions, so the children developed relatively normally. Age is therefore important, as more significant change is possible in younger brains. Teuber (1975) studied soldiers with brain injuries and found that those under 20 had a much better recovery of movement and visual problems than older soldiers. Kapur (1997) found that doctors recovered better after brain damage than people in the general population, suggesting that education helps recovery.

A strength of this research is the strong support from research studies. Maguire's MRI scans are objective, scientific measures, and the link between years of experience and hippocampal size suggests experience causes the change, rather than people with larger hippocampi choosing to become taxi drivers. Villablanca and Hovda also support the idea that the brain can reorganise itself after severe trauma, which increases the validity of the concept of functional recovery.

However, much of the research is based on case studies or studies with small numbers of participants, such as patients who have had a hemispherectomy or a particular type of injury. Each case of brain damage is unique, so it is difficult to generalise the results to the wider population. Teuber's sample of soldiers were also all male and had war injuries, which may not represent recovery from strokes in older people. In addition, much of the research comes from non-human animals, such as Blakemore and Mitchell's kittens. The human brain is far more complex than a cat's brain, so there are problems with extrapolating the findings to humans. There are also ethical issues, as the kittens were deprived of normal visual experience and suffered lasting harm.



A further limitation is the difficulty of predicting the level of recovery, so research has low predictive validity. There are huge individual differences in recovery because many factors play a part, for example age, gender, level of education (cognitive reserve), determination, amount of practice and the degree and location of the damage. This makes it hard to give accurate predictions to individual patients and their families. Plasticity is also not always positive. Negative plasticity can occur, for example phantom limb syndrome, where amputees continue to feel sensations in a missing limb because the brain areas that represented the limb are reorganised. This suggests that the brain's adaptations can sometimes be maladaptive.

Despite this, the research has important real-world applications.

Knowledge about plasticity has given importance to rehabilitation and Extra space treatment, such as physiotherapy, speech therapy and constraint-induced movement therapy, in order to promote recovery.

Because the brain can form new connections, therapy can help patients regain lost functions, especially if it begins early.

In conclusion, there is convincing evidence that the brain is plastic and can recover function after trauma, especially in younger people, although the reliance on animal studies and case studies and the large individual differences mean the findings should be applied with caution.



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0 7

Section B: Cognitive DevelopmentAnswer **all** questions in the spaces provided.**0 5**

What is meant by scaffolding in cognitive development?

[2 marks]

Scaffolding is the help or support given to a learner by a more knowledgeable other (MKO), such as a parent or teacher, to complete a task. The support is gradually reduced as the learner moves through the zone of proximal development.

0 6

Reginald is learning how to read.

Using your knowledge of scaffolding, explain how Reginald's father could help Reginald learn to read.

[3 marks]

His father could model reading by reading aloud to him regularly, then sound out letters and forming words, getting Reginald to repeat them. He could point to words to help Reginald say them, and use books with many pictures to help him work out the meaning, and give praise. As Reginald progresses, his father should gradually reduce support, e.g. Reginald reads aloud to him from books with fewer pictures.

0 7

Describe the role of the mirror neuron system in social cognition.

[3 marks]

Mirror neurons 'fire' both when we perform an action and when we observe someone else performing the same action, e.g. watching someone drink water activates our mirror neurons as if we had drunk it. They play a role in social cognition, e.g. understanding intentions, imitation and empathy, as observing someone in pain activates the same systems as being in pain. It is less active in people low in empathy or with ASD.



0 8

Eve watches Pete yawn and starts yawning herself.

With reference to the mirror neuron system, briefly explain why Eve starts yawning.

[2 marks]

As Eve watches Pete yawn, her mirror neuron system is activated as though she were yawning, which triggers a yawning response, so she involuntarily mimics Pete's yawn. This is a subconscious, empathetic mirroring of his behaviour, not a sign that Eve is tired.

0 9

Describe the procedure of **one** study that investigated violation of expectation in very young children.

[4 marks]

In Baillargeon's drawbridge study, in the familiarisation stage each 5-month-old infant watched a drawbridge (screen) swing through 180 degrees.

In the possible (expected) event, the infant saw the drawbridge's motion stopped by a block placed in the way. In the impossible (unexpected) event, the drawbridge swung all the way through 180 degrees despite the block. Looking time was measured for the possible and impossible events.

Turn over for the next question

Turn over ►



1 0

Describe Piaget's theory of cognitive development.

[6 marks]

Piaget's theory refers to the development of thinking skills, which occurs in discrete stages marked by qualitative differences in the way children think. Development is seen as a progressive reorganisation of mental processes as a result of biological maturation and environmental experience.

Children build schemas, mental frameworks of knowledge about the world. Through adaptation, new information is assimilated into existing schemas. When new information does not fit, the child experiences disequilibrium and must accommodate, changing the schema or creating a new one. Equilibration is the process of restoring the balance between assimilation and accommodation, which drives cognitive development.

In the sensorimotor stage (0 to 2 years) infants learn through their senses and actions and develop object permanence, the understanding that objects continue to exist when out of sight, at about 8 months.

In the pre-operational stage (2 to 7 years) children use words as symbols for objects but are egocentric, unable to see things from another's point of view, as in the three mountains task. They cannot yet conserve or understand class inclusion.

In the concrete operational stage (7 to 11 years) logical (operational) thought begins, shown by the ability to work things out in the head and to conserve, understanding that quantity stays the same despite changes in appearance.

In the formal operational stage (11+ years) children become capable of abstract thought and reasoning, logical thinking and hypothesis testing.



1 1

Explain **one** strength of Piaget's theory of cognitive development.**[3 marks]**

One strength is that Piaget's theory has led to real-life applications in education. It regards children as active learners who must be 'ready' for certain learning, so teaching is child-centred, using discovery learning and stage-appropriate tasks, e.g. using concrete objects for 7 to 11-year-olds. His tasks have also been replicated, confirming some findings (reliability).

1 2

Describe **one** of the Sally–Anne studies investigating theory of mind.**[4 marks]**

Baron-Cohen, Leslie and Frith (1985) showed autistic, Down's syndrome and typically developing children two dolls, Sally and Anne. Sally has a basket and Anne has a box.

Sally put her marble in the basket and left the room. While she was gone, Anne moved it to the box. The child was asked: "Where is the marble really?", "Where was the marble in the beginning?" and the critical belief question, "Where will Sally look for her marble?". This showed whether the child understood Sally's false belief (basket).

1 3

Explain **one** limitation of the Sally–Anne studies.**[3 marks]**

One limitation is that the Sally-Anne test requires participants to have sufficiently developed language skills to understand the story and the questions. It is therefore not suitable for very young children or children with ASD who have limited language. A child may fail because they do not understand the questions rather than because they lack theory of mind, which lowers the validity of the test.

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Section C: Research Methods 1

Answer **all** questions in the spaces provided.

Researchers wanted to investigate the attitudes of 16–18-year-old students towards environmental issues. They created a questionnaire that contained both open questions and closed questions. The researchers carried out a pilot study of the questionnaire.

After the pilot study, they selected 40 students aged 16–18 from a local school to take part in their investigation.

1	4
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Briefly explain **one** reason why the researchers carried out a pilot study of the questionnaire.

[2 marks]

To check that the content of the questions was clear and concerned students' attitudes towards environmental issues, so that any confusing questions could be changed before the main study.

1	5
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Identify the population **and** the sample in this investigation.

[2 marks]

Population *16 to 18-year-old students.*

Sample *40 students aged 16 to 18 from a local school.*

1	6
---	---

Write an open question the researchers could have used in their questionnaire.

[1 mark]

"Explain what you can do to protect the environment."

Turn over for the next question



1 7

One of the questions asked the 16–18-year-old students to rate their attitudes towards global warming on a scale of 1–10, where 1 meant not very important and 10 meant most important.

The results are shown in **Table 1** below.

Table 1 Frequency of rating scores on the attitudes scale (1–10).

Rating score of attitude scale (1–10)	Frequency
1	2
2	1
3	1
4	1
5	2
6	3
7	10
8	11
9	7
10	2

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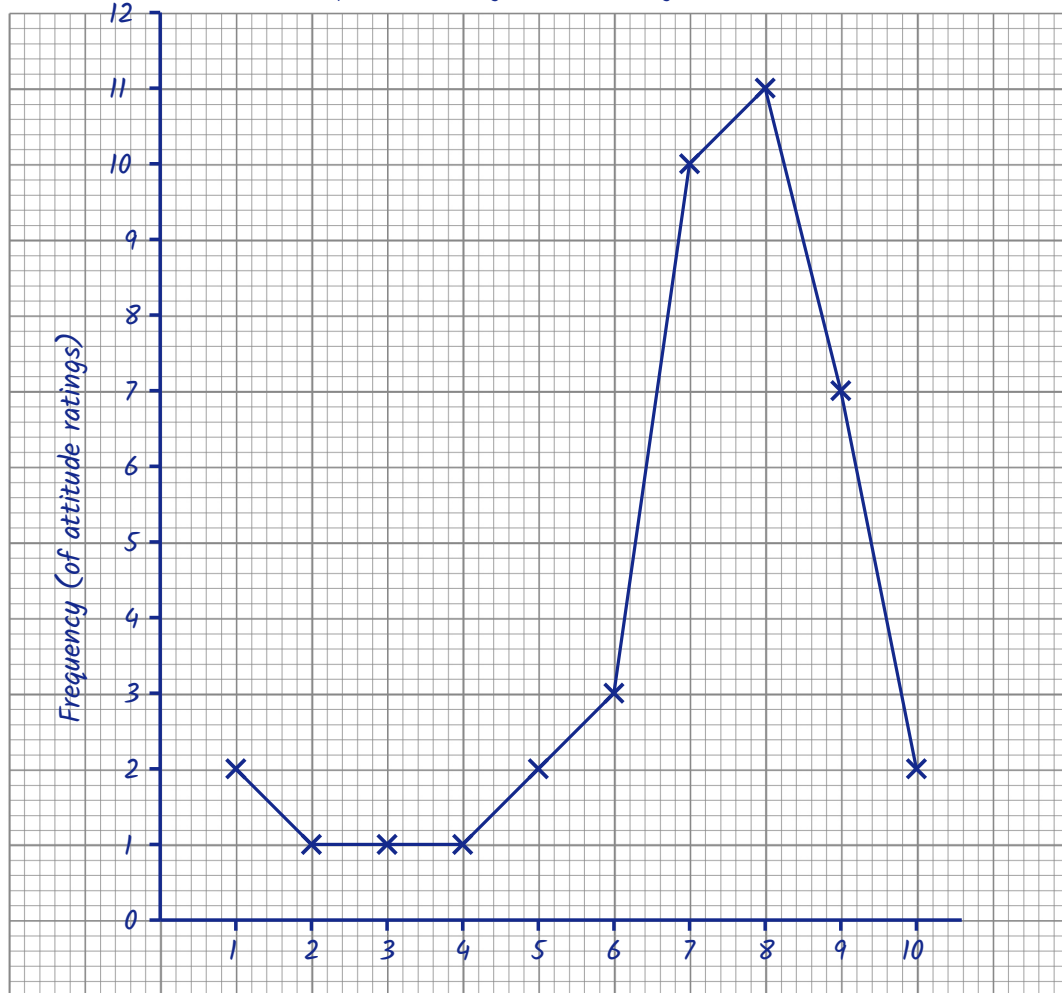


1 7. 1

Using the data from **Table 1**, draw a line graph. Provide a title for your graph, and fully label both axes.

[4 marks]

Title *Line graph showing the frequency of attitude ratings (1 to 10) towards the importance of global warming*



Attitude ratings of 16 to 18-year-old students towards the importance of global warming (rating scale 1 to 10)

Turn over for the next question



1 7 . 2

Using the data from **Table 1**, calculate the mean, median and mode.
Show your workings.

[6 marks]

Mean *Mean = 7*

$$(1 \times 2) + (2 \times 1) + (3 \times 1) + (4 \times 1) + (5 \times 2) + (6 \times 3) + (7 \times 10) + (8 \times 11) + (9 \times 7) + (10 \times 2) =$$

$$280$$

$$\text{Mean} = 280 \div 40 = 7$$

Median *Median = 7.5*

40 scores, so median is midway between the 20th and 21st scores.

Ratings 1 to 7 = 20 scores, so the 20th score is 7 and the 21st is 8.

$$\text{Median} = (7 + 8) \div 2 = 7.5$$

Mode *Mode = 8*

The most frequent rating is 8, with a frequency of 11 ratings.

1 7 . 3

Using the mean, median and mode you calculated in your answer to Question **17.2**, what do these statistics tell us about the distribution of the frequency ratings?

[4 marks]

The distribution is negatively skewed, not a normal distribution. It is not symmetrical, as the mean, median and mode are all different.

The mean (7) is smaller than the median (7.5), which is smaller than the mode (8), so the bulk of the data is at the higher end of the scale and most scores are above the mean of 7, with a few low scores pulling the mean down.

This indicates that the majority of the students think that global warming is an important issue.



To gain a better understanding of attitudes towards environmental issues, the researchers carried out an unstructured interview with some of the 16–18-year-old students.

1 8

What is meant by an unstructured interview?

[2 marks]

An unstructured interview is guided by themes rather than predetermined questions. It is like a conversation, so the interviewer can respond to the participant's answers, e.g. to seek clarification or pursue a new line of enquiry.

1 9 . 1

Explain why having the right to withdraw is important in the design and conduct of psychological studies.

[3 marks]

It provides an added layer of protection from harm for participants who may experience emotional discomfort or stress, and ensures that they have control over their involvement in the study. When participants know they can leave at any time, they are more likely to be honest in their responses, increasing the validity of the data. Withdrawing their data at the end also reduces distress.

Question 19 continues on the next page



1 9 . 2

Explain how the researchers could have ensured that the 16–18-year-old students knew that they had the right to withdraw from the interview.

[3 marks]

As part of the consent process, the researchers should have explained to the students that taking part in the interview is voluntary and that they can withdraw at any point, without giving a reason or facing any negative consequences. They should remind the students of this if they appear distressed during the interview, and tell them in the debrief how to contact the researchers to withdraw their responses.

2 0

At the end of each interview, the researchers conducted a debrief with the student.

Explain what information the researchers should have included in the debrief.

[3 marks]

The researchers should remind the students of the aim of the interview, which was to investigate attitudes towards environmental issues, and that they can withdraw their answers if they want to. They should reassure the students that the interview was confidential and their privacy is guaranteed, and offer access to help in case the interview brought up anything they wished to discuss further.

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END OF QUESTIONS



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