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I declare this is my own work.

INTERNATIONAL AS PSYCHOLOGY

Unit 2 Biopsychology, Development and Research Methods 1

Monday 11 January 2021 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	
Section	Mark
A	
B	
C	
TOTAL	



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

For each 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 1Which of the following statements about the somatic nervous system is **FALSE**?Shade **one** box only.**[1 mark]**

- A** It contains motor pathways which control skeletal muscles.
- B** It includes sensory pathways from sensory receptors.
- C** It is further divided into the sympathetic and parasympathetic branch.
- D** It maintains the communication between the central nervous system and the outside world.

**0 2**

Name a sub-division of the central nervous system.

[1 mark]*Brain (or spinal cord).*

0 3

Briefly describe the function of a relay neuron.

[2 marks]

Relay neurons carry signals within the central nervous system (brain and spinal cord). They interconnect sensory and motor pathways, allowing sensory neurons and motor neurons to communicate, and connect different parts of the CNS with each other.

0 4 . 1

Barika is waiting to give a speech to the whole school. Her mouth is dry and her heart is beating faster than usual.

Using your knowledge of the fight or flight response, explain the symptoms experienced by Barika **before** giving the speech.

[3 marks]

Barika perceives the speech to the whole school as a stressor (a threat), which activates the sympathetic branch of the autonomic nervous system (ANS). The ANS is responsible for her arousal via the fight or flight response, which prepares her body for energy release in order to fight or flee.

The adrenal medulla releases adrenaline into her bloodstream, which initiates the body's response to the perceived danger of the speech.

Adrenaline slows down (inhibits) Barika's digestion, including saliva production, causing her mouth to be dry. Adrenaline also makes her heart beat faster in order to pump more oxygenated blood and glucose around her body to her muscles.

Question 4 continues on the next page

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0 4 . 2

After the speech Barika is much calmer and feels hungry.

Using your knowledge of the fight or flight response, explain the symptoms experienced by Barika **after** the speech.

[3 marks]

After the speech the 'threat' is over, so the parasympathetic branch of the ANS takes over and restores Barika's bodily functions to normal, the 'rest and digest' state.

Adrenaline release is reduced, so her heart rate slows down and her breathing returns to normal, which is why Barika feels much calmer.

Her digestion is no longer suppressed, as the parasympathetic branch stimulates digestion and saliva production again, so energy can be stored rather than released, and this is why Barika now feels hungry.



0 5

Discuss research investigating localisation of function in the brain.

[20 marks]

Localisation of function is the theory that different areas of the brain are responsible for different, specific behaviours, processes or activities.

The cerebral cortex is divided into two hemispheres and four lobes. The motor cortex, at the back of the frontal lobe in both hemispheres, controls voluntary movement on the opposite side of the body. The somatosensory cortex, at the front of the parietal lobe, processes sensory information from the skin such as touch, heat and pain. The primary visual cortex in the occipital lobe processes visual information, with each eye sending information from the right visual field to the left visual cortex and vice versa. The primary auditory cortex in the temporal lobe processes sounds such as pitch and volume.

Language is localised to the left hemisphere for most people (hemispheric lateralisation). Broca studied a patient, Leborgne, nicknamed 'Tan' because it was the only syllable he could say. Tan could understand spoken language but could not produce speech. After his death, a post-mortem showed a lesion in the left frontal lobe, now called Broca's area, which Broca concluded was responsible for speech production. Damage here causes Broca's (expressive) aphasia: slow, effortful speech lacking fluency. Wernicke studied patients who could speak fluently but could not understand language, and found damage in the left temporal lobe, now called Wernicke's area, responsible for language comprehension. Damage here causes Wernicke's (receptive) aphasia, where speech is fluent but often meaningless.

Other case studies also support localisation. Phineas Gage had a tamping iron driven through his left frontal lobe; he survived, but changed from

Turn over ►

calm and reasonable to rude and impulsive, suggesting the frontal lobe is involved in regulating mood and personality. H.M. had his hippocampi removed to treat epilepsy and could no longer form new long-term memories, suggesting the hippocampus is involved in memory formation.

Sperry's (1968) split-brain research studied patients whose corpus callosum had been cut to treat severe epilepsy. When a picture was shown to the right visual field (left hemisphere), patients could describe it, but when it was shown to the left visual field (right hemisphere), they could not say what they had seen, although they could select the matching object with their left hand. This shows that language is lateralised to the left hemisphere.

A strength of this research is the support from neuroimaging studies.

Using PET scans, Petersen et al (1988) found that Wernicke's area was active during a listening task and Broca's area was active during a reading task, suggesting these areas have different functions. Scans of healthy brains give objective evidence that supports the findings from damaged brains.

Further support comes from aphasia research. Patients with damage to Broca's area consistently show problems with speech production, and patients with damage to Wernicke's area show problems with comprehension. This double dissociation supports the functional differentiation of the two areas.

However, much of the evidence comes from case studies, such as Tan, Gage and H.M., which involve unique individuals with unusual brain damage. Their findings are hard to generalise. Similarly, Sperry's split-brain patients were 'abnormal' patients with a long history of



epilepsy, which may itself have changed how their brains were organised, and the sample was very small (only 11 patients took part in the main study), so conclusions about normal brains should be drawn with caution.

Lesion studies often involve non-human animals such as rats and monkeys, whose brains differ from human brains, especially in the cortex, so there are issues with generalising the findings to humans.

A further criticism is that complex functions such as language are too complex to be assigned to just one area. Dick and Tremblay (2016)

found that only about 2% of modern researchers think that language is controlled entirely by Broca's and Wernicke's areas, and neuroimaging suggests language involves networks of brain regions, including areas in the right hemisphere and subcortical regions connected by fibre tracts.

Lashley's equipotentiality theory also argued that higher cognitive

Extra space functions such as learning are distributed across the whole cortex.

Finally, evidence of plasticity challenges strict localisation. After brain damage, undamaged regions, for example the equivalent area in the opposite hemisphere, can take over the function of the damaged area (functional recovery). If functions can be relocated, they may not be fixed to specific areas.

In conclusion, there is strong evidence from case studies, split-brain research and brain imaging that some functions, especially motor, sensory and basic language functions, are localised. However, more complex functions are probably carried out by networks of interacting areas, so a holistic view that combines localisation with plasticity seems most valid.



Section B: Cognitive DevelopmentAnswer **all** questions in the spaces provided.**0 6**

Briefly outline what Vygotsky meant by the zone of proximal development.

[2 marks]

The zone of proximal development is the distance between the tasks a child can do on their own (their current, actual level of development) and the tasks they can achieve with the help of a more knowledgeable other, i.e. the difference between actual and potential ability.

0 7Briefly outline what is meant by equilibration **and** class inclusion in Piaget's theory of cognitive development.**[4 marks]**

Equilibration is the balance (state of mental equilibrium) a child achieves between using existing schemas to assimilate new information and accommodating (changing) schemas that do not work. New experiences that do not fit cause disequilibrium, which motivates the child to adapt their schemas until balance is restored.

Class inclusion is the ability to work out how categories of objects relate to one another, i.e. to classify an object into two or more categories simultaneously. For example, a car can be in a subordinate category (sports car) and a superordinate category (vehicle) at the same time.



0 8

Dan is 3 years old and plays with his 6-month-old sister, Mai.

0 8 . 1

Dan covers his face with his hands. When he takes down his hands, Mai is surprised and laughs.

Explain why Mai is surprised and laughs. Refer to object permanence in your answer.

[4 marks]

Mai is only 6 months old, so she is in the sensorimotor stage and has not yet achieved object permanence, the understanding that objects (and people) continue to exist even when they are out of sight. According to Piaget this develops at about 8 months.

When Dan covers his face with his hands, his face is out of sight, so Mai believes that it no longer exists. When Dan takes his hands away and reveals his face again, Mai is surprised to see his face because, as far as she is concerned, it had disappeared and she had forgotten it existed. The surprise is pleasurable, so she laughs.

Question 8 continues on the next page

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When Mai gets upset and begins to cry, Dan tries to calm her down. He gives Mai his own favourite toy rather than her own favourite blanket.

Explain why Dan gives Mai his toy and not her blanket. Refer to egocentrism in your answer.

[4 marks]

Dan is 3 years old, so he is in the pre-operational stage (2 to 7 years), when children are egocentric. Egocentrism is the tendency to see the world only from one's own point of view and the inability to understand that others may have a different perspective.

Trying to calm Mai by giving her his own favourite toy suggests that Dan thinks that what comforts him will also comfort his sister. He does not give Mai her blanket because he is unable to see the situation from Mai's point of view and so does not realise that she would prefer her own favourite object.



0 8 . 3

Dan asks for a drink of water. His mother pours the same amount of water into two different shaped glasses. One glass is short and wide, and the other glass is tall and narrow. Dan chooses the tall and narrow glass as he thinks it contains more water.

Explain Dan's choice of glass. Refer to conservation in your answer.

[4 marks]

Dan is 3 years old, so as a pre-operational child he has not yet achieved conservation, the understanding that the quantity of a substance stays the same despite changes in its appearance, e.g. when water is poured into a different shaped glass.

Dan judges the amount of water by looking only at the height of the water level and does not pay attention to the width of the glass (he concentrates on one feature). In the tall, narrow glass the level is higher than in the short, wide glass, so he believes it contains more water. Dan also lacks reversibility: he cannot mentally reverse the pouring to realise the amounts were the same.

Turn over for the next question

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0 9

Discuss research into theory of mind.

[12 marks]

Theory of mind (ToM) is the ability to understand that other people have mental states, such as beliefs, desires, intentions and emotions, that may differ from our own, and to put oneself mentally in someone else's place. It concerns the development of a child's understanding of the social world. It usually develops at around age 4.

Wimmer and Perner (1983) used a false belief task, the Maxi test.

Children watched a puppet show in which Maxi puts some chocolate in a cupboard and leaves. While he is away his mother moves the chocolate to a different cupboard. Children were asked where Maxi would look for the chocolate when he returned. Most 3-year-olds wrongly said the new location, whereas most 4 to 6-year-olds correctly said the original cupboard, showing that they understood Maxi held a false belief.

Baron-Cohen, Leslie and Frith (1985) used the Sally-Anne test with children with autism, children with Down's syndrome and typically developing children. Sally puts a marble in her basket and leaves; Anne moves it to her box. When asked 'Where will Sally look for her marble?', about 85% of the typically developing children and 86% of the children with Down's syndrome answered correctly, but only 20% of the children with autism did. This suggests that a lack of ToM may underlie the social difficulties in autism.

Perner, Leekam and Wimmer (1987) used the Smarties task, an appearance reality task. A Smarties tube was shown to actually contain a pencil. When asked what a friend who had not seen inside would think was in the tube, most 3-year-olds said 'a pencil', whereas most 4-year-olds said 'Smarties'.



A strength of ToM research is that it is carefully controlled.

Baron-Cohen et al matched the groups on mental age, and the tasks use standardised procedures and control questions, so they can be replicated and the findings are reliable. The findings are supported by a meta-analysis of 178 studies by Wellman et al (2001), which consistently found that children pass false belief tasks from about the age of 4.

However, the false belief tasks require participants to have sufficiently developed language skills and memory to follow the story and answer the questions. They are unsuitable for very young children or severely autistic children, and children may fail because of task demands rather than lack of ToM. Studies using simpler, non-verbal methods, such as looking-time measures, suggest that infants may show some understanding of false belief much earlier.

There are also generalisation issues. The Sally-Anne study used a small sample of children with developmental deficits, e.g. 20 children on the autistic spectrum, so conclusions about autism and about typical development may not apply to everyone.

Furthermore, there are individual differences in the development of ToM, suggesting nurture plays a role. Children from larger families, especially those with older siblings, and from more affluent families tend to outperform their peers on false belief tasks, suggesting an environmental influence on ToM development, which challenges a purely maturational explanation.

Overall, research consistently shows ToM develops at around age 4, although verbal tasks may underestimate younger children.

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Section C: Research Methods 1

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

A psychology teacher noticed that students who attended a gym performed better in their A-level examinations than students who did not attend a gym. To investigate this she interviewed 30 A-level students from her school. Each student was asked the same 10 questions in the same order.

1	0
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Write a suitable aim for the psychology teacher's investigation.

[2 marks]

To find out if there is a relationship between going to the gym and A-level examination performance in A-level students.

1	1
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Briefly describe what a hypothesis is.

[2 marks]

A hypothesis is a precise, testable statement that makes a specific prediction about the outcome of an investigation, using clearly operationalised variables.

1	2
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Before selecting a sample, psychologists identify a population.

Briefly outline what is meant by a population.

[1 mark]

A population is the wider group of people identified beforehand, from whom the sample is drawn and to whom the findings should be applied (generalised).

Turn over for the next question

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1 3

The psychology teacher used a random sample.

Briefly describe what a random sample is.

[1 mark]

A sample in which all members of the target population have an equal chance of being selected to take part in the research.

1 4

Describe how a random sample can be collected in psychological research.

[4 marks]

The lottery ('names from a hat') method can be used. First, the researcher obtains a list of every member of the target population, e.g. all the A-level students at the school.

Each person is given a number, which is written on a separate piece of paper. The pieces of paper are placed in a container (hat) and mixed. The researcher randomly selects one piece of paper at a time from the container, without looking.

This process is repeated until the required number of participants for the sample size has been selected, e.g. 30 students. Alternatively, the numbers can be entered into a computer random number generator, which selects the required number of participants randomly.



1 5

Name the type of interview the psychology teacher used and briefly explain your answer.

[3 marks]

Structured interview.

The psychology teacher followed a predetermined set of questions: each of the 30 students was asked the same 10 questions in the same order, and she did not add any follow-up questions based on their answers.

1 6 . 1

Write a question the teacher could have asked in order to collect quantitative data.

[2 marks]

"On average, how many times during a week do you go to the gym?"

1 6 . 2

Briefly explain in what way the question you have written collects quantitative data.

[1 mark]

The data is numerical: the student gives a number indicating the frequency of going to the gym, which can be counted and analysed statistically.

Turn over for the next question

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1 7

The data the teacher collected was primary data.

Briefly describe what primary data is.

[1 mark]

Data collected first-hand by the researcher specifically for the purpose of the research being conducted, e.g. the teacher's own interviews.

1 8

The psychology teacher was concerned about demand characteristics.

Briefly explain **one** way the psychology teacher could have reduced the risk of demand characteristics in her interview.

[2 marks]

The teacher could have used another person who is unknown to the students to carry out the interviews. The students would then not need to worry about how they came across, as they would not have any further encounters with this person, so they would be less likely to give answers they think their teacher wants to hear.

1 9

In order to find out more information, the psychology teacher decided to follow-up her research with a questionnaire. She created a questionnaire with open and closed questions.

Briefly describe what a closed question is.

[2 marks]

A closed question limits the participant's responses in some way: it provides a fixed number of possible answers from which the participant selects the one that best applies to them, e.g. 'Do you go to the gym? Yes / No'.



2 0

From the information provided by the questionnaire the psychology teacher calculated measures of central tendency for her students' gym use (number of hours per week).

She calculated the mean, mode and median for this data (see **Table 1**).

Table 1: Measures of central tendency for gym use (number of hours per week)

Measure of central tendency	Score
Mean	4.3
Mode	6
Median	5

The information in **Table 1** suggests a negative skew. Explain why.

[3 marks]

The distribution is not symmetrical because the mean, median and mode are all different. The mode (6) is larger than the median (5), which is larger than the mean (4.3).

This means the bulk of the scores are at the higher end of the scale, above the mean of 4.3, with a few low scores pulling the mean down, so the tail of the distribution is to the left (lower end).

Turn over for the next question

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2 1

Explain how the psychology teacher could have ensured confidentiality in the follow-up study using the questionnaire.

[3 marks]

The teacher should ensure that all the information collected in the questionnaire remains private and anonymous. Students should not write their names on the questionnaires; instead each student should be given a code number, so that their answers about gym use cannot be linked to them.

The completed questionnaires should be stored securely. Furthermore, she should not discuss any student's data with anyone else, e.g. another teacher, and no student should be identifiable when the findings are reported.

2 2

Apart from confidentiality, identify **one other** ethical issue. Briefly explain why the psychology teacher should have addressed this issue.

[3 marks]

Right to withdraw.

The teacher should have told the students that they could withdraw from the study at any time, including withdrawing their data, without any consequences. As the students know her as their teacher, they may have felt obliged to participate and to keep answering, so without the right to withdraw they might have endured undue stress. Ensuring the right to withdraw would protect them from psychological harm.

30

END OF QUESTIONS



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