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I declare this is my own work.

INTERNATIONAL AS PSYCHOLOGY

Unit 2 Biopsychology, Development and Research Methods 1

Friday 31 May 2024

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	



J U N 2 4 P S 0 2 0 1

Section A: BiopsychologyAnswer **all** questions in the spaces provided.**0 1**

Describe Wernicke's area.

[2 marks]

Wernicke's area is a small cortical area in the left temporal lobe. It is responsible for language comprehension: understanding verbal (spoken) and written language. It also enables meaningful speech, as damage causes fluent but meaningless speech (Wernicke's aphasia).

0 2

Describe the functions of the central nervous system.

[4 marks]

The CNS controls, maintains and produces behaviour and regulates the body's physiological processes. The brain controls most bodily functions, e.g. movement, sensations, thoughts, speech and memory.

The spinal cord carries messages between the brain and the PNS, and reflexes can occur via the spinal cord without the brain. Sensory neurons carry information from receptors to the CNS, and motor neurons carry it from the CNS to effectors.



0 3

Dmitry walks on some broken glass and cuts his foot.

Briefly explain how Dmitry's motor neurons will respond in this situation.

[2 marks]

Dmitry's motor neurons receive information from the relay neurons in his spinal cord (CNS) and send signals to the skeletal muscles (effectors) in his leg, so he lifts his foot away from the glass. As this is a reflex, the response is instant, without the involvement of his brain.

0 4

Briefly evaluate studies into plasticity.

[4 marks]

Studies into plasticity have used animals, e.g. Blakemore and Mitchell's (1973) kitten study, allowing controlled manipulation of experience, but animal brains differ from human brains so generalising to humans is an issue. Research is supported by objective evidence from brain scans, e.g. Giedd (2004) used MRI in a longitudinal study tracking brain changes in children. Case studies, e.g. Villablanca and Hovda (2000) on hemispherectomy, have small samples so are hard to generalise. Functional recovery research has useful applications in neurorehabilitation.

Turn over for the next question

Turn over ►



0 5

Describe the procedure **and** findings from **one** research study investigating activity in split brains.

[6 marks]

Sperry (1968) studied split-brain patients who had undergone a commissurotomy, in which the corpus callosum was cut to treat severe epilepsy, so the two hemispheres could no longer communicate. He used the divided field paradigm. The participant sat in front of a screen and fixated with one eye on a focus point in the centre. Words or pictures of objects were flashed very briefly (about one tenth of a second) to either the left or right of the focus point, so the information went only to the right visual field (left hemisphere) or the left visual field (right hemisphere). Participants were asked to say what they saw, or to select the matching object with their hand behind the screen without seeing it.

Sperry found that a word projected to the right visual field could be
 Extra space *recognised and spoken by the participant, because it was processed by the left hemisphere where the language centres are located. A word presented to the left visual field could not be recognised and spoken, because it was processed by the right hemisphere without access to the language centres; participants usually said they saw nothing, but could pick out the matching object with their left hand.*



0 6

Explain the process of synaptic transmission.

[6 marks]

Transmission of nerve impulses across the synapse is chemical.

Neurotransmitters are stored in vesicles within the pre-synaptic terminal.

Electrical nerve impulses (action potentials) travel down the axon, and when they reach the axon terminal they stimulate the vesicles to release neurotransmitter molecules into the synaptic gap.

The molecules diffuse across the synaptic gap to the post-synaptic neuron and lock into specific synaptic receptors on its dendrites. The post-synaptic neuron converts the chemical message back into an electrical impulse that travels down to the next pre-synaptic terminal.

Some neurotransmitters, e.g. serotonin, are inhibitory: they increase the negative charge of the post-synaptic neuron, which decreases the chance that it will fire and pass on the impulse. Others, e.g. adrenaline, are

Extra space *excitatory: they increase the positive charge, which increases the chance that it will fire.*

Whether the post-synaptic neuron fires depends on summation: if the net effect of excitatory and inhibitory inputs reaches the threshold, an impulse is passed on.

Turn over for the next question

Turn over ►



0 7

Sarita is about to sing in a concert. Before the concert, she notices that her mouth is dry and her heart is beating very fast. Sarita feels sick and is unable to eat.

After the concert, her breathing slows down and she feels hungry and tired.

Use your knowledge of the autonomic nervous system to explain Sarita's experiences before **and** after the concert.

[6 marks]

Sarita's experiences are due to the action of the sympathetic and parasympathetic sections of the autonomic nervous system (ANS), which acts automatically and controls involuntary functions.

Before the concert, the ANS is responsible for Sarita's arousal. Her performance in the concert is a source of stress and anxiety, so it initiates the fight or flight response. The sympathetic section is activated and adrenaline is released from the adrenal medulla. Due to the action of adrenaline, her heart rate increases to distribute oxygen and other resources such as glucose around the body to release energy for fight or flight. Salivation is inhibited, so her mouth is dry, and digestion is slowed down, so Sarita feels sick (nauseous) and is unable to eat.

Extra space *After the concert, the threat has passed, so the parasympathetic section of the ANS restores her body to its normal resting state ('rest and digest'). Her breathing slows down because adrenaline action is reduced and her body no longer needs to pump extra oxygen around the body. Digestion is restarted so Sarita feels hungry, and as her body conserves energy and recovers she feels tired.*

30



Section B: Cognitive DevelopmentAnswer **all** questions in the spaces provided.**0 8**

What is meant by a schema?

[1 mark]

A schema is a mental representation of objects, actions and situations that enables us to organise our knowledge.

0 9

Piaget suggested that there are four stages of intellectual development in his theory of cognitive development.

Describe the **second** stage of Piaget's theory.**[6 marks]**

The second stage is the pre-operational stage, from about 2 to 7 years of age.

Language emerges, enabling the child to use words as symbols for objects. However, the child is unable to reason logically. The child understands object permanence, that objects continue to exist even when they are out of sight.

This stage is characterised by cognitive limitations, which are mental tasks the child appears unable to do. The child is egocentric and unable to see the world from another person's viewpoint, e.g. in the three mountains task they chose their own view, not the doll's.

The child does not understand class inclusion and cannot work out how categories of objects relate to one another, e.g. that there are more

Extra space *animals than dogs because dogs are a subset of animals.*

The child does not understand conservation: they cannot understand that quantity remains the same despite changes in appearance, e.g. thinking there is more liquid when it is poured into a taller, thinner glass (centration).

Turn over ►

1	0
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In a study, monkey **A** watches monkey **B** pick up a banana. While this is happening, the brain activity of both monkeys is being measured.

The researchers find that the same brain areas are active in both monkeys, even though monkey **A** does not move.

Using your knowledge of mirror neurons, explain why monkey **A** has the same brain activity as monkey **B**.

[3 marks]

Monkey A's mirror neurons are activated when it watches monkey B's hand pick up the banana. Although monkey A does not move, its brain responds as if it had picked up the banana, firing the same matching neurons as monkey B. This neural mirroring lets monkey A identify the goal it would have if it performed the action itself, so it can understand monkey B's intention.



1 1

Psychologists have suggested that in order to understand the behaviour of other people we have to develop theory of mind.

Describe **and** evaluate theory of mind as an explanation for social cognition.

[20 marks]

Theory of mind (ToM) concerns the development of a child's understanding of the social world. It refers to the ability to put oneself mentally in someone else's place and to guess what they may feel, think and know, understanding that others have beliefs, desires and intentions that can differ from our own. This allows us to explain and predict their behaviour, which is central to social cognition. ToM usually develops at around the age of 4 years.

ToM is tested using false belief tasks. In the Maxi test (Wimmer and Perner, 1983), children saw a puppet, Maxi, put chocolate in a cupboard and leave; his mother then moved it to another cupboard. When asked where Maxi would look for the chocolate, most 3-year-olds said the new location, but most 4 to 5-year-olds correctly said the original cupboard, showing they understood Maxi held a false belief.

Baron-Cohen, Leslie and Frith (1985) used the Sally-Anne test with three groups: 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. Children were asked the belief question, 'Where will Sally look for her marble?' About 85% of typically developing children and 86% of children with Down's syndrome answered correctly, but only 20% of the autistic children did, even though they had a higher verbal mental age. This suggested that autism involves a deficit in ToM.

Appearance-reality tasks such as the Smarties task (Perner, Leekam and Wimmer, 1987) showed children a Smarties tube that actually contained

Turn over ►



a pencil. Most 3-year-olds said another child would think it contained pencils, failing to understand that others can hold a false belief, whereas older children said Smarties.

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

Baron-Cohen et al. selected children with matched mental ages, so differences in performance could not be due to general intelligence, and used standardised procedures with control questions (e.g. the memory and reality questions) to check the children had followed the story. This increases internal validity and allows the studies to be replicated, increasing reliability.

There is also strong supporting research. Wellman et al. (2001) carried out a meta-analysis of 178 studies of false belief tasks and found a consistent developmental pattern across different countries and versions of the task, with children moving from failing to passing at around 4 years. This large body of evidence increases confidence that ToM is a genuine developmental milestone that explains social cognition.

However, false belief tasks require participants to have sufficiently developed language and memory skills to follow the story and answer questions. This means they are not suitable for very young children or severely autistic children, and children may fail because of language demands rather than a lack of ToM. Research using non-verbal methods, such as looking-time studies, suggests that infants may show some understanding of false beliefs much earlier, so the tasks may underestimate when ToM develops, reducing their validity.

There are also generalisation issues. Much research uses samples of neurodiverse children, e.g. children on the autism spectrum, and small



samples, so it may not be valid to generalise conclusions about ToM to all children. Not all autistic children fail ToM tasks, and some difficulties in autism, such as attention to detail, are not explained by ToM, suggesting it is not a complete explanation of social cognition.

Individual differences also suggest an environmental (nurture) influence.

Children from larger families and more affluent families tend to outperform their peers on ToM tasks, possibly because interacting with siblings and talking about mental states gives more practice at considering other people's perspectives. This suggests ToM is not purely a maturational ability that develops at a fixed age.

Extra space *Finally, the artificial tasks, using puppets and dolls, lack mundane realism, so they may not reflect how children understand real people in everyday social situations, reducing ecological validity.*

Overall, theory of mind is a useful explanation of social cognition that is supported by a large amount of controlled research, but the reliance on language-based tasks and the influence of environmental factors mean it should be seen as one part of a broader explanation of how we understand other people.



Section C: Research Methods 1

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

Only **two** answers per question are allowed.

For each multiple-choice question completely fill in the circles alongside the appropriate answers.

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.



A university professor is worried about her students' learning in lectures. One behaviour she is concerned about is their use of phones. She asks a psychologist to investigate student behaviour during a 45-minute lecture.

Her students all agree to be part of this investigation and provide fully informed consent. They are aware that the psychologist is using video cameras to film the lecture. Afterwards, the professor gives the students a test on the content covered in the lecture.

The psychologist then watches the film and analyses the students' behaviour.

The psychologist records the time (in minutes) that any student spends using their phone.



1 2Identify **two** observation techniques that are used in this investigation.Shade **two** boxes.**[2 marks]****A** Controlled☐**B** Covert☐**C** Naturalistic☒**D** Overt☒**E** Participant☐**1 3 . 1**

What is meant by the term pilot study?

[1 mark]

A pilot study is a preliminary small-scale trial (test run) of an investigation carried out before the main study.

1 3 . 2

Explain why it would be useful to carry out a pilot study before this investigation.

[2 marks]

To check that the video cameras are correctly positioned to record the students' behaviour, e.g. that phone use can be seen clearly, and to check that the 45-minute lecture is an appropriate time interval, so changes can be made before the real study.

1 4

Identify the sampling method used in this investigation. Briefly explain your answer.

[2 marks]

Opportunity sampling.

The professor's students were used because they were available at the time, as they were attending the lecture.

Turn over ►

1 5 . 1

What is meant by the term population in psychological research?

[2 marks]

The population is the wider group of people that the researcher wants to study and to whom the findings of a study should apply. It should be represented by the sample so the results can be generalised.

1 5 . 2

Identify the population in this investigation.

[1 mark]

Students at that university (the professor's students).

1 6

Protection from harm and confidentiality are two ethical issues.

Explain why the psychologist needs to consider protection from harm **and** confidentiality in this investigation.

[4 marks]

Protection from harm: the students may feel anxious or embarrassed being watched on camera, and that the psychologist may see their messages on their phones. They may feel unable to leave as they would miss the lecture.

Confidentiality: the students can be identified because the lecture is filmed and the professor knows them. The private content of their messages may be seen on the recording, and other people may see their test results if they are displayed publicly.



1 7

The psychologist records the time in minutes each student spends on their phone during the 45-minute lecture.

Suggest **one other** operationalised behavioural category the psychologist might use in this investigation.

[2 marks]

The number of times each student checks their phone during the 45-minute lecture.

1 8

Identify **one** type of data the psychologist collected. Briefly explain your choice.

[2 marks]

Quantitative data.

The time spent using the phone is measured in minutes and the test score is out of 15, so the data is numerical.

Turn over for the next question

Turn over ►



Table 1 shows the data of six students. The psychologist analysed this by correlating their test scores (out of 15) with the times spent on their phones.

Table 1 A table to show phone use (in minutes) and test score (out of 15) for six students

Student	Phone use (in minutes)	Test score (out of 15)
1	14	1
2	5	12
3	0	2
4	8	0
5	3	0
6	7	3

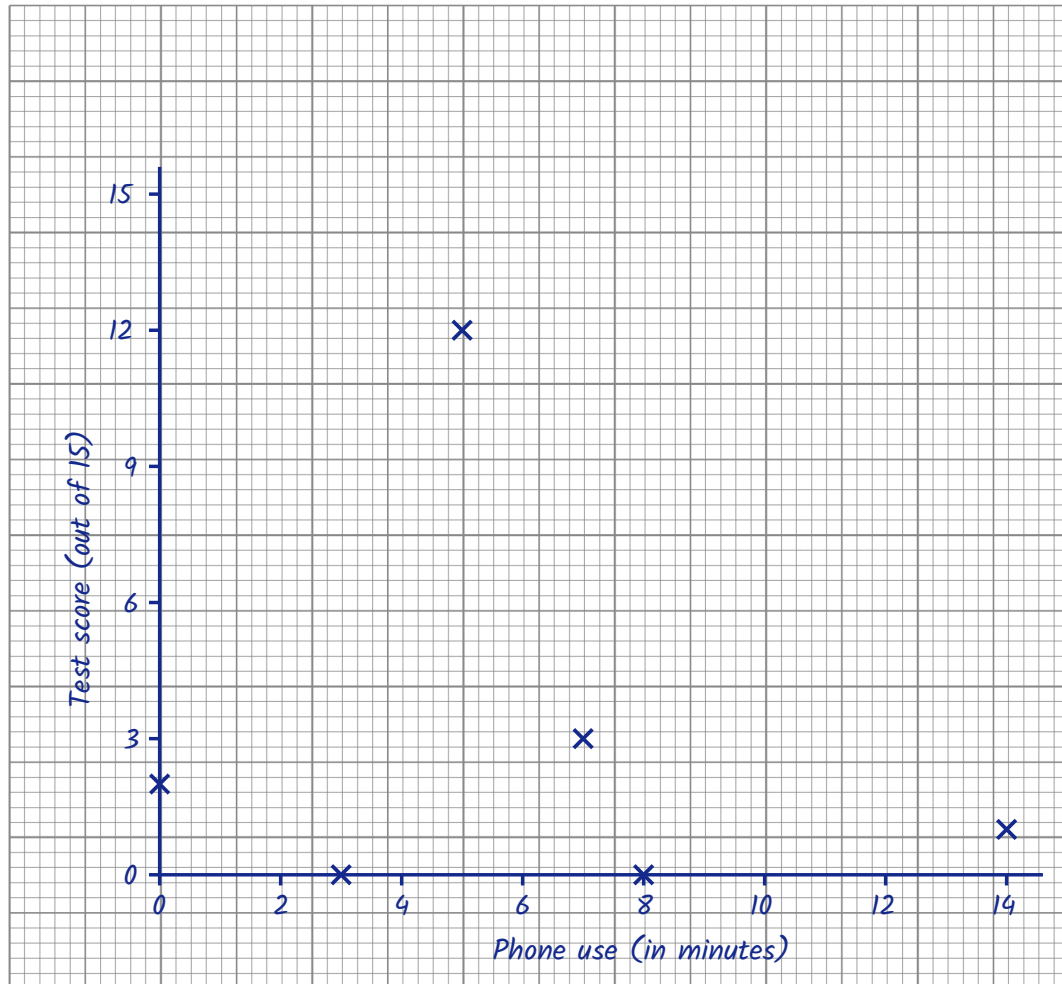


1 9 . 1

Using the information from **Table 1**, draw an appropriate graph to display the data. You should include a title and label your graph appropriately.

[4 marks]

Title Scatter graph of phone use (in minutes) and test score (out of 15)



1 9 . 2

What does the graph you have drawn in Question 19.1 suggest?

[2 marks]

There is no (zero) correlation.

The time spent on the phone (in minutes) has no relationship with the test score (out of 15); there is no identifiable pattern between them.

Turn over ►



2 0 . 1 Using the data in **Table 1**, calculate the median test score.

Show your workings.

[2 marks]

In order: 0, 0, 1, 2, 3, 12

Middle two values: $(1 + 2) \div 2 = 3 \div 2 = 1.5$

Median = 1.5

2 0 . 2 Explain why the range may **not** be a representative measure of dispersion for the test scores in **Table 1**.

[2 marks]

The test score of 12 is an outlier, as all the other scores are much lower, between 0 and 3. The range ($12 - 0 = 12$) only uses the two extreme scores, so the outlier distorts it and it does not represent the spread of most scores.

2 1 Apart from ethical issues, briefly explain **one** limitation of using an observation technique.

[2 marks]

In an overt observation there may be demand characteristics: participants know they are being watched, so they might change their behaviour, e.g. use their phone less, which reduces the validity of the data.

30

END OF QUESTIONS



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2 4



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