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Centre number

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Candidate number

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Surname *StemUp Model Solution*

Forename(s)

Candidate signature

I declare this is my own work.

INTERNATIONAL AS PSYCHOLOGY

Unit 2 Biopsychology, Development and Research Methods 1

Tuesday 17 January 2023 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 1**

Below are four statements about neurotransmitters.

Identify the **one** statement that is **incorrect**. Shade **one** box only.**[1 mark]****A** Neurotransmitters affect nerve impulses in the nervous system.☐**B** Neurotransmitters always produce an inhibitory response.☒**C** Neurotransmitters diffuse across the synaptic gap.☐**D** Neurotransmitters usually attach to the receptors of the post-synaptic neuron.☐**0 2**

Localisation of function in the brain suggests specific brain areas are specialised for certain functions.

Briefly describe the function of the somatosensory cortex.

[2 marks]

The somatosensory cortex, in the parietal lobe, receives and processes sensory information from receptors in the skin in all areas of the body. It is responsible for interpreting sensations of touch, pain, temperature and pressure, with more sensitive body parts, e.g. the lips and fingers, having a larger area devoted to them.



0	3
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Outline possible effects of damage to Broca's area.

[3 marks]

Broca's area, in the left frontal lobe, is responsible for speech production, so damage to it causes Broca's (expressive) aphasia. The person can usually still understand language but is unable to produce fluent speech.

Their speech is slow, laboured and effortful, with many pauses. It lacks normal grammatical structure: they tend to use key content words, such as nouns and verbs, but leave out linking words, function words and prepositions such as 'the', 'and' or 'on'. For example, Broca's patient 'Tan' could only produce the single word 'tan'. Some patients may only produce specific words, invent words, or have difficulty finding words, and they are often aware of and frustrated by their difficulties.

Turn over for the next question

Turn over ►



0 4

Describe the function of the endocrine system.

[6 marks]

The endocrine system is a network of glands throughout the body. Its main function is to control and regulate the activity of particular cells and organs, maintaining internal physiological regulation (homeostasis), e.g. of growth, metabolism, stress responses and reproduction.

Endocrine glands secrete chemical messengers called hormones directly into the bloodstream. The blood carries the hormones around the body, but each hormone only affects target cells that have specific receptors for it. Hormones act more slowly than nerve impulses but have longer-lasting effects, and they are vital to most physiological functions of the body.

The hypothalamus in the brain controls the endocrine system through the pituitary gland. The pituitary is known as the 'master gland' because it releases hormones that control the other endocrine glands, e.g. it releases ACTH, which stimulates the adrenal cortex to release cortisol in response to stress.

Examples of glands and their hormones include: the adrenal glands, which release adrenaline and cortisol; the thyroid gland, which releases thyroxine to regulate metabolism; the pineal gland, which releases melatonin to regulate sleep; the pancreas, which releases insulin; and the ovaries and testes, which release oestrogen and testosterone.

The endocrine system works with the nervous system in the fight or flight response: when a threat is detected, the sympathetic nervous system stimulates the adrenal medulla to release adrenaline into the bloodstream, which increases heart rate and breathing rate to prepare the body to fight or flee.



0 5

Pavel is cooking dinner. He picks up a pan from the cooker. When he touches the hot handle, Pavel drops the pan.

Explain how sensory neurons, relay neurons and motor neurons would function in this situation.

[6 marks]

Sensory neurons: the receptors in the skin of Pavel's fingers detect the heat from the hot handle of the pan. Sensory neurons convert this stimulus into electrical nerve impulses and carry this information from his fingers, via the peripheral nervous system (PNS), to the central nervous system (spinal cord and brain).

Relay neurons: relay neurons are found in the CNS and connect sensory neurons to motor neurons. They pass the message on and are involved in analysing the sensation of heat and pain from the handle, and in processing the decision to let go of the pan. As this is a reflex response, relay neurons in Pavel's spinal cord can pass the message straight to the motor neurons without waiting for the brain, so his response is very fast and he is less likely to be burned.

Motor neurons: the motor neurons receive the message from the relay neurons in the CNS and carry nerve impulses away from the CNS to the effectors, the muscles in Pavel's hand and arm. The muscles contract, causing his fingers to open and let go of the hot handle, which is why Pavel drops the pan.

The message is also sent on to Pavel's brain, so he becomes aware of the pain and heat shortly after dropping the pan.

Turn over ►



0 6

Discuss split brain research.

[12 marks]

Split brain research studies people who have undergone a commissurotomy, in which the corpus callosum, which connects the two hemispheres, has been cut to treat severe epilepsy. As the hemispheres can no longer communicate, stimuli can be presented to each hemisphere separately. Information from the right visual field (RVF) is processed by the left hemisphere, which has access to the language centres, and information from the left visual field (LVF) is processed by the right hemisphere, which does not have access to the language centres.

Sperry (1968) studied a small group of split brain patients using the divided field technique. The participant sat in front of a screen, covered one eye and fixated 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 the right of the focus point, so the information reached only one hemisphere. Participants were asked to say what they saw, to draw it, or to select a matching object by touch with one hand behind the screen.

Sperry found that words or images presented to the RVF could be named, as they were processed by the left hemisphere. When they were presented to the LVF, participants usually said they saw nothing, but could draw the object or select it with their left hand, showing that the right hemisphere had seen it but could not express it in words. Sperry's work on word processing also showed that the right hemisphere has some basic language ability, e.g. recognising simple words. Using non-verbal stimuli such as faces and shapes, later research (e.g. Gazzaniga) found that the right hemisphere was better at matching



shapes and faces and was superior on visuo-spatial tasks. Turk et al (2002) found that, although the right hemisphere is generally better at face processing, the left hemisphere appears to play an important role in self-recognition.

A strength of split brain research is that it was ground-breaking. It advanced our knowledge by changing the view of how the two hemispheres function, providing strong evidence for hemispheric lateralisation, e.g. that language is mainly lateralised to the left hemisphere. Sperry received a Nobel Prize for this work.

A further strength is that the research used highly controlled, standardised procedures. Presenting the stimuli for only a tenth of a second ensured that the information reached only one visual field, as the eye could not move to see it with the other, which increases the internal validity of the findings and allows replication.

However, the samples were very small, often only about 10 to 15 patients, so it is difficult to generalise the findings, as they might not represent all split brain patients, let alone people with a normal brain.

There are also issues with generalisation because the patients studied were a very varied group, differing in gender, age and handedness. Their operations were not always comparable: in some cases the cut was less complete, so there might have been some limited communication between the hemispheres. In addition, all the patients had a history of epilepsy, which may have caused unique changes in their brains, so the findings may not apply to people without epilepsy. Some patients may also have had drug therapy for longer than others.

Most of the research involved artificial laboratory set-ups to ensure

Turn over ►



Extra space

control of variables, such as exposing stimuli to one visual field only. In everyday life, split brain patients can move their eyes to compensate, so the results may lack ecological validity and may not be relevant to everyday functioning. Some researchers also argue the findings exaggerate how lateralised the normal brain is, as in an intact brain the hemispheres work together.

Overall, split brain research has been very influential in showing that the two hemispheres are specialised for different functions, although its findings should be generalised with caution because of small, unusual samples.



Section B: Cognitive Development

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

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Ameeta is six months old. In a violation of expectation study Ameeta watched toy cars move along a track. As they moved along the track the cars passed behind a tall screen which had a window at the top. Ameeta watched two different cars moving along the track.

Condition 1: A small car moved along the track. It was not visible in the window.

Condition 2: A tall car moved along the track. Although it should have been visible through the window, it was not.

The researchers found that Ameeta looked much longer in Condition 2 than in Condition 1.

Explain why Ameeta spent much longer looking in Condition 2. Refer to Baillargeon's violation of expectation research in your answer.

[4 marks]

Condition 1 is similar to Baillargeon's expected (possible) event, and Condition 2 is similar to her unexpected (impossible) event. Baillargeon assumed infants look longer at events that surprise them because they violate their expectations.

Ameeta spent much longer looking in Condition 2 because she was surprised that she could not see the tall car in the window. This event violated her expectation that the tall car should have been visible through the window as it passed behind the screen. This shows that Ameeta knew the tall car continued to exist when it went behind the screen and was out of sight, so at six months she already has object permanence, as Baillargeon found with infants watching a tall rabbit pass behind a screen with a window.

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08.1

What is meant by theory of mind?

[2 marks]

Theory of mind is the understanding that other people have their own beliefs, intentions, desires and knowledge, which may differ from our own. It is the ability to see and understand the world from someone else's perspective and so to predict their behaviour.

08.2

Describe what researchers have found out about the theory of mind in the Sally-Anne studies.

[4 marks]

Researchers found that children under the age of about four tend to fail the unexpected transfer (false belief) task: they state that Sally will look for the marble where it really is, the box, rather than in the basket where she left it, because they cannot separate their own knowledge from Sally's false belief. From about four years onwards, most children pass, showing that theory of mind is developing.

Baron-Cohen et al (1985) found that the belief question was answered correctly by 85% of typically developing children and 86% of children with Down's syndrome, but by only 20% of the children with autism, despite their higher mental age. They concluded that children with autism have a specific deficit in theory of mind: difficulty in putting themselves in someone else's shoes and taking the perspective of others.



0 9

Describe and evaluate Piaget's theory of cognitive development.

[20 marks]

Piaget's theory proposes that the development of thinking skills occurs in four discrete, universal stages that are marked by qualitative differences in how children think. Development is seen as a progressive reorganisation of mental processes as a result of biological maturation and environmental experience, with the child as an active learner who constructs knowledge by exploring the world.

Key processes drive this development. A schema is a mental structure containing all the information about an object, action or concept.

Adaptation involves assimilation, fitting new information into an existing schema, and accommodation, changing an existing schema or creating a new one when new information does not fit. When new experiences do not fit existing schemas, the child is in an unpleasant state of disequilibrium, and equilibration is the process of restoring balance through assimilation and accommodation, which moves development forward.

In the sensorimotor stage (0 to 2 years), infants learn through their senses and movement, and develop object permanence at around eight months: the understanding that objects continue to exist when out of sight. In the pre-operational stage (2 to 7 years), children use words and symbols to represent objects, but their thinking is egocentric (they cannot see the world from another's viewpoint) and they cannot conserve. In the concrete operational stage (7 to 11 years), logical, operational thought begins: children can work things out in their head, conserve and decentre, but only with concrete, physical objects. In the formal operational stage (11 years and over), the ability for abstract

Turn over ►

thought and reasoning develops, with logical thinking and systematic hypothesis testing.

A strength of the theory is its historical importance and influence on education. It led to child-centred, discovery learning in educational policy and teaching practice, regarding children as active learners who must be 'ready' for certain learning before it is taught, and encouraging teachers to match tasks to the child's stage.

There is supporting research evidence. In Piaget and Inhelder's (1956) three mountains task, children were shown a model of three mountains and asked to choose a picture of what a doll would see from a different position. Four-year-olds tended to choose their own view, whereas seven-year-olds chose the doll's view, supporting the idea that pre-operational children are egocentric. Piaget's conservation tasks also showed that younger children believe the amount of liquid changes when it is poured into a taller, thinner glass.

However, contradictory research suggests that Piaget underestimated children's abilities and the ages at which they occur. McGarrigle and Donaldson (1974) used a glove puppet, 'Naughty Teddy', to 'accidentally' mess up a row of counters. 62% of children aged four to six conserved number when the change appeared accidental, compared with far fewer when the experimenter changed the row deliberately, suggesting children conserve earlier than Piaget claimed and that his method of asking the same question twice confused them. Hughes' policeman doll study found that 90% of three-and-a-half to five-year-olds could take another's perspective when the task made sense to them. Baillargeon's violation of expectation research showed object permanence in infants as young as



three to five months, much earlier than Piaget suggested.

Piaget's methods have also been criticised. His observations and clinical interviews were often carried out by him alone, so they may be open to researcher bias, and his tasks used complex language that young children may have misunderstood. His samples were small and unrepresentative, as he studied his own children and the children of colleagues in Geneva, mainly from educated, middle-class backgrounds, which leads to problems generalising his findings to all children.

The claim that the stages are universal has been challenged, as research suggests that only about one-third of adults ever reach the formal operational stage, and this depends on education and culture. Central concepts such as 'schema' and 'equilibration' cannot be objectively observed or measured, so the theory is difficult to test scientifically.

Extra space An alternative explanation is Vygotsky's theory, which emphasises the role of the social and cultural environment, language and the more knowledgeable other in cognitive development, whereas Piaget saw the child as a lone scientist and largely ignored social influences. Overall, Piaget's theory has been enormously influential and is supported by some evidence, but it underestimates young children's abilities and overlooks social factors.



Section C: Research Methods 1

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

A teacher read a report featuring a meta-analysis of smartphone use amongst teenagers. She decided to conduct her own research into the relationship between quality of sleep and smartphone use. The teacher told her class about her study and asked them if they would be willing to take part as participants. She gave every student a piece of paper and asked them to write down two pieces of information:

- A score out of 5 for the quality of their sleep on the previous night (a score of 1 = poor sleep and a score of 5 = excellent sleep).
- The total number of hours they had used their smartphone on the previous day.

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What is meant by a meta-analysis?

[2 marks]

A meta-analysis is a method that combines the (secondary) data from a number of other studies on the same topic to create a larger set of data, which can then be further analysed using descriptive and inferential statistics to reach an overall conclusion.

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Write an appropriate non-directional hypothesis for the teacher's study.

[3 marks]

There will be a correlation between the quality of sleep score (rated from 1 to 5) on the previous night and the total number of hours of smartphone use on the previous day.



1 2

Identify the sampling method the teacher used. Explain your answer.

[3 marks]*Opportunity sampling.**The teacher used the students in her own class, who were conveniently available to her at the time, rather than selecting participants from the wider population of teenagers.***1 3**Briefly explain **one** problem with how the quality of sleep was measured in this study.**[2 marks]***The rating is a subjective self-report measure: each student may perceive the scale differently, e.g. one student's 3 may be another's 4, so it is difficult to compare one person's ratings with another's, reducing validity.***Turn over for the next question****Turn over ►**

1 4

Consent and confidentiality are two ethical issues.

Explain how the teacher could have obtained consent from her students **and** ensured confidentiality of their data.

[6 marks]

Consent: before collecting any data, the teacher should obtain fully informed consent by asking her students for their permission by signing a consent form. The form should provide information about the aim of her investigation (the relationship between quality of sleep and smartphone use), what the students would be required to do (write down a sleep score and their hours of smartphone use), how long it would take, and that participation is voluntary. She should tell them that they have the right to withdraw themselves and their data at any time, without any effect on how she treats them or on their grades. As the students may be under 16, she should also obtain consent from their parents.

Confidentiality: to ensure that the students' data is kept confidential, the teacher should not ask them to write down their names on the paper, but should give each student a code number instead, so that no individual can be identified. She should store the data safely, e.g. in a locked cabinet or on a password-protected computer, and destroy the papers after the study. As she knows the students, she could ask another researcher who does not know them to collect the data, so their answers stay anonymous. Confidentiality would be stressed in the brief and debrief, and if the results are published, no student will be named.



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The teacher collected her participants' results and put them into **Table 1**:

Table 1: Quality of sleep score and smartphone use (hours)

Participant	Quality of sleep score (1–5)	Hours of smartphone use
1	3	3
2	4	2
3	1	5
4	4	4
5	3	4
6	4	3
7	5	2
8	2	6

1 5

The teacher wanted to calculate a measure of central tendency for smartphone use. Briefly explain why the mode would not be an appropriate measure of central tendency for this data.

[2 marks]

There are three modes for smartphone use (2, 3 and 4 hours), so there is no single, precise value to represent the average of the data. With only 8 students, the mode is also unreliable, as it is affected by small changes.

The teacher then decided to plot her data on a scattergram.

1 6

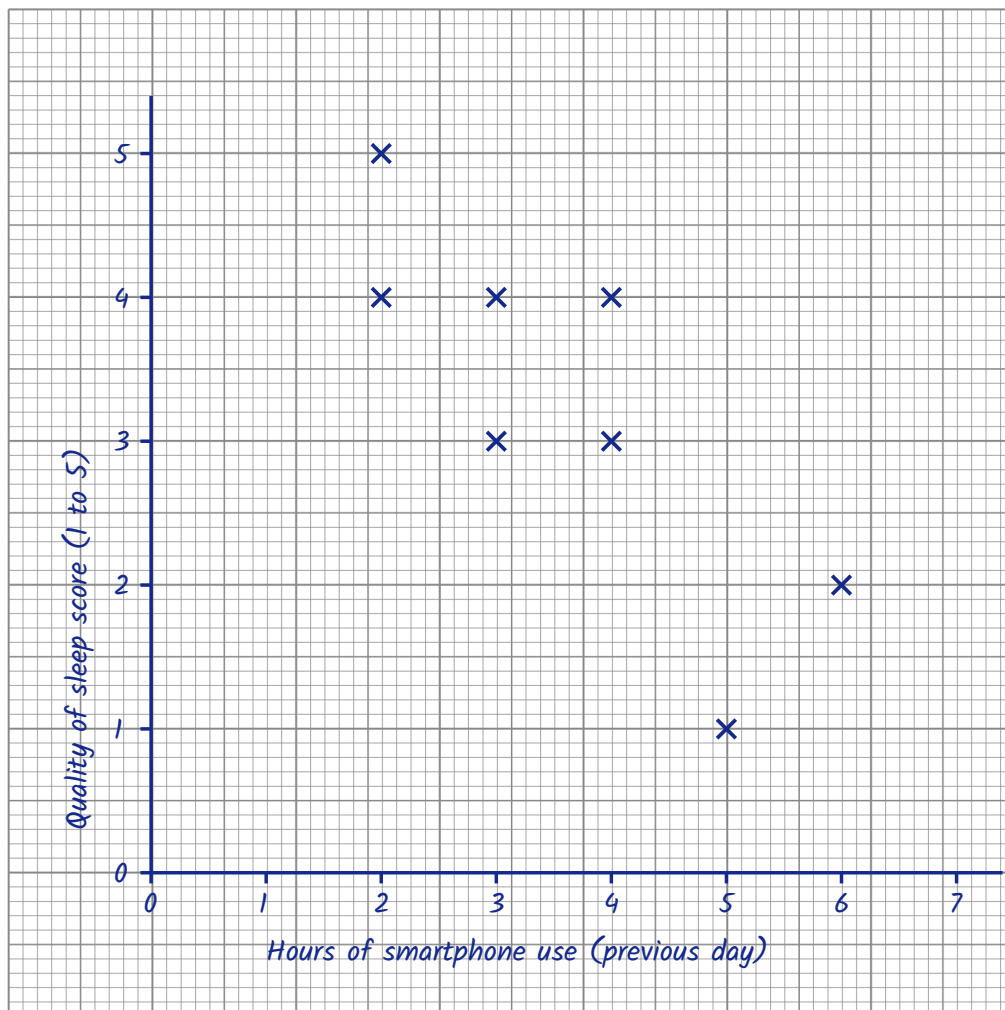
Explain what is meant by a scattergram.

[2 marks]

A scattergram is a graphical presentation of the relationship between two co-variables. Each participant's pair of scores is plotted as a single point (cross), one co-variable on each axis.



1 7

Draw an appropriate scattergram using the data in **Table 1**.**[4 marks]**Title: Relationship between quality of sleep score and hours of smartphone use

1 8

Use your scattergram to identify and explain the type of correlation found in the study.

[3 marks]Negative correlation.

As shown on the scattergram, as the number of hours of smartphone use increases, the quality of sleep score decreases: the greater the smartphone use, the worse the quality of sleep rating, e.g. 6 hours of use with a score of 2, but 2 hours with a score of 5. The points slope downwards from left to right and are fairly close together, so it is a moderate to strong negative correlation.

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1	9
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The teacher decided to carry out a follow-up study to see if increased smartphone use causes poor sleep quality.

Explain why an experiment would be a suitable method for her follow-up study.

[3 marks]

An experiment would allow her to establish cause and effect, i.e. whether increased smartphone use causes poorer quality of sleep, which a correlation cannot show. She can manipulate smartphone use as the independent variable (e.g. one hour versus four hours in the evening) and measure the effect on quality of sleep as the dependent variable. She can also control extraneous variables that may affect sleep, e.g. what students use the phone for and bedtime, and use standardised procedures, so the study would be easier to replicate to check reliability.

30

END OF QUESTIONS



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