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INTERNATIONAL AS PSYCHOLOGY

Unit 2 Biopsychology, Development and Research Methods 1

Monday 10 January 2022 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 **two** answers per question are allowed.

For each question completely fill in the circle 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.

**0 1**

Below are five statements describing the role of adrenaline in the fight or flight response.

Identify the **two** statements that are correct.

Shade the box for each statement that is correct.

[2 marks]**A** Adrenaline increases the breathing rate.☒**B** Adrenaline leads to storage of energy.☐**C** Adrenaline lowers blood pressure.☐**D** Adrenaline lowers the heart rate.☐**E** Adrenaline narrows blood vessels.☒**0 2**

Briefly outline the function of endocrine glands.

[2 marks]

Endocrine glands produce and secrete hormones directly into the bloodstream, which carries them to target organs and cells. Their function is to regulate the body's internal environment and initiate changes in body function, e.g. the adrenal glands release adrenaline to initiate the fight or flight response.



0	3
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Describe the process of inhibition in relation to synaptic transmission.

[4 marks]

Neurotransmitter released by the presynaptic neuron binds to receptors on the postsynaptic neuron. Some neurotransmitters, e.g. GABA, have an inhibitory effect: they decrease (dampen) neural activation in the postsynaptic neuron, making it less likely to fire.

The postsynaptic neuron summates excitatory and inhibitory inputs: if there is more inhibition than excitation, a new action potential is not created in the postsynaptic neuron, so the message is not passed on.

Inhibition maintains the balance between excitation and inhibition needed for normal brain functioning, and closes certain pathways so that the flow of information is directed appropriately.

0	4
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Some functions are only found in one hemisphere of the brain. What word is used to describe this?

[1 mark]

Lateralisation.

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0 5

Benji is a split-brain patient who had his right and left hemispheres separated. After the operation, Benji took part in a research study. A picture of a bird was displayed in his left visual field. After the picture was displayed, Benji was asked to describe what he had seen. He could not describe the bird.

0 5 . 1

Explain why Benji was unable to describe the bird. Use your knowledge of split-brain research and language centres.

[3 marks]

The picture of the bird in Benji's left visual field is processed by his right hemisphere. For most people, including Benji, the language centres (Broca's and Wernicke's areas) are in the left hemisphere. Because his corpus callosum has been cut, Benji's hemispheres cannot exchange information, so the information about the bird cannot be transferred to his language centres in the left hemisphere. Therefore he is unable to describe the bird verbally, although his right hemisphere has seen it.

0 5 . 2

Briefly explain **one** limitation of split-brain research.

[2 marks]

Split-brain research uses very small samples, e.g. Sperry studied only about 10 to 15 patients, who all had a history of epilepsy and differed in age, handedness and how the operation was done, so it is difficult to generalise the findings to people with a normal brain.



0 6

Chiara's grandfather had an accident. A brain scan shows damage to his Wernicke's area.

0 6 . 1

Describe how this damage might affect her grandfather's ability to use language.

[4 marks]

Wernicke's area is in charge of language comprehension, so Chiara's grandfather may suffer from Wernicke's (receptive) aphasia. He will have problems understanding spoken and written language, so he might fail to follow Chiara's instructions or answer her questions appropriately. He will still be able to produce fluent speech with normal rhythm, but its content may be bizarre and disconnected, e.g. he might produce nonsense words or jumbled speech.

0 6 . 2

Explain how Chiara's grandfather may recover from the damage to his Wernicke's area. Use your knowledge of plasticity and functional recovery.

[4 marks]

Due to plasticity, Chiara's grandfather may recover some speech comprehension. Some recovery early on might be due to the swelling of the brain going down after the accident. Through brain reorganisation, undamaged areas, e.g. the equivalent area in the right hemisphere, may take over language comprehension. Axonal sprouting from surviving neurons and neurogenesis in areas neighbouring Wernicke's area may also aid this process.

The less severe the damage, the sooner he starts speech therapy and the more he practises speaking and comprehension, the better his chance of recovery. However, as a grandfather he may be old, so there is less chance of functional recovery.

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0 7

Describe the structure and function of the divisions of the nervous system.

[8 marks]

The nervous system is divided into the central nervous system (CNS) and the peripheral nervous system (PNS). The CNS is made up of the brain and the spinal cord. The brain is the centre of conscious awareness, and the spinal cord relays information between the brain and the body and controls simple reflexes.

The PNS is made up of nerves outside the CNS, including spinal nerves, which contain sensory (afferent) and motor (efferent) pathways that connect the CNS with receptors, organs and muscles in the body.

The PNS is further divided into the somatic nervous system (SNS) and the autonomic nervous system (ANS). The SNS is made up of sensory pathways from sensory receptors (e.g. for touch, pain and pressure) and motor pathways. The sensory pathways send information from the environment to the brain, and the motor pathways control the skeletal muscles, which enable a voluntary response to a sensory stimulus. The SNS therefore maintains communication between the CNS and the outside world.

The ANS is also made up of motor pathways, which control the involuntary activity of internal body systems, e.g. the heart and circulatory system. It is central to homeostasis.

Extra space The ANS is further subdivided into the sympathetic and parasympathetic branches. Activity in the sympathetic branch leads to bodily arousal, e.g. increased heart rate and breathing rate, and it is in charge of the fight or flight response to a threat. Activity in the parasympathetic branch reverses these effects and leads to relaxation (the 'rest and digest' state), e.g. slowing the heart rate, once the threat



has passed.

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Section B: Cognitive Development

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

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Aliya is 4 years old and she has never brushed her own teeth independently. Her father wants to teach her how to brush her teeth.

Using your knowledge of scaffolding, explain what her father could do to help Aliya learn to brush her teeth.

[6 marks]

Scaffolding is the help or support given to a learner by a more knowledgeable other, which enables them to complete a task within their zone of proximal development that they could not do alone. Here, Aliya's father is the more knowledgeable other, and his support will enable Aliya to brush her teeth independently.

First, her father could show Aliya how to brush her teeth by demonstrating it on his own teeth, so she can see each step. He could then give her prompts, guiding her verbally through the process and using specific instructions about what she should be doing, e.g. 'move the toothbrush in small circles on your back teeth'.

He should encourage her with general verbal instructions, e.g. praising her for brushing her teeth and asking her to do it again, to keep her

Extra space *motivated. Initially, her father will need to give Aliya a lot of assistance, but the level of help he offers will decline the more Aliya practises and progresses. Eventually she will no longer need scaffolding, as she will be able to brush her teeth without any help from her father.*



0 9

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

[4 marks]

Mirror neurons are nerve cells that fire both when a person performs an action and when they observe (see or hear) the same action being performed by another person. They were first discovered in the premotor cortex of macaque monkeys by Rizzolatti and colleagues.

The mirror neuron system appears to play a role in several areas of social cognition, including action understanding, empathy and imitation.

The neural 'mirroring' could enable the observer to identify the intention of the other person carrying out the action, and to feel what they feel.

The mirror neuron system is therefore important for social communication and interaction. It is believed that a defective mirror neuron system may be the basis of the problems with social interaction found in autism.

1 0

Describe and evaluate Baillargeon's violation of expectation research.

[20 marks]

Violation of expectation (VoE) research is a method devised by Baillargeon to assess infants' understanding of the physical world without requiring them to reach for or search for objects. It is based on the visual preference technique, which assumes that the longer an infant looks at a stimulus, the more interesting or less familiar (surprising) it is to the child. Eye tracking technology is used to measure how long the child looks at the object or event.

VoE research has two stages. First, in the habituation stage, the child is repeatedly exposed to a particular event until it stops responding to it, e.g. a train goes into a tunnel and re-emerges. In the second stage, children are divided into two groups: one group watches an expected

Turn over ►



(possible) event, and the other watches an unexpected (impossible) event that violates the child's expectation, e.g. the train goes into the tunnel and does not re-emerge, or a different object comes out instead.

Baillargeon et al (1985) habituated five-month-old infants to a drawbridge (screen) rotating through 180 degrees. A block of wood was then placed behind the drawbridge. In the possible event, the drawbridge stopped when it reached the hidden block; in the impossible event, it appeared to rotate through the space occupied by the block. Infants looked longer at the impossible event, suggesting that they understood that the block still existed when hidden and that one solid object cannot pass through another.

Baillargeon investigated different types of events, including occlusion (an object moving behind another), containment (an object put inside a container), covering and support (e.g. resting object research). From this research she proposed that infants have innate object knowledge, or an innate fast-learning mechanism, that allows them to rapidly acquire knowledge of the physical world.

A strength of VoE research is that it is an improved method compared to Piaget's. Piaget's search tasks required infants to reach for hidden objects, so their poor motor skills may have hidden their understanding. VoE only requires the child to look, and it showed that infants as young as three and a half months understand object permanence, so Piaget underestimated infants' abilities.

A further strength is that eye tracking technology provides an objective and scientific measure of looking time, which reduces researcher bias and increases reliability.

However, the method relies on inference. Researchers assume that a child



looks longer at an event because it violates their expectation, but looking time may simply reflect novelty, interest or a perceptual preference rather than surprise or understanding of object permanence, reducing internal validity.

Alternative explanations have been put forward. Bogartz and Rivera suggested that infants in the drawbridge study looked longer at the impossible event simply because they preferred the full 180 degree

Extra space movement, which involved more motion. Haith argued that infants may see an afterimage of the blocks, so their looking reflects a perceptual process rather than conceptual knowledge.

On the other hand, there is research support for VoE from Kaufman et al, who used brain scans and found increased brain activity in the temporal cortex of infants when an object unexpectedly disappeared, which suggests that infants were mentally representing the hidden object.

Baillargeon's research has been very influential, as it has led to the development of several connectionist models of brain development that explain how infants learn about objects. Overall, VoE research provides an objective method suggesting infants understand the physical world earlier than Piaget claimed, but conclusions should be drawn with caution because they rely on inference from looking time.

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Section C: Research Methods 1

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

Researchers investigated whether there was a difference between how mothers played with their daughters and how mothers played with their sons. They went to the local playground and asked mothers of children aged 2 years old if they would be willing to take part in the study. They asked each mother to come to the laboratory the following day and spend 30 minutes playing alone with her child.

On the day of the observation, the researchers took each mother and her child into a room and provided the same selection of toys for every observation. The researchers observed each mother–child pair separately while they were left alone in the room. The researchers made a video recording in order to analyse the behaviours observed between the mother and her child.

1	1
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Identify the sampling technique used in this study. Explain **one** problem that might occur when using this sampling technique.

[3 marks]

Opportunity sampling.

The researchers only went to one local playground, so they might only access a certain type of mother who tends to visit that playground at the time of recruitment, e.g. mothers who do not work during the day.

They may also be biased in who they approach, so the sample may not be representative and the findings about mother and child play cannot be generalised.

1	2
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Explain why it would be useful to carry out a pilot study for this observation.

[3 marks]

A small-scale trial run would allow the researchers to check whether the behavioural categories of play are clearly defined, measurable and comprehensive, and whether the camera is placed in an appropriate position to give a clear recording of the mother and child interaction.

They could also check whether the selection of toys, the 30-minute time period and the instructions to the mothers are appropriate, and make changes before the real study.



1 3

Identify **one** ethical issue in this observation. Explain how the researchers could have dealt with this issue.

[4 marks]

Privacy and confidentiality.

The pairs are video recorded, so the researchers must tell the mothers about the recording beforehand and get their informed consent, also on behalf of their two-year-olds. They should give each pair a code number instead of names, store the recordings securely, only let the research team watch them and destroy them after analysis. No mother or child should be identifiable in any publication.

1 4

The researchers decided to use behavioural categories in their observation. What is meant by the term 'behavioural categories'?

[2 marks]

Behavioural categories are a list of clearly defined, unambiguous and observable behaviours to be recorded during an observation. They should be agreed and operationalised before recording takes place.

1 5

Give **one** operationalised behavioural category that the researchers could have used in this observation.

[1 mark]

Mother offers a toy to the child.

Turn over ►

1 6

Briefly explain **two** strengths of conducting an observation.

[4 marks]

One strength is that participants are often unaware that they are being observed, e.g. in a covert observation, so demand characteristics are less likely to occur and their behaviour is more natural, which increases internal validity.

A second strength is that using more than one observer and recording the observation, e.g. on video, enables researchers to check for inter-observer reliability by comparing the observers' tallies for each behavioural category.

1 7

Identify **one** extraneous variable that the researchers controlled in this observation. Explain why it was important to control this variable.

[3 marks]

The same selection of toys was provided for every observation.

This was important to ensure that the children were not exposed to different, more attractive toys, which might change the way they interact and play with their mothers. Otherwise any difference found between mother and daughter and mother and son play might be due to the toys rather than the child's gender.



1 8

The researchers were concerned about demand characteristics. Describe what is meant by demand characteristics.

[4 marks]

Demand characteristics occur when participants (unconsciously) guess the purpose of the research and change their behaviour accordingly. Participants pick up subtle clues that make them aware of what they think the researchers expect to find or how they are supposed to behave. They might try to please the researcher by behaving in a socially desirable way, they might be nervous, or they might try to sabotage the study (the screw-you effect). Demand characteristics are therefore confounding variables that can alter the outcome of the study.

1 9

Briefly explain **one** way in which the researchers could have reduced the risk of demand characteristics in this observation.

[2 marks]

They could use a cover story, e.g. telling the mothers that they are investigating the popularity of certain types of toys rather than the true aim of comparing how mothers play with sons and daughters, so the mothers do not change their play.

2 0

The researchers used 52 mother–child pairs in their study. 25% of the 52 mother–child pairs were mothers with their sons. Calculate the number of mother–son pairs that took part in the study.

[3 marks]

$$25 \div 100 = 0.25$$

$$0.25 \times 52 = 13$$

13 mother–son pairs took part in the study.

Turn over ►



2	1
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The researchers wanted to follow up their research using a self-report technique.
Name **one** self-report technique.

[1 mark]

Questionnaire.

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END OF QUESTIONS



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