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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 16 January 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	
Question	Mark
A	
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TOTAL	



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Section A: Biopsychology

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

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Describe the function of the somatic nervous system.

[3 marks]

The somatic nervous system maintains communication between the central nervous system (CNS) and the outside world. Sensory neurons carry information from receptors in the senses to the CNS. Motor neurons carry messages from the CNS to the muscles (effectors) to control voluntary, conscious movement. It contains all the neurons not in the CNS.

0	2
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Describe the function of the autonomic nervous system.

[3 marks]

The autonomic nervous system controls involuntary bodily functions such as heart rate and digestion, carrying information to and from smooth-muscle organs such as the heart and gut. Its sympathetic branch is involved in the fight or flight response, preparing the body to respond to a threat. Its parasympathetic branch produces the rest and relax response, restoring normal functioning.



0	3
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Explain the function of the endocrine system.

[4 marks]

The endocrine system controls and regulates the activity of particular cells and organs (internal physiological regulation). It does this through glands that secrete hormones directly into the bloodstream, which carry them to target organs. These hormones are vital to most bodily functions. The hypothalamus controls the endocrine system through the pituitary gland, the 'master gland', which controls the other glands. For example, in fight or flight the adrenal medulla releases adrenaline, increasing heart rate to prepare the body for a threat.

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0 4

Amour is a split brain patient who had her right and left hemispheres separated. Amour takes part in an experimental procedure known as the divided field. In this experiment, an object is flashed to one visual field only. The researcher flashes a picture of a tree to the left visual field of Amour's left eye.

When the researcher asks Amour to name the object she saw, Amour is unable to name or give any description of the tree. However, Amour is able to draw the tree with her left hand.

Describe and evaluate split brain research. Refer to Amour in your answer.

[20 marks]

Split brain patients have had their corpus callosum, the bundle of fibres connecting the two hemispheres, cut to treat severe epilepsy. This means that information can no longer be passed between the hemispheres, so 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 (Broca's and Wernicke's areas), and information from the left visual field (LVF) goes to the right hemisphere, which has no access to the language centres.

Sperry (1968) used the divided field technique with 11 split brain patients. Each patient sat with one eye covered and stared at a fixation point in the centre of a screen while words or pictures were flashed for about a tenth of a second to either the LVF or RVF, too quickly for the eyes to move. Behind the screen they could feel objects with either hand without seeing them. When an object was shown to the RVF the patient could name and describe it, but when it was shown to the LVF the patient could not name it and said there was nothing there.

However, they could draw the object or pick it out by touch with their left hand, which is controlled by the right hemisphere. Sperry also found that the right hemisphere had some basic language ability, as patients could select the matching object with the left hand when a word was shown to the LVF. Gazzaniga (2005) used non-verbal stimuli such as



faces and shapes and found the right hemisphere was better at matching shapes and superior on visuo-spatial tasks. Turk et al (2002) found that the right hemisphere is generally better at face processing, but the left hemisphere plays an important role in self-recognition. This explains Amour's behaviour. The picture of the tree was flashed to her left visual field, so it was processed by her right hemisphere. For most people, including Amour, the language centres are in the left hemisphere. Because her hemispheres have been separated, they cannot exchange information, so her left hemisphere never receives the image of the tree. Amour has no access to her language centres for this image and is therefore unable to name or describe the tree. However, she can draw the tree with her left hand because the left hand is controlled by the right hemisphere, which did see the tree.

A strength of split brain research is that it was ground-breaking and advanced our knowledge. It changed the view of the brain as a single unit and showed that the hemispheres have different functions (lateralisation), with language mainly in the left hemisphere and visuo-spatial skills in the right. Sperry was awarded a Nobel Prize for this work, and the use of the divided field procedure with standardised presentation of stimuli means the research is highly controlled and replicable.

However, the research used small samples, with Sperry studying only about 11 patients, and samples of 10 to 15 are typical. This makes it difficult to generalise the findings because these patients might not represent all split brain patients, let alone people with intact brains. There are further issues with generalisation because the patients studied



were a very varied group, differing in gender, age, handedness and the length of time they had had epilepsy, which may itself have caused unusual brain organisation. The operations were not always comparable, and in some cases there may have been some limited communication between the hemispheres, so the extent of the disconnection is uncertain. A control group of epileptic patients without the surgery would have helped to separate the effects of the split from the effects of epilepsy.

In addition, most of the research involved artificial set-ups in order to control variables, such as flashing stimuli for a fraction of a second to one visual field only. In everyday life split brain patients can move their eyes to send information to both hemispheres, so they function fairly normally. The results therefore have low ecological validity and are not relevant to everyday life.

Finally, later research suggests the differences between the hemispheres may be exaggerated. Gazzaniga found some patients developed language in the right hemisphere, and the brain shows plasticity, so functions are not always rigidly lateralised.

Overall, split brain research such as Sperry's clearly explains why Amour can draw but not name the tree, and it provides strong evidence of lateralisation, although its small, unusual samples and artificial tasks mean conclusions should be applied to the general population with caution.



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Section B: Cognitive Development

Answer **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 5

Below are four statements describing cognitive development.

Which **one** of the following statements does **not** describe cognitive development according to Vygotsky's theory?

Shade **one** box only.

[1 mark]

A Cognitive development happens during social interactions.

☐

B Cognitive development is based on mental processes children are born with.

☐

C Cognitive development occurs in stages.

☒

D Cognitive development requires inner speech.

☐

0 6

Briefly outline what is meant by the term scaffolding, in cognitive development.

[2 marks]

Scaffolding is the help or support given to a child by a more

knowledgeable other (an adult or a more competent peer). It allows the

child to work within their zone of proximal development, and is gradually

reduced as the child becomes more competent.



0	7
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What is meant by theory of mind?

[3 marks]

Theory of mind is the understanding that other people have their own beliefs, intentions, knowledge and emotions, which may differ from our own. It is the ability to see and understand the world from someone else's perspective, which enables us to guess what other people are thinking or feeling. For example, knowing that a friend who did not see a sweet being moved will falsely believe it is still in its original place.

Turn over for the next question

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0 8

Wilma and Abe are 4 months old and take part in a study investigating violation of expectation. A large train and a small train move along a track and pass behind a screen with a window. The large train can be seen in the window but not the small train.

Abe is in the control condition and only sees the small train which disappears behind the screen. It cannot be seen in the window.

Wilma is in the experimental condition and watches as the large train disappears behind the screen. Although the train should be seen in the window, it does not appear. The researcher finds that Wilma looks longer at the screen than Abe.

Using your knowledge of Baillargeon's violation of expectation research, explain why Wilma looks longer at the screen than Abe.

[6 marks]

Baillargeon's violation of expectation research shows that young infants look longer at events that violate their expectations about the physical world, because they are surprised. Looking time is used as a measure of what infants understand.

Wilma sees the unexpected, impossible event. The large train is tall enough that it should be seen in the window, yet it cannot be seen in the window even though it passes behind the screen. Wilma spends longer looking at the screen, which suggests she is surprised that she cannot see the large train in the window. This event violates her expectation that she should be able to see the large train in the window because she understands that the train still exists behind the screen. This violation causes her to look at the screen for longer.

Abe sees the expected, possible event, because the small train is too Extra space short to be seen in the window. Contrary to Wilma, Abe's expectations are not violated, as he knows that the small train is too small to appear in the window. Therefore he is not surprised and is less interested in the screen, so he spends less time looking at it than Wilma.



0 9

Describe the procedure and findings of **one** study that investigates Piaget's theory of cognitive development.

[6 marks]

Piaget and Inhelder (1956) used the three mountains task to test

egocentrism in children of different ages, aged 4 to 12.

A model of three mountains of different sizes, each with a distinctive feature such as snow, a cross or a house on top, was placed on a table.

Each child was encouraged to explore the model and walk around it to see it from all sides. The child then sat on one side of the table and a small doll was placed at different points around the table. The child was asked to carry out several tasks to test their ability to put themselves into the doll's viewpoint. For example, the child was given ten pictures of the model taken from different positions and asked to select the one showing what the doll could see.

Children under the age of seven were usually unable to select the

Extra space *correct picture showing the doll's viewpoint. Instead, they tended to choose the picture of their own viewpoint, and 4-year-olds almost always did this. By 7 to 8 years, children could consistently choose the correct picture.*

Piaget concluded that children in the pre-operational stage are egocentric: they are unable to decentre and see the world from another person's point of view, whereas children in the concrete operational stage have lost their egocentrism.

Turn over ►



1 0

Describe and evaluate research into the role of the mirror neuron system in social cognition.

[12 marks]

Mirror neurons are nerve cells that fire both when an animal or person performs an action and when they observe, hear or see the same action being performed by another. They were discovered by Di Pellegrino et al (1992) and Rizzolatti et al (1996), who recorded from single neurons in the premotor cortex of macaque monkeys. The same neurons fired when a monkey grasped food and when it watched the experimenter grasp food.

The mirror neuron system appears to play a role in several areas of social cognition, including action understanding, empathy, communication and imitation. The neural mirroring could enable the observer to identify the intention of the person carrying out the action. For example, when we see someone drink water, our mirror neurons are activated as though we had drunk the water ourselves. Brain scans have shown that observing someone in pain activates the same brain systems as being in pain ourselves, which may be the foundation of empathy. Gazzola et al (2006) found that people who scored higher on an empathy questionnaire showed more activity in their mirror neuron system when hearing actions. Research has also shown that the mirror neuron system is less activated in people low in empathy and in autistic people.

A strength is that research using fMRI scanning supports the link with social deficits. Dapretto et al (2006) found that autistic children showed less mirror neuron activity in the inferior frontal gyrus than typically developing children when imitating and observing emotional faces, and lower activity was linked to more severe social symptoms. Oberman et al (2005) found similar reduced mirror activity using EEG.



This suggests a biological explanation for autism and may lead to greater understanding of, and interventions for, social deficits in Autism Spectrum Disorder.

However, the evidence is mixed. Dinstein et al (2010) found that autistic adults showed normal mirror system responses when observing and performing hand movements, which contradicts the 'broken mirror' explanation. Heyes (2012) argued that mirror neurons may be a product of associative learning rather than an innate cause of social understanding, so their role may be the result rather than the cause of social cognition.

A further limitation is that much of the research has been carried out with animals, especially macaque monkeys. Single neurons can be recorded in monkeys but not usually in humans, where fMRI only shows activity in whole brain areas. As the human brain is more complex, there is a problem with extrapolating the findings to human social behaviour.

The explanation is also reductionist, because it reduces social cognition to a low-level biological explanation (the brain) rather than considering Extra space behavioural, family and social levels such as upbringing and culture. Social cognition is too complex to be explained simply by mirror neurons, and other factors such as language and theory of mind are also involved.

In conclusion, mirror neurons probably contribute to social cognition such as empathy and understanding intentions, but the research is correlational and partly based on animals, so it cannot show that they are the sole cause.



Section C: Research Methods 1

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

Studies have shown that estimates of the speed of vehicles involved in accidents were higher when the participants were asked questions with words that suggested a fast speed rather than a slow speed.

A researcher used a sample of 30 university students. The students watched a video of an accident between a car and a bus. They were then asked six questions about the accident. The critical question asked the students to estimate the speed of the car. The answers to the other five questions were not used for analysis. The researcher did not obtain fully informed consent.

The students were randomly allocated into one of two conditions:

Condition 1: The students were asked: "What speed do you think the car was going when it touched the bus?"

Condition 2: The students were asked: "What speed do you think the car was going when it crashed into the bus?"

1	1
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Briefly explain the difference between an aim and a hypothesis.

[2 marks]

An aim refers to the broader question the study sets out to investigate and is derived from a theory, whereas a hypothesis is derived from the aim and is a specific, testable prediction about the outcome of the investigation.



1 2

What type of variable is the estimate of the speed of the car?

Shade **one** box only.

[1 mark]

A Control variable

☐

B Dependent variable

☒

C Extraneous variable

☐

D Independent variable

☐
1 3

Explain why the researcher could **not** gain fully informed consent from the students in this study.

[4 marks]

For fully informed consent, the researcher would have to explain to the students the aim of the study, which was to see whether the speed estimate is affected by the intensity of the word used. Knowing the aim would increase demand characteristics, eg students might have exaggerated their speed estimate in the crashed condition in order to please the researcher. The speed estimates would then not represent the real estimates they would have given, reducing the internal validity of the results.

1 4

Apart from informed consent, briefly explain **one other** ethical issue the researcher needed to consider for this study.

[2 marks]

Deception: by not telling the students about the 'touched' and 'crashed' conditions, the true aim was withheld, so they could not fully understand the study. This increases the risk of harm, eg distress from watching an accident.

Turn over ►



1 5

The researcher used a directional hypothesis. Explain why a directional hypothesis was appropriate.

[2 marks]

Previous studies indicated the direction of the results. The researcher could therefore expect that the verb 'crashed', which suggests a greater impact, would lead to a higher speed estimate than the word 'touched'.

1 6 . 1

Explain **one** reason why the researcher randomly allocated the students to the two conditions.

[3 marks]

Random allocation avoids bias. It makes it more likely that participant variables, such as driving experience or ability to judge speed, are equally distributed across the two conditions, reducing the effect of individual differences. Any difference in speed estimates is then more likely to be due to the wording of the question, increasing internal validity.

1 6 . 2

Explain how the researcher could have randomly allocated the students to the two conditions.

[4 marks]

Lottery method: each of the 30 students is given a number, which is written on a separate piece of paper.

All the pieces of paper are placed into a hat and mixed up.

The researcher randomly draws out one piece of paper at a time without looking, and places each student into either condition 1 or condition 2, alternating between the two conditions.

This is repeated until all pieces have been drawn, so there are 15 students in each condition.



1	7
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With reference to demand characteristics, explain why the researcher included the five other questions which were not relevant to this study.

[3 marks]

The five other questions are distractor questions which remove the focus from the critical question about the speed of the car. They make the aim of the investigation, which is to measure the effect of the wording of the question, less obvious. This decreases demand characteristics, as students are less likely to guess the aim and change their speed estimate to please the researcher, increasing internal validity.

Turn over for the next question

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The researcher analysed the answers to the critical question about the speed of the car and showed the mean estimates in **Table 1**.

Table 1 Mean speed estimates in miles per hour (mph) for 'touched' (condition 1) and 'crashed' (condition 2)

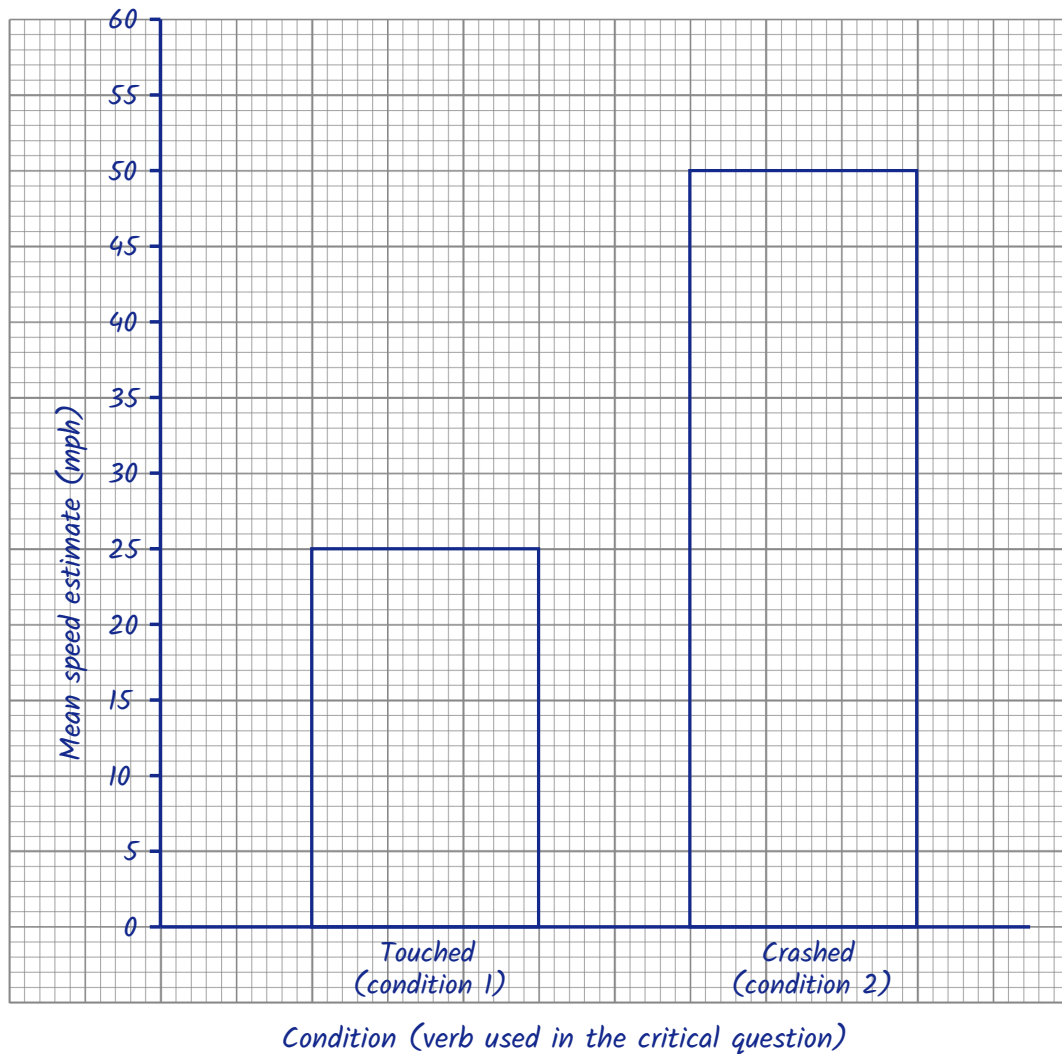
	Touched (condition 1)	Crashed (condition 2)
Mean speed estimate (mph)	25	50

1 8

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

[4 marks]

Title Bar chart showing the mean speed estimate (mph) for 'touched' and 'crashed'



1 9

The researcher calculated the mean speed estimates.

Briefly explain **one** limitation of using the mean as a measure of central tendency.

[2 marks]

The mean is easily distorted by extreme scores, eg one student estimating 120 mph, so it may be less representative of the whole data set. It also may not represent an actual score.

2 0

The sample of students consisted of 18 female and 12 male students.

Calculate the percentage of male students in the sample.

Show your workings.

[2 marks]

Total = 18 + 12 = 30 students

12 ÷ 30 = 0.4

0.4 × 100 = 40% of students are male

2 1

Name the method used in this study.

[1 mark]

Experimental method (laboratory experiment).

30**END OF QUESTIONS**

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