

Please write clearly in block capitals.

Centre number

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Candidate number

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Surname *StemUp Model Solution*

Forename(s)

Candidate signature

INTERNATIONAL AS PSYCHOLOGY

Unit 2: Biopsychology, Development and Research Methods 1

Wednesday 29 May 2019 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: Biopsychology

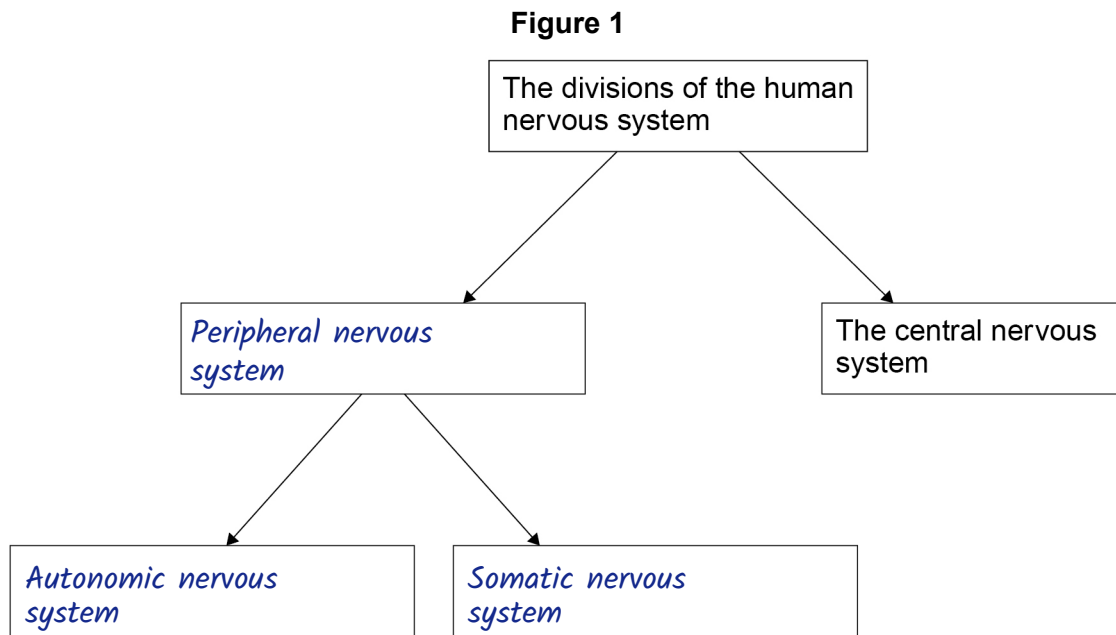
Answer **all** questions in the spaces provided.

0 1

Figure 1 is a diagram of the divisions of the human nervous system. The names of some of the divisions are missing.

Complete **Figure 1** by writing the name of a division in each box.

[3 marks]



0 2

Outline the process of synaptic transmission.

[6 marks]

Transmission of nerve impulses across the synapse is chemical.

Neurotransmitters are stored in synaptic vesicles within the pre-synaptic terminal (axon terminal) of the pre-synaptic neuron.

An electrical nerve impulse (action potential) travels down the axon.

When it reaches the axon terminal, it stimulates the synaptic vesicles to release neurotransmitter molecules into the synaptic gap (cleft).

The neurotransmitter molecules diffuse across the gap to the post-synaptic membrane, where they lock into specific synaptic receptors



on the dendrites of the next (post-synaptic) neuron. The post-synaptic

Extra space *neuron then converts the chemical message back into an electrical impulse, which travels down its axon to the next pre-synaptic terminal. Transmission is therefore one-way.*

The effect can be excitatory or inhibitory. Some neurotransmitters, e.g. adrenaline, increase the positive charge of the post-synaptic neuron, which increases the chance that it will fire and pass on the impulse (excitation). Others, e.g. serotonin, increase the negative charge of the post-synaptic neuron, which decreases the chance that it will fire (inhibition). Whether the neuron fires depends on the overall balance of excitatory and inhibitory signals it receives (summation).

0	3
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Sienna is waiting to enter the examination hall for her final examination paper. She is very nervous, and her heart is beating very fast. She feels sweaty and sick and wants to run away.

Describe the fight or flight response. Refer to Sienna's experience in your answer.

[9 marks]

The fight or flight response is an automatic (reflex) response: it is the body's physiological reaction to a threatening or stressful situation, and it allows the individual to react quickly so that they can either fight the threat or escape from it. For Sienna, the threat is the final examination she is about to enter.

When a threat is perceived, the hypothalamus in the brain recognises the threat and activates the sympathetic branch of the autonomic

Turn over ►



nervous system (ANS). Control switches from the parasympathetic nervous system (the resting, 'rest and digest' state) to the sympathetic nervous system.

The sympathetic nervous system sends a message to the adrenal medulla of the adrenal glands. This triggers the release of adrenaline into the bloodstream (the endocrine system) and noradrenaline in the brain.

Adrenaline then prompts a series of physical changes to help the body deal with the threat or escape from it.

These changes are what Sienna is experiencing. Her heart is beating

Extra space very fast because adrenaline increases heart rate, which speeds up blood flow so that oxygen and glucose reach her muscles and brain more quickly. Her breathing rate is also likely to increase to take in more oxygen.

She feels sweaty because sweating increases to cool and regulate the body's temperature, as her muscles are preparing for intense activity.

She feels sick because adrenaline reduces (inhibits) digestion: blood is diverted away from the stomach and digestive system, as digestion is not needed in an emergency, which produces the feeling of nausea or 'butterflies'.

Sienna wants to run away because blood flow has been diverted to her large muscles, providing energy to aid flight, which is the 'flight' part of the response. Once the threat has passed, the parasympathetic nervous system returns her body to its resting state.



0 4

Doctor Storr has two patients who have difficulty with language.

Tami suffered a head injury in a car accident. She understands words and sentences but now has difficulty producing speech.

Si had a brain operation. He speaks in sentences but now his words make no sense.

Describe what research has shown about the two language centres in the brain. Refer to Tami and Si in your answer.

[12 marks]

You may use this space to plan your answer.

Language is usually localised in the left hemisphere of the brain (lateralisation). Research has identified two specific language centres there, known as Broca's area and Wernicke's area, each responsible for a different aspect of language.

Broca (1861) carried out a case study of a patient known as 'Tan', who could understand language but could only produce one word, 'tan'. After Tan died, Broca carried out a post-mortem and found a lesion at the base of the left frontal lobe. He studied further patients with similar problems and found the same damage. He concluded that this area, now known as Broca's area, is responsible for putting words together and for the production of speech.

Damage to Broca's area causes Broca's (expressive) aphasia: speech production is lost or impaired, so speech is slow, effortful and lacks fluency, with function words often missing, but comprehension of

Turn over ►



language remains intact.

Wernicke (1874) noticed that patients with damage in the left hemisphere at the top (posterior part) of the temporal lobe, close to the auditory cortex, had different, specific language impairments. They could speak fluently but could not comprehend language, and they had difficulty finding the correct words (anomia). This area is now known as Wernicke's area. Wernicke's area has a specific function: it helps an individual to understand language and to use the correct words.

Damage to Wernicke's area causes Wernicke's (receptive) aphasia: the individual appears to speak fluently, in sentences with normal rhythm, but has lost speech comprehension, so their speech contains nonsense words or the wrong words and makes little sense. The two areas are connected by a bundle of nerve fibres called the arcuate fasciculus, so that the meaning processed in Wernicke's area can be passed to Broca's area to be produced as speech.

Tami's head injury in the car accident is likely to have damaged the left side of her brain, as it has affected her language. She now has difficulty producing speech, although she still understands words and sentences. This suggests that the damage is to Broca's area in her left frontal lobe, as damage here results in an inability to produce language while comprehension is intact. Tami therefore appears to have Broca's (expressive) aphasia, and her speech is likely to be slow and effortful.

Si's brain operation has probably caused damage in his left hemisphere, in the temporal lobe near the auditory cortex, in the area known as Wernicke's area, as this would result in his specific language impairment. Si can still speak in sentences, so his speech production is fluent, but his words make no sense. This matches Wernicke's (receptive) aphasia,



where speech is fluent but meaningless because comprehension and the ability to select the correct words are lost. Si is also likely to have difficulty understanding what Doctor Storr says to him.

Tami and Si therefore show a double dissociation: Tami has impaired production with intact comprehension, while Si has fluent production with impaired comprehension. This supports the research showing that the two language centres have separate functions, Broca's area for

Extra space speech production and Wernicke's area for language comprehension. Doctor Storr could confirm the location of the damage in each patient using a brain scan such as an MRI.



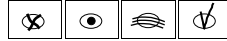
Section B: Cognitive developmentAnswer **all** questions in the spaces provided.Only **one** answer per question is allowed.

For each answer 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**

Which of the following terms is the name of Piaget's fourth stage of intellectual development?

Shade **one** box only.**[1 mark]****A** Concrete operational**B** Formal operational**C** Post-operational**D** Pre-operational

0 6

Table 1 lists five terms used by Piaget.

For each definition, choose the correct term from **Table 1** and write it next to the definition in **Table 2**.

[4 marks]

Table 1

Accommodation	Assimilation	Conservation	Egocentrism	Equilibration
---------------	--------------	--------------	-------------	---------------

Table 2

Definition	Term used by Piaget
Adding new experiences to an existing schema.	<i>Assimilation</i>
Changing a schema or developing a new schema.	<i>Accommodation</i>
The inability to see the world from another's perspective.	<i>Egocentrism</i>
Understanding quantity remains the same even if appearance changes.	<i>Conservation</i>

0 7

Briefly discuss **one** strength and **one** limitation of Piaget's theory of cognitive development.

[6 marks]

One strength is that Piaget's theory has had a major influence on education. It led to child-centred (discovery) learning, in which children are given opportunities to explore and discover for themselves, and teachers provide materials suited to the child's stage of development, e.g. concrete objects for children in the concrete operational stage. This shows that the theory has practical applications and has improved teaching. Piaget's theory also stimulated interest in cognitive development and paved the way for further research.

One limitation is that Piaget's stage theory is considered too rigid and may underestimate children's abilities. Later research found that children

Turn over ►



could perform tasks at younger ages than Piaget claimed. For example, McGarrigle and Donaldson (1974) found that when the change to a row of counters was made accidentally by 'naughty teddy', many more children aged 4 to 6 could conserve number than in Piaget's original task. This suggests that the children's failure was due to the design of Piaget's tasks rather than a lack of cognitive ability, and that the ages for each stage are not fixed, which led Piaget to introduce the concept of horizontal decalage.

0 8

Briefly outline what is meant by Vygotsky's concept of the zone of proximal development.

[2 marks]

The zone of proximal development (ZPD) is the gap between the child's current level of development (what the child can do unaided, on their own) and what the child could potentially do with the help of a more knowledgeable other, such as a more experienced peer or an adult.

0 9

Adam is a 3 year old who can complete a 4-piece wooden block task but he is unable to complete a 12-piece wooden block task. His 10-year-old sister Mai is helping him to complete the 12-piece wooden block task.

Briefly explain how the zone of proximal development could be involved when Mai helps her younger brother with the 12-piece wooden block task.

[2 marks]

Adam's current ability is the 4-piece task, but with Mai's help his potential is the 12-piece task. Mai, as the more knowledgeable other (expert), helps (scaffolds) Adam, e.g. by giving hints, so he works within his zone of proximal development.



A violation of expectation experiment was carried out with 4-month-old infants.

There were two conditions:

Condition 1: a short carrot moved behind a wall which had a window.

Condition 2: a tall carrot moved behind the same wall with the same window.

The short carrot did not appear in the window, as the window was too high (possible event). The tall carrot should have appeared in the window, but it did not appear (impossible event). The time each infant spent looking at the window was measured.

The findings are shown in **Table 3** below.

Table 3 Average time in seconds spent looking at the possible and impossible events

Condition 1 (possible event)	Condition 2 (impossible event)
14	28

1 0

With reference to Baillargeon's violation of expectation research, explain the findings in **Table 3**.

[2 marks]

The infants looked twice as long at the impossible event (tall carrot, 28 seconds) as at the possible event (short carrot, 14 seconds), showing they were more interested and surprised. They expected the tall carrot to appear in the window, so its absence was a violation of expectation. This shows 4-month-old infants could mentally represent the hidden carrot and reason about hidden objects (object permanence).

1 1

Suggest **one** problem with the violation of expectation method of investigating infants' understanding of the physical world.

[1 mark]

Infants are unable to speak, so the conclusions rely on inference: looking for longer does not necessarily mean the infant expected something different, as they may look longer because they are tired, bored or simply prefer the tall carrot.

Turn over ►



1 2

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

[12 marks]

You may use this space to plan your answer.

Mirror neurons are a specific type of neuron in the brain that 'fire' both when an individual performs an action and when they observe the same action performed by someone else. They were discovered by Rizzolatti in macaque monkeys.

The mirror neuron system is thought to play a role in several areas of social cognition, including understanding actions and intentions, imitation and empathy. When we see someone carry out an action, e.g. drink water, our mirror neurons are activated as though we had drunk the water ourselves. This may allow us to understand the intention behind an action.

Brain scans have shown that observing someone in pain activates the same brain systems as when we experience pain ourselves, which is thought to be the foundation of empathy. Research has also shown that the mirror neuron system is less activated in people who are low in empathy or who are autistic, suggesting it underlies the social difficulties of autism spectrum disorder (ASD).

There is research evidence to support the role of mirror neurons in social cognition. Gazzola et al (2006) found that people scoring higher on



empathy showed greater activity in mirror neuron areas when listening to the sounds of actions. Dapretto et al (2006) used fMRI scanning and found that when imitating and observing emotional facial expressions, autistic children showed less mirror neuron activity than typically developing children.

This research suggests a biological explanation for autism, which may
Extra space lead to a greater understanding of social deficits in ASD, which is a practical strength.

However, much of the research has been carried out on animals, particularly macaque monkeys, and in humans mirror neuron activity is mostly inferred from fMRI scans, so there is a problem with extrapolating the findings from monkeys to humans.

There is also contradictory evidence. Dinstein et al (2010) found that autistic participants showed normal mirror neuron responses when observing and performing hand movements, which challenges the 'broken mirror' explanation of autism. Heyes (2012) argues that mirror neurons may not be innate but develop through associative learning, so they may be a product of social experience rather than its cause.

Social cognition is too complex to be explained simply by mirror neurons.

It also depends on higher processes such as theory of mind and language. The explanation is therefore reductionist, as it reduces social cognition to a low-level biological explanation (activity in the brain) and ignores behavioural, family and social levels of explanation.

In conclusion, the mirror neuron system is likely to make an important contribution to social cognition, especially action understanding and empathy, but it is best seen as one part of a more complex explanation.



Section C: Research Methods 1

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

Only **one** answer per question is allowed.

For each answer 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.



A researcher wanted to investigate the relationship between age and memory.

She carried out a pilot study using 10 of her work colleagues who were in the office on that day. Her colleagues were aged between 26 and 65 years.

Each person was individually shown the same list of 20 words for 2 minutes. Each person was then given 4 minutes to recall as many of the words as possible.

The results are shown in **Table 4** below.

Table 4 Age of work colleagues and number of words recalled from list of 20 words

Participant	Age (years)	Words recalled
1	26	19
2	62	9
3	30	18
4	27	16
5	35	15
6	65	7
7	42	14
8	48	11
9	55	10
10	50	11



1 3

What type of sample was used in this study?

Shade **one** box only.**[1 mark]****A** Opportunity☒**B** Pilot☐**C** Population☐**D** Random☐**1 4**

Write a suitable hypothesis for this study.

[3 marks]

There will be a negative correlation between age (in years) and the number of words correctly recalled from a list of 20 words, so as age increases, the number of words recalled decreases.

1 5Explain **at least one** reason for using a pilot study in this research.**[4 marks]**

A pilot study is a small-scale trial run of the study. The researcher tested a small sample of 10 participants to check the timing, in this case whether 2 minutes to learn and 4 minutes to recall the words was appropriate, and the procedures, e.g. whether the instructions were clear, before the real study, so she could modify the study if necessary. It also allowed her to test the materials, in this case the list of 20 words, e.g. to check it was not too easy or too hard, which saves time and resources before investing in a large-scale study.

Turn over ►

Table 4 is repeated below.

Table 4 Age of work colleagues and number of words recalled from list of 20 words

Participant	Age (years)	Words recalled
1	26	19
2	62	9
3	30	18
4	27	16
5	35	15
6	65	7
7	42	14
8	48	11
9	55	10
10	50	11

1 6

Calculate the mean age of participants from the data in **Table 4**. Show your calculations.

[2 marks]

$$26 + 62 + 30 + 27 + 35 + 65 + 42 + 48 + 55 + 50 = 440$$

$$440 \div 10 = 44$$

Mean age of participants = 44 years

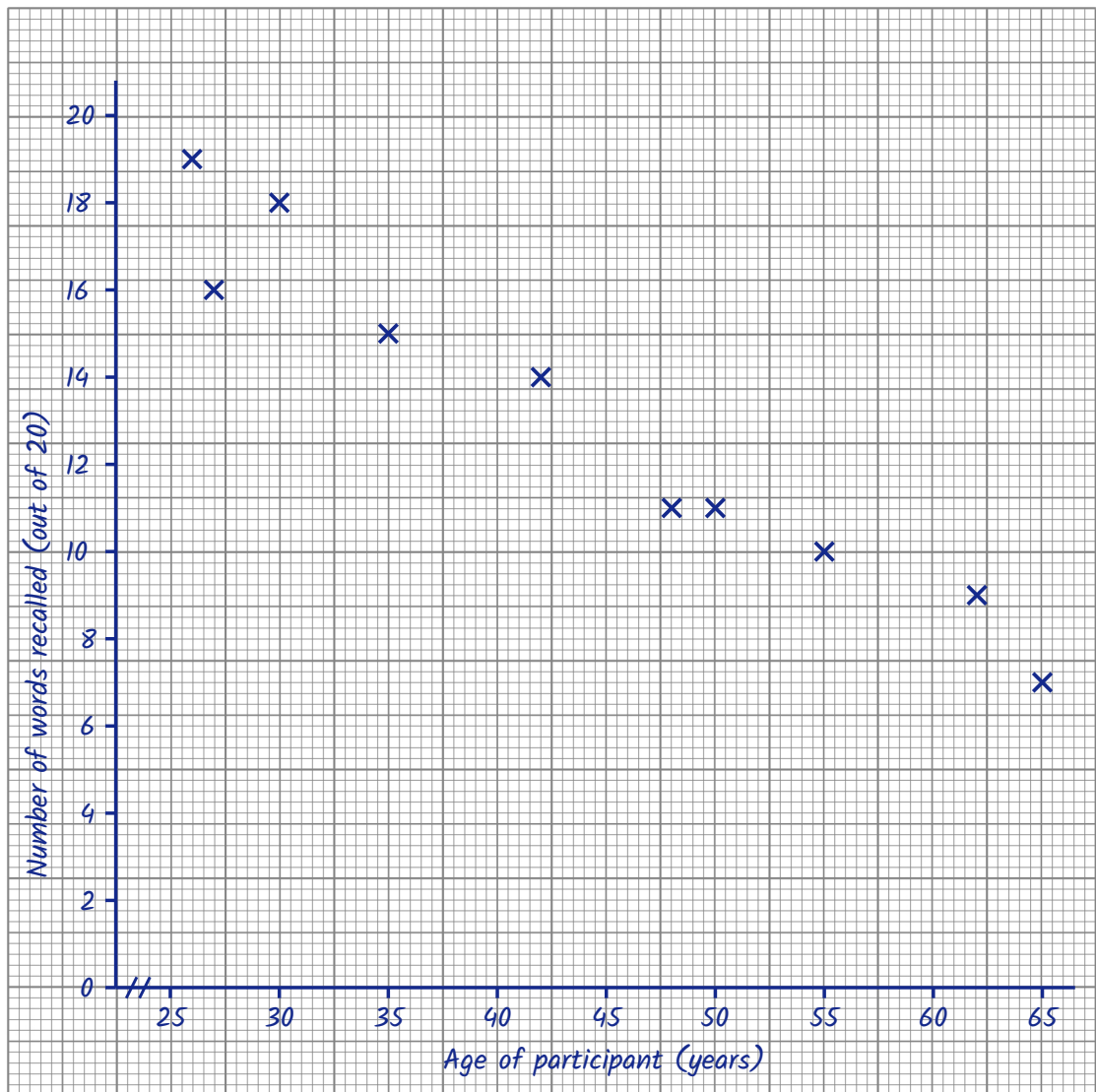


1 7

Draw a scattergram using the data in **Table 4**. Label the axes. You do not have to provide a title for your graph. Use the graph paper below.

[4 marks]

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box



1 8

Identify the type of relationship shown in the scattergram you have drawn in your answer to **Question 17**. Explain what the researcher could conclude from this relationship.

[3 marks]

A negative correlation.

As age increases (people get older), the number of words recalled (memory) decreases.

Turn over ►



1 9

Briefly discuss **one** limitation of correlational research. Refer to this study in your answer.

[4 marks]

One limitation is that correlational research can only demonstrate a relationship between two co-variables, not cause and effect. In this study there is a strong negative correlation between age and the number of words recalled, but the researcher cannot conclude that getting older causes memory to deteriorate. There may be a third (extraneous) variable causing the effect, for example stress, tiredness or poor eyesight among the older colleagues, or the older colleagues may have been less familiar with that type of memory test. As age was not manipulated, the researcher cannot rule out these alternative explanations.

2 0

Outline **one** ethical issue that the researcher should have considered in this study.

[2 marks]

Confidentiality: all personal data, such as each colleague's age and memory score, should be protected and not disclosed unless agreed beforehand. This is important as the researcher is testing a small sample of 10 colleagues whom she knows personally, so they could easily be identified.



2 1

Explain how the ethical issue outlined in your answer to **Question 20** could have been dealt with in the design of the study.

[4 marks]

In the brief before the study, the researcher should stress that all data will be kept confidential and that no names will be recorded on the memory recall test. Each colleague could be given a participant number instead, and 'confidential' written at the top of each memory test. The data should be stored securely, and individual memory scores and ages would not be identified or discussed with anyone, including other colleagues, so that no colleague could be linked to a low score, and in any report only group results would be published.

At the end of the study, the researcher wanted to further investigate the relationship between age and memory. She carried out a structured interview with each of her 10 work colleagues.

2 2

Outline the main features of a structured interview.

[2 marks]

*The questions are decided in advance (pre-set).
The same questions are asked to each participant in the same order, and they cannot be missed out or changed.*

2 3

Write a suitable closed question that could be used in a structured interview.

[1 mark]

Do you sometimes forget a word when you are speaking? YES / NO

30**END OF QUESTIONS**



[illegible]

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ANSWER IN THE SPACES PROVIDED**

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2 4



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