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PSYCHOLOGY **9990/21**

Paper 2 Research Methods **October/November 2023**

1 hour 30 minutes

You must answer on the question paper.

You will need: Ruler

INSTRUCTIONS

- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
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INFORMATION

- The total mark for this paper is 60.
- The number of marks for each question or part question is shown in brackets [ ].

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Section A

Answer **all** questions in this section.

1 **(a)** Explain what is meant by 'covert' observation.

Covert observation is when the observer's role is hidden from the participants, so they do not know they are being observed, e.g. Bandura et al. watched the children through a one-way mirror, or a hidden camera could be used. [2]

(b) Explain **one** strength of a covert observation.

Because the participants do not know the observer is there, they are likely to act naturally, so there is less risk of demand characteristics or socially desirable behaviour, which makes the data more valid. [2]

(c) Explain **one** weakness of a covert observation.

The participants are watched without their knowledge or permission, so the study breaks the ethical guideline of informed consent, and they are also denied the right to withdraw because they do not know they are taking part. [2]

2 A hypothesis is 'There will be a difference in helpfulness between obedient and disobedient people'.

(a) State whether this is a directional (one-tailed) hypothesis or a non-directional (two-tailed) hypothesis. Include a reason for your answer.

Non-directional, because it does not say which group (obedient or disobedient people) will be more helpful. [1]

(b) Write a null hypothesis for this study.

There will be no difference in how helpful obedient and disobedient people are; any difference is due to chance. [1]

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3 The study by Pepperberg (parrot learning) tested a parrot's understanding of the concepts of 'same' and 'different'. Table 3.1 shows the total results for correct responses and incorrect responses for two categories of objects.

Table 3.1

Category of objects	Total responses to 'same?' and 'different?' questions	
	correct	incorrect
objects used in training	99	30
objects not used in training	96	17

(a) (i) Describe the results in Table 3.1 for correct responses.

The number of correct responses was very similar for the two categories of objects (99 and 96). [1]

(ii) Describe the results in Table 3.1 for incorrect responses.

There were more incorrect responses for the objects used in training (30) than for the objects not used in training (17). [1]

(b) Whether or not the objects had been used in training affected the accuracy of the parrot's responses.

Describe how Pepperberg explained this effect.

Alex was given the objects themselves as his reward, and the new (non-training) objects were more interesting and motivating to him than the familiar ones, so he paid more attention to them (e.g. wanting to chew them or use them for preening) and answered more accurately. [2]

4 In the study by Canli et al. (brain scans and emotions), all the participants were female.

State the **two** reasons that Canli et al. gave for using only female participants in this study.

1 *Females show stronger physiological reactivity to emotional stimuli than males.*

2 *Females are more likely than males to report intense emotional experiences.*

[2]

5 In Experiment 1 of the study by Laney et al. (false memory), participants were randomly allocated to one of two conditions (levels of the independent variable).

(a) State what is meant by 'random allocation'.

Each participant has an equal chance of being put into either condition (the love group or the control group). [1]

(b) State why one of the two groups was called a 'control condition'.

Because the IV was absent; they were not given the false suggestion that they had loved asparagus, so they acted as a baseline for comparison. [1]

6 Describe the ethical guidelines of 'right to withdraw' and 'confidentiality', using any examples.

Right to withdraw means participants must be told at the start that they can leave the study at any time without giving a reason, and that they can remove their data from the study, even after it has finished. For example, Milgram's participants were told they could leave and still keep their payment, but the verbal prods ("the experiment requires that you continue") made withdrawing difficult. In Piliavin et al. the passengers did not know they were being observed, so they could not withdraw.

Confidentiality means participants' personal information must be kept private so they cannot be identified in any report. This is done by removing names and giving participants codes, storing records securely and limiting the number of researchers who can see them. For example, Dement and Kleitman identified their participants only by their initials, and Saavedra and Silverman described the boy only by his age and ethnicity, which is not enough to identify him. [6]

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Section B

Answer **all** questions in this section.

7 Two female researchers, Meilin and Nina, are preparing a structured interview about dreams. Each researcher will interview 10 participants.

(a) Suggest **three** ways that Meilin and Nina could standardise their structured interview, other than using the same questions.

1 *Ask the questions in the same order for every participant.*

2 *Both wear the same sort of clothes and use the same neutral tone of voice.*

3 *Interview everyone in the same quiet room and for the same length of time.*

[3]

(b) Explain **one** reason why a structured interview should be standardised.

So that every participant is treated in the same way; otherwise differences in their answers about dreams might be due to how Meilin or Nina interviewed them rather than real differences, so standardising makes the results reliable and valid.

[2]

(c) Explain **one** reason why it may be better for Meilin and Nina to use an unstructured interview.

In an unstructured interview they could ask each participant different follow-up questions depending on their answers, so they could find out much more detail about each individual's own dreams, e.g. what happens in a recurring dream.

[2]

(d) Outline **one** ethical problem with interviewing participants about their dreams.

Participants may be embarrassed about the content of their dreams and feel it is private, so they may not want to reveal it. [1]

8 Alf conducted an experiment comparing the range of television programmes that old and young people watch. He collected his data by questionnaire and found that young people watch a wider range of television programmes than old people.

(a) (i) Suggest **one** extraneous variable that could affect the range of television programmes that old people watch, other than their age.

The range of channels the old people can access, e.g. whether they have the internet or streaming services. Old people may only have terrestrial channels, so they watch a narrower range of programmes because fewer are available to them, not because of their age. [2]

(ii) Explain how Alf could investigate whether the extraneous variable that you suggested in **(a)(i)** was the cause of the difference he found.

Alf could add a question to the questionnaire asking how many channels and which streaming services each person has, then only compare young and old people who have access to the same number of channels, to see if the difference remains. [2]

(b) Alf used opportunity sampling to obtain participants but would have preferred to use volunteer sampling.

(i) Outline what is meant by 'volunteer sampling'.

Participants choose to take part themselves by responding to a request from the researcher, e.g. an advert. [1]

(ii) Suggest **one** way that Alf could have used volunteer sampling to obtain both old and young participants.

He could put an advert on the noticeboard of a local swimming pool that has sessions for both young and old people, asking anyone who would like to take part in a study about television to contact him.

[2]

(c) Explain the experimental design that Alf used.

Independent measures design, because the young and old people were in two different groups; each participant could only be in one level of the IV (young or old), as Alf cannot wait for the young people to grow old and test them again.

[2]

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9 Calle is planning a correlational study. He is measuring two variables: happiness and confidence.

Calle's friend Violet is helping him to plan his questions.
Calle has written two questions:

- For happiness: Are you happy? Answer 1 for yes and 0 for no
- For confidence: How certain do you feel that you will succeed when you begin a new task? 0 = not at all, 5 = very.

(a) Violet says that the data Calle would get from his question on happiness would **not** be suitable to use in a correlation.

Explain why Violet is correct.

The data are nominal (only two categories, yes or no), not a scale, so they cannot be used to plot a correlation. [1]

(b) Suggest **one** problem with the validity of Calle's question on confidence.

It may not measure general confidence, because "a new task" is vague: confidence depends on what the task is, e.g. someone may be confident doing a handstand but not baking a cake, so Calle may not be testing what he claims to test. [2]

(c) **(i)** Calle changes his question for happiness and uses his original question for confidence. He finds a positive correlation.

Draw a line to show the pattern of Calle's data, using the axes below.



[1]

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(ii) Explain why Calle **cannot** conclude that greater happiness leads to higher confidence.

A correlation only shows that there is a relationship between two variables; it cannot show cause and effect, because neither variable is manipulated. The direction could be the other way round: greater confidence might lead to greater happiness. Or a third factor could affect both, e.g. having lots of friends could increase both happiness and confidence, so happiness need not be the cause of the confidence. [3]

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Section C

Answer **all** questions in this section.

10 Sophie is planning a natural experiment to investigate the effects of closing a road on anger in drivers. One road into a town will be closed for three weeks and the traffic will have to take a longer route. Sophie wants to investigate whether having to take the longer route makes drivers angry.

(a) Describe how Sophie can conduct a natural experiment to investigate whether having to take the longer route makes drivers angry.

Sophie would conduct a natural experiment, as the IV (whether drivers have to take the longer route) is caused by the road closure, not by her. It has two levels: drivers arriving in the week before the road closes (normal route) and drivers arriving during the three-week closure (longer route). This is an independent measures design.

Location and participants: the main car park in the town centre, which drivers on both the normal and the longer route use. Participants would be adult drivers, an opportunity sample of the first 50 drivers who park between 8:00 and 9:00 am on weekdays in each condition. Each is first asked which way they drove in, and only drivers who normally use the road that is closed are included, so in the second condition all of them took the longer route.

DV, anger, measured in two ways:

1. Self-report: as soon as they leave their car, Sophie asks "How angry do you feel right now?", rated from 0 (not at all angry) to 10 (extremely angry), and "How frustrating was your journey?" from 0 to 10, giving an anger score out of 20.

2. Observation: a second researcher stands at the car park entrance and tallies the number of times each driver sounds their horn or makes an angry gesture while queuing to enter.

Controls: same car park, same time of day, weekdays only, same researcher reading the same questions in the same neutral tone, and testing is not done on days of very bad weather or traffic accidents.

Ethics: drivers are told the aim and give informed consent, are told they can withdraw at any time, answers are anonymous (a participant number only) and the

questions take about a minute so they are not delayed; they are thanked and debriefed.

Analysis: Sophie calculates the mean anger score and mean number of horn sounds for each condition and shows them on a bar chart; a higher mean during the closure would suggest the longer route makes drivers angrier.

[10]

(b) Identify **one** practical weakness/limitation with the procedure you have described in your answer to part **(a)** and suggest how your study might be done differently to overcome the problem.

Do **not** refer to ethics or sampling in your answer.

Because different drivers are tested before and during the closure, differences in anger could be due to participant variables, e.g. some drivers being naturally more short-tempered or in more of a hurry, rather than the longer route. To overcome this, Sophie could use a repeated measures design: drivers tested before the closure would give a contact number and be asked to come back to the same car park at the same time during the closure to answer the same questions again, so each driver's anger after the longer route is compared with their own anger after the normal route.

[4]

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CANDIDATE NAME: StemUp Model Solution

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PSYCHOLOGY **9990/22**

Paper 2 Research Methods **October/November 2023**

1 hour 30 minutes

You must answer on the question paper.

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Section A

Answer **all** questions in this section.

1 From the study by Pepperberg (parrot learning):

(a) State the aim of this study.

To investigate whether a parrot (Alex) could learn and understand the concepts of 'same' and 'different'. [1]

(b) Explain why it was necessary to present the parrot with questions in a random order.

To avoid order effects and bias. If the questions were in a fixed order, e.g. all the 'shape' questions together, Alex could guess the answer from the pattern rather than understanding, or he might be bored by the end and do badly on whichever type came last. [2]

2 Explain the importance of the ethical guidelines of anaesthesia, analgesia and euthanasia in relation to the use of animals in research.

They are important because they reduce animal suffering. Anaesthesia removes pain and distress during procedures, e.g. during an operation on an animal's brain. Analgesia (painkillers) reduces pain afterwards, e.g. while the animal recovers from an operation. Euthanasia (humanely killing the animal) prevents it from having to endure continued suffering, e.g. if it is badly injured in a fight or by an experimental procedure. [3]

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3 Participants in the study by Laney et al. (false memory) completed a 'Restaurant Questionnaire', which was formatted to look like a menu.

(a) Describe the Restaurant Questionnaire.

It was set out like a menu with five categories (e.g. appetizers, soups and salads, entrees, sides, desserts) listing 32 dishes. Participants imagined they were out for a special meal and rated how likely they were to order each dish, from 1 (definitely no) to 8 (definitely yes). [2]

(b) Explain why it was important that the Restaurant Questionnaire looked like a menu.

To make it realistic and distract participants from the real aim, reducing demand characteristics; they would be less likely to guess the study was about memory or to notice that the asparagus item was the critical one, so their ratings were more valid. [2]

4 The study by Yamamoto et al. (chimpanzee helping) used a repeated measures experimental design.

(a) Outline what is meant by a 'repeated measures design'. Include an example from the study by Yamamoto et al. in your answer.

Each participant takes part in all levels of the IV. In Yamamoto et al. each chimpanzee was tested in both the 'can see' condition (it could see its partner's situation) and the 'cannot see' condition (a panel blocked its view of its partner).

..... [2]

(b) Explain **one** advantage of using a repeated measures design for this study, compared to using an independent measures design.

It controls participant variables: chimpanzees differ, e.g. some are older or more naturally helpful than others. With independent measures these differences between the groups could affect helping, but with repeated measures each chimpanzee is compared with itself. ..... [2]

5 In a study that measured two variables, a relationship between the variables was found. As one variable increased, the other decreased.

(a) Name this relationship.

A negative correlation.

..... [1]

(b) Suggest **two** variables, from any core study, that show this relationship.

In Baron-Cohen et al.: AQ (Autism Spectrum Quotient) score and Eyes Test score.

..... [1]

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6 Describe natural experiments and naturalistic observations, using any examples.

A natural experiment has an IV that varies naturally (it occurs spontaneously or is a pre-existing difference) rather than being manipulated by the researcher, who then measures a DV. The researcher uses existing differences, so participants cannot be randomly allocated to conditions. For example, instead of Bandura et al. exposing children to an aggressive model, a researcher could compare the aggression of children from violent and non-violent homes.

A naturalistic observation is when participants' behaviour is watched in its normal setting, without the researcher manipulating any variables or interfering, so there are no controls. For example, children's aggression could be observed during their normal school playtime, tallying behaviours such as hitting and pushing. Behaviour is natural, but extraneous variables cannot be controlled.

[6]

Section B

Answer **all** questions in this section.

7 James is conducting an interview to investigate topics that could influence anger and euphoria. He has already written his questions about anger. James needs to write questions which cover three topics that could increase euphoria. These topics are:

- sports or games
- films or music
- the natural world (e.g. animals and plants, being outside or good weather).

(a) Suggest **one** closed question and **one** open question that James could use to investigate **one** of his three topics about euphoria. Do **not** use a rating scale in your answer.

Closed question *Does watching your favourite film make you feel euphoric? Answer options: Yes / No*

Open question *Describe how you feel when you listen to your favourite music, and explain why.*

[3]

(b) James has chosen to conduct a semi-structured interview.

Explain **two** strengths of a semi-structured interview.

1 *Some questions are the same for every participant, so the data are comparable between participants and the study is replicable: other researchers could repeat it with the same questions about anger and euphoria, so it is more reliable.*

2 *James can also ask new follow-up questions tailored to each person, so he can explore the particular sports, films, music or parts of nature that make each individual euphoric, giving rich, detailed and valid data.*

[4]

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(c) James was planning to use opportunity sampling to obtain participants from his university but has decided random sampling would be better.

(i) Explain how James could use random sampling to obtain participants from his university.

He would get a numbered list of every student at his university (e.g. from student records) and use a random number generator to pick 50 numbers; the students with those numbers form his sample, so every student has an equal chance of being chosen. [2]

(ii) Explain **one** advantage for James of using random sampling compared to using opportunity sampling.

The sample is more likely to be representative and unbiased than an opportunity sample (e.g. just his friends), so it should include students with a range of interests in sport, films, music and nature, making his results more generalisable. [2]

8 Olive and Durnaz are planning a questionnaire to use in their study, which aims to investigate forgetting in old people.

(a) Olive thinks that they should include some irrelevant questions so that the participants are less likely to guess the aim of the study. Durnaz thinks this is unethical.

(i) Explain why Olive's plan to include irrelevant questions would be useful.

It reduces demand characteristics; if the old people guessed the study was about forgetting, they might try harder than normal to remember or hide their memory problems, so the irrelevant questions make their answers more valid.

..... [2]

(ii) Explain why Durnaz thinks that Olive's plan would be unethical.

The irrelevant questions mislead the participants about the aim, which is deception; they believe all the questions are part of the study, so they cannot give fully informed consent. Extra questions might also make them tired or distressed.

..... [2]

(b) Olive and Durnaz want to be able to generalise their findings to all old people.

(i) Suggest **one** variable that could affect memory in old people, other than age.

Whether they live alone or with other people.

..... [1]

(ii) Explain why the variable you suggested in **(b)(i)** could affect memory in old people.

People who live alone have no one to talk to or to remind them of things, so they get less practice at using their memory, which could make their memory worse than old people who live with family.

..... [2]

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9 Gagan has collected data about personality characteristics. Two of the questions he asked were:

- Personality question:
  Which word best describes your personality? Angry / Confident / Kind / Worried.
- Shyness question:
  How shy do you feel in new situations on a scale of 0–5? (0 = not at all, 5 = very).

(a) Name the **most** appropriate measure of central tendency to use with the data from each question.

Personality question Mode

Shyness question Median

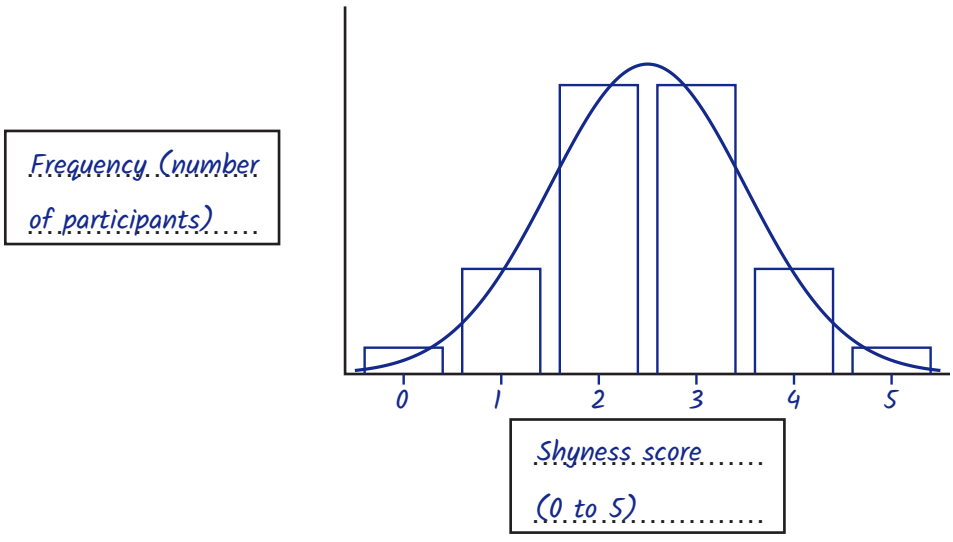
[2]

(b) Name the **most** appropriate type of graph for Gagan to use to display the results from the 'personality question'.

A bar chart [1]

(c) When Gagan analyses the data for the 'shyness question', he finds that the scores are normally distributed.

Sketch a graph using the axes below to show the pattern of Gagan's data from the 'shyness question'. You **must** label the axes.



[3]

Section C

Answer **all** questions in this section.

10 Sara wants to test whether people with a higher intelligence quotient (IQ) are better at concentrating. She will conduct a laboratory experiment and already has a test for measuring the IQ of the participants.

(a) Describe how Sara can conduct a laboratory experiment to test whether people with a higher IQ are better at concentrating than people with a lower IQ.

Sara would conduct a laboratory experiment in a quiet room at her university. The IV is IQ (higher or lower) and the DV is concentration.

Participants: 40 adults aged 18 to 25, a volunteer sample recruited through adverts on university noticeboards. They give informed consent, are told they can withdraw at any time, their IQ scores are kept confidential (participant numbers only) and they are not told their own score, to avoid distress; all are debriefed at the end.

IV: each participant first completes Sara's IQ test on their own. Participants are ranked by IQ score and split at the median: the 20 highest scorers form the 'higher IQ' group and the 20 lowest the 'lower IQ' group, so this is an independent measures design.

DV: concentration is measured with a 10-minute computer task. Letters appear one at a time in the centre of the screen every 1.5 seconds, and the participant must press the space bar whenever an X appears (40 X's among 400 letters, at random positions). The concentration score is the number of X's correctly detected (out of 40) minus the number of false presses, so a higher score means better concentration.

Controls: the concentration task is done on a different day from the IQ test, at the same time of day (10:00 am), so tiredness from the IQ test cannot affect it. Each participant sits alone in the same quiet, windowless lab, hands in their phone, uses the same computer and hears the same standardised instructions read by Sara, followed by a one-minute practice. Participants who have had less than six hours' sleep are tested on another day.

Analysis: Sara calculates the mean and standard deviation of the concentration scores

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for each group and shows the means on a bar chart. If the higher IQ group has a higher mean score, this supports the hypothesis that people with a higher IQ are better at concentrating.

[10]

(b) Identify **one** practical weakness/limitation with the procedure you have described in your answer to part (a) and suggest how your study might be done differently to overcome the problem.

Do **not** refer to ethics or sampling in your answer.

Splitting at the median means participants just above and just below the median (e.g. IQs of 101 and 99) are put in different groups even though their IQs are almost the same, so the two groups may not differ much in IQ and a real effect on concentration may be missed. To overcome this, Sara could give the IQ test to 80 people and only use the 20 with the highest scores and the 20 with the lowest scores, leaving out the middle 40, so the two groups clearly differ in IQ.

[4]

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PSYCHOLOGY **9990/23**

Paper 2 Research Methods **October/November 2023**

1 hour 30 minutes

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Section A

Answer **all** questions in this section.

1 A matched pairs design is an experimental design that can be used in studies comparing two conditions, or levels, of an independent variable.

(a) Explain what is meant by a 'matched pairs design'.

Participants are put into pairs who are similar on characteristics important to the study (e.g. age, IQ), then one of each pair goes into each condition of the IV. [1]

(b) Explain **one** advantage of using a matched pairs design compared to using a repeated measures design.

There are no order effects, such as practice or fatigue, because each participant only takes part in one condition, whereas in repeated measures they are tested twice, so they might do better the second time through practice, or worse through tiredness.

[2]

2 A range can be calculated when numerical scores are collected from participants in a study.

(a) Define the term 'range'.

A measure of spread; how spread out (dispersed) the scores are, found from the difference between the largest and smallest scores. [1]

(b) Describe how the range of 'hours spent asleep' could have been calculated in the study by Dement and Kleitman (sleep and dreams).

Find the longest number of hours that any participant slept and the shortest number of hours any participant slept, then subtract the shortest number of hours slept from the longest.

[2]

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3 The reliability of a study is affected by the measures (scales or tasks) chosen by the researcher and the way that these are used when conducting the study.

(a) One way to check reliability is the test-retest technique.

Describe how this technique checks reliability.

The same measure (e.g. a test or questionnaire) is given to the same participants on two separate occasions, e.g. two weeks apart, by the same researcher under the same conditions. The two sets of scores are then compared (correlated): if each person gets similar scores both times, giving a strong positive correlation, the measure is reliable (consistent).

..... [3]

(b) Another type of reliability is inter-rater reliability.

Explain how the inter-rater reliability of studies can be improved.

Raters can be given clear operational definitions of each behavioural category, then practise together by rating the same videoed behaviour, discussing any disagreements and repeating this until they produce the same records.

..... [2]

4 In each of the core studies, the researchers report their conclusions.

(a) Explain what is meant by the term 'conclusions', using an example from a core study from the social approach.

Conclusions are the generalisations that can be drawn from the results of a study about behaviour beyond the sample. For example, Piliavin et al. found that the cane victim was helped more than the drunk victim, and concluded that an ill person is more likely to be helped than a drunk person. ..... [2]

(b) In the study by Baron-Cohen et al. (eyes test), two main conclusions were drawn.

Outline **one** of these conclusions.

People with Asperger syndrome or high-functioning autism have a deficit in theory of mind, so they are less able to identify emotions from the eyes. ..... [1]

5 In the study by Saavedra and Silverman (button phobia), a boy was repeatedly asked to use the Feelings Thermometer. Other questions investigated his phobia further and showed that he disliked buttons touching his body.

Explain the type of interview used in this study.

It was a semi-structured interview, because some questions were standardised and repeated every time (the boy rated his distress about buttons on the Feelings Thermometer), while other questions were flexible and explored his phobia further, e.g. finding that he disliked buttons touching his body. [2]

6 Describe the ethical guidelines of 'housing' and 'rewards' in relation to animals, using any examples.

Housing: animals must be kept in conditions that avoid pain and distress by meeting the needs of their species, age, sex and activity level, e.g. warmth, suitable food and water, cover or nest sites so they feel safe, and enough space to exercise. Social animals should be housed with others so they are not distressed by isolation, and overcrowding must be avoided as it can cause aggression. For example, Yamamoto et al.'s chimpanzees, which are social animals, were housed in groups, and Pepperberg allowed Alex space to fly in the laboratory.

Rewards: researchers should use positive experiences such as food or praise to change animals' behaviour, rather than punishment such as electric shocks, to reduce pain and distress. For example, Pepperberg rewarded Alex by giving him the object he had identified and by praising him.

[6]

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Question 7 appears on Page 6.

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Section B

Answer **all** questions in this section.

7 Dr Casson conducted a field experiment to compare the emotions that people show when they respond to shop assistants who are either wearing a uniform or casual clothes. She asked the assistants at her local shop to wear a uniform on Saturdays and wear casual clothes on Sundays.

(a) Explain why Dr Casson's study was a field experiment.

It is an experiment because Dr Casson manipulated an IV (whether the shop assistants wore a uniform or casual clothes) and measured a DV (the emotions the customers showed). It is a field experiment because it took place in the participants' normal setting for this behaviour, a real local shop where people normally respond to shop assistants, and some controls were still possible, e.g. the same shop and the same assistants on both days. [3]

(b) **(i)** Suggest how Dr Casson could have measured the dependent variable in her study.

By observing the customers' emotional expressions as they are served: a hidden observer tallies how many customers smile at the assistant and how many frown, in each condition.

[2]

(ii) Suggest **one** reason why it may be more difficult to measure the dependent variable in a field experiment than in a laboratory experiment.

In a shop she cannot give questionnaires or tests without making the aim obvious, so she must rely on observing emotions, which is harder to record accurately, e.g. brief smiles may be missed in a busy shop, so the data may be less reliable. [2]

8 Keung and Jovita are planning a correlational study to investigate the relationship between a person's physical activity level and their attention level. They each make a different prediction about their results.

(a) Suggest how Keung and Jovita could measure the physical activity level of their participants.

Count how many steps each participant takes per day for a week, using a step-counting app on their phone, and calculate their daily mean. [1]

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(b) Write a null hypothesis for Keung and Jovita's correlational study.

There will be no correlation between a person's physical activity level and their attention level. [1]

(c) Keung predicted that there would be a positive correlation and Jovita predicted that there would be a negative correlation.

Their results show that a higher physical activity level is related to a lower attention level.

Explain whether Keung or Jovita's prediction was correct.

Jovita was correct, because she predicted a negative correlation, which is where as one variable increases the other decreases, and here as physical activity level went up, attention level went down.

[2]

(d) Keung and Jovita plot a scatter diagram of their results.

Explain how they can see the strength of the correlation from their scatter diagram.

Each point shows one participant's physical activity and attention scores. If the points lie close to the line of best fit, physical activity is strongly related to attention; if they are widely scattered around the line, the correlation is weak.

[2]

(e) Keung and Jovita's friend says that their results show that the difference in physical activity level is affecting attention level.

Explain why they **cannot** draw this conclusion from their research.

A correlation cannot show cause and effect, because no variable is manipulated. They do not know whether activity affects attention, attention affects activity, or a third variable such as age changes both.

[2]

9 Dr Wilson is conducting an experiment on memory for complex, coloured shapes. He is using students for his sample. Dr Wilson intends to generalise his results widely, to understand how well internet users remember visual stimuli.

(a) Suggest how **one** extraneous variable could affect Dr Wilson's study.

Colour blindness: students who are colour blind would find it harder to see and remember the colours of the shapes, so their scores would be lower for reasons unrelated to memory, making the results less valid.

..... [2]

(b) **(i)** Dr Wilson is using a volunteer sample of students from his university.
Suggest how he could recruit his sample.

He could put up adverts around the university and in the student residences, asking students who would like to take part in a memory study to contact him by email, so the students choose to reply to become participants.

..... [2]

(ii) Suggest **one** advantage of using a volunteer sample compared to an opportunity sample.

Volunteers have chosen to take part, so they are more willing and committed than people approached by opportunity sampling, so they are less likely to drop out or not try hard during the memory task.

..... [2]

(iii) Suggest **one** disadvantage of using a volunteer sample compared to an opportunity sample.

It may be slower, as he has to wait for students to reply to his adverts and there may be few replies, whereas with opportunity sampling he could ask students who are nearby straight away.

..... [2]

(c) One reason why Dr Wilson cannot generalise the results from his study is his sampling technique.

State **one** reason why he should **not** generalise the results from his students to all internet users, other than his sampling technique.

Students are younger than many internet users and use the internet a lot for their studies, so they have more practice with visual stimuli on screens. ..... [1]

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Question 10 appears on Page 10.

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Section C

Answer **all** questions in this section.

10 Dr Birkin is planning an observational study of children's imaginary play behaviour (for example, a child might use a leaf as a plate, or a big cardboard box as a boat or a house).

(a) Describe how Dr Birkin could conduct an observational study of children to investigate their imaginary play behaviour.

Dr Birkin would carry out a naturalistic, non-participant, structured observation. It would be overt, as the children can see her, but she would visit the nursery every day for a week first so the children get used to her and behave naturally.

Participants and location: 30 children aged 3 to 5 at a local nursery, observed in the outdoor play area during free-play time (10:00 to 11:00 am). Each morning the staff put out the same set of open-ended objects: leaves, sticks, large cardboard boxes, wooden blocks, cups and cloths.

Procedure: Dr Birkin sits quietly at the edge of the play area and does not interact with the children or join in their play. The session is also video-recorded. She uses focal sampling: each child is observed for 10 minutes on three different days, and every 30 seconds she ticks the category of behaviour the child is showing (time sampling).

Behavioural categories (imaginary play):

- object substitution: using an object as if it were something else, e.g. a leaf as a plate or a block as a phone

- pretend scene: making something into a place, e.g. a box as a boat or a house

- imaginary object: acting with something that is not there, e.g. pouring pretend tea

- role play: pretending to be another person or animal, e.g. a parent or a dog

- non-imaginary play: e.g. running, climbing, building with no pretence.

She also makes brief qualitative notes of what each object was used as (e.g. "stick = spoon").

Ethics: the nursery and parents give informed consent; any child who becomes upset or wants to stop is not observed; children are identified only by codes and the videos

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are kept securely and deleted afterwards; parents are debriefed.

Analysis: tallies for each category are totalled and turned into the percentage of intervals spent in each type of play, shown on a bar chart, and the mean number of object substitutions per child is calculated.

..... [10]

(b) Identify **one** practical weakness/limitation with the procedure you have described in your answer to part **(a)** and suggest how your study might be done differently to overcome the problem.

Do **not** refer to ethics or sampling in your answer.

As Dr Birkin is the only observer, deciding whether play is imaginary is subjective, e.g. a child pushing a box could be pretending it is a car or simply moving it, so her coding may be inconsistent and the data unreliable. To overcome this, a second trained observer could independently code the same video footage using the same behavioural categories. Their tallies would be correlated, and any category they disagree on would be defined more clearly (with examples) and re-coded until there is high inter-rater reliability.

..... [4]

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