Cambridge Assessment International Education

Cambridge International AS & A Level

CANDIDATE NAME: StemUp Model Solution

CENTRE NUMBER | | | | | |

CANDIDATE NUMBER | | | | |

5070981004

PSYCHOLOGY **9990/11**

Paper 1 Approaches, Issues and Debates **May/June 2023**

1 hour 30 minutes

You must answer on the question paper.

No additional materials are needed.

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.
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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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Answer **all** questions.

1 From the study by Schachter and Singer (two factors in emotion):

(a) Identify which **one** of the following groups scored the highest on the Activity Index in the Euphoria condition.

- ☐ Epinephrine Ignorant (Epi Ign)
- ☐ Epinephrine Informed (Epi Inf)
- ☑ Epinephrine Misinformed (Epi Mis)
- ☐ Placebo [1]

(b) In the Anger condition, an observer recorded the participant's response to the stooge using several categories.

Outline how the category of 'Ignores' was operationalised in this study.

The participant made no verbal response to the stooge and ignored his comments. They did not look at or pay any attention to the stooge, but worked wholly on their own questionnaire. [2]

2 From the study by Andrade (doodling):

(a) Identify **two** features of the sample used in this study.

1 *There were 40 participants, aged 18 to 55 years (35 female, 5 male).*

2 *Opportunity sample from the panel of the MRC Applied Psychology Unit, Cambridge.* [2]

(b) Identify **one** strength of the sample used in this study.

It is more generalisable because it had a wide age range (18 to 55) and included both males and females. [1]

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3 From the study by Saavedra and Silverman (button phobia):

(a) Describe the Disgust/Fear hierarchy used in this study.

The boy rated 11 different scenarios involving buttons (different types of buttons and situations) for how distressing they were. He rated each one using a Feelings Thermometer, a distress scale from 0 to 8, where 0 = no distress and 8 = the highest distress. For example, small clear plastic buttons were rated 8, the most distressing item.

..... [3]

(b) Explain **one** weakness of the Disgust/Fear hierarchy used in this study.

The ratings were subjective self-reports, so the boy may have given socially desirable ratings, e.g. lower distress than he felt to please his mother and the therapist. This means the hierarchy may not accurately show his real level of disgust or fear.

..... [2]

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4 The study by Piliavin et al. (subway Samaritans) used 'victims' who needed help.

(a) Describe the victims used in this study.

The victims were all male, aged 26 to 35 years; three were white and one was black. They were identically dressed in Eisenhower jackets, old slacks and no tie. In the drunk condition the victim smelled of liquor and carried a bottle of liquor wrapped in a brown paper bag. In the ill condition the victim appeared sober and carried a black cane. About 70 seconds after the train left the station, the victim staggered forward and collapsed on the floor, then stayed lying there looking at the ceiling until he received help.

..... [4]

(b) One conclusion was that in a field setting, diffusion of responsibility did **not** happen.

Outline **one** other conclusion from this study.

A person who appears ill is more likely to receive help when they collapse than a person who appears drunk, because people feel more sympathy for someone who is not to blame for their condition and the costs of helping them seem lower.

..... [2]

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5 In Experiment 1 of the study by Laney et al. (false memory), participants completed both the Food History Inventory and the Restaurant Questionnaire.

Describe **one** result from the Food History Inventory and **one** result from the Restaurant Questionnaire.

You **must** use data for **one** of these results.

Result – Food History Inventory *After the false suggestion, the Love group's confidence that they had loved asparagus the first time they tried it increased significantly more than the Control group's. The Love group's mean rating increased by 2.6 points, while the Control group's rating stayed roughly the same (it rose by only 0.2 points).*

Result – Restaurant Questionnaire *The Love group gave higher mean ratings than the Control group for how much they would like to order asparagus dishes in a restaurant, at both sessions. Believers in the Love group reported more desire to eat asparagus at Session 2 than non-believers, with their score rising by around 0.5 points.*

[5]

6 Outline **two** assumptions of the cognitive approach.

You **must** use an example from a core study for each assumption.

1 *Behaviour and emotions can be explained in terms of internal cognitive processes such as attention, memory, perception and language. For example, in Andrade's study doodling while listening to a boring telephone message helped participants to maintain attention, so the doodling group recalled 29% more information than the control group (7.5 vs 5.8 names).*

2 *Similarities and differences between people can be understood in terms of individual patterns of cognition. For example, in Baron-Cohen et al.'s study adults with AS/HFA scored significantly lower on the Revised Eyes Test than the control groups, showing that they process information about other people's mental states (theory of mind) differently.*

[6]

7 Suggest **two** real-world applications based on the study by Milgram (obedience).

Your suggestions **must** be ethical.

1 *Teachers could get students to complete set tasks in the classroom by wearing smart, formal clothes that show authority and by using firm verbal prods, e.g. "You must finish this task before the end of the lesson".*

2 *Doctors could encourage people to take up a life-saving vaccine by appearing in advertisements wearing a white lab coat in a clinic, firmly telling people that "it is essential that you have the vaccine".*

[4]

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8 Two friends, Danilo and Noah, are discussing the validity of the study by Baron-Cohen et al. (eyes test). Danilo thinks the study has validity but Noah thinks the study does **not** have validity.

Explain **one** reason why Danilo is correct and **one** reason why Noah is correct, using evidence from this study.

Danilo (has validity) *The study has internal validity because of its controls. Every participant saw the same 36 black and white photographs of the eye region, each with the same four mental state words to choose from, in a standardised procedure, and a glossary was available so that all participants understood the words. Because extraneous variables were controlled, Baron-Cohen could conclude that the type of participant (AS/HFA or control) caused the difference in Eyes Test scores.*

Noah (does **not** have validity) *The study lacks ecological validity. The participants only judged static photographs of the eyes, which is not how we judge emotions in real life, where faces move and we also have social cues such as the person's voice, body language and the situation. So low scores on the Eyes Test may not show how well people with AS/HFA actually understand others in everyday life. It also lacks population validity as there were only 15 AS/HFA participants, all male.*

[6]

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9 From the study by Dement and Kleitman (sleep and dreams):

(a) Describe what is meant by REM sleep.

REM stands for rapid eye movement sleep, when the eyes move rapidly from side to side under the eyelids. The EEG shows a low-voltage, relatively fast brain wave pattern, similar to when we are awake, although the body's muscles are paralysed. It is the stage of sleep in which we tend to dream and are most likely to recall dreams. REM periods occur at regular intervals through the night, about every 90 minutes, lasting from 3 to 50 minutes (on average about 20), and they tend to get longer as the night goes on.

..... [4]

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(b) Explain **one** similarity and **one** difference between the study by Dement and Kleitman (sleep and dreams) and the study by Canli et al. (brain scans and emotions).

Similarity: both studies used small samples. Dement and Kleitman studied only 9 adults (7 men and 2 women), and only 5 of them were studied intensively, while Canli et al. used only 10 right-handed female participants. Because both samples were so small and narrow (e.g. Canli used no men), the findings about dreaming and about emotional memory may not be generalisable to people in general.

Difference: the studies used different techniques to measure brain activity. Canli et al. used an fMRI scan, which showed which areas of the brain (e.g. the amygdala) were active while participants viewed emotional scenes. Dement and Kleitman used an EEG, with electrodes on the scalp and near the eyes, which could only record the pattern of electrical brain wave activity and eye movements during sleep, not where in the brain it came from. Therefore Canli's technique gives more detailed, comprehensive information about brain activity than Dement and Kleitman's.

[8]

10 Evaluate the study by Bandura et al. (aggression) in terms of **two** strengths and **two** weaknesses. At least one of your evaluation points **must** be about reliability.

One strength of Bandura et al.'s study is its reliability. It used a standardised procedure; each model performed the same distinctive aggressive acts towards the Bobo doll (e.g. hitting it with a mallet and saying "Pow"), all children experienced the same mild aggression arousal, and each child spent 20 minutes in the same room with the same toys. Behaviour was recorded in 5-second intervals, giving 240 response units per child. This means the study can be replicated to check whether the results are consistent. The observations also had high inter-rater reliability, as a second observer independently rated half of the children and agreement with the model was high (about 0.9), so the scoring did not depend on one person's judgement.

A second strength is high internal validity due to its controls. Children were matched in triplets on their aggression ratings from the teacher and experimenter, then randomly allocated to the aggressive, non-aggressive or control condition, so differences in aggression were not due to how aggressive the children already were. As the observation produced quantitative data, the groups could be compared objectively, so Bandura could conclude the model caused the imitation.

However, one weakness is ethics. The 72 young children (aged about 3 to 5) were exposed to an adult behaving violently and were deliberately frustrated by being taken away from attractive toys. This may have caused distress and the children may have learned aggressive behaviour that continued after the study, so they were not protected from harm.

A second weakness is low ecological validity and generalisability. The children watched an unfamiliar adult in a laboratory and then played with a Bobo doll, a toy designed to be hit, so their behaviour may have been play rather than real aggression and may not show how children imitate violence they see in everyday life. Also, all the children came from one university nursery, so the sample may not represent children from other backgrounds.

Overall, the high reliability and controls give confidence that the model caused the imitation, but the ethical problems and the artificial setting mean the findings should be

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applied to real life with caution.

[10]

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Cambridge Assessment International Education

Cambridge International AS & A Level

CANDIDATE NAME: StemUp Model Solution

CENTRE NUMBER | | | | | |

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4612702940

PSYCHOLOGY **9990/12**

Paper 1 Approaches, Issues and Debates **May/June 2023**

1 hour 30 minutes

You must answer on the question paper.

No additional materials are needed.

INSTRUCTIONS

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Answer **all** questions.

1 From the study by Schachter and Singer (two factors in emotion):

(a) Identify which **one** of the following groups self-rated the highest score for palpitations in the Euphoria condition.

- [x] Epinephrine Ignorant (Epi Ign)
- [ ] Epinephrine Informed (Epi Inf)
- [ ] Epinephrine Misinformed (Epi Mis)
- [ ] Placebo [1]

(b) In the Anger condition, an observer recorded the participant's response to the stooge using several categories.

Outline how the category of 'Watches' was operationalised in this study.

The participant made no verbal response to the stooge's comments, neither agreeing nor disagreeing with him, but just directly watched (observed) the stooge. [2]

2 From the study by Baron-Cohen et al. (eyes test).

(a) Name the **two** tests used in this study, other than the eyes test.

1 *Autism Spectrum Quotient (AQ) questionnaire*

2 *An IQ test (Wechsler adult intelligence scale)* [2]

(b) For **one** of the tests you named in **(a)**:

Identify **one** strength of this test.

The AQ gives quantitative scores, so the AS/HFA group's scores can be compared easily and objectively with the control groups. [1]

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3 In the study by Canli et al. (brain scans and emotions), participants viewed scenes.

(a) Outline how the participants' emotional arousal towards the scenes was measured.

Participants were shown 96 scenes in the fMRI scanner. After each scene they rated how emotionally intense it was for them by pressing a button on a four-point scale, from 0 = not emotionally intense at all to 3 = extremely emotionally intense.

[3]

(b) Explain **one** weakness of how the participants' emotional arousal towards the scenes was measured.

It was a forced choice scale with only four options, so the rating may not exactly represent how the participant actually felt about the scene. It is also subjective, so different participants may have different ideas of what a "3" means.

[2]

4 From the study by Bandura et al. (aggression):

(a) Describe how the participants were allocated into the experimental groups.

Before the study, each child was rated for aggression by the experimenter and a nursery teacher who knew the children well, on four five-point scales (physical aggression, verbal aggression, aggression towards objects and aggressive inhibition). These were added to give each child a composite aggression score. Children were then arranged in triplets with similar aggression scores, and the members of each triplet were randomly allocated, one each, to the aggressive model, non-aggressive model and control groups.

..... [4]

(b) One conclusion was that imitation of aggression in children is influenced by the sex of the model.

Outline **one** other conclusion from this study.

Witnessing an adult behave aggressively is enough to produce aggression in children, as they imitate the aggressive behaviour even when the model is no longer present and without being rewarded for it.

..... [2]

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5 In Experiment 2 of the study by Laney et al. (false memory), participants completed both the 'Memory or Belief?' questionnaire and the Food Preferences Questionnaire.

Describe **one** result from the 'Memory or Belief?' questionnaire and **one** result from the Food Preferences Questionnaire.

You **must** use data for **one** of these results.

Result – 'Memory or Belief?' questionnaire *More participants in the Love group reported that they had a "memory" of loving asparagus the first time they ate it, compared with the Control group. In the Love group this was 28% of participants.*

Result – Food Preferences Questionnaire *Believers in the Love group reported more desire to eat asparagus at Session 2 (the follow-up) compared with the controls. The mean rating for the believers rose by 1 point, while the controls' rating did not increase in this way.*

[5]

6 Outline **two** assumptions of the social approach.

You **must** use an example from a core study for each assumption.

1 *Behaviour, cognitions and emotions can be influenced by other individuals. For example, in Milgram's study the experimenter in a grey lab coat used verbal prods such as "The experiment requires that you continue", and 65% of participants obeyed and continued to give the maximum 450-volt shock.*

2 *Behaviour, cognitions and emotions can be influenced by groups and the social context. For example, in Piliavin et al.'s study on the New York subway, helping depended on the situation: the ill victim with a cane received spontaneous help on 62 of 65 trials, but the drunk victim only on 19 of 38 trials, and on some trials people only helped after a model had intervened.*

[6]

7 Suggest **two** real-world applications based on the study by Dement and Kleitman (sleep and dreams).

Your suggestions **must** be ethical.

1 *It can help people with sleep disorders. With the patient's consent, a sleep clinic could attach them to an EEG overnight to check whether their brain waves and REM cycles (about every 90 minutes) are typical or not.*

2 *It can help people improve their quality of sleep. People could use a sleep app or smart watch to track their stages of sleep and REM time, to see if their sleep needs improving, e.g. by going to bed earlier.*

[4]

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8 Two friends, Haji and Dottie, are discussing the ethics of the study by Yamamoto et al. (chimpanzee helping). Haji thinks the study is ethical but Dottie thinks the study is **not** ethical.

Explain **one** reason why Haji is correct and **one** reason why Dottie is correct, using evidence from this study.

Haji (ethical) *The study followed the guideline of using the smallest number of animals needed to meet the aims of the study. Yamamoto et al. used only five chimpanzees, which was enough to test targeted helping. Also, the chimpanzees did not experience any deprivation; they were not deprived of food and had access to water at all times.*

Dottie (**not** ethical) *Behaviour should not be controlled by rewards in a way that causes suffering. In the study only one chimpanzee could get the juice reward, at the expense of the other, as the helper received nothing. The recipient could also see the juice but could not reach it without help, so it may have been frustrated and stressed while waiting, especially when its partner did not give it the right tool.*

[6]

9 From the study by Saavedra and Silverman (button phobia):

(a) Outline what is meant by a phobia.

A phobia is an irrational, persistent fear of a specific object or situation, so the person feels very anxious in the presence of the phobic stimulus and avoids it.

..... [2]

(b) Outline what is meant by evaluative learning.

It is a form of classical conditioning in which a person comes to evaluate a previously neutral object negatively as a result of complex cognitive processes, so it is more likely to cause disgust than fear.

..... [2]

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(c) Explain **one** similarity and **one** difference between the study by Saavedra and Silverman (button phobia) and the study by Pepperberg (parrot learning).

Similarity: both studies used the case study method. Saavedra and Silverman studied one 9-year-old boy who had been diagnosed with a button phobia, and Pepperberg studied one African Grey parrot, Alex, who was tested on the concepts of same and different. This means both studies could collect rich, in-depth data about the participant over a long period, but the results may not be generalisable to other people with phobias or to other parrots.

Difference: the studies used different species. Saavedra and Silverman's participant was a human child, so the findings about treating a phobia with disgust imagery exposure can be applied directly to other people, and the boy and his mother could give informed consent. Pepperberg's participant was a parrot, so she had to follow ethical guidelines for animals (e.g. housing and caring for Alex properly), and her findings about understanding abstract concepts may not be generalisable to humans.

..... [8]

10 Evaluate the study by Andrade (doodling) in terms of **two** strengths and **two** weaknesses. At least one of your evaluation points **must** be about the use of an independent measures design.

One strength of Andrade's study is its independent measures design. Each participant heard the telephone message only once, in either the doodling or the control condition, so there were no order effects. If participants had done both conditions they would have known about the surprise memory test and heard the party names before, so their recall in the second condition would have been improved by practice. This increases the validity of the comparison between the two groups.

A second strength is reliability through a standardised procedure. All participants heard the same tape-recorded mock telephone message of about 2.5 minutes, spoken in a monotonous voice, with the same names and places, and the doodling group all shaded the same printed shapes. This makes the study replicable, and the controls give internal validity, so Andrade could conclude that doodling caused the 29% better recall (mean 7.5 names compared with 5.8 in the control group).

However, a weakness of the independent measures design is participant variables. There were only 20 people in each group, so individual differences such as memory ability, age (the sample ranged from 18 to 55) or how tired and bored each person already was could have caused the difference in recall rather than the doodling. This reduces the validity of the conclusion.

A second weakness is low ecological validity. Participants shaded shapes they were told to shade while listening to a deliberately boring recorded message in a laboratory, which is not like spontaneous everyday doodling during a real phone call or lecture. Also, the sample was mainly female (35 of 40), so the findings may not generalise to men.

Overall, the design and controls give good evidence that doodling helps attention, but the small groups and artificial task mean the findings should be applied to real life with caution.

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CANDIDATE NAME: StemUp Model Solution

CENTRE NUMBER: | | | | | |

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PSYCHOLOGY **9990/13**

Paper 1 Approaches, Issues and Debates **May/June 2023**

1 hour 30 minutes

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Answer **all** questions.

1 From the study by Schachter and Singer (two factors in emotion):

(a) Identify which **one** of the following groups scored the lowest on the Activity Index in the Euphoria condition.

- [ ] Epinephrine Ignorant (Epi Ign)
- [x] Epinephrine Informed (Epi Inf)
- [ ] Epinephrine Misinformed (Epi Mis)
- [ ] Placebo [1]

(b) In the Anger condition, an observer recorded the participant's response to the stooge using several categories.

Outline how the category of 'Neutral' was operationalised in this study.

The participant gave a non-committal or irrelevant response to any of the stooge's remarks, so they neither agreed nor disagreed with him. [2]

2 From the study by Piliavin et al. (subway Samaritans):

(a) Name **two** measures observed for every participant who helped a victim.

1 *Latency: the time taken for the first person to help the victim*

2 *The sex, race and location in the carriage of each helper*

[2]

(b) Identify **one** methodological strength of this study.

It has high ecological validity, as it was a field experiment on a real New York subway train with real passengers. [1]

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3 In the final part of the study by Bandura et al. (aggression), each participant spent 20 minutes in the experimental room and their behaviour was observed through a one-way mirror.

(a) Outline the procedure for this final part of the study.

The room contained aggressive toys (e.g. a Bobo doll, mallet and dart guns) and non-aggressive toys (e.g. crayons and a tea set). Behaviour was recorded in predetermined categories, e.g. imitative physical aggression and imitative verbal aggression. The 20 minutes were divided into 5-second intervals using an electric interval timer, giving 240 response units per child.

..... [3]

(b) Explain **one** weakness of this final part of the study.

The observers may have known which condition each child had been in, because many children copied the model's distinctive aggressive acts. This could cause observer bias, so the recording of behaviour may not have been valid.

..... [2]

4 From the study by Milgram (obedience):

(a) Describe the feedback from the learner (victim) that was given to the teacher (participant) during this study.

The learner's responses were predetermined. He gave about three wrong answers to every one correct answer. No vocal response was heard until the 300-volt shock, when the learner pounded on the wall, and from then on he gave no answers on the signal box. He pounded on the wall again at 315 volts, and after that there was no more pounding and no answers at all.

..... [4]

(b) One conclusion was that people find it stressful to follow destructive orders from a person in authority.

Outline **one** other conclusion from this study.

People are much more obedient to an authority figure than we would expect, and will follow orders even if it means harming an innocent person.

..... [2]

5 In Experiment 2 of the study by Laney et al. (false memory), participants completed both the Food History Inventory and photograph ratings of food items.

Describe **one** result from the Food History Inventory and **one** result from the photograph ratings of food items.

You **must** use data for **one** of these results.

Result – Food History Inventory *The mean confidence of the Love group that they had loved asparagus the first time they ate it increased more than the Control group's after the false suggestion. The Love group's mean rating increased by 2.5 points.*

Result – photograph ratings *Believers rated the photograph of asparagus as more appetising than the controls did, with a mean rating of 5.1. Believers also gave asparagus the lowest rating for how disgusting it looked.*

[5]

6 Outline **two** assumptions of the learning approach.

You **must** use an example from a core study for each assumption.

1 *Behaviour can be learned and changed through operant conditioning, so behaviour that is reinforced is more likely to be repeated. For example, in Pepperberg's study Alex the parrot was rewarded with the object he correctly identified, so correct answers about same and different were reinforced.*

2 *Behaviour can be learned through social learning, by observing and imitating models. For example, in Bandura et al.'s study children who watched an adult hit the Bobo doll with a mallet and say "Pow" later imitated these aggressive behaviours, although they had never been rewarded for them.*

[6]

7 Suggest **two** real-world applications based on the study by Baron-Cohen et al. (eyes test).

Your suggestions **must** be ethical.

1 *The eyes test could be used as a diagnostic tool for AS/HFA. Clinicians could give the test (with consent) alongside other assessments, as people who score low may show a lack of theory of mind.*

2 *The eyes test could be used to improve social intelligence in people with AS/HFA. A therapist could go through the photographs with them, explaining why each pair of eyes shows that mental state, to help them recognise emotions.*

[4]

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8 Two friends, Maria and Oscar, are discussing the ethics of the study by Saavedra and Silverman (button phobia). Maria thinks the study is ethical but Oscar thinks the study is **not** ethical.

Explain **one** reason why Maria is correct and **one** reason why Oscar is correct, using evidence from this study.

Maria (ethical) *The study gained informed consent. Consent was obtained from both the boy and his mother before the therapy started, so they both knew exactly what the treatment would involve. They agreed to take part in the study and to the results being published, so the boy's rights were respected.*

Oscar (**not** ethical) *The study could easily have caused psychological stress, so there was a risk of harm. The boy had to confront his button phobia throughout the therapy, imagining disgusting images of buttons. He also had to discuss possible causes of his phobia, such as the incident when buttons fell on him in art class, which would have been distressing for him.*

[6]

9 From the study by Yamamoto et al. (chimpanzee helping):

(a) Outline what is meant by altruism.

Altruism is the willingness to help someone else, even if it gives the helper no benefit or is at a cost to themselves.

..... [2]

(b) Outline what is meant by targeted helping.

Targeted helping is helping based on understanding the other's needs and the demands of the situation, e.g. a chimpanzee selecting the appropriate tool and giving it to another chimpanzee so it can solve the task.

..... [2]

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(c) Explain **one** similarity and **one** difference between the study by Yamamoto et al. (chimpanzee helping) and the study by Pepperberg (parrot learning).

Similarity: both studies used non-human animals as participants. Yamamoto et al. used chimpanzees at the Primate Research Institute in Japan to test targeted helping, while Pepperberg used one African Grey parrot, Alex, to test his understanding of the concepts of same and different. Therefore both studies had to follow the same ethical guidelines for animals, such as suitable housing, and both have the problem that findings may not generalise to humans.

Difference: the studies used different numbers of participants. Yamamoto et al. tested five chimpanzees in pairs, so they could see whether targeted helping was shown by several animals and compare their behaviour. Pepperberg was a case study of a single parrot, so although she collected in-depth data over a long period, her findings may be unique to Alex. So Yamamoto's findings are more generalisable to the species than Pepperberg's.

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10 Evaluate the study by Dement and Kleitman (sleep and dreams) in terms of **two** strengths and **two** weaknesses. At least one of your evaluation points **must** be about reliability.

One strength of Dement and Kleitman's study is its reliability. It used a standardised procedure: participants avoided alcohol and caffeine on the day of the study, arrived at the laboratory near their usual bedtime, had electrodes attached near the eyes and on the scalp, and were woken by a loud doorbell. They then described any dream into a tape recorder by the bed before any contact with the experimenter. This means the study could be replicated, and the results were consistent across participants, as dreams were recalled after 152 of 191 REM awakenings compared with only 11 of 160 NREM awakenings.

A second strength is that the EEG gave objective, quantitative data. Machines recorded the brain waves and eye movements, so the researchers could identify REM sleep precisely and the data could not be biased by the researchers' interpretation. This gives the study high internal validity.

However, one weakness is low ecological validity. Participants slept in an unfamiliar laboratory with electrodes attached to their heads and were woken several times by a doorbell, which is very different from normal sleep at home. Their sleep patterns and dreams may therefore not be typical.

A second weakness, also about reliability, is that dream recall relied on self-report. Participants may not have remembered their dreams accurately, and their estimates of whether they had been dreaming for 5 or 15 minutes were subjective. Also, there were only 9 participants (7 men and 2 women), and only 5 were studied intensively, so the sample may not be representative.

Overall, the standardised procedure and objective EEG data make the link between REM sleep and dreaming reliable, but the artificial setting and small sample mean we should be cautious about generalising to everyday sleep.

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