Write your name here

Surname: StemUp Model Solution

Other names:

Pearson Edexcel
International Advanced Level

Centre Number

Candidate Number

Psychology

International Advanced Subsidiary
Paper 2: Biological Psychology, Learning Theories and Development

Thursday 17 May 2018 – Afternoon
Time: 2 hours

Paper Reference
WPS02/01

You do not need any other materials.

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided – *there may be more space than you need.*

Information

- The total mark for this paper is 96.
- The marks for **each** question are shown in brackets – *use this as a guide as to how much time to spend on each question.*
- The list of formulae and statistical tables are printed at the start of this paper.
- Candidates may use a calculator.

Advice

- Read each question carefully before you start to answer it.
- Check your answers if you have time at the end.

Turn over ▶

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FORMULAE AND STATISTICAL TABLES

Standard deviation (sample estimate)

$$\sqrt{\left(\frac{\sum(x-\bar{x})^2}{n-1}\right)}$$

Spearman's rank correlation coefficient

$$1-\frac{6\sum d^2}{n(n^2-1)}$$

Critical values for Spearman's rank

	Level of significance for a one-tailed test				
	0.05	**0.025**	**0.01**	**0.005**	**0.0025**
	Level of significance for a two-tailed test				
N	**0.10**	**0.05**	**0.025**	**0.01**	**0.005**
5	0.900	1.000	1.000	1.000	1.000
6	0.829	0.886	0.943	1.000	1.000
7	0.714	0.786	0.893	0.929	0.964
8	0.643	0.738	0.833	0.881	0.905
9	0.600	0.700	0.783	0.833	0.867
10	0.564	0.648	0.745	0.794	0.830
11	0.536	0.618	0.709	0.755	0.800
12	0.503	0.587	0.678	0.727	0.769
13	0.484	0.560	0.648	0.703	0.747
14	0.464	0.538	0.626	0.679	0.723
15	0.446	0.521	0.604	0.654	0.700
16	0.429	0.503	0.582	0.635	0.679
17	0.414	0.485	0.566	0.615	0.662
18	0.401	0.472	0.550	0.600	0.643
19	0.391	0.460	0.535	0.584	0.628
20	0.380	0.447	0.520	0.570	0.612
21	0.370	0.435	0.508	0.556	0.599
22	0.361	0.425	0.496	0.544	0.586
23	0.353	0.415	0.486	0.532	0.573
24	0.344	0.406	0.476	0.521	0.562
25	0.337	0.398	0.466	0.511	0.551
26	0.331	0.390	0.457	0.501	0.541
27	0.324	0.382	0.448	0.491	0.531
28	0.317	0.375	0.440	0.483	0.522
29	0.312	0.368	0.433	0.475	0.513
30	0.306	0.362	0.425	0.467	0.504

The calculated value must be equal to or exceed the critical value in this table for significance to be shown.

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Chi-squared distribution formula

$$X^2 = \sum \frac{(O-E)^2}{E} \qquad df = (r-1)(c-1)$$

Critical values for chi-squared distribution

	Level of significance for a one-tailed test					
	0.10	**0.05**	**0.025**	**0.01**	**0.005**	**0.0005**
	Level of significance for a two-tailed test					
df	**0.20**	**0.10**	**0.05**	**0.025**	**0.01**	**0.001**
1	1.64	2.71	3.84	5.02	6.64	10.83
2	3.22	4.61	5.99	7.38	9.21	13.82
3	4.64	6.25	7.82	9.35	11.35	16.27
4	5.99	7.78	9.49	11.14	13.28	18.47
5	7.29	9.24	11.07	12.83	15.09	20.52
6	8.56	10.65	12.59	14.45	16.81	22.46
7	9.80	12.02	14.07	16.01	18.48	24.32
8	11.03	13.36	15.51	17.54	20.09	26.12
9	12.24	14.68	16.92	19.02	21.67	27.88
10	13.44	15.99	18.31	20.48	23.21	29.59
11	14.63	17.28	19.68	21.92	24.73	31.26
12	15.81	18.55	21.03	23.34	26.22	32.91
13	16.99	19.81	22.36	24.74	27.69	34.53
14	18.15	21.06	23.69	26.12	29.14	36.12
15	19.31	22.31	25.00	27.49	30.58	37.70
16	20.47	23.54	26.30	28.85	32.00	39.25
17	21.62	24.77	27.59	30.19	33.41	40.79
18	22.76	25.99	28.87	31.53	34.81	42.31
19	23.90	27.20	30.14	32.85	36.19	43.82
20	25.04	28.41	31.41	34.17	37.57	45.32
21	26.17	29.62	32.67	35.48	38.93	46.80
22	27.30	30.81	33.92	36.78	40.29	48.27
23	28.43	32.01	35.17	38.08	41.64	49.73
24	29.55	33.20	36.42	39.36	42.98	51.18
25	30.68	34.38	37.65	40.65	44.31	52.62
26	31.80	35.56	38.89	41.92	45.64	54.05
27	32.91	36.74	40.11	43.20	46.96	55.48
28	34.03	37.92	41.34	44.46	48.28	56.89
29	35.14	39.09	42.56	45.72	49.59	58.30
30	36.25	40.26	43.77	46.98	50.89	59.70
40	47.27	51.81	55.76	59.34	63.69	73.40
50	58.16	63.17	67.51	71.42	76.15	86.66
60	68.97	74.40	79.08	83.30	88.38	99.61
70	79.72	85.53	90.53	95.02	100.43	112.32

The calculated value must be equal to or exceed the critical value in this table for significance to be shown.

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Wilcoxon Signed Ranks test process

- Calculate the difference between two scores by taking one from the other
- Rank the differences giving the smallest difference Rank 1

  Note: do not rank any differences of 0 and when adding the number of scores, do not count those with a difference of 0, and ignore the signs when calculating the difference
- Add up the ranks for positive differences
- Add up the ranks for negative differences
- T is the figure that is the smallest when the ranks are totalled (may be positive or negative)
- N is the number of scores left, ignore those with 0 difference

Critical values for the Wilcoxon Signed Ranks test

	Level of significance for a one-tailed test		
	0.05	0.025	0.01
	Level of significance for a two-tailed test		
n	0.1	0.05	0.02
N=5	0	-	-
6	2	0	-
7	3	2	0
8	5	3	1
9	8	5	3
10	11	8	5
11	13	10	7
12	17	13	9

The calculated value must be equal to or less than the critical value in this table for significance to be shown.

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SECTION A

BIOLOGICAL PSYCHOLOGY

Answer ALL questions in this section. Write your answers in the spaces provided.

1 Synaptic transmission occurs throughout the body, including in the brain.

Describe what is meant by 'synaptic transmission'.

Synaptic transmission is the process by which a message passes from one neuron to the next across the synaptic gap. When an action potential (electrical impulse) arrives at the terminal button of the pre-synaptic neuron, it causes vesicles to move to the membrane and release neurotransmitters into the synapse. The neurotransmitter diffuses across the gap, and if it fits the receptor sites on the post-synaptic neuron it binds to them, so the message continues, either exciting or inhibiting the next neuron. Leftover neurotransmitter is then broken down or taken back up by the pre-synaptic neuron (reuptake).

(Total for Question 1 = 3 marks)

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2 Oti carried out an experiment to determine the effects of drinking coffee on behaviour.

- In Condition A participants were given a puzzle to complete.
- In Condition B the same participants were given a cup of coffee to drink and then asked to complete the same puzzle again.

Oti timed how many seconds it took the participants to complete the puzzle in Condition A and Condition B.

(a) State a fully operationalised directional (one-tailed) hypothesis for the experiment Oti carried out.

(3)

Participants will take significantly more seconds to complete the puzzle after drinking one cup of coffee (Condition B) than when they complete the same puzzle without having drunk any coffee (Condition A).

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Oti's results are shown in **Table 1**.

Condition A Mean number of seconds taken to complete the puzzle before drinking coffee	Condition B Mean number of seconds taken to complete the puzzle after drinking coffee
360	600

Table 1

(b) Interpret the results of this experiment, using the data from **Table 1**.

(3)

The results suggest that drinking coffee had a negative effect on the participants' ability to complete the puzzle. Before drinking coffee they took a mean of 360 seconds, but after drinking a cup of coffee they took a mean of 600 seconds. This is a difference of 240 seconds, so they took (240 ÷ 360) × 100 = 66.7% longer to complete the puzzle after drinking coffee, suggesting caffeine may have made them less able to concentrate on the puzzle.

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Oti carried out a statistical test to determine whether her results were significant or not.

(c) State which statistical test Oti would have used for her data.

(1)

Wilcoxon Signed Ranks test (a test of difference for a repeated measures design).

(d) Explain **one** improvement Oti could have made to her experiment.

(2)

Oti could have used an independent groups design, with one group completing the puzzle without coffee and a different group completing it after a cup of coffee. This would remove order effects, as the slower times in Condition B may have been due to boredom or fatigue from doing the same puzzle twice rather than the coffee, so the results would be more valid.

(Total for Question 2 = 9 marks)

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3 Anastacia had an accident where she slipped on a wet floor, banged her head and was unconscious for a short time. Since then she has become more aggressive, getting angry quickly and often shouting at her friends if she thinks they are wrong. Anastacia recently hit another person who accidently pushed her in a crowded room.

(a) Describe brain functioning as an explanation for Anastacia's aggression.

(4)

When Anastacia banged her head she may have damaged her prefrontal cortex, the area at the front of the brain responsible for decision making and controlling impulses. Because the prefrontal cortex normally inhibits emotional responses from the limbic system, damage to it means Anastacia may no longer be able to control her impulse to get angry and shout at her friends when she thinks they are wrong. Her amygdala, part of the limbic system that processes emotions such as fear and anger, may also have been damaged by the fall. This could make her react to threats more quickly and impulsively, which explains why she hit the person who accidentally pushed her in the crowded room, as she may have interpreted the push as an attack. Raine et al. (1997) found murderers had lower activity in the prefrontal cortex, supporting this.

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(b) Explain **one** strength and **one** weakness of brain functioning as an explanation for Anastacia's aggression.

(4)

Strength

Like Anastacia banging her head when she slipped, the case of Phineas Gage showed that damage to the frontal lobe from a head injury can lead to an increase in aggression and impulsive behaviour. This supports brain functioning as an explanation of Anastacia's aggression, so it has validity.

Weakness

There are other explanations for Anastacia's aggression, such as reinforcement, as she may feel satisfaction after shouting at friends or hitting someone, so the behaviour is repeated. Therefore we cannot say her brain injury alone caused her aggression, which reduces the validity of the explanation.

(Total for Question 3 = 8 marks)

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QUESTION 4 BEGINS ON THE NEXT PAGE.

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4 Gorka carried out a study that looked at the effect of age on the number of minutes children slept per night during a week. He compared a group of 1- to 5-year olds, a group of 6- to 10-year olds and a group of 11- to 15-year olds.

Gorka's results are shown in **Table 2**.

Age range in years	Mean number of minutes slept per night
1- to 5-year olds	660
6- to 10-year olds	600
11- to 15-year olds	540

Table 2

(a) Calculate the ratio of minutes slept for 1- to 5-year olds compared to minutes slept for 6- to 10-year olds.

You **must** express this ratio in its lowest form.

(1)

Space for calculations

660 : 600

÷ 60 ⇒ 11 : 10

Ratio 11 : 10

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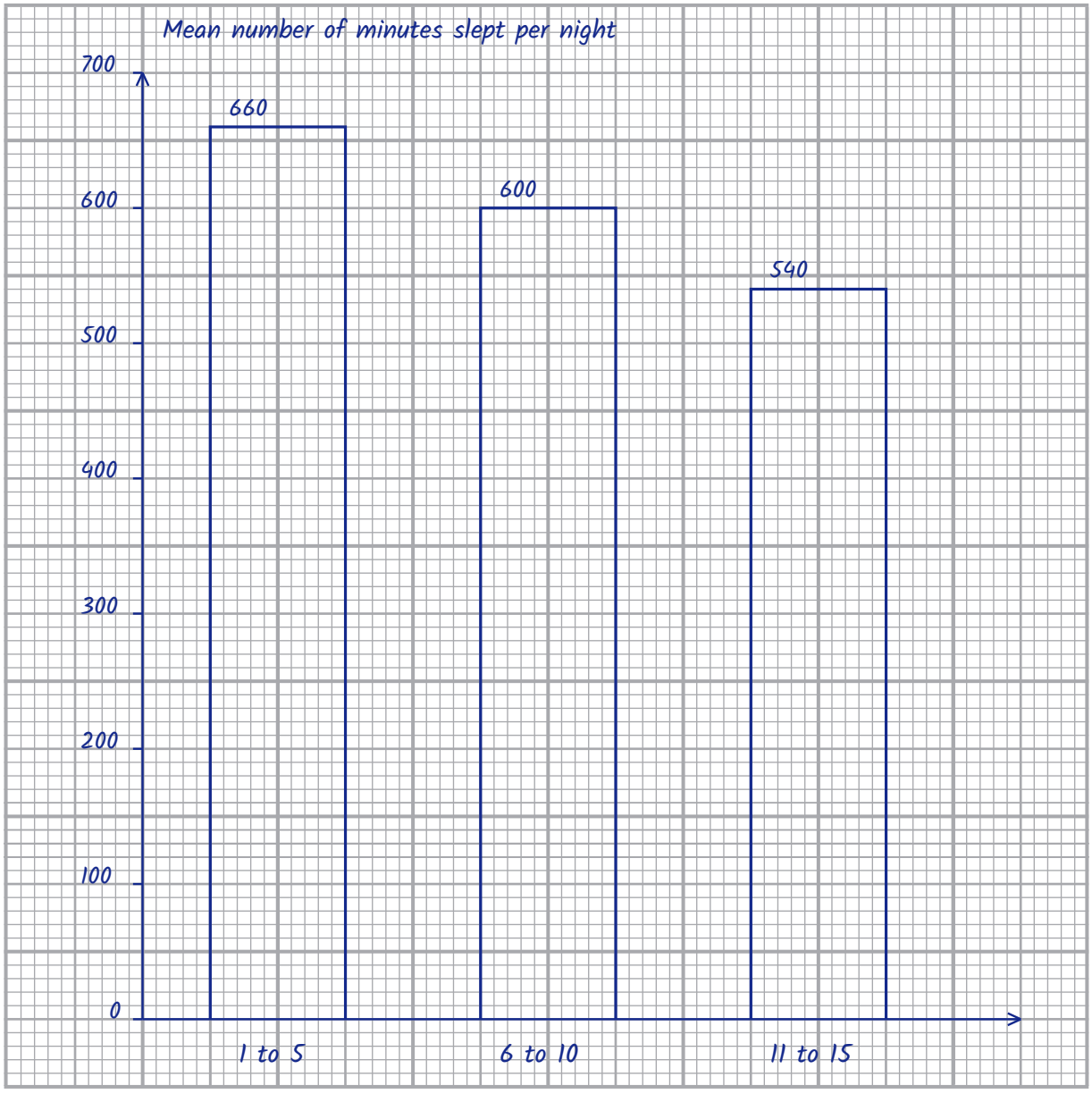
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(b) Draw a suitable graph to represent the data shown in **Table 2**.

(3)

Title

Bar chart showing the mean number of minutes slept per night by age group



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(c) Explain **one** weakness of the mean as a measure of central tendency.

(2)

The mean is affected by extreme scores (outliers). For example, if one child in Gorka's 1- to 5-year-old group slept much longer than the others, the mean would be pulled up, so it may not be an accurate representation of how long most of the children in that group slept.

(Total for Question 4 = 6 marks)

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5 Evaluate research into the role of hormones in aggression.

(8)

Research into hormones and aggression mainly focuses on testosterone, a male sex hormone thought to increase dominance and aggression. Dabbs et al. (1987) measured testosterone in saliva samples from 89 male prison inmates and found that testosterone levels were higher in those who had committed violent crimes than in those who had committed non-violent crimes. Chang et al. (2012) found that in fish, as aggression, exploring and boldness increased, so did the level of testosterone in their blood. Much of this research uses a variety of measures of aggression, such as rating scales, crime records and observations, and measures hormones objectively from saliva or blood samples.

A strength is that hormone levels are measured objectively from saliva or blood, so the data is scientific and not open to interpretation. When more than one measure of aggression is used, the data from each method can be cross-checked, which increases reliability. Dabbs et al. (1987) also had a fairly large sample of 89 participants, so the findings are more generalisable.

However, studies on humans are usually correlational, so they show a relationship between testosterone and aggression but cannot show cause and effect. It may be that behaving aggressively or being in a violent environment, such as prison, raises testosterone rather than testosterone causing the aggression. Dabbs et al. only studied male prisoners, so the findings may not generalise to women or to people outside prison. Animal studies such as Chang et al. (2012) are well controlled and can show causation, but they may not generalise to humans, as human aggression is often social and influenced by learning and culture, whereas in animals this is rarely the case.

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In conclusion, research gives reliable, objective evidence of a link between hormones such as testosterone and aggression, but because human studies are correlational and animal studies may not generalise, hormones are best seen as one factor that interacts with social and environmental factors.

(Total for Question 5 = 8 marks)

TOTAL FOR SECTION A = 34 MARKS

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SECTION B

LEARNING THEORIES AND DEVELOPMENT.

Answer ALL questions in this section. Write your answers in the spaces provided.

6 Ore observed his father painting a picture of a local scene. When the painting was finished Ore's mother praised his father and said how good the painting was. Ore decides to try and paint the same local scene.

(a) Explain, using social learning theory, why Ore's father is a role model for Ore.

(2)

Ore's father is male, so he is the same sex as Ore. According to Bandura, children are more likely to identify with and imitate a role model who is similar to them, so Ore pays attention to his father and copies his behaviour, such as painting.

(b) Describe, using social learning theory, what may have motivated Ore to try and paint the same local scene as his father.

(2)

Ore was vicariously reinforced, as he saw his father being praised by his mother for how good the painting was. Ore is motivated to paint the same scene because he expects that he will also receive praise from his mother if he does.

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Ore also likes to be outside playing cricket with his friends. His mother gives Ore his favourite food when he comes back home after playing cricket.

(c) Describe, using positive reinforcement, **one** reason why Ore likes to be outside playing cricket with his friends.

(2)

Ore is positively reinforced, as he is given his favourite food, a pleasant consequence, when he comes home after playing cricket. He associates playing cricket with this reward, so the behaviour is strengthened and he is more likely to want to go outside and play cricket again.

(Total for Question 6 = 6 marks)

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7 Aljaz carried out a study to investigate whether the use of an electric shock would teach pigeons not to peck at a circle. He placed one pigeon at a time in a box that contained a circle on one of the walls. When they pecked at a circle, the pigeons either received an electric shock or did not receive an electric shock.

- In Condition A, pigeons did not get an electric shock if they pecked at the circle.
- In Condition B, pigeons did get an electric shock if they pecked at the circle.

On the following day, the pigeons were placed in the box again. Aljaz recorded how many pigeons pecked at the circle and how many pigeons did not peck at the circle. The results are shown in **Table 3**.

	Number of pigeons that did not peck at a circle	**Number of pigeons that pecked at a circle**
Condition A **Did not get electric shock**	13	20
Condition B **Did get electric shock**	22	5

Table 3

(a) Calculate *df* using **Table 3**.

The formula can be found in the formulae and statistical tables at the front of the exam paper.

(1)

Space for calculations

$df = (\text{rows} - 1) \times (\text{columns} - 1)$

$= (2 - 1) \times (2 - 1)$

df = 1

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(b) Calculate the chi-squared for the data gathered by Aljaz by completing **Table 4**.

You should give your answer to **two** decimal places.

The formula can be found in the formulae and statistical tables at the front of the exam paper.

		Observed	Expected	O-E	$(O-E)^2$	$(O-E)^2/E$
Condition A **Did not get electric shock**	Did not peck at circle	13	19.25	−6.25	39.0625	2.0292
	Pecked at circle	20	13.75	6.25	39.0625	2.8409
Condition B **Did get electric shock**	Did not peck at circle	22	15.75	6.25	39.0625	2.4802
	Pecked at circle	5	11.25	−6.25	39.0625	3.4722
				Chi-squared =		10.82

Table 4

(4)

Space for calculations

$13 - 19.25 = -6.25$, $(-6.25)^2 = 39.0625$, $39.0625 \div 19.25 = 2.0292$

$20 - 13.75 = 6.25$, $39.0625 \div 13.75 = 2.8409$

$22 - 15.75 = 6.25$, $39.0625 \div 15.75 = 2.4802$

$5 - 11.25 = -6.25$, $39.0625 \div 11.25 = 3.4722$

$\chi^2 = 2.0292 + 2.8409 + 2.4802 + 3.4722 = 10.8225$

$\chi^2 = 10.82$ (2 d.p.)

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(c) Describe **two** ethical issues, using the Scientific Procedures Act (1986), regarding the use of animals in laboratory experiments.

(4)

1 *Re-use of animals: under the Act an animal cannot be re-used in a second procedure if that procedure would cause more pain than the first. A vet must also declare that the animal is healthy enough to be re-used.*

2 *Killing animals: if an animal has to be killed, this can only be done by an establishment with the correct licence. It must be done as humanely as possible, using an approved method, with the animal sedated first.*

(d) Explain **one** weakness with generalising results from an animal study to humans.

(2)

Animals such as pigeons have different brain structures from humans, for example a much less developed cortex. This means humans may not learn or behave in the same way, as they use cognitive processes, so the findings may not be valid when applied to human behaviour.

(Total for Question 7 = 11 marks)

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8 Psychoanalysis uses many different techniques.

(a) Describe free association as it is used in psychoanalysis.

(4)

The aim of free association is to allow unconscious thoughts and feelings to be expressed so they can be made conscious. The patient lies on a couch, usually with the psychoanalyst sitting behind them, so they cannot see the analyst's reactions to what they say. The patient is asked to say whatever comes into their mind, such as early memories or reactions to a word, without censoring anything, however trivial or embarrassing it seems, with little or no input from the analyst. This allows the patient to say things they would not say if asked direct questions, as the ego is not monitoring what is said as closely. The analyst notes any hesitations, slips or blocks, which may show resistance, and interprets what is said to uncover repressed memories and conflicts.

(b) Describe transference as it is used in psychoanalysis.

(2)

Transference is when the patient unconsciously redirects feelings they had towards someone important in their past, usually their parents, onto the therapist. This allows the analyst and patient to understand how the patient reacts to their parents because of their unconscious thoughts.

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Tameka is a psychoanalyst. She has an adult client that she has been seeing for over a year. Recently Tameka has found that her client acts in a childlike manner, and Tameka is responding to this by getting frustrated with her client.

She feels her client should be able to make decisions for herself and gets angry with the client when she does not. Tameka has found that she sometimes talks to her client in an angry tone of voice, and does not listen to her client as closely as she should.

(c) Describe counter-transference in relation to Tameka and her client.

(3)

Counter-transference is when the therapist unconsciously transfers their own feelings onto the client, often in response to the client's transference. Tameka's client acts in a childlike way, so Tameka is responding to her as a frustrated parent might, by getting angry that she cannot make her own decisions and speaking to her in an angry tone. Tameka can use this to see that the client's parents may also have become frustrated and spoken angrily to her. Tameka and the client can then explore how her parents' reactions may have led to the client's unconscious response of acting in a childlike manner. Tameka should also discuss her feelings in supervision, as not listening closely could harm the therapy.

(Total for Question 8 = 9 marks)

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9 Assess the effectiveness of systematic desensitisation as a treatment/therapy.

(8)

Systematic desensitisation is a therapy based on classical conditioning, used mainly to treat phobias by replacing the fear response with relaxation (counter-conditioning). The therapist first carries out a functional analysis to find out what triggers the client's anxiety. The client then builds a hierarchy of fear with the therapist, ranking feared situations from least to most anxiety-provoking, for example from looking at a picture of a spider to holding one. The therapist teaches relaxation techniques such as deep breathing and muscle relaxation. The client is then exposed to the lowest situation on the hierarchy, either imagined (in vitro) or real (in vivo), and practises relaxing until they no longer feel any anxiety. They only move up to the next step when they are calm, because it is impossible to be relaxed and afraid at the same time (reciprocal inhibition).

There is evidence that systematic desensitisation is effective. McGrath et al. (1990) found that 75% of patients with a phobia of a specific object showed a significant improvement after systematic desensitisation, showing it works well for specific phobias. Capafons et al. (1998) found that people with a fear of flying who had systematic desensitisation reported less fear than a waiting list control group. It may also be more effective than other therapies because the client has input into the hierarchy and controls the pace, so they feel ownership of the therapy and are less likely to drop out. It is also quicker and cheaper than psychoanalysis and more ethical than flooding, as it causes less distress.

However, Toozandehani et al. (2011) found that a combination of systematic desensitisation and assertiveness training was more effective than either treatment on its own, suggesting it may not be fully effective as a single treatment. It is less effective for social phobias and more complex disorders, and in vitro exposure relies on the client's

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ability to imagine the feared object clearly. Psychoanalysts would argue that it only treats the symptoms and not the unconscious cause of the phobia, so symptom substitution may occur, where the client develops a different problem after therapy.

Overall, systematic desensitisation is highly effective for specific phobias, as research such as McGrath et al. (1990) shows, but it is less effective for complex or social anxieties, where it may work best combined with other therapies.

(Total for Question 9 = 8 marks)

TOTAL FOR SECTION B = 34 MARKS

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SECTION C

Answer ALL questions in this section. Write your answers in the spaces provided.

10 To what extent does light therapy work effectively for people diagnosed with seasonal affective disorder?

(12)

Seasonal affective disorder (SAD) is a type of depression that occurs at a particular time of year, usually in winter when there is less daylight. Less light reaching the eyes means the pineal gland releases more melatonin, which makes people feel tired and low. Light therapy aims to simulate sunlight. Patients sit in front of a light box, usually for 30 to 60 minutes each day, preferably in the morning. The stronger the light from the box, the less time the patient needs to spend in front of it. Some light boxes have diffusers so the light is softer on the eyes, and some use a dawn simulator, which gradually increases the light in the bedroom in the morning. The bright light is detected by the retina and passed to the suprachiasmatic nucleus, which reduces melatonin release, so the patient should feel more alert and less depressed during the day.

There is evidence that light therapy works effectively. Lam et al. (2016) found that light therapy was more effective at treating depression than being given anti-depressants, so it can be seen as an effective therapy. Reeves et al. (2012) found that self-report scores for depression fell after just one session of light therapy, showing it can work quickly. Light therapy also has fewer side effects than anti-depressants, with only mild problems such as headaches or eye strain, so it is a very effective option for people who suffer side effects from medication. It is also non-invasive and can be used at home, so patients are more likely to keep using it.

However, how effective the treatment is depends on the type of box used, as dawn simulators have been found to be less effective than a light box. Light boxes can be

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unsafe for patients with pre-existing conditions, such as those taking medicine for rheumatoid arthritis that makes them sensitive to light, so it is not a suitable treatment for everyone. Light therapy may also only work in the short term. It does not prevent SAD from returning the following winter, so it treats the symptoms rather than curing the disorder, and patients may need to use it every year. Studies such as Reeves et al. (2012) rely on self-report data, which may be affected by social desirability or a placebo effect, as it is difficult to create a convincing placebo for a bright light, so the effectiveness of light therapy may be exaggerated.

In conclusion, light therapy works effectively for many people with SAD, as it is supported by research showing it can be more effective than anti-depressants with fewer side effects. However, it is not suitable for everyone, its effectiveness depends on the type of light box, and it only manages symptoms rather than curing SAD. Therefore it is an effective treatment to a large extent, but it may work best when used every winter, possibly alongside other treatments such as talking therapies.

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11 In your studies you will have learned about the following classic studies in detail.

- Raine et al. (1997) Brain abnormalities in murderers indicated by positron emission tomography.
- Watson and Rayner (1920) Little Albert: conditioned emotional responses.

Evaluate both of these classic studies in terms of reliability and validity.

(16)

Raine et al. (1997) compared the brain activity of 41 murderers who had pleaded not guilty by reason of insanity (NGRI) with 41 controls matched for age and sex, and six of the controls had schizophrenia to match the six schizophrenic murderers. All participants had a standardised procedure: they practised the continuous performance task, were injected with a glucose tracer, did the task for 32 minutes and then had a PET scan. The murderers had lower glucose metabolism in the prefrontal cortex and abnormal asymmetries in the amygdala, hippocampus and thalamus. Watson and Rayner (1920) used one healthy male baby, Little Albert, aged 9 months at the start. In a laboratory, they paired a white rat with a loud noise made by hitting a steel bar with a hammer, and Albert came to fear the rat. His fear generalised to similar objects such as a rabbit and a fur coat, and they reported each stage of the study, including which objects were presented and whether the bar was struck.

Raine et al. (1997) has high reliability. Because the procedure was standardised, with every participant practising and then doing the same continuous performance task for 32 minutes, other researchers can carry out exactly the same procedure to check the results. The PET scans also gave objective, quantitative data on glucose metabolism, so the results are reliable, as they accurately showed which areas of the brain were more or less active. However, there may have been some subjectivity, as researchers still had to interpret the PET scan images, which could reduce reliability.

Watson and Rayner (1920) also has some reliability, as they reported all the stages of the

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study in detail, so in principle it is possible to replicate the exact procedure. However, it would be unethical to put another baby through the distress Little Albert experienced, so the study cannot actually be replicated to test whether the findings are reliable. With only one participant, there is no way to check that the conditioning would happen consistently, so its reliability is lower than Raine et al. (1997).

In terms of validity, Raine et al. (1997) has good internal validity, as the control group was matched for age, sex and schizophrenia, so the researchers could be more confident that differences in brain activity were linked to violence and not to mental illness. However, it lacks population validity, as the murderers were a very specific group of NGRI offenders in the USA, so the findings may not generalise to other violent offenders. The continuous performance task in a laboratory is also artificial, so brain activity during the task may not reflect activity when someone is behaving violently in real life, reducing ecological validity.

Watson and Rayner (1920) has very low population validity, because it was a single male baby, so we cannot generalise to how all humans learn fears. There is also debate about whether Albert was a normal, healthy baby as they claimed, as Beck et al. (2009) suggested he may have been Douglas Merritte, who had hydrocephalus, which would make the findings less valid. The laboratory setting reduces ecological validity, as Albert's responses may not reflect natural behaviour. On the other hand, it could be argued that babies do experience loud noises paired with objects in real life, so the laboratory may not have greatly affected his behaviour. Also, the conditioned fear was observed as a clear behaviour (crying and crawling away), which was filmed, so it was measured fairly validly.

In conclusion, Raine et al. (1997) is the more reliable and valid of the two studies,

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because of its standardised procedure, objective PET data, larger sample and matched controls, although its sample is specific and the task artificial. Watson and Rayner (1920) is detailed enough to be replicated in theory, but it cannot be repeated for ethical reasons and is based on one possibly unrepresentative baby, so its reliability and validity are both limited.

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(Total for Question 11 = 16 marks)

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