7.7 Experimental Designs: Repeated Measures, Independent Groups and Matched Pairs

AQA 7182 · about 45 minutes · Write-in edition

Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions.

1 Identify one acceptable method of random allocation the researchers could have used and state why reporting the method matters.

(Total for Question 1 is 2 marks)

2 Identify two statistical advantages of switching to a repeated measures design in this situation, and explain why each matters for the analysis.

(Total for Question 2 is 4 marks)

3 Identify one potential problem caused by imperfect matching in matched pairs, and outline one way the researcher could check whether imperfect matching has affected the results.

(Total for Question 3 is 3 marks)

4 Identify the experimental design described and explain one advantage of using random allocation in this design.

(Total for Question 4 is 3 marks)

5 Identify the experimental design used and outline one drawback specific to this design.

(Total for Question 5 is 3 marks)

6 Outline one order effect and give one way to control it in a repeated measures design.

(Total for Question 6 is 2 marks)

7 Identify one remaining weakness of the independent groups design after random allocation, and outline one way to reduce this weakness in the study.

(Total for Question 7 is 2 marks)

8 Outline what is meant by demand characteristics and give one method the researcher could use to reduce them in a repeated measures design.

(Total for Question 8 is 2 marks)

9 Evaluate the relative strengths and limitations of a repeated measures design versus an independent groups design for this research aim. Make a reasoned recommendation and justify it.

(Total for Question 9 is 12 marks)

10 Explain how ABBA counterbalancing controls order effects in this two condition repeated measures study. Describe clearly the sequence of testing and why this reduces practice and fatigue confounds.

(Total for Question 10 is 4 marks)

Mark scheme · 7.7 Experimental Designs: Repeated Measures, Independent Groups and Matched Pairs

Question 1

identifies an acceptable method, e.g. using a random number generator, drawing names from a hat, or coin toss oe **B1**

states why reporting matters, e.g. allows readers to judge whether allocation was truly random and assess risk of bias, aiding transparency and replicability oe **B1**

Answer: They could have used a random number generator or coin toss to allocate participants. Reporting the method matters so readers can judge whether allocation was truly random, assess risk of bias, and replicate the method.

Question 2

identifies statistical advantage, e.g. greater statistical power with the same number of participants because participant variables are controlled oe **M1**

explains that with higher power there is a greater chance of detecting a true effect, reducing the likelihood of a Type II error oe **A1**

identifies another relevant advantage, e.g. fewer participants are needed to achieve the same power compared with independent groups oe **M1**

explains why this matters practically, e.g. useful when participant recruitment is difficult or expensive oe **A1**

Answer: Statistical advantage: repeated measures gives greater statistical power because participant variables are controlled, increasing the chance of detecting a true effect and reducing Type II error risk. Also it requires fewer participants for the same power, useful when recruitment is difficult.

Question 3

identifies problem, e.g. residual differences between paired participants could act as confounding participant variables oe **M1**

explains consequence, e.g. apparent differences between conditions may be due to unmatched characteristics rather than the IV oe **A1**

outlines a check, e.g. compare pre test/baseline scores statistically between the two groups or run an analysis of covariance controlling for the unmatched variable oe **A1**

Answer: Problem: imperfect matching leaves residual participant differences that can confound results, so differences may reflect these unmatched traits rather than the IV. Check by statistically comparing baseline scores between the two groups or using an analysis that controls for the unmatched variable, such as ANCOVA, to see if the effect remains.

Question 4

identifies independent groups design, different participants in each condition cao **B1**

states advantage of random allocation, e.g. helps balance participant variables between groups oe **M1**

explains why this matters, e.g. reduces likelihood that group differences are due to pre existing differences rather than the technique oe **A1**

Answer: Independent groups design; random allocation helps balance participant variables across groups, reducing the chance that results are due to pre existing differences rather than the revision technique.

Question 5

identifies matched pairs design, participants paired on a relevant variable and split between conditions cao **B1**

outlines a drawback, e.g. matching participants is time consuming and expensive oe **M1**

explains consequence, e.g. imperfect matching can leave residual participant variable differences that may confound results oe **A1**

Answer: Matched pairs design; a drawback is that matching is time consuming and potentially expensive, and imperfect matches can leave residual differences that still confound results.

Question 6

identifies an order effect, e.g. practice effect where performance improves with experience, or fatigue effect where performance worsens over time oe **B1**

gives a control, e.g. counterbalancing such as ABBA or randomising order of conditions to distribute order effects evenly oe **B1**

Answer: An order effect is a practice effect, where participants improve with practice, or fatigue, where they worsen over time. It can be controlled by counterbalancing, for example using ABBA or randomising the order of conditions.

Question 7

identifies a remaining weakness, e.g. random allocation may not perfectly balance all participant variables especially with smaller samples oe **B1**

outlines a way to reduce it, e.g. increase sample size or use stratified random sampling to ensure key variables are balanced between groups oe **B1**

Answer: Weakness: random allocation may not fully balance all participant variables, especially in small samples. Reduce it by increasing sample size or using stratified random sampling to ensure key variables are balanced between groups.

Question 8

defines demand characteristics, e.g. cues in the study that lead participants to guess the aim and alter their behaviour accordingly oe	**B1**
gives a method to reduce them, e.g. use deception about the study aim where ethical, use filler tasks, or use single blind procedures so participants do not know the hypothesis oe	**B1**

Answer: Demand characteristics are cues that let participants guess the study aim and change their behaviour. They can be reduced by using filler tasks or single blind procedures so participants do not know the hypothesis, or by ethically approved deception about the aim.

Question 9

Level 4 Detailed knowledge of repeated measures and independent groups designs is shown. Evaluation is thorough and well balanced, addressing control of order effects, participant variables, demand characteristics, practicality and ethics. The recommendation is justified with clear, well developed reasoning and appropriate examples. Specialist terminology is used accurately.	**10-12**
Level 3 Good knowledge of both designs with relevant evaluation. Most key issues are addressed, though some points may be less developed. A recommendation is given and justified, but reasoning may be less detailed. Specialist terms used appropriately.	**7-9**
Level 2 Some knowledge of the designs is present but limited. Evaluation is superficial or partial, addressing only a few issues. Recommendation may be given but with limited justification. Specialist terminology may be used inconsistently.	**4-6**
Level 1 Limited knowledge and evaluation. Answers are brief, descriptive or list like. Recommendation, if present, is unsupported. Specialist terminology is largely absent or incorrect.	**1-3**
Level 0 No creditworthy content.	**0**

Indicative content:

- AO1: Repeated measures means the same participants take part in both environments, controlling participant variables such as baseline concentration ability.
- AO1: Independent groups means different participants are used in each environment, avoiding order effects but introducing participant variable differences between groups.
- AO3: Strength of repeated measures, control of participant variables increases statistical power and reduces required sample size, which is useful with limited recruitment.
- AO3: Weakness of repeated measures, order effects such as practice or fatigue may influence performance; these can be controlled by counterbalancing (e.g. ABBA or random order) but counterbalancing may not eliminate all carryover effects between testing days.
- AO3: Repeated measures risk demand characteristics because participants experience both environments and may guess the aim, changing their behaviour; single blind, filler tasks or deception can reduce this, but ethical constraints limit deception.
- AO3: Strength of independent groups, no order effects or carryover between conditions, and lower risk of demand characteristics from exposure to both conditions.
- AO3: Weakness of independent groups, participant variables may differ between groups even with random allocation; larger samples or stratified sampling are needed to reduce this, which has resource implications.
- AO3: Practical and ethical considerations: repeated measures require participants to return on different days, increasing attrition and scheduling burden, whereas independent groups requires recruiting more participants which may be impractical. Repeated testing may also cause stress or inconvenience which must be managed ethically.
- AO3: Recommendation example: if the psychologist has a small sample and can use effective counterbalancing and blinding, repeated measures may be preferable for power and control of participant variables. If carryover effects between environments are likely or the tasks could permanently change concentration, independent groups would be safer to avoid contamination between conditions.
- AO3: Consideration of external validity: independent groups with a larger, diverse sample may give more generalisable results, while repeated measures may be more internally valid for detecting small effects.

Question 10

explains the ABBA sequence, e.g. participant does A then B then B then A, and another participant does the reverse B then A then A then B oe	**M1**
explains that ABBA balances practice effects because each condition appears equally often in early and later positions across participants oe	**M1**
explains that fatigue effects are also balanced because any decline in performance over time affects each condition equally across the counterbalanced sequences oe	**A1**
states that this makes systematic order effects unlikely to explain condition differences, increasing internal validity oe	**A1**

Answer: ABBA uses sequences such as A-B-B-A and the reverse B-A-A-B so each condition occurs in early and late positions equally. This balances practice and fatigue effects because improvements or declines over time affect both conditions equally across participants, reducing the chance that order rather than condition causes differences.