



PSY.RES2 Experimental Designs: Repeated Measures, Independent Groups and Matched Pairs

AQA 7182 · Calculators not allowed · about 60 minutes

Total Marks

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Name: _____ Date: ____ / ____ / ____

Answer ALL questions. Show all your working.

- 1** In a lab study of reaction time to visual stimuli, every participant completes both a simple and a complex reaction-time task in one session.
- Identify the experimental design used in this reaction-time study and give one reason why this design might be chosen.

(Total for Question 1 is 2 marks)

- 2** A researcher wants to compare recall between two different revision techniques. They recruit 80 students and randomly allocate 40 to Technique A and 40 to Technique B, each student uses only one technique.
- Identify the experimental design described and explain one advantage of using random allocation in this design.

(Total for Question 2 is 3 marks)

- 3** A clinical psychologist plans to compare two types of brief relaxation training. They pair participants by baseline anxiety score and allocate one member of each pair to Treatment X and the other to Treatment Y.
- Identify the experimental design used and outline one drawback specific to this design.

(Total for Question 3 is 3 marks)

- 4** In a within participants memory experiment, order effects such as practice and fatigue can influence performance when participants do more than one condition.
- Outline one order effect and give one way to control it in a repeated measures design.

(Total for Question 4 is 2 marks)

- 5** A memory lab uses the ABBA counterbalancing technique to control order effects in a two condition repeated measures study where condition A is a word list recall and B is a face recognition task. The sequence used is A then B for half the participants, and B then A for the other half. Some participants then repeat the second task a second time in the reverse order to balance practice and fatigue effects.

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 5 is 4 marks)

- 6** A researcher running a repeated measures study uses standardised instructions and procedures for every participant. The tasks, wording of instructions, timing and environment are kept the same for both conditions.

Outline one reason why standardised instructions and procedures are important for controlling variables in repeated measures designs.

(Total for Question 6 is 3 marks)

- 7** A study compares two teaching methods. The researcher considers using matched pairs. They match students on prior attainment and then randomly assign one of each matched pair to Method 1 and the other to Method 2.

Explain one strength and one limitation of using a matched pairs design for this educational comparison.

(Total for Question 7 is 3 marks)

- 8** A researcher uses an independent groups design to compare two training programmes. They are concerned about participant variables and use random allocation to groups.

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 8 is 2 marks)

- 9** A researcher has limited resources and must pick a design for a simple two condition study. They know repeated measures gives more power with fewer participants but risks demand characteristics because participants experience both conditions.

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 9 is 2 marks)

- 10** A small lab study compares two versions of a cognitive task using an independent groups design with 12 participants per group. The researcher is deciding whether to switch to a repeated measures design instead.

Identify one statistical advantage of switching to a repeated measures design in this situation, and explain why it matters for the analysis.

(Total for Question 10 is 4 marks)

- 11** A researcher must ensure their matched pairs matching is fair. They match participants on age and baseline score, but resource limits mean exact matching is not possible and some pairs differ slightly.

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 11 is 3 marks)

- 12** A psychologist plans a study with the aim: 'To compare how two study environments affect short term concentration in university students.' The psychologist can choose either a repeated measures design where each student is tested in both environments on separate days, or an independent groups design where different students experience only one environment each. The psychologist asks you to evaluate which design would be more appropriate, considering control of order effects, participant variables, demand characteristics, practicality and ethical concerns.

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 12 is 12 marks)

- 13** A student reading the methods section of a paper notices the authors used random allocation in an independent groups design but did not report the method used.

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

(Total for Question 13 is 2 marks)

- 14** A researcher running a matched pairs study finds matching on one key variable greatly improved baseline equivalence, but they are concerned about unknown participant variables. Outline one advantage of using random allocation within each matched pair and one remaining limitation that cannot be solved by this step.

(Total for Question 14 is 3 marks)

Mark scheme · PSY.RES2 Experimental Designs: Repeated Measures, Independent Groups and Matched Pairs

Question 1

- **B1** identifies repeated measures design, where each participant takes part in both conditions (simple and complex) cao
- **B1** gives a reason, e.g. controls participant variables because the same people do both tasks oe
- **Answer: Repeated measures design; chosen because it controls participant variables since each participant performs both the simple and complex task.**

Question 2

- **B1** identifies independent groups design, different participants in each condition cao
- **M1** states advantage of random allocation, e.g. helps balance participant variables between groups oe
- **A1** explains why this matters, e.g. reduces likelihood that group differences are due to pre existing differences rather than the technique oe
- **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 3

- **B1** identifies matched pairs design, participants paired on a relevant variable and split between conditions cao
- **M1** outlines a drawback, e.g. matching participants is time consuming and expensive oe
- **A1** explains consequence, e.g. imperfect matching can leave residual participant variable differences that may confound results oe
- **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 4

- **B1** 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
- **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 5

- **M1** 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
- **A1** 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
- **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.**

Question 6

- **M1** states that standardisation reduces situational/extraneous variables, e.g. differences in instructions, task timing or environment oe
- **A1** explains that keeping these procedures the same ensures differences between conditions are more likely due to the IV rather than procedural differences oe
- **A1** links to reliability or replicability, e.g. standardisation makes it easier to repeat the study and get comparable results oe
- **Answer: Standardised instructions and procedures reduce situational or extraneous variables by ensuring the same task wording, timing and environment for both conditions. This helps ensure condition differences reflect the IV not**

Question 7

- **M1** strength: matching on prior attainment controls participant variables that could confound the comparison oe
- **A1** explains that this increases internal validity because groups are similar on the matched characteristic oe
- **A1** limitation: matching is time consuming and may be imperfect, and finding suitable pairs for all participants can be difficult or costly oe
- **Answer: Strength: matching on prior attainment controls participant variables, improving internal validity because groups are similar on the matched characteristic. Limitation: matching is time consuming, may be imperfect and can be difficult or costly to carry out for all participants.**

Question 8

- **B1** 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
- **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 9

- **B1** 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
- **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 10

- **M1** identifies statistical advantage, e.g. greater statistical power with the same number of participants because participant variables are controlled oe
- **A1** explains that with higher power there is a greater chance of detecting a true effect, reducing the likelihood of a Type II error oe
- **M1** identifies another relevant advantage, e.g. fewer participants are needed to achieve the same power compared with independent groups oe
- **A1** explains why this matters practically, e.g. useful when participant recruitment is difficult or expensive oe
- **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 11

- **M1** identifies problem, e.g. residual differences between paired participants could act as confounding participant variables oe
- **A1** 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
- **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 12

- **Level 4** (10-12): 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.
- **Level 3** (7-9): 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.
- **Level 2** (4-6): 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.
- **Level 1** (1-3): Limited knowledge and evaluation. Answers are brief, descriptive or list like. Recommendation, if present, is unsupported. Specialist terminology is largely absent or incorrect.
- **Level 0** (0): No creditworthy content.
- **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 13

- **B1** identifies an acceptable method, e.g. using a random number generator, drawing names from a hat, or coin toss
- **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
- **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 14

- **M1** advantage: random allocation within pairs prevents systematic assignment bias and ensures which member of the pair receives each condition is not predictable oe
- **A1** explains that this reduces confounding due to non random assignment and helps isolate the effect of the IV oe
- **A1** limitation: unknown or unmeasured participant variables may still differ between matched members and confound results, and cannot be controlled by randomising which matched member gets which condition oe
- **Answer: Random allocation within pairs avoids systematic assignment bias so which matched partner gets each condition is unpredictable, helping isolate the IV effect. However unknown or unmeasured participant variables may still differ between matched members and confound results, which random allocation cannot eliminate.**