11. MM.2 · Research designs and statistical interpretation

Starter Quiz ·

GRE Subject Test · GRE Psychology Name: _____ Score: _____

1. In a balanced 2 × 2 example, A2 has cell means 7 and 9 at the two B levels. Giving the B levels equal weight, what is A2's marginal mean?

   _____

2. Observed cell means are A1: 3, 5 and A2: 7, 9 across B1, B2. With equal weighting, which description fits these means?

   ☐ A crossover interaction pattern.

   ☐ An interaction contrast only, with equal marginal means.

   ☐ No differences in any of the means.

   ☐ Marginal mean differences for both factors and a zero interaction contrast.

3. For a quantitative outcome, the same participants are measured before and after training. Assuming an appropriate distribution of independent participants' differences, which procedure compares the mean change?

   ☐ paired t-test

   ☐ chi-square

   ☐ one-way ANOVA with two independent groups

   ☐ independent-samples t-test

4. Any study without random assignment is automatically a quasi-experiment, even if it simply records existing group differences.

   ☐ True ☐ False

5. In within-subjects designs, varying the order of conditions across participants is called _____.

   _____

6. One class's volunteers are randomly assigned to app and comparison conditions. Which claim is directly supported by that assignment process?

   ☐ The volunteers form a random sample of all students.

   ☐ Assignment supports a treatment comparison among the enrolled units, subject to the rest of the design.

   ☐ Every missing outcome and implementation problem is eliminated.

7. An observational longitudinal study can establish that one recorded measurement preceded another without, by that fact alone, establishing causation.

   ☐ True ☐ False

8. Condition A teaches a lasting strategy later used in B. Why might A–B/B–A counterbalancing be insufficient?

   ☐ Varying order guarantees that all learning disappears.

   ☐ A lasting effect of A can change later performance in a way that merely reversing order does not remove.

   ☐ Repeated scores become independent just because order changes.

9. Under a suitable one-way ANOVA model, the omnibus test rejects equality of four group means. What follows?

   ☐ Every pair of groups has been shown to differ.

   ☐ The all-means-equal null is rejected; identifying particular differences needs appropriate comparisons.

   ☐ The design must have been randomly assigned.

10. A p-value above 0.05 by itself establishes that the population effect is exactly zero.

    ☐ True ☐ False

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Answers ·

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1. **8**

   The equally weighted marginal mean is (7 + 9) / 2 = 8. With unequal cell sizes, a pooled participant mean can use different weights.

2. **Marginal mean differences for both factors and a zero interaction contrast.**

   The B difference is +2 at both A levels, so its difference across A is zero. A marginal means are 4 and 8; B marginal means are 5 and 7. No population significance result is supplied.

3. **paired t-test**

   A paired t procedure analyses the within-person differences. Independence is between participants' differences, not between a person's before and after scores. The procedure alone does not prove that training caused the change.

4. **False**

   Absence of random assignment is not sufficient. A simple smoker/non-smoker comparison is observational; a quasi-experimental intervention evaluation needs an intervention and a design for comparing its outcomes.

5. **counterbalancing**

   Counterbalancing varies order across participants to distribute specified order effects. It does not guarantee that persistent learning or every carryover effect is removed.

6. **Assignment supports a treatment comparison among the enrolled units, subject to the rest of the design.**

   Random assignment addresses allocation to conditions. It does not randomise selection into the sample or remove every threat to interpretation.

7. **True**

   Time ordering and causal identification are different. Confounding, measurement and alternative explanations still require attention.

8. **A lasting effect of A can change later performance in a way that merely reversing order does not remove.**

   Counterbalancing distributes specified order effects. Persistent or asymmetric carryover may require another design or control.

9. **The all-means-equal null is rejected; identifying particular differences needs appropriate comparisons.**

   The omnibus test concerns equality of all the means. It does not establish every pairwise contrast or the study's causal design.

10. **False**

Failure to reject at a chosen threshold is not proof of zero. Examine the estimate, uncertainty, assumptions and the effects the data can distinguish.