

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.