

Experimental Design with Supplied Data

g11_u09_w34

Purpose and boundary

Use original fictional data cards and paper-design prompts only. No experiment, sample collection, chemical handling, survey, personal-data collection, or real-world testing is requested.

Targets: I can name variables and controls, evaluate a fictional design, and define a decision rule bounded by supplied data. **Vocabulary:** independent variable, dependent variable, control, replicate, confounder, decision rule. **Prerequisites:** evidence, uncertainty, graphs, systems boundaries.

All trial values are fictional. A paper design is a model, not a protocol.

1. Define independent and dependent variables.

2. What is a control variable?

3. Why are replicates useful in a data-model design?

4. A card changes model concentration and records signal. Name the independent and dependent variables.

5. A card changes two conditions at once. Why is causal interpretation limited?

6. A fictional design has 3 repeats at each level. What variation question can it begin to address?

7. A design has one repeat at each level. What uncertainty limit remains?

8. Name one plausible confounder in a fictional temperature-signal card.

9. Why should a decision rule be stated before reading a result?

10. A card says accept a model only if all residual magnitudes are below 0.10. What does this rule check?

11. Fictional trial values are 4.8, 5.0, 5.2 units. Find their mean.

12. Find the range and half-range for item 11.

13. A second condition has mean 5.8 ± 0.1 units; compare it with item 11's simple summary.

14. Why does non-overlap of simple intervals not prove mechanism?

15. A student changes the decision rule after seeing results. Identify the interpretation concern.

16. A table has missing trials with no explanation. Name one bias/traceability question.

17. Explain why a paper model can include a blank/control without requesting a physical procedure.

18. State one supported and one unsupported claim from a fictional controlled comparison.

19. Propose one additional paper-data column that would test a confounder.

20. Write a two-sentence design rationale with a variable, control, decision rule, and limitation.
