

Statistics For Research Designs

X = Treatment
 O = Observation
 R = Randomization

Design

1. One-Shot Case Study

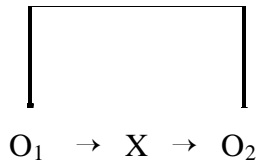
$$X \rightarrow O_1$$

Analysis Choices:
Statistical Tests

Single-sample hypothesis test
 -test against a hypothesized value

Design

2. One-Group Pretest-Posttest Design

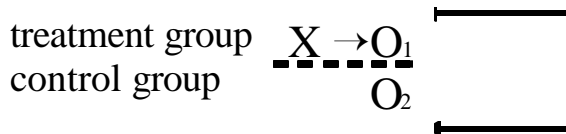


Analysis Choices:
Statistical Tests

- (1) **Preferred:** Matched-Pairs *t*-test
 [Repeated Measures *t*-test]
 -compare “before” to “after”
 on a case-by-case basis
- (2) Separate Sample *t*-test on the group means: “before” vs. “after”

Design

3. Static Group Comparison



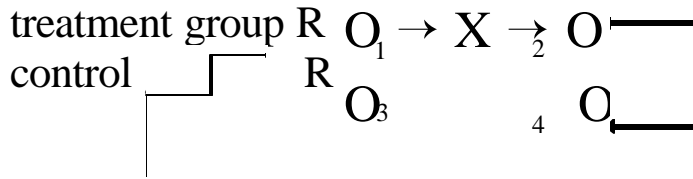
Analysis Choices:
Statistical Tests

Separate Sample *t*-test:
 -comparison of treatment vs. control group means
 (Note: Need F-test on variances to

Design

Analysis Choices:
Statistical Tests

4. Pretest-Posttest Control Group Design



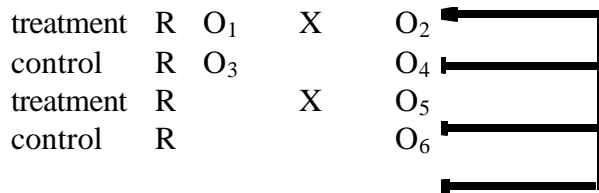
Separate sample *t*-test to test for validity of randomization, need for ANOCOVA.

Best: Analysis of Covariance (ANOCOVA)
Also: Separate Sample *t*-tests for treatment effect: compare treatment vs. control group means

Design

Analysis Choices:
Statistical Tests

5. Solomon Four-Group Design



Basic: One-way ANOVA across the four group means
Note: Follow-up with Scheffe' Test
Also: (1) ANOCOVA on first two groups
(2) Separate Sample *t*-tests on second two
Or: (3) Two-way ANOVA, with Interaction Effect
A: treatment vs. control
B: pretest vs. no pretest
AB: interaction

Design

Analysis Choices:
Statistical Tests

6. Posttest-Only Control Group Design

treatment	R	X	O ₁	[]	Separate Sample <i>t</i> -test: -comparison of treatment vs. control group means
control	R		O ₂		

Extension to Several Treatments:

treatment "A"	R	X _A	O ₁	[]	One-Way ANOVA across the four group means. Note: (1) Follow up with Scheffe' Tests, which is very conservative; or (2) Use Dunnett's Test, which is more liberal
treatment "B"	R	X _B	O ₂		
treatment "C"	R	X _C	O ₃		
control	R		O ₄		

Design

Analysis Choices:
Statistical Tests

10. Nonequivalent Control Group Design

O ₁	?	X	?	O ₂	Best: Analysis of Covariance Also: Separate Sample <i>t</i> -tests for treatment effect: compare treatment vs. control group means
O ₃	?	?	?	O ₄	

Design 4, without randomization.
(very common)