

Experimental Designs Part 2

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Choosing a Design

- The design drives the procedures of a study
- Certain designs control for various threats more effectively than others
- Choosing a design
 - What will make your study possible?
 - What is feasible, given your constraints?
 - Of the remaining options, which does the best job of controlling for the important threats?

Broad Approaches

- Single variable designs
 - One variable is manipulated
- Factorial designs
 - Two or more independent variables: at least one is manipulated

General Techniques

- Randomization when possible
 - Random selection and assignment
- Matching
 - Subjects sharing similar characteristics are assigned to different groups; makes groups as alike as possible
- Homogeneous groupings
 - Form groups with strong similarities on the variable of interest
- Participants as own controls
 - Exposed to treatments one at a time; susceptible to multiple-treatment interaction
- Analysis of Covariance - statistical correction for initial differences in groups

Categories of Designs

- True experimental designs
 - The preferred type of design when feasible; control for more threats
 - Started discussion two weeks ago
- Pre-experimental designs
 - Not very powerful; limited value; useful for exploring an area
- Quasi-experimental designs
 - We'll look at this one next week

True Experimental

- Pre-test, post-test control group
- Can be expanded to have multiple treatments
 - This one has three different treatments, and the control group

R O X1 O
R O X2 O
R O X3 O
R O O

True Experimental

- Posttest-only Control Group
 - Same as pre/post, without the pretest
 - Random assignment controls for most threats, except mortality
 - Useful when you worry about testing threat
 - Works for multiple treatments

R X1 O
R X2 O
R X3 O
R O

True Experimental

- Solomon 4-group Design
 - We saw this two weeks ago
 - Combines pre test/post test design with post-test only

R O X O
R O O
R X O
R O

Pre-experimental Designs

- One shot case study X O
 - One group
 - No pretest
- One group pretest posttest design O X O
 - One group
 - Uses a posttest

Very weak designs - Avoid these!

True Experimental

- Factorial designs
 - Involve two or more independent variables and often with multiple levels
 - At least one variable is manipulated
 - These are essentially elaborations of the single variable designs
 - Useful for determining if there are interactions

Factorial Example

- Two types of mathematics instruction: personalized and traditional
- Two categories of student: high aptitude and low aptitude

		Type of Instruction	
		Personalized	Traditional
Aptitude	High	Group 1	Group 2
	Low	Group 3	Group 4

A 2x2 factorial design

Factorial Design Strengths

- Does not necessarily require as many groups as it may appear
 - Two classes could have both high and low aptitude students, for example
- Can accommodate more than a 2x2 design
 - There is a practical limit, though.
- Helps determine whether effects are generalizable across all levels, or specific ones
- Can demonstrate relationships not apparent in single variable design studies

Real World Examples

- See links from class website