

Experimental Research Designs

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PS 585
Research Methods

Today's Blueprint

Last Class:

- Making Observations
 - What will you observe?
 - How will you observe it?
 - From what kind of population are you sampling?
 - How will you record your observations?

Today's Class:

- Experimental Research Designs
 - The logic of experiments
 - Types of experiments
 - Strengths and weaknesses

...But first, a word or two about research design...

Research Design

- Measurement
 - Focuses on transition from concepts to variables
 - Purpose: To test the quality of your variables
- Research Design
 - Focuses on the relationship between variables
 - Purpose: To test your hypotheses

Research Design

- What is it?

The Logic of Experiments

Experimental Design

- *"Experimental observation is only experience carefully planned in advance."*—Sir Ronald A. Fisher (1890-1962)

Experimental Design

- *"An experiment is an arrangement of conditions or procedures for the sake of testing hypotheses"*—Johnson and Joslyn (1995)

Experimental Design

- Independent variable
- Dependent Variable
- Random Assignment
- Experimental group
- Control group
- Pre-test
- Post-test

Experimental Designs

- The active ingredients of experimental designs:
 - Control

- Random Assignment

Experimental Designs

- Control = Control of experimental conditions
 - Researcher produces the setting
 - Researcher creates the treatments
 - Researcher schedules the observations

Experimental Designs

- Random Assignment
 - Eliminates prior group differences
 - Therefore, differences in experiment are due to treatment

Experimental Design

- Remember:
 - Control and Random Assignment are the active ingredients that give experiments the power to make causal inference

Types of Experiments

Types of Experiments

- Types of Experiments:
 - Pre-experiments
 - “True” experiments
 - Quasi-experiments

Types of Experiments

Experimental terminology:

- R = Random Assignment
- O = Observation of dependent variable
- X = Independent variable (exposure to treatment)

Types of Experiments

[See charts]

Strengths and Weaknesses

Strengths and Weaknesses

Advantages ☺

- Determining causality
- Establishing causal direction
- Cost (sometimes)
- Convenience
- Adjustability/flexibility
- Replicability
- Isolate components of complex relationships

Disadvantages ☹

- Lack of “reality”
- Unrepresentative samples (e.g., college sophomores instead of “real people”)
- Cost (sometimes)
- Potentially dangerous outcomes

Strengths and Weaknesses

- The dilemma:

- Internal and External Validity = Standards for evaluating research
- Experiments are strong on internal validity but weaker on external validity.
- Internal vs. external validity = Tradeoff in experimental design

Strengths and Weaknesses

- Internal Validity:
 - Deals with the causal relationship between the independent variable(s) and the dependent variable(s)
 - The ability to rule out spurious relationships

Strengths and Weaknesses

- History
- Maturation
- Experimental mortality
- Testing effects [ex]: instrument decay]
- Regression to the mean
- Selection bias
- Failure of random assignment
- Experimenter biases or expectations
- Experimenter characteristics (race, sex, personality, etc)
- Demand characteristics
- Interactions of the above (e.g. selection/maturation, etc.)

Strengths and Weaknesses

- External Validity:
 - Deals with getting results that are generalizable
 - The ability to apply results across persons, settings, and time

Strengths and Weaknesses

- Test reactivity
- Selectivity
 - Subjects
 - Environment
 - Time
- Interaction between selection bias and testing
- Multiple treatment interfaces (time series design)
- Reactive effects of experimental arrangement
- Unnatural processing mode
 - Consistency
 - Ego
 - Mindfulness
 - accountability

Strengths and Weaknesses

- My two-cents:
 - Results are not truly generalizable until a clear causal relationship can be established
 - External Validity < Internal Validity

Strengths and Weaknesses

- Getting around the threats:
- Experimental Realism:
 - The extent to which behave as if the experimental conditions are “real”
- Mundane Realism:
 - The extent to which experimental conditions reflect reality.