

PSY 250

Chapter 7: Experimental Research Strategy

Cause and Effect Relationships

- Can be clear relationship but not a causal one – e.g. between getting dressed up and having a headache the next morning

The Third-Variable Problem

- Can be clear relationship but not a direct causal one between 2 variables
 - E.g. children's involvement in extra-curricular abilities and confidence
- 3rd variable may be controlling both of the other 2 (family involvement, opportunities for more friendships)
- Research becomes the art of teasing apart and separating a set of naturally interconnected variables

Cause and Effect

- 4 basic elements to establish cause and effect:
 1. Manipulation
 2. Measurement
 3. Comparison
 4. Control

Variables

- **Manipulate** Independent
- **Measure** Dependent
- **Control** Extraneous

- Levels of the IV
 - The different values of the IV selected to create and define the treatment conditions/groups
 - Must be ≥ 2
- Treatment Condition
 - Situation or environment characterized by one specific value of the IV

Control

- Eliminate all confounding variables
- E.g. Meaningfulness and imagery (IV) on memorability (DV)
 - (Paivio, 1965)
- Create two lists (high vs. low imagery) with equal average meaningfulness

- Classification of confounding vs. independent variable depends on research hypothesis

The Directionality Problem

- Which is the cause and which is the effect?
 - E.g. assertiveness and success
 - Sleep and depression

Manipulation and Control

- Unique to experimental research strategy

- Manipulation
 - Create treatment conditions corresponding to values of IV

 - If change in A does not cause change in B then A is not a causal agent (unless change is too small to affect B)

Control

- Prevent extraneous variables from becoming confounding variables
- Only confounding if it influences DV
 - AND
- It varies systematically with IV
- 3 types of extraneous variables:
 - Environmental
 - Participant
 - Time - Related

Methods of Controlling Extraneous Variables

- 1. Holding a Variable Constant
 - Hold absolutely constant or
 - Limit to restricted range
- But can limit generalizability
- What is this a threat to?

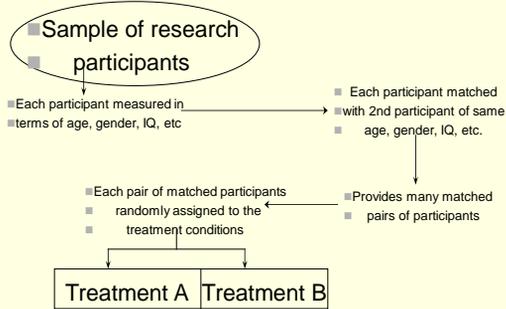
Methods of Controlling Extraneous Variables

- 2. Matching Values across Treatment Conditions
 - E.g. each condition has = # males and females
 - Or ensure average value is same – e.g. average age is 4.5 in each group
 - Also match on environmental and time variables

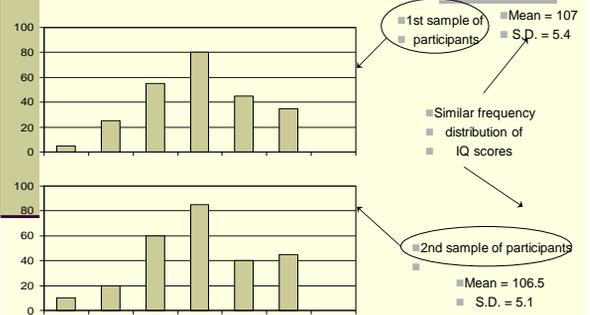
2. Matching by Equating Participants

- Also increases sensitivity of exp.
- Similar to building EV into design
- # of participants is some multiple of the # of levels of the IV
- Two methods

2a. Precision Control

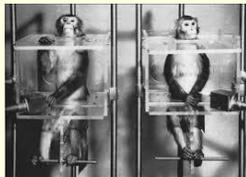


2b. Frequency Distribution Control

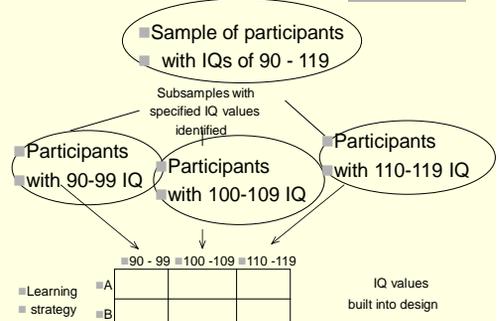


3. Matching by Yoked Control

- Controls for possible influence of temporal relationship between event and response
- Ulcers due to physical or psychological stress of shock in monkeys (Brady, 1958)



4. Building Extraneous Variable into the Design



Methods of Controlling Extraneous Variables

- 5. Randomization
 - Disrupts any systematic relation between EVs and IV – prevents EVs from becoming CVs
 - Unpredictable, unbiased procedure to distribute different values of each EV across treatment conditions
 - All possible outcomes equally likely
 - But chance CAN produce biased outcomes – e.g. all heads with 10 coin tosses

Control Through Participant Assignment

- Random assignment
 - ensures influential extraneous variables are balanced among experimental conditions
 - “*whenever possible, randomize*”
 - representative

Counterbalancing

- To control for sequencing effects
 - Order effects
 - IV – rate of presentation of nonsense syllables
 - DV – verbal learning
 - Learn slow, moderate then fast list – speed confounded with order
 - Carry-over effects
 - Performance in condition partially dependent on preceding conditions
 - IV – monetary reward
 - Dime may be more rewarding when preceded by 5 vs. 15 cents

Control Groups

- No treatment condition
 - Provides baseline measure of normal behavior
- Experimental group – treatment condition
- Placebo control groups

General Control Procedures

- Preparation of setting
 - structuring research setting
- Response measurement
 - careful selection and preparation of measures
- Replication
 - systematic and conceptual replication

Control Over Subject and Experimenter Effects

- Demand Characteristics
 - Cues as to true purpose of experiment
- Experimenter effects
- Participant (subject) effects

Control Over Subject and Experimenter Effects (cont'd)

- Single-blind procedures
 - experimenter is unaware
- Partial-blind
 - Experimenter unaware for portions of exp.
- Double-blind procedures
 - experimenter and participant are unaware
- Deception
 - Participant is unaware

Control Over Experimenter Effects (cont'd)

- Automation
 - reduces experimenter-participant contact
- Using objective measures
 - require minimal judgements

Control Over Subject and Experimenter Effects (cont'd)

- Multiple observers
 - ratings of behaviors
- Control of experimenter attribute errors
 - physical and psychological characteristics
 - Hold constant across treatments

Gaining Insight Into Participants' Perceptions of Experiment

- Experimental manipulation check
 - Did manipulation work?
 - What did participant think experiment was about?
 - How does participant think others will respond?
- Participant Manipulations
- Subtle Manipulations
- Simulations
- Placebo Controls

Simulation Studies

- Try to duplicate natural environment in lab – bring real world into lab
- Mundane Realism
 - Superficial, physical characteristics
- Experimental Realism
 - Psychological aspects of situation
 - Do participants become immersed in situation
 - E.g. Haney, Banks & Zimbardo (1973) prisoner study
 - Prisoner's dilemma

Field Studies

- Bring lab into real world
- E.g. Bystander Apathy in emergency situations