Research methods 05

Experimental Design III

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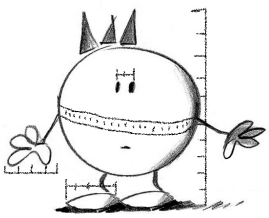
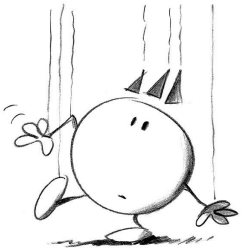
Operationalizing variables

Measurement **vs.** **Manipulation**





- **assigning numbers to people**
- **changing people's experience and behavior in a systematic way**

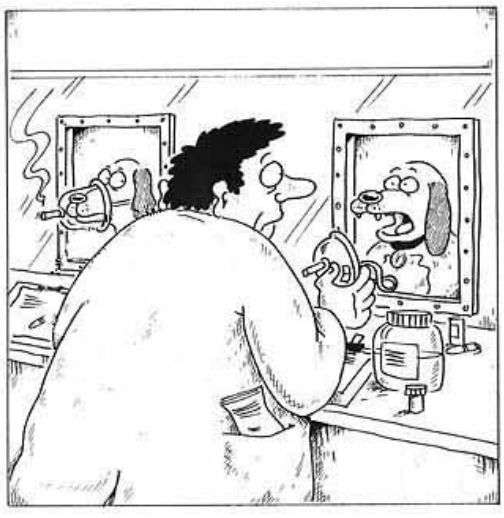
Operationalizing the IV:
via Manipulation

What issues do you need to consider to design **effective manipulations** of independent variables?

The cover story

Create a convincing cover story

"I still don't believe that this experiment is all about self-identity…"

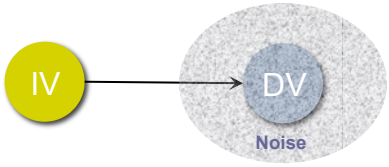


The cover story

- Answers the question: **Why are you here?**
- The cover story should be
  - Simple
  - Involving
  - Unrelated to manipulations
  - Inducing the same psychological state
- Must provide a framework for interpreting the experiment

Operationalizing the IV:
2 sources of error: random error

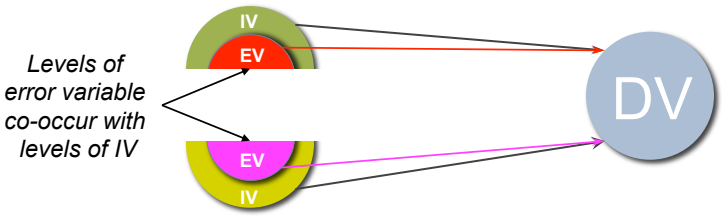
- **Random error:** extraneous variables whose average influence on the outcome is the same in all conditions.
- Random errors usually result from events that occur in experimental settings, subject variables, or any variable not under experimenter's control.



- Random errors obscure the relationship between the IV and the DV
- To reduce - hold extraneous variables constant

Operationalizing the IV:
2 sources of error: systematic error

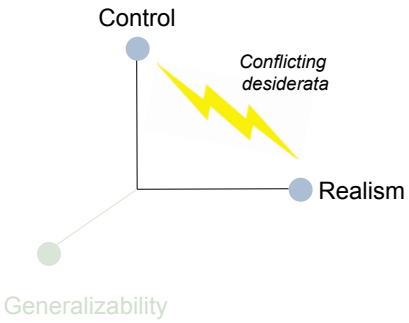
- **Systematic error:** extraneous variables whose influence on the outcome is different across conditions of the IV
- Systematic error variables are a threat to internal validity



Operationalizing the IV:
2 sources of error: systematic error

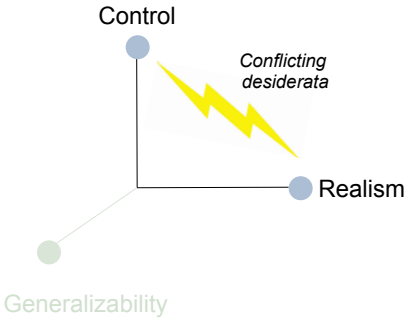
- Systematic error results from extraneous variables that cannot be separated from the IV
  - Can be part of the experimental setting or manipulation
  - Can be subject variables (differences in subjects across conditions)
- Systematic error distorts the relationship between the IV and the DV
- To reduce systematic error
  - Carefully operationalize variables so that extraneous variables don't occur with the IV
  - Random assignment of subjects to conditions

Operationalizing the IV:
Control vs. Impact



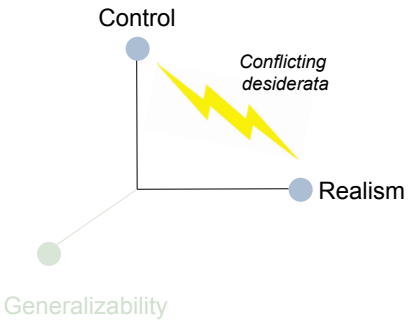
- **Control**
  - We need as much control as possible over manipulation so that error is minimized
  - To achieve this choose manipulation where potential for extraneous variables coming into play is low
- **Impact**
  - Manipulation has enough meaning for the subject so that it is involving
  - To achieve this choose rich manipulation as close to the conceptual variable as possible

Operationalizing the IV:
Control vs. Impact



- As we increase the impact of a manipulation, we are likely to decrease our control over it.
- The goals of impact and control are in constant tension.

Operationalizing the IV:
Control vs. Impact



- How to deal with conflict?
  - IV should have enough impact to show up against background noise

BUT

  - not so much as to have multiple meanings or alternative explanations

Operationalizing the IV:
Pilot-testing

- Purpose: Determine if manipulations (IV) have intended effect
- An initial study is done to examine whether you manipulated the IV effectively
- Manipulate IV and measure it's effects on the psychological state you were trying to manipulate
  - Example: Manipulating gender-typing of a job

Operationalizing the IV:
Manipulation checks

- Purpose: Determine if manipulations (IV) have intended effect
- Questions in the main study to determine if your IV had it's intended effect
- Measure the effect of your manipulation on psychological state of participants
  - Example: Manipulating hiring status of job applicant

Operationalizing the IV:
Internal Analysis

- What if my manipulation check fails?
- Internal analysis
  - Use manipulation check responses to assign subjects to a condition
  - Form new "groups" based on those who the manipulation worked for
- But, ***not an experimental design***, a pre-experimental design

Operationalizing the IV: **Realism**

- Realism is another desiderata of a manipulation
- 2 senses in which a manipulation can be realistic
  - **Experimental realism**
    - 'Psychological reality'
    - Manipulation is realistic to subjects and has an impact to them
  - **Mundane realism**
    - 'Physical reality'
    - Manipulation is similar to real-life events
- Not opposites, but differentially important

Operationalizing the IV
Types of bias in lab experiments

- **Demand characteristics**
  - Cues provided by the experimental setting that help the subject to develop naïve hypotheses about the experiment's purpose and to behave accordingly.
  - Subject is not a passive responder in the experiment, but a thinking person.
- Cues can be related to:
  - Information about the experiment (rumors, announcement)
  - Physical setting
  - Experimental instructions, procedures, tasks
  - Experimenter
- Demand characteristics are a source of systematic error

Demand Characteristics in Action

Types of bias in lab experiments

Strategies for minimizing demand characteristics

- A deceptive cover story
- Collect DVs unobtrusively
- Expose subjects to only one condition
- Separate IV manipulation from experimental session
- Subjects are unaware that they are in an experiment
- Behavioral Measures as DVs

Types of bias in lab experiments

- **Demand characteristics**
  - Subjects may respond to demand characteristics in various ways:
    - Good subject
    - Bad subject
    - Normal subject
  - Can demand characteristics be eliminated?
  - Which designs are most susceptible?

Types of bias in experiments

- **Experimenter effects**
  - Unintentional errors experimenters make in eliciting desired responses from subjects
  - Experimenter is not passive stimulus in experiment
    - Knows the hypothesis and wants it confirmed
    - Behaves selectively
  - Problem: subjects respond to IV and experimenter cues
  - Creates a self-fulfilling prophecy
  - Experimenter cues become source of **systematic error**

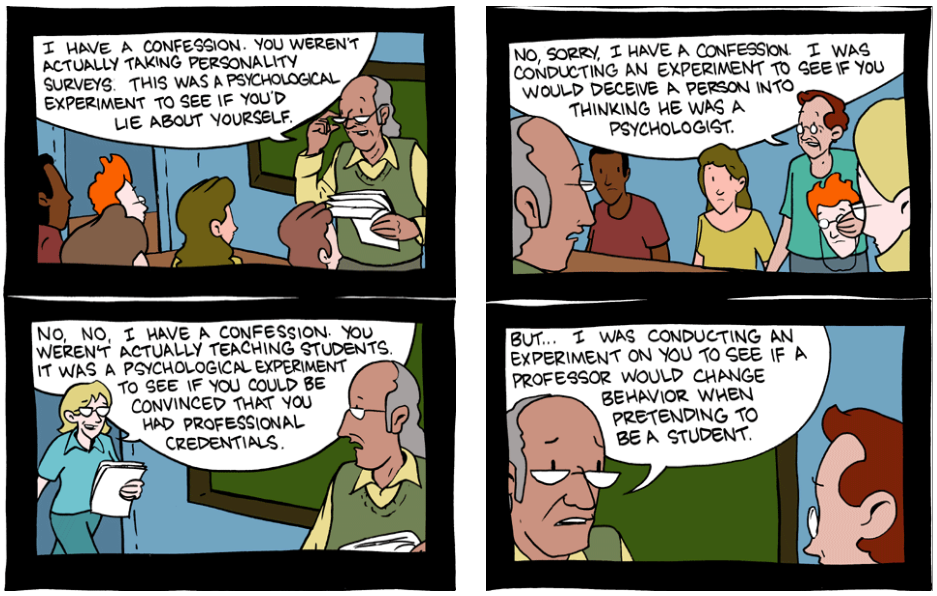
Types of bias in experiments

Minimizing Experimenter's expectancy

- Experimenter is unaware of condition
- Experimenter is unaware of hypothesis
- Multiple experimenters within sessions
- Multiple experimenters across sessions
- Experimenter is unaware of condition as long as possible
- Randomly assign experimenters to conditions
- Experimenters are trained

Minimizing experimenter's role in the experiment

- Use of other media to communicate instructions
- Minimize experimenter - subject interactions



Types of bias in lab experiments

- How pervasive is experimenter bias?
  - Not found on intelligence tests
  - Rosenthal studies differ from most lab studies in that:
    - Setting deprived of other cues
    - Experimenters ran only 1 condition
    - Highly subjective DV
- What behaviors cause experimenter bias?
  - Not all verbal
  - Unclear on what experimenters do to cause this