Chapter 9

Experimental design:

Between-subject design
Between-subject design (Bet-Ss)
- aka “Between-participant design”
  - Grps get different treatment
  - Quasi:
    - Grps different based on person variable (age, gender...)
- Experimental design and vocabulary
- Threats to internal validity
- Threats to external validity

Within-subject design (W/in-Ss)
- aka “Correlated-groups designs”
- Within-participants design
- Matched-participants design
Introduction
- Can we improve memory for nonsense pics w/ cue?

Method
- Study: See 28 pics (w/ or w/o label)
- Test: Immediate recall (draw)

Results
- Label: 70% (SE = 1.25)
- No label: 51% (SE = .92)
- $t(16) = 3.43, p < .01$

Discussion
- Memory significantly improved by use of verbal label

Droodles by Roger Price
a. 4 elephants sniffing an orange
b. An early bird catching a very strong worm
c. A man in a mailbox signaling a left turn
Experimental design

- What is independent variable (IV)?
  - What are the *levels* of the IV?
  - What is the control group?
  - What is the experimental group?
- What is dependent variable (DV)?
  - What is measured?

- If you were to design a replication of the study, what would you need to control?
  - What are the potential confounds in the experiment?
  - Is difference in DV due to expmt’l manipulation?
  - What population do you want the sample to represent? Who do you want to make conclusions about? How do select sample?
  - You want maximal reliability, internal and external validity!
Confounds

- Are results due to the effect of IV or confound?
- Example: Quinn, et al. (1999)
  - Examine if night lights for kids (<2) creates myopia (nearsighted)
  - Results: w/o 10% myopic; w/ night light 45% myopic
  - Confounds?
    - Parents w/ myopia need night light so they can see in room
    - Data collected in eye clinic so non-normal population
    - Relied on parental memory for 6yrs prior (on avg)

- Effect of confounds:
  - Confound can systematically affect Ss in 1 grp differently than other grp
  - Confound can obscure real difference between grps by raising or lowering scores in 1 grp
- It can be difficult to spot confounds!
Horner (1968, as cited in Kasof, 1993)

- **Method:**
  - Study phase: Read story
  - Test phase: write summary about story
  - IV: Male Ss read about a male character (John); Female Ss read about a female character (Joan)

- **Result (Horner, 1968)**
  - Women wrote more negative comments about character

- **Conclusion**
  - Women show fear of success

- **Confounds according to Kasof (1993)**
  - Ss’s interpretation of names (how smart/attractive they are based on name)
  - Others?
Threats to internal validity

Internal validity: Extent results due to effect not confounded

- Nonequivalent control grp
  - Grps different before testing
- History
  - Time of measurement effect
- Maturation
  - Aging effect
- Testing effect
  - Practice effect or fatigue effect
- Regression to mean
  - Effect of extreme scores
- Instrumentation effect
  - Measurement error
- Mortality or attrition
  - Effect of drop-out or death
- Diffusion of treatment
  - Biased by prior Ss
- Experimenter or participant effects
  - Experimenter bias
  - Reactivity; placebo effect
- Ceiling and floor effects
  - DV not sensitive measure
Examine anxiety disorders

IV: 3 therapy conditions
- Psychodynamic
- Behavioral
- Control

Results
- Any therapy helps
Loftus & Palmer (1974)

Depiction of actual accident

Ss watch slides of accident

Leading question:
“About how fast were the cars going when they **contacted/smashed** into each other?”

**1wk later:**
“Did you see broken glass?”

- “Contacted”
  - 32 mi/hr
  - Yes glass 11%

- “Smashed”
  - 41 mi/hr
  - Yes glass 32%

Memory construction
Ross, et al. (1994)

Experimental
- View film of male teacher reading to students.
- View film of female teacher getting robbed.
- Test: Pick robber from photospread.

Control
- View film of female teacher reading to students.

(b) Actual robber not in photospread
- Percent identified male teacher: E (60), C (20)

(c) Actual robber was in photospread
- Percent identified male teacher: E (20), C (20)
Schuman & Scott (1989)

- “the most important public or political event of past 70 years”

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Ss age in 1989
Ss year of birth
Bargh, Chen, & Burrows (1996)

- Ss fill-out “test of language ability”
- Unknowingly “primed” w/ stereotypes of words in 1 of 3 categories
- Examine how quickly Ss interrupts conversation of experimenter w/ friend

*Figure 1.* Percentage of participants who interrupted the experimenter within the 10-min period, by trait priming condition (Experiment 1).
Method

Watch video
- w/ or w/o gun being shot

DV: EDR or stress response

IV: group
- Police officer
- Citizen

Figure 1. Mean electrodermal response (EDR) as a function of shoot condition and time for police and citizen witnesses. The arrow indicates the point in the scenarios when a shooting occurs.
- Ss given “visual test”
- Unknowingly “primed” w/ pics of A-A or caucasian faces
- Exp3: examine hostility rating after told about “computer error”
- Rated by experimenter and blind coders
Prospective memory (PM)

- Einstein & McDaniel (1990)
- Question:
  - What is effect of cue familiarity on PM
- Method:
  - Press key when see cue word
  - IV: familiar vs unfamiliar cue word
- Results:
  - 3x more likely to press key for unfamiliar cue word than familiar cue word

How likely are you to forget PM task?
- Effect of background task
- Effect of importance


- **Method**
- **IV**: group (training vs. no training)
- **Training**: 12+ days on working memory task
- **DV**: Performance on intelligence task before and after training sessions
Method:

*Baseline task:*
- Find repeated # in series of 10 #s

*Transformation task:*
- Add or subtract 1 to each #, then find repeated # in series of 10 #s

IV: Age (Yng v Older)
DV: Accuracy
Duke undergraduates tested day after 9/11 (Flashbulb memory - FB)
Tested again at 1, 6, or 32 weeks after 9/11
DV: consistency of FB and everyday memory
Results:
  - Both types of memory declined over time
  - No relationship between accuracy and confidence in memory
Threats to internal validity

How to prevent these potential confounds

- Nonequivalent control grp
  - Use random assignment
  - Use pretest/posttest design
- History
  - Test at different time pts
- Maturation
  - Use control group
- Testing effect
  - Use control group
- Regression to mean
  - Use control grp w/ same extreme scores

- Instrumentation effect
- Mortality or attrition
- Diffusion of treatment
  - Tell Ss not to discuss study
- Experimenter or participant effects
  - Use single-blind or double-blind method
  - Use placebo group
- Ceiling and floor effects
  - Carefully select DV to avoid
Threats to external validity

- External validity: Results can be generalized beyond lab
- Generalization to population of interest
  - “College sophomore problem”
  - Replicate with other groups
  - Will that sample act like population?
  - Consider different socioeconomic and geographic variables
- Generalization beyond lab setting
  - Lab setting = good internal validity b/c more control
  - But, can = poor external validity b/c more artificial
  - Exact replication study
  - Systematic replication study
  - Conceptual replication study
Replication of Bower, Karlin & Dueck (1975)

If you were to design a replication of the study, what would you need to control?

- Nonequivalent control grp
  - Use random assignment
  - Use pretest/posttest design
- History
  - Test at different time pts
- Maturation
  - Use control group
- Testing effect
  - Use control group
- Regression to mean
  - Use control grp w/ same extreme scores
- Instrumentation effect
  - Use control group
- Mortality or attrition
  - Use control group
- Diffusion of treatment
  - Tell Ss not to discuss study
- Experimenter or participant effects
  - Use single-blind or double-blind method
  - Use placebo group
  - Use good “cover story”
- Ceiling and floor effects
  - Carefully select DV to avoid