

# *Design Strengths & Weaknesses & Confounding Variables*



# LABORATORY EXPERIMENTS

- ∞ **Strengths:** *Tighter control of variables. Easier to comment on cause and effect. Relatively easy to replicate. Enable use of complex equipment. Often cheaper and less time-consuming than other methods.*



# LABORATORY EXPERIMENTS

- ∞ **Weaknesses:** Demand characteristics - participants aware of experiment, may change behavior. Artificial environment - low realism. May have low ecological validity - difficult to generalize to other situations. Experimenter effects - bias when experimenter's expectations affect behavior.



# FIELD EXPERIMENTS

- ∞ *A field experiment takes place anywhere in a natural setting; it could take place in a school, hospital, the street or an office.*
- ∞ *Note: A field experiment is an experiment; the independent variable is manipulated. Not all field studies are experiments.*
- ∞ **Strengths:** *People may behave more naturally than in laboratory - higher realism. Easier to generalize from results. Less chance of interference from experimenter bias.*



# FIELD EXPERIMENTS

- ⌘ **Weaknesses:** Often only weak control of extraneous variables - difficult to replicate. Can be time-consuming and costly. No control over the allocation of participants to groups (random in a 'true experiment').



# CASE STUDY

- ∞ *In-depth investigation of an individual's life, used to reconstruct major aspects of a person's life. Attempt to see what events led up to current situation. Usually involves: interview, observation, examination records, & psych. testing.*
- ∞ **Strengths:** *good for assessing psychological disorders - can see history and development.*



# CASE STUDY

- Weaknesses: very subjective. Like piecing together a puzzle, often there are gaps - relies on memory of the individual, medical records, etc.

*Savage Chickens*

by Doug Savage



# SURVEY

- ∞ *Either a written questionnaire, verbal interview, or combination of the two, used to gather information about specific aspects of behavior.*
- ∞ **Strengths:** *Can gather a lot of information in a short time. Can gather information on issues that are not easily observable. Less costly. Can provide valuable information.*



*“One final question: Do you now own or have you ever owned a fur coat?”*

# SURVEY

- ⌘ **Weaknesses:** self-report data (honesty is questionable). Yay-saying or nay-saying. Trying to 'psych out' the researcher by trying to guess what is being studied. Not taking the questions seriously. Limits the kind of data one can obtain to the questions asked.



**87% OF THE 56% WHO COMPLETED MORE THAN 23% OF THE SURVEY THOUGHT IT WAS A WASTE OF TIME**

# PSYCHOLOGICAL TESTING

- ∞ In psychological testing, one provides a test and then scores the answers to draw conclusions.
- ∞ Examples. - I.Q. tests, personality inventories, S.A.T., G.R.E., etc...
- ∞ **Weaknesses:** validity is always a question; honesty of answers.
- ∞ **Strengths:** can be very predictive and useful if valid.



# EXPERIMENTAL RESEARCH

- ∞ Only way to approach Cause & Effect – the method of determining whether variables are related is when the researcher manipulates the independent variable and controls all other variables either by randomization or by direct experimental control.
- ∞ **EXPERIMENTAL DESIGN:** Three experimental designs are commonly used:
  - **INDEPENDENT GROUPS:** Testing separate groups of people, each group is tested in a different condition.
  - **REPEATED MEASURES:** Testing the same group of people in different conditions, the same people are used repeatedly.
  - **MATCHED PAIRS:** Testing separate groups of people - each member of one group is same age, sex, or social background as a member of the other group.

# ADVANTAGES AND DISADVANTAGES FOR EACH EXPERIMENTAL DESIGN

## ∞ INDEPENDENT GROUPS:

- **Pros:** Avoids order effects. If a person is involved in several tests they may become bored, tired and fed up by the time they come to the second test, or becoming wise to the requirements of the experiment!
- **Cons:** More people are needed than with the repeated measures design.
- Differences between participants in the groups may affect results, for example; variations in age, sex or social background. These differences are known as participant variables.

## ∞ REPEATED MEASURES:

- **Pros:** Avoids the problem of participant variables.
- Fewer people are needed.
- **Cons:** Order effects are more likely to occur.

## ∞ MATCHED PAIRS:

- **Pros:** Reduces participant variables.
- Avoids order effects.
- **Cons:** Very time-consuming trying to find closely matched pairs.
- Impossible to match people exactly, unless identical twins!

# ***POSSIBLE EXPERIMENTAL CONTROLS***

- ∞ ***COUNTERBALANCING:*** Alternating the order in which participants perform in different conditions of an experiment. For example, group 1 does 'A' then 'B', group 2 does 'B' then 'A' this is used to eliminate order effects.
- ∞ ***RANDOMIZATION:*** Material for each condition in an experiment is presented in a random order, this is also to prevent order effects.

# CONFOUNDING VARIABLES

- ∞ *A confounding variable is a variable, other than the independent variable that you're interested in, that may affect the dependent variable.*
- ∞ *This can lead to erroneous conclusions about the relationship between the independent and dependent variables.*
- ∞ *You deal with confounding variables by controlling them; by matching; by randomizing; or by statistical control.*

# CONFOUNDING VARIABLES

## COMMON CONFOUNDING VARIABLES INCLUDE:

- ∞ *Intelligence of participants, Personality of participants, Gender of participants, Time of day, Weather, Noise levels, Temperature...*
- ∞ *Obviously in an experiment we take steps to minimize these:*
  - *Example: we could ensure that the procedure is carried out at the same time of day, in the same room, with similar temperature settings etc.*

# MURDER AND ICE CREAM

It is known that throughout the year, murder rates and ice cream sales are highly positively correlated.

∞ *There are three possible explanations for this correlation:*

- ∞ **Possibility #1:** Murders cause people to purchase ice cream. One could imagine a world where this is true. Perhaps when one is murdered, they are resurrected as zombies who primarily feed on ice cream.
- ∞ **Possibility #2:** Purchasing ice cream causes people to murder or get murdered. Again, one could imagine a world where this is true. Perhaps when one eats ice cream, those without ice cream become jealous and murder those with ice cream.
- ∞ **Possibility #3:** There is a third variable—a confounding variable—which causes the increase in BOTH ice cream sales AND murder rates.

# MURDER AND ICE CREAM

- ∞ For instance, the weather. When it's cold, people stay at home rather than go outside and murder people. They also probably don't eat a lot of ice cream.
- ∞ When it's hot, people spend more time outside interacting with each others, and hence are more likely to get into the kinds of situations that lead to murder. They are also probably buying ice cream.

# MURDER AND ICE CREAM

- ∞ In this example, the weather is a variable that confounds the relationship between ice cream sales and murder rates.
- ∞ You may also recognize this as the so-called *third variable problem*, which refers to the fact that any time we observe a relationship among two variables, there's always the possibility that some third variable which we don't know about is responsible for (“confounding”) the relationship.

# LAB

- ∞ Go to the Labs webpage to complete lab assignment:  
“Evaluating Research Methods in Popular Media” (Due Before Class Next Week)
  - Use the “Research Strengths and Weaknesses and Confounding Variables” handout as an aid for your lab assignment