What do we need for an experiment?

An environment that we systematically control and manipulate in order to observe the effect of the manipulation upon some behavior to answer a specific question.

What do we need for an experiment?

Said another way, we need:

- Dependent variable
- Independent variable

• Dependent variable
  – Measurement made by the researcher
  – Time until someone sits down.

• Independent variable
  – Manipulation in the controlled environment
  – There must be at least 2 levels of the manipulated variable in order to make a comparison.
   - Different doses
     – repeated measures
   - Presence vs. absence of variable
     – Control vs experimental group
What do we need for an experiment?

- Control over irrelevant variables
  - Independent variables with no manipulation

Why do psychologists value experiments so much?

- Better control over extraneous environment
- This control allows us to conclude that the difference in the dependent variable was caused by the change in the independent variable.
  - Draw conclusions carefully
    - Deaf fleas

Some Problems with Experiments

- Can’t control EVERYTHING
  - Not all variables can be controlled (especially if you don’t know about it)
  - Confounded variable
    - Two or more variables whose separate effects can not be isolated.
    - Teaching effectiveness example
      - Prof. X uses book A
      - Prof. Y uses book B
Some Problems with Experiments

• Can’t manipulate some variables
  – Inherent subject characteristics
    • Gender, age, race, ethnicity, etc.
  – Social Attributes
    • Social class, region of residence, etc.
  – Exposure
    • Natural disasters
    • Disease states

• In such cases you must take what you are given
  – This may include some confounding variables.
  – X, Z, X + Z may cause the difference you observe.

• These situations are best described as “quasi-experiments”

Some Problems with Experiments

• Demand characteristics
  – Participants behave the way they think the experimenter wants them to.
  – Can you do that in all experiments?

• Evaluation apprehension
  – Participants want to “look good” to the researcher.
  – What about S’s in the last week of classes?
Some Problems with Experiments

• Humans are not inert “manipulable objects”
  – They seek meaning in everything they do
  – Experiments that treat humans as mechanistic objects provide results that are misleading.

• Limited number of variables manipulated through a limited range
  – This range may not reflect the range encountered in the real world.

• Limited number of variables manipulated through a limited range
  – We might control away an interesting influence or effect
    • Word Frequency and Word Duration in speech error analysis

Experiments are artificial!

• Participants respond to a stimulus on the basis of extremely limited information
  – Words not in sentence, Lexical decision task
  – Lines or letters, not people or car keys
Some Problems with Experiments

Experiments are artificial!

• Bear little resemblance to real life, so how can we be sure that what we observe in an experiment happens in real life?

Some Problems with Experiments

Experiments are artificial!

• They lack external validity!
  – Can’t generalize to other:
    • populations, settings, independent variables, dependent variables, etc.

Are these real “concerns”?

Experiments are not conducted to yield estimates or likelihood of behavior.

– “Artificialness” gives us control allowing us to test causal hypotheses.
– Does a change in X lead to a change in Y?
– NOT: How often does Y happen when given X?
  • It’s a feature, not a bug!

What do experiments do?

They test the predictions of a theory/model.

The theory is supposed to generalize, not the experiment!
What do experiments do?

- In an experiment, we are not making generalizations, we are testing them.
  - Harlow’s monkey
    * Drive reduction theory predicted X, but Y happened!
    * It was not meant to test anything about rhesus monkeys, terry cloth, wire, etc.

Psychological research is interested in:

- What can happen (rather than what typically does happen)?
  - We ask questions that might not otherwise occur to us
    * Wearing glasses makes you “look” smarter.
    * Mnemonists- very unique individuals; not generalizable.

Psychological research is interested in:

- Something ought to happen in the lab, so we test it in the lab.
  - Brown’s work with language learning- Parents should correct (or not respond to) ungrammatical utterances by children. Instead, parents react to content of utterance, not the form.

Psychological research is interested in:

- Demonstrate the power of a phenomenon by showing it happens in unnatural settings
  - Milgram’s studies
  - Implanted memories
Psychological research is interested in:

Lab is used when there is no counterpart in the real world.

- Psychophysical studies lead to understanding systems that operate in the real world
  - Dark adaptation

Note

There ARE situations in which generalizability and subject representativeness IS important.

- “Applied” research
- Educational research
- Agricultural research