

## 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.

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## What do we need for an experiment?

Said another way, we need:

- Dependent variable
- Independent variable

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## What do we need for an experiment?

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

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## What do we need for an experiment?

- 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

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## What do we need for an experiment?

- Control over irrelevant variables
  - Independent variables with no manipulation

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## 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

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## Why do psychologists value experiments so much?

- Economy (Quick & Efficient)
  - Naturalistic observation requires a great deal of time (and patience) to wait for the desired behavior to occur
    - Low frequency behaviors
      - Relationship between heat and aggression in the Arctic.
      - Speech errors
    - May miss the behavior when it does finally occur

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## 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

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## 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

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## Some Problems with Experiments

- 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”

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## Some Problems with Experiments

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

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## Some Problems with Experiments

- Evaluation apprehension
  - Participants want to “look good” to the researcher.
  - What about S's in the last week of classes?

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## 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.

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## Some Problems with Experiments

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

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## Some Problems with Experiments

- 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

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## Some Problems with Experiments

### 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

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## 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?

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## Some Problems with Experiments

### Experiments are artificial!

- They lack *external validity*!
  - Can't generalize to other:
    - populations, settings, independent variables, dependent variables, etc.

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## 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!

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## What do experiments do?

They test the predictions of a theory/model.

The theory is supposed to generalize,  
not the experiment!

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## 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.

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## 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.

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## 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.

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## Psychological research is interested in:

Demonstrate the power of a phenomenon by showing it happens in unnatural settings

- Milgram's studies
- Implanted memories

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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

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Note

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

- “Applied” research
- Educational research
- Agricultural research

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