

Variables

A *variable* is a characteristic of a person, place or a thing that can change (vary) over time or from one situation to another.

E.g.: temperature, height, weight, etc...

Almost anything can be considered a variable:

"Blond, S. M, 25, seeks, S. F, aged 20-26, for fun and friendship"

Operational and Conceptual Definitions

- **Conceptual definition** – A dictionary definition; the common meaning of a word
- **Operational definition** – A precise definition of a construct based on how it will be measured or manipulated in a study

Hunger: A strong desire or need for food

Hungry: Experiencing a desire or need for food.

Hunger: Number of days without a meal.

Defining Variables

- Theoretical definitions
 - Define variables in abstract terms
 - Hunger – connection between reported feeling of hunger and sensory experience
 - Prejudice – premature judgment
 - Frustration – blocked goals
 - Depression – feeling sadness and despair, sleep and weight problems, lost interest

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Hunger: A strong desire or need for food

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Hunger: Number of days without a meal.

Defining Variables

- Operational definitions
 - Define variables in concrete terms
 - Specific way to measure or manipulate variables
 - Hunger – stomach contractions
 - Prejudice – attitude scale
 - Frustration – interrupting play
 - Depression – Beck Depression Inventory

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Independent and Dependent Variables

- Dependent Variable
 - "The effect"
 - What is measured
- Independent Variable
 - "The cause"
 - What is manipulated
 - Can occur in combinations (interactions)

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Independent Variable

Variable that systematically varies across different conditions in the experiment.

- It is what is manipulated in the experiment.

Independent Variable

- IV's have different levels
 - Levels tell you how many types of the IV are in a study
 - An IV must have at least 2 levels.
 - Ex: Gender could be described as a single variable that has 2 levels (male, female)

Dependent Variable

Variable that is allowed to vary freely to see if it is affected by changes in the independent variable

- It is what is measured in the experiment.

An Example

- Does birth order affect one's ÖSS score?
 - Birth order is the IV; ÖSS score is DV
 - For this example, we will only be looking at first, second and third born children. How many levels would this IV have?

Confounds and Extraneous Variables

- **Confound:** Any extraneous variable that covaries (changes with) with the IV and could provide an alternative explanation of the results.
- **An example:** Suppose you are conducting an experiment to see if spaced practice results in better retention than massed practice

Confounds and Extraneous Variables

- Students in the spaced practice group study for 1 hour on Monday, 1 hour on Wednesday, and 1 hour on Friday morning
- Students in the massed practice group study for 3 hours on Thursday
- Everyone is tested on Friday afternoon.
- Is there anything besides my IV (type of study) that might affect my results?

Example-1

For each of the following hypotheses, identify the independent and dependent variable. Then give an example of how you would operationalize each variable.

- People who are nervous perform poorly
- Reading speed decreases as word length increases
- Attractive people are more influential in debates
- People sleep better if they read before going to bed
- Alcohol impairs judgment

Example-2

A researcher was interested in the following hypothesis: people are less likely to help others when they are preoccupied. To test this prediction Dr. Batson asked students to rehearse a speech as they walked across campus to deliver a lecture, while other students were simply asked to walk across campus for the second part of a study. On the route to the other building a man was laying on the ground in need of help. Observers then recorded whether the passing student stopped to assist the fallen man.

- What is the conceptual independent variable?
- What is the conceptual dependent variable?
- What is the IV operationalization?
- What is the DV operationalization?

Example-3

Nancy thinks that drivers would be more likely to allow a member of the opposite sex to cross the street. She sets up an experiment at an intersection using a male and female friend as pedestrians. For every odd car (i.e., cars 1, 3, 5, etc.) that comes by she has a member of the same sex attempt to cross the street. For every even car (i.e., cars 2, 4, 6, etc.) that comes by, a member of the opposite sex attempts to cross. Nancy counts the number of times that pedestrian is allowed to cross the street.

- What is the independent variable (IV) in this experiment?
- What are the levels of the IV?
- What is the dependent variable?

Example-4

Riley wants to know if it is possible for people to show signs of alcohol intoxication even when they haven't ingested any alcohol. She randomly assigns one group of subjects to drink 4 beers with alcohol while another group of subjects is given 4 non-alcoholic beers. Subjects are given one and a half hours to drink the beers. A control group of subjects is given an equivalent amount of water to drink over the same time span. After each group has consumed their drinks, Riley has each subject perform a paper and pencil maze task and measures the time it takes to complete the maze.

- What is the IV in this experiment?
- What are the levels of the IV?
- What is the dependent variable?

Example-5

Bob is interested in whether his students perform better with only a mid-term and final during a course or with several tests given throughout the semester. To test this, he administers a mid-term and final to Section-1 and six exams to Section-2. At the end of the semester he compares final grades for each section.

- What is the IV in this experiment?
- What are the levels of the IV?
- What is the dependent variable?

Formulating a Hypothesis

- A good hypothesis should have the following features:
 - **Plausible (credible)**
 - **Testable**
 - **Falsifiable (refutable)**
 - **Operational definitions**

Activity



- Identify the relevant independent and dependent variables. Provide an operational definition for each.
- Do blondes have more fun?

Activity



- Identify the relevant independent and dependent variables. Provide an operational definition for each.,
- Does taking vitamins increase brain power?

Activity



- Identify the relevant independent and dependent variables. Provide an operational definition for each.
- Does age affect how well you can exercise?

Activity



- Identify the relevant independent and dependent variables. Provide an operational definition for each.
- Does interacting with relatives cause anxiety?

Activity



- Identify the relevant independent and dependent variables. Provide an operational definition for each.
- Does living in close quarters increase the desire to hurt others?

Activity



- Identify the relevant independent and dependent variables. Provide an operational definition for each.
- Does exposure to repeated disappointment result in sadness?

Activity



- Identify the relevant independent and dependent variables. Provide an operational definition for each.
- Is physical attractiveness related to arrogance?

Activity



- Identify the relevant independent and dependent variables. Provide an operational definition for each.
- Do children have more behavioral problems when both parents have careers?

Activity



- Identify the relevant independent and dependent variables. Provide an operational definition for each.
- Do patient people take longer to get to the center of a tootsie roll pop?

Discussion Questions

What research topics in psychology interest you?

- What hypothesis can you form about your topic?
 - Identify dependent and independent variables.
 - Make operational definitions.

Multiple Choice Questions for Review

- Paul has suffered brain damage in a car accident. Dr. Thaler, a specialist in internal medicine, studies Paul intensively, giving him many clinical interviews and tests to measure his cognitive functioning. Based on his work with Paul, Dr. Thaler comes up with a brilliant new hypothesis, which he and others can test further in empirical research. We would say that doctor's hypothesis came about primarily through
 - A) serendipity
 - B) analogical thinking
 - C) an intensive case study
 - D) the examination of paradoxical incident

Multiple Choice Questions for Review

- A researcher at the University of Colorado is interested in studying dynamics in small groups. She begins by thinking that people in small groups relate to each other much as the governments of large countries relate to each other. She develops hypotheses about small-group dynamics by thinking about how people in small groups are similar to diplomats at the United Nations. Her hypothesis came about
 - A) attempting to resolve conflicting results
 - B) improving on older ideas
 - C) using analogical thinking
 - D) serendipity

Multiple Choice Questions for Review



- A medical researcher at the university of Minnesota sets out to find a new treatment for cancerous brain tumors. She accidentally discovers a treatment for Parkinson's disease, a disease that is totally unrelated to cancer. Her new discovery has come about through
 - A) improving on older ideas
 - B) using analogical thinking
 - C) examining intensive case studies
 - D) serendipity