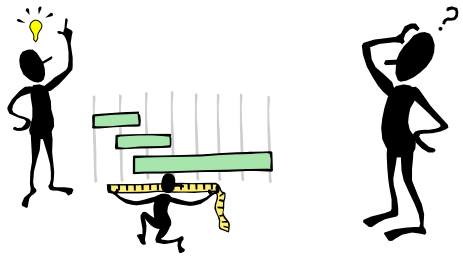
Lesson 2: Introducing Variables in Research

What is a Variable?



DEFINITION

- Variables are ***properties or characteristics of people or things that vary in quality or magnitude*** from person to person or object to object (Miller & Nicholson, 1976)
  - Demographic characteristics
  - Personality traits
  - Communication styles or competencies
  - Constructs
- In order to be a variable, ***a variable must vary*** (e.g., not be a constant), that is, it must take on different values, levels, intensities, or states

Types of Variables

1. Independent Variable

(also called the manipulated variable)

- **the variable that is manipulated either by the researcher or by nature or circumstance**
- **There can be only one independent variable in a research.**

2. Dependent Variable

(also called the responding variable)

- **A variable that is *observed or measured*, and that *is influenced or changed by the independent variable.***
- **There can be one or more dependent variables in a research.**

3. Controlled Variables

- **The factors or conditions that are kept the same (unchanged) in a research.**
- **There can be many controlled variables in a research.**

EXAMPLES OF VARIABLES IN RESEARCH

Research Study Question	Independent Variable (What I change)	Dependent Variables (What I observe)	Controlled Variables (What I keep the same)
Is a classroom noisier when the lecturer leaves the room?	**Lecturer location:** The lecturer is either in the room or not in the room.	**Loudness**, measured in decibels.	**•Same classroom •Same students •Same time of day**
Does heating a cup of water allow it to dissolve more sugar?	**Temperature of the water**	**Amount of sugar that dissolves** completely(*measured in grams*)	**• Stirring • Type of sugar** *(More stirring might also increase the amount of sugar that dissolves, and different sugars might dissolve in different amounts, so to ensure a fair test ,keep these variables the same for each cup of water.")*

Practice

Identify variables for the following experiments.

Students of different ages were given the same jigsaw puzzle to put together. They were timed to see how long it took to finish the puzzle.

Identify the variables in this investigation.

What was the independent variable?

- Ages of the students
  - –Different ages were tested by the scientist

What was the dependent variable?

- The time it to put the puzzle together
  - –The time was observed and measured by the scientist

What was a controlled variable?

- Same puzzle
  - All of the participants were tested with the same puzzle.
  - It would not have been a fair test if some had an easy 30 piece puzzle and some had a harder 500 piece puzzle.

Another example:

An investigation was done with an electromagnetic system made from a battery and wire wrapped around a nail. Different sizes of nails were used. The number of paper clips the electromagnet could pick up was measured.

What are the variables in this investigation?

Independent variable:

- Sizes of nails
  - These were changed by the scientist

Dependent variable:

- Number of paper clips picked up
  - The number of paper clips observed and counted (measured)

Controlled variables:

- Battery, wire, type of nail
  - None of these items were changed

One more:

The higher the temperature of water, the faster an egg will boil.

- Independent variable – temperature of water
- Dependent variable – time to cook an egg
- Controlled variable – type of egg

Last one:

The temperature of water was measured at different depths of a pond.

- Independent variable – depth of the water
- Dependent variable – temperature
- Controlled variable – thermometer

4. Extraneous Variables

- Extraneous variables are ***any variables that you are not intentionally studying*** in your research.
- When you carry out a given research, you're looking to see if one variable (the independent variable) has an effect on another variable (the dependent variable).
- In an ideal world you'd run the experiment, check the results, and voila! Unfortunately…like many things in life…it's a little more complicated than that.
- Other variables, perhaps ones that never crossed your mind, might influence the outcome of your research. ***These undesirable variables are called extraneous variables.***
- Extraneous variables ***are variables that are not the independent variable but have an impact on the dependent variable.***

- For researchers to be confident that change in the IV will solely affect change in the DV, potential extraneous variables need to be identified and controlled/eliminated; poor control will lead to results with lower reliability.
- There are **three key considerations to take** when controlling extraneous variables:

1. **Participant variables** – minimizing differences between participants (e.g. their stage of development such as age, or ability such as IQ).
2. **Researcher variables** – factors such as researcher behaviour, appearance or gender could affect participant responses, so should be made consistent throughout the experiment.
3. **Situational variables** – control of the setting where the experiment takes place, such as keeping light, sound and temperature levels consistent.