Understing Variables in Research

1 What is a variable

A variable is a characteristic or property that can take on different values. It can vary from one individual, object, or event to another

for eg

- Height is a variable because different people have different height
- Temperature is a variable because it changes over time.

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2 What are Independent and dependent variables?
Independent Variable: The factor that is manipulated
controlled by the experimenter. It is cause in an experiment
Dependent variable: The factor that is measured to see the
effect of the independent variable. It is the outcome of
the experiment

Examples of Independent and dependent variables
- Can Blueberries slow down aging?
Independent variables: Type of dietary supplement (none,
blueberry, strawberry, spinach)
Dependent variables: Memory test results and motor skills
test results (measuring improvement)

- How Bright is Right for Brake lights?
Independent variable: Brightness of brake lights
Dependent variable: Time taken to hit the brakes

Levels of an independent variable
The levels of an independent variable refer to the different
conditions or groups in an experiments
If an experiment compares an experimental treatment vs a
control treatment, than the IV has two levels (eg
taking a drug vs taking a placebo)
If an experiment test five different diets, then the
IV has five levels (each diet type)

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Understanding Qualitative and Quantitative Variables

- What are Qualitative and Quantitative variables?

* Qualitative Variables (categorical variables): These variables represent qualities or categories and do not have a numerical value) eg Hair color (eg, black, brown), Religion (eg, Christianity, Islam, Hinduism)

* Quantitative Variables (Numerical variables): These variables represent numbers can be measured or counted. eg Height (5 ft 7 inch, Weight (eg 150 pounds)

Understanding Discrete and Continuous Variables

- What are Discrete and continuous variables?

* Discrete Variables: Variables that can take on a countable number of values (eg number of people, number of cars)

* Continuous Variables: Variables that can taken on any value within a range. They usually represent things that can be measured (eg time, weight)

Basics of Data Collection

Many times, when data is initially collected, it may be in verbal or non numeric forms (eg height recorded in feet and inches, or a response scale like "very little", "moderate", "lots" etc) for statistical analyses to work, this data must be converted into numerical form.

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Table 1. Example Data

Student Name	Hair Color	Height
Naina	Brown	5'4"
Amber	Black	5'7"
Paul	Blonde	6'1"
Christopher	Blonde	5'10"
Sonya	Blonde	5'9"

Eg: Converting Height for statistical Computation

- Current form: In Table 1, heights are recorded in feet and Inches (eg 5'6")
- Problem: You cannot directly input 5'6" int a statistical program because it doesn't understand this format

Solution Convert all height into inches

5'4" is equivalent (5 x 12)+4 = 64 inches

This way, all heights will be represented numerically (in inches) and you can now calculate the mean height using a statistical program

Table 2 Conversion of verbal descriptions to numbers

1	2	3	4	5
Very little	little	Moderate	lots	Very lots

In the second case, you want to calculate the mean amount of computer experience, but it's described verbally (eg "very little", "moderate")

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Current Form: The variable "computer experience" is described using words.

Problem: You can't calculate an average with words, so you need to convert them into numbers.