

A black pen and a pair of glasses are resting on a wooden desk next to a lined notebook. The pen is positioned diagonally across the notebook page. The glasses are in the upper left corner of the frame. The notebook has horizontal lines and is open to a blank page.

# Variables and its Types

***Dr. Diwakar Singh***

**A variable is a construct or a characteristic that can take on different values or scores. Researchers study variables and the relationships that exist among variables.**

**Height is one example of a variable; it can vary in an individual from one time to another, among individuals at the same time, among the averages for groups, and so on.**

# ***Types of Variables***

# TYPES OF VARIABLES

Continuous variable

- Infinite set of values between 2 levels of variables.
- They are result of measurements.

Discontinuous variable

- Only a finite.
- Potentially countable set of values.

Independent

- A stimulus variable which is chosen by the researcher to determine its relationship to an observed phenomena.

Control variable

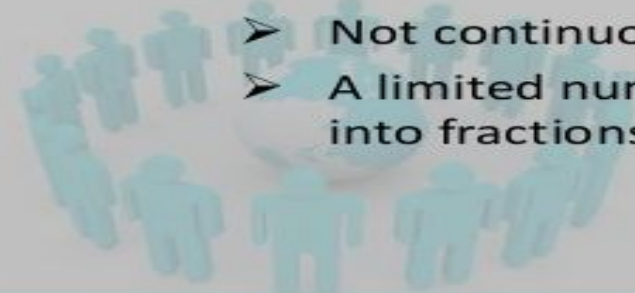
- The research in which the effects can be neutralized by removing the variable.

Dependent variable

- A response variable which is observed & measured to determine the effect of the independent variable.

# *Continuous and Discrete Variable*

## **DISCRETE VARIABLE**

- It is a type of statistical variable.
  - Can assume only fixed number of distinct values and lacks an inherent order.
  - Also known as a categorical variable , because it has separate, invisible categories.
  - Can only take on discrete specific values.
  - Not continuous.
  - A limited number of values which cannot be divided into fractions.
- 

# DISCRETE VARIABLE

## NOMINAL VARIABLES

- Named variables .
- A scale that categorizes items.
- No ordering , No direction.
- EX; Marital status (married/unmarried).

## ORDINAL VARIABLES

- Named variables + Ordered variables
- Rankings, Orders or Scalling.
- EX; Student letter grade,

# EXAMPLES OF DISCRETE VARIABLE

Number of printing mistakes in a book.

Number of road accidents in new Delhi.

Number of siblings of an individual.

A person (Live/Dead).

Result (Fail/Pass).



# CONTINUOUS VARIABLE

- It is a random variable that assumes all the possible values in a continuum.
- It can take any value within the given range.
- It defined over an interval of values, meaning that can suppose any values in between the minimum and maximum value.
- Infinite number of value.





# CONTINUOUS VARIABLE

## **INTERVAL VARIABLES:**

- Named variables + Ordered variables + difference between measurements.
- No true zero.
- EX; Temperature in Fahrenheit, Standardized exam score.

## **RATIO VARIABLES:**

- Named variables + Ordered variables + Difference between measurements+ Accommodate absolute zero.
- True zero exit.
- EX; Height ,Weight, Age.

# EXAMPLES OF CONTINUOUS VARIABLE

Height of a person.

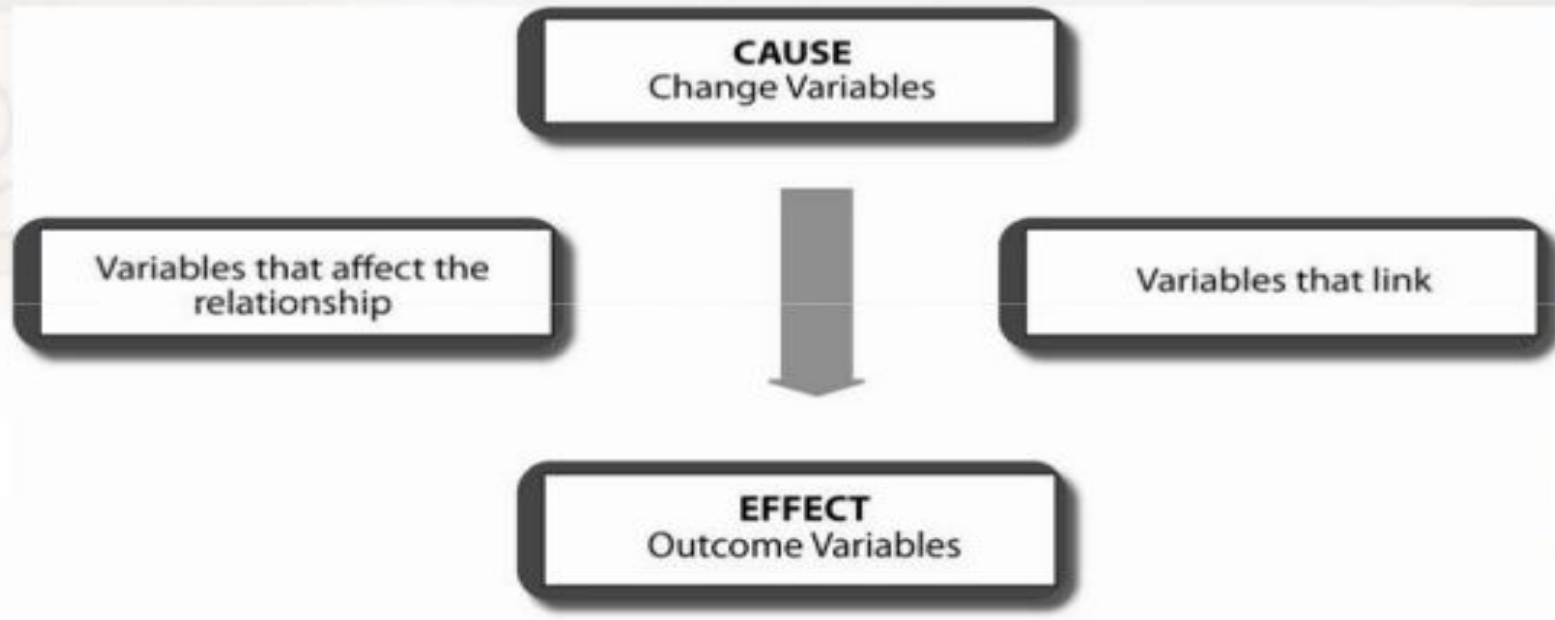
Age of a person.

Profit earned by the company or other.

Temperature of a day.

Income of employee.

# 4 main types of variables



- In research or studies that are attempting to study a causal based relationship, four sets of variables may operate:
  - (a) Change variables that are responsible for bringing about change in a phenomenon;
  - (b) Variables which affect the link between cause and effect variables;
  - (c) Outcome variables which results from the effects of a change variable; and
  - (d) Connecting or linking variables, which in certain situations important to complete the relationship between cause and effect.

# Dependent Variable

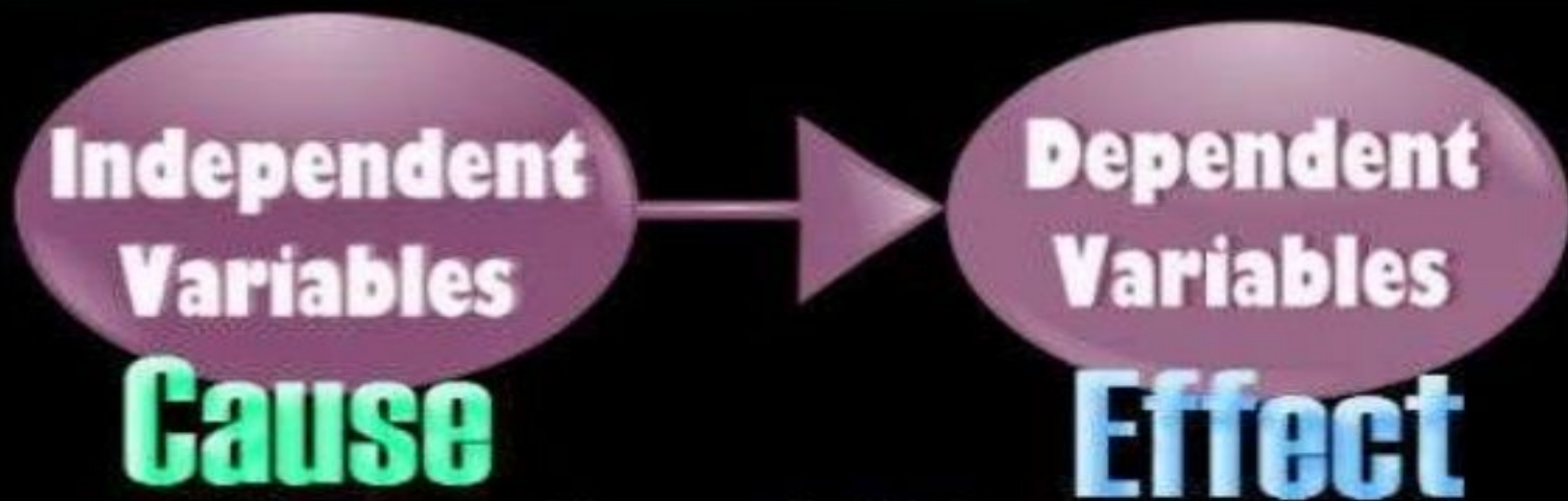
- They are also referred as *outcome* or *effect* or *responding* or *criterion variables*.
- The variable that is the effect or the result or outcome of another variable is the *dependent variable*.
- The dependent is the factor that may change as a result of changes made in the independent variable.
- Variable that is *influenced by* the independent variable.



# Independent Variable

- They are also referred as *manipulated* or *experimental* or *treatment variables*.
- The independent is a factor that's intentionally varied by the experimenter.
- The values of the independent variable are under experimenter control.
- "Variable that is believed to *cause or influence* the dependent variable".

# Relationship between Independent and Dependent Variables



It is a Causal Relationship

©Afdated



# Moderate Variable

- A moderator variable is a **secondary independent variable** that the researcher selects because he or she thinks it may have a strong contingent effect on the relationship between the primary independent variable and the dependent variable.
- A variable that influences, or moderates, or modifies the relation between two other variables and thus produces an interaction effect.

# EXAMPLES

- ✓ **Research Question 1:** “Does anxiety affect test performance and, if so, does it depend on **test-taking experience?**”
  - Independent variable: *anxiety level*
  - Moderator variable: *test-taking experience*
  - Dependent variable: *test performance*

✓ **Research Question 2: “Effects of library facilities available on achievement of students.”**

- Independent variable: library facilities
- Moderator variable: interest and inclination towards reading
- Dependent variable: academic achievement

# Inter-veining Variable

- A variable that explains a relation or provides a causal link between other variables.
- Also called by some authors “**mediating variable**” or “**intermediary variable.**”
- It cannot be measured.
- It is affected by the independent variable and it affects the dependent variable.



✓ **Research Question 2: “Higher education typically leads to higher income.”**

- Independent variable: *higher education*
- Intervening variable: *better occupation*
- Dependent variable: *higher income*

❑ The inter-veining variable is causally affected by education and itself affects income.

# Control Variable

- An extraneous variable that an investigator does not wish to examine in a study.
- Thus the investigator controls this variable.
- It is also called a covariate.
- The factor that is kept constant all throughout the experiment.
- There can be many controlled variables in an experiment.

**For example:-**

Does changing the temperature of a ball affect the height the ball will bounce?

- **Controlled Variables:**



- ✓ **Same ball**
- ✓ **Dropped from the same height**
- ✓ **Dropped onto the same surface etc...**



# COMMON TYPES OF VARIABLES

Continuous variable

Discrete variable

Dependent variable

Independent variable

Moderate variable

Control variable

Intervening variable