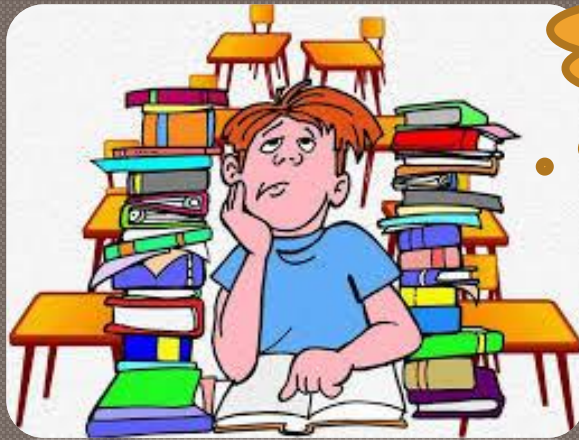


Variables



What are they?

Types of Variables



- Dichotomous (Binary) variable

- Observations that occur in one or two possible states (often labeled 0 and 1) Ex. Improved/Not improved

- Categorical variable

- Variable that contains values indicating membership in several categories Ex. Marital status (Single, Married, Divorced)

- Discrete variable

- Variable having only integer value Ex. Number of students

- Continuous variable

- Variable that is not restricted to particular values Ex. Time

Types of Variables (Cont.)



- ☉ Independent (Predictor) variable

- The presumed **cause** in a study

- ☉ Dependent variable

- The presumed **effect** in a study

- ☉ Confounding variable

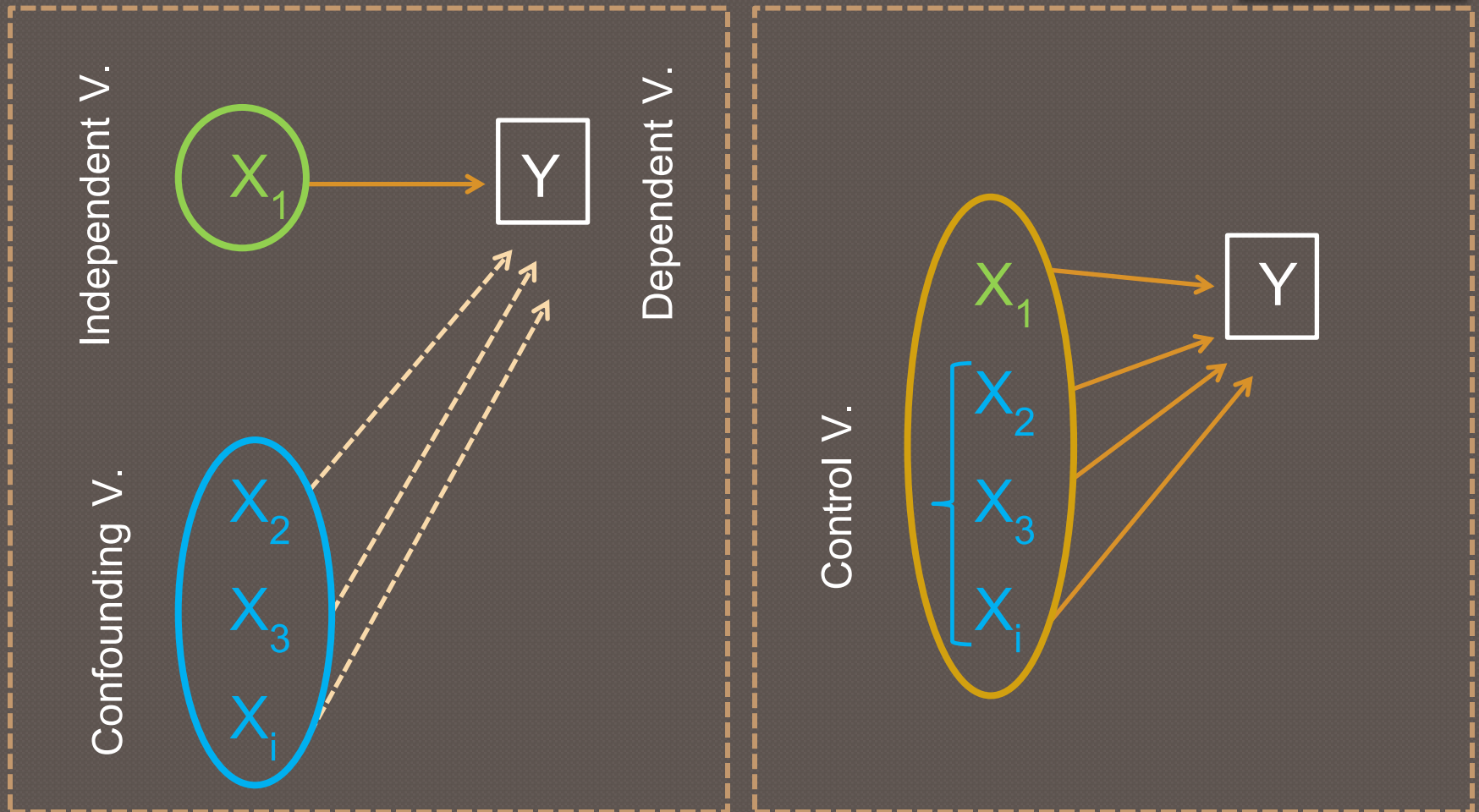
- Variable that obscures the effects of another variable.

- ☉ Control variable

- Variable that a researcher does not wish to examine in a study.
Thus, a researcher controls this variable.



Types of Variables (Cont.)



Types of Variables (Cont.)



Mediating variable

→ A variable that provides a **causal link** between other variables

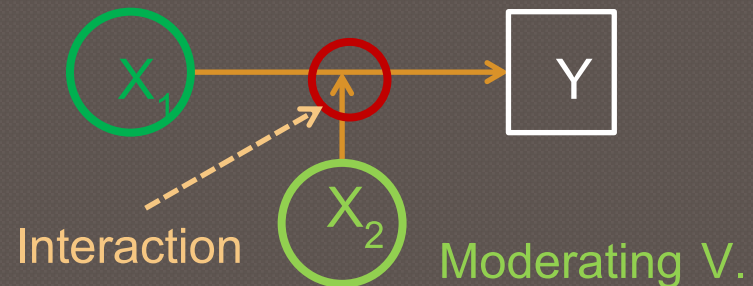
Ex. Income → Longevity



Income → Medical care → Longevity
Mediating V.

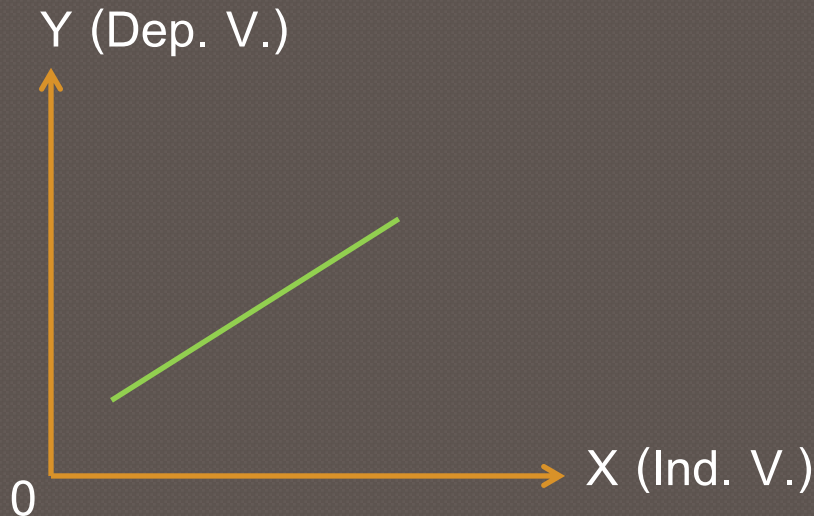
Moderating variable

→ A variable that influences the relation between two other variables and thus produces an **interaction effect**.

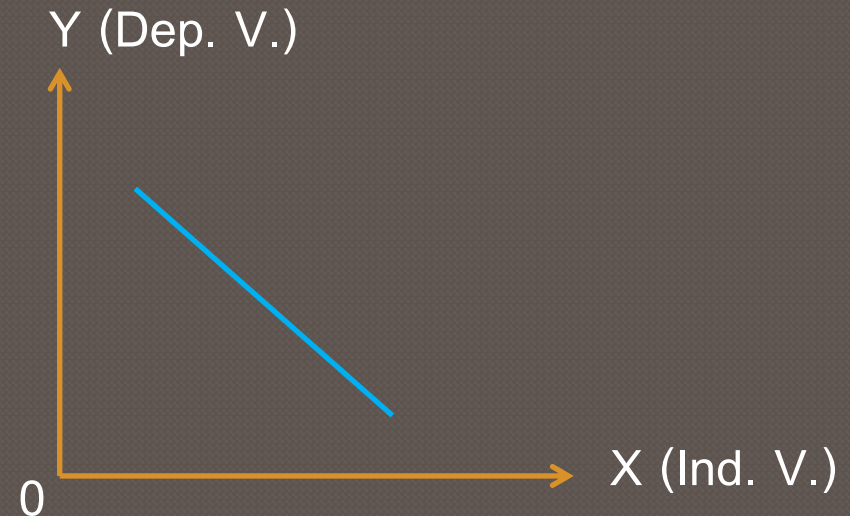


Placement of Variables on X-Axis and Y-Axis

Positive Relationship



Negative Relationship



Note: 1) The independent variable is always on the horizontal x-axis, and the dependent variable is always on the vertical y-axis.

2) The terms “Positive” and “Negative” refer to the directions of the relationship, not to whether the relationship is good or bad.

Definitions of Variables



☉ Conceptual definition

→ A specific theoretical meaning of a term, but usually not one used for describing measurement (could find in dictionary)

Remark: The conceptual definition of some variables is self-explanatory such as gender

☉ Operational definition

→ The explicit specification of a variable in such a way that its measurement is possible

Definitions of Variables (Cont.)



CONCEPTUAL DEFINITION

- **Intelligence** is often defined as the general mental ability to learn and apply knowledge to manipulate your environment, as well as the ability to reason and have abstract thought.

OPERATIONAL DEFINITION

- **IQ** is obtained by dividing mental age by chronological age and multiplying by 100.
- **GPA** is the average of all grades received.

Levels of Measurement



● Categorical variables

- **Nominal variable:** A variable with discrete without order or value Ex. Gender, Ethnicity
- **Ordinal variable:** A variable with discrete with order or ranking Ex. High to Low, Most to Least

Levels of Measurement



Continuous variables

- **Interval variable:** A variable measured on a continuous scale with equal intervals between values Ex. Celsius, Fahrenheit
- **Ratio variable:** A variable measured on a continuous scale with equal intervals between values, and with a true zero Ex. Age, Height

Levels of Measurement (Cont.)



Level Characteristics	Categorical Variables		Continuous Variables	
	Nominal	Ordinal	Interval	Ratio
Ordered		X	X	X
Equal intervals			X	X
Based on a true zero point				X

Levels of Measurement

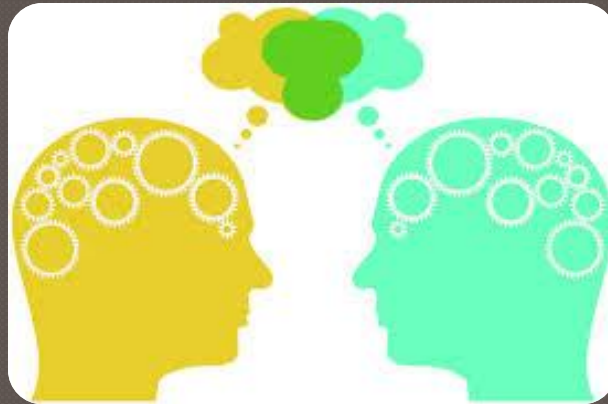


Question: Why are we interested in the types of scales that measure variables?



Answer: Types of scales affect statistical methods chosen to be used in your research.

Research Design



Research Design



Meaning

- Research Design is a detailed outline of how an investigation will take place. A research design will typically include how data is to be collected, what instruments will be employed, how the instruments will be used and the intended means for analyzing data collected.

Criteria for Selecting a Research Design



◎ The research problem

Ex. To identify factors that influence an outcome = **Quantitative**

To explore new phenomenon with little research on the topic
and unknown variables to be examined = **Qualitative**

◎ The personal experience

→ Depending on personal training and experiences

◎ The audiences

→ Depending on recommendations from advisors, graduate committees, colleagues and journal editors

Selection of a Research Design



Step 1

Types of Designs

Qualitative

Quantitative

Step 2

Strategies of Inquiry

✓ Survey

✓ Experiment

✓ Case study and etc.

Step 3

Research Methods

✓ Data collection

✓ Data analysis

✓ Interpretation and etc.

Selection of a Research Design (Cont.)



	Qualitative Approach	Quantitative Approach
Strategies of Inquiry	Case study and etc.	Survey, Experiment
<u>Research Method</u> Questions	Open-ended Emerging approaches	Closed-ended Predetermined approach
Data collection	Interview, Observation	Instrument based
Data analysis	Text analysis	Statistical analysis
Interpretation	Themes interpretation	Statistical interpretation

