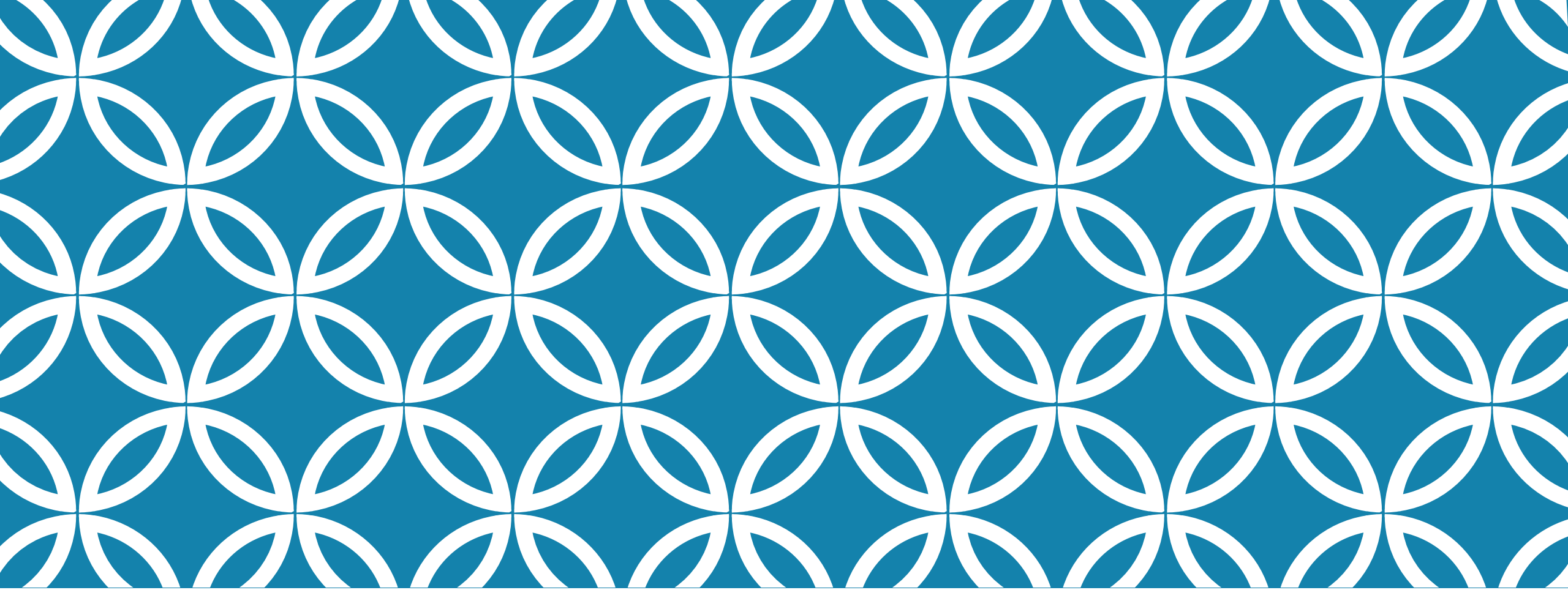


INTRODUCTION TO QUANTITATIVE ANALYSIS

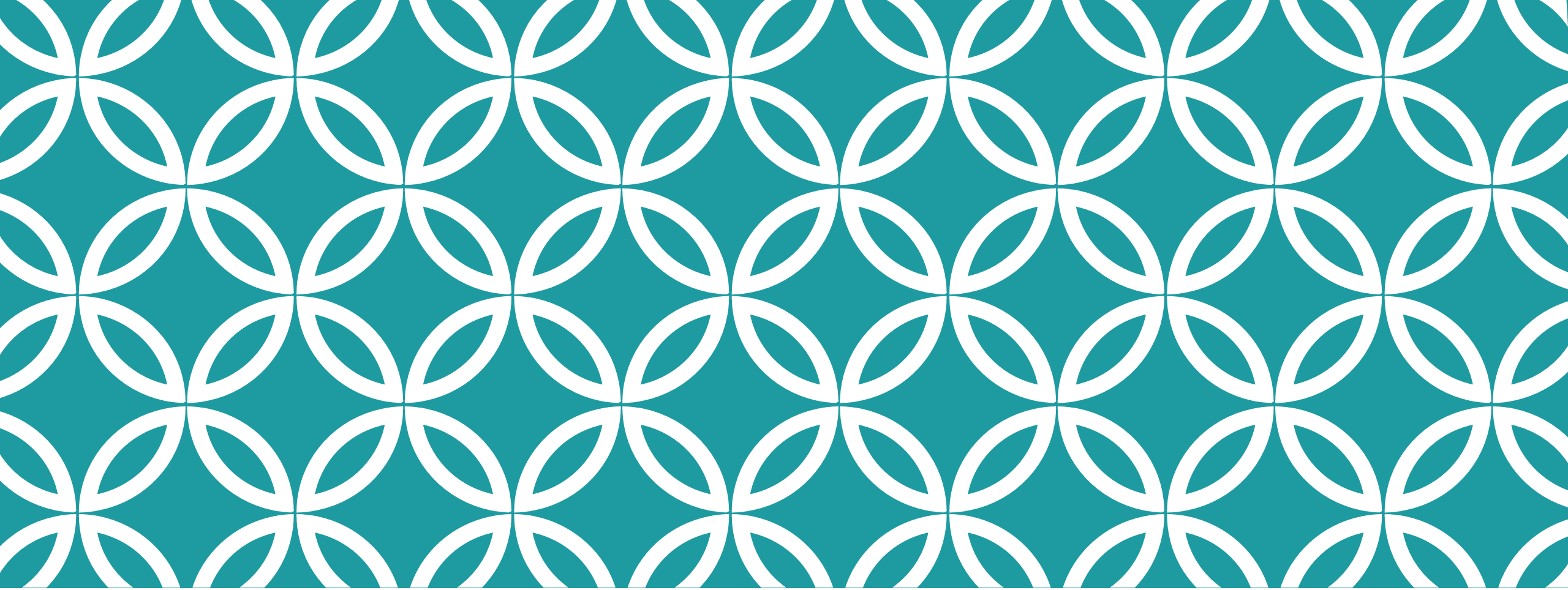
EMPIRICAL SOCIAL SCIENCE

Social scientists do empirical research by…

examining relationships between variables, across **observations**, and develop **explanations** for these relationships

EMPIRICAL SOCIAL SCIENCE

Observations + Explanation



OBSERVATIONS

OBSERVATIONS

Units of Analysis

- The level of social life under investigation
  - Individual Level
    - Person (people)
  - Aggregate Level
    - Family
    - Organization
    - City, County, State, etc.

OBSERVATIONS

Observations on ***ROWS***

	A	B	C	D	E
1	ID	Age	Happiness	Race_Ethnicity	SES
2	Person 1	18	23	White	Lower
3	Person 2	24	56	Black	Middle
4	Person 3	21	93	Asian	Upper
5	Person 4	32	17	LatinX	Lower
6	Person 5	20	68	Native/Indigenous	Middle

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OBSERVATIONS

What is the unit of analysis here?

	A	B	C	D	E
1	ID	Age	Happiness	Race_Ethnicity	SES
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OBSERVATIONS

Every observation under investigation has many **variables…**

OBSERVATIONS: VARIABLES

Properties of observations that are different (vary) across observations.

- Social class
- Age
- Gender
- Sex
- Race

OBSERVATIONS

Variables on ***COLUMNS***

	A	B	C	D	E
1	ID	Age	Happiness	Race_Ethnicity	SES
2	Person 1	18	23	White	Lower
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OBSERVATIONS

Every observation under investigation has many **variables…**

… and each variable has many attributes

OBSERVATIONS: VARIABLES AND ATTRIBUTES

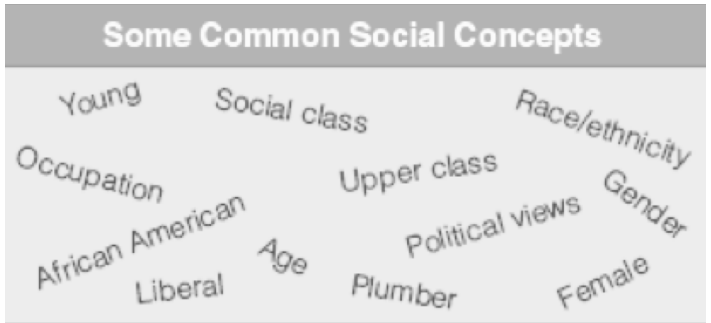
Variables:

- Properties of observations that are different (vary) across observations
  - e.g. Race/Ethnicity

Attributes:

- Specific characteristics or qualities that describe each observation, can be grouped into variables
  - Black, White, LatinX, etc.

VARIABLES AND ATTRIBUTES



Variable	Attributes
Age	Young, middle-aged, old
Gender	Female, male
Occupation	Plumber, lawyer, data-entry clerk . . .
Race/ethnicity	African American, Asian, Caucasian, Latino . . .
Social class	Upper, middle, lower . . .
Political views	Liberal, conservative

OBSERVATIONS

What are the attributes for the variable SES?

	A	B	C	D	E
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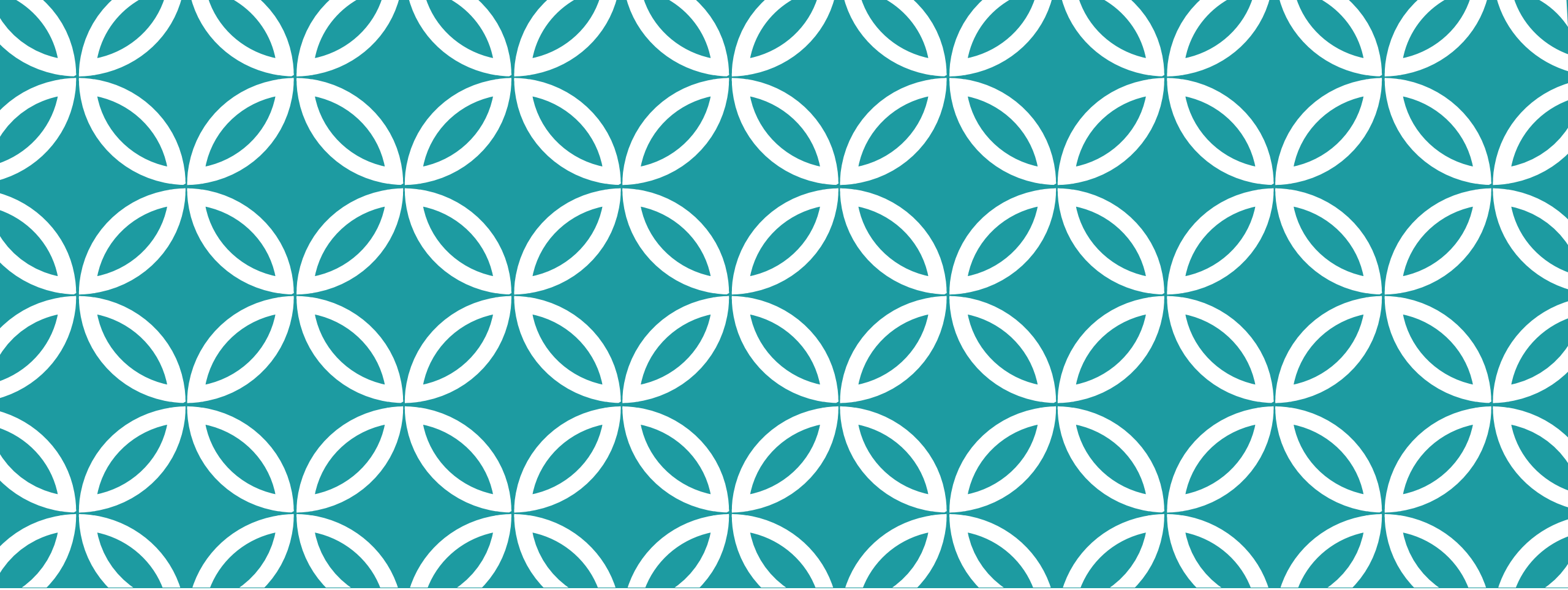

QUANTITATIVE OBSERVATIONS

OBSERVATIONS: TYPES

Quantitative

- Numerical data used to represent some social phenomenon

OBSERVATIONS: LEVELS OF MEASUREMENT

Nominal

Ordinal

Interval-Ratio

OBSERVATIONS: NOMINAL (MOST BASIC)

A set of categories for the purpose of naming, labeling, or classifying, but cannot be ranked

- Political party
- Religion
- Gender
- Major

Dichotomous/Binary Variable:

- Special type of nominal variable that has only two values
  - Yes/No, Non-White/White, Student/Teacher

OBSERVATIONS: ORDINAL (MODERATE)

Variables with attributes that name, label, or classify, and can be ranked

- Social class/SES
  - Upper
  - Middle
  - Working
- Conservativeness

Can assign numbers, but lack an associated numerical value

OBSERVATIONS: INTERVAL-RATIO (HIGHEST, MOST SPECIFIC)

Variable whose attributes classify, can be ranked, and have an equal and meaningful numerical distance between values

- Age
- Income
- SAT scores

Ratio variables have a natural zero point

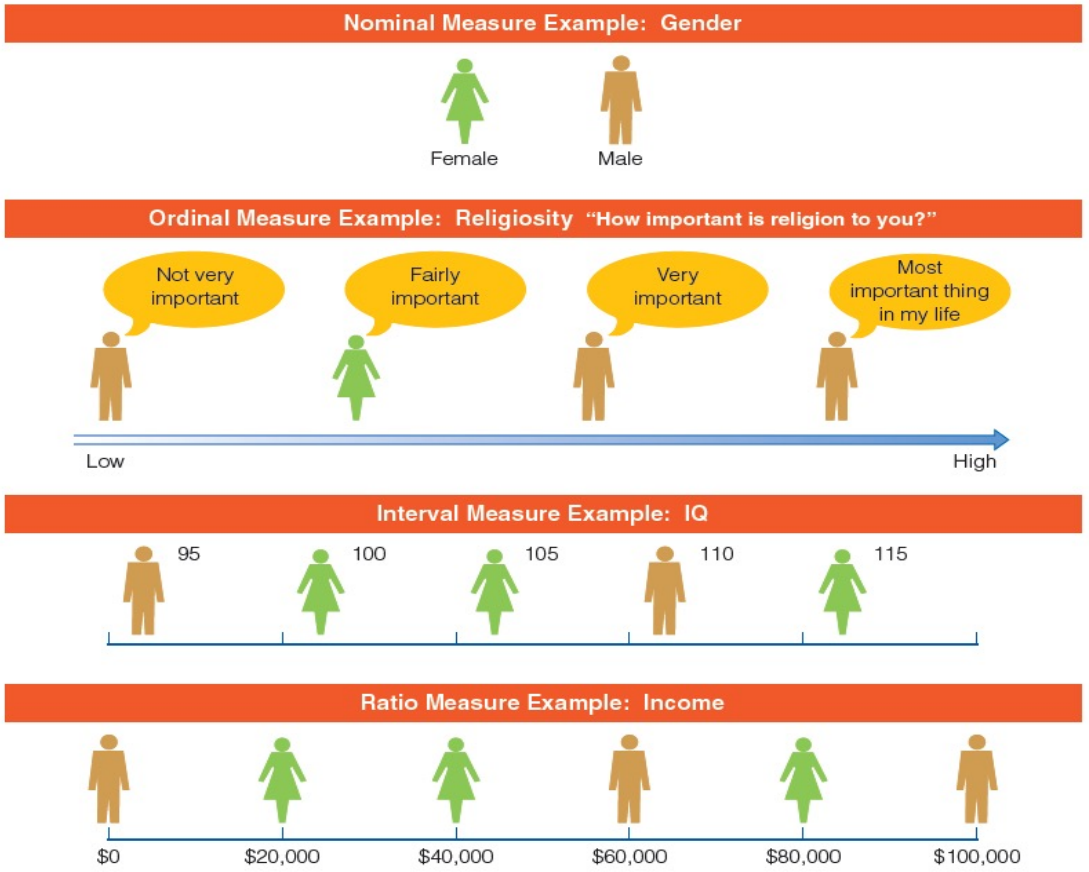

FIGURE 5-1 **Levels of Measurement.** Often you can choose among different levels of measurement—nominal, ordinal, interval, or ratio—carrying progressively more amounts of information.

OBSERVATIONS: LEVELS OF MEASUREMENT

OBSERVATIONS: LEVELS OF MEASUREMENT

The variable <u>SES</u> is what level of measurement?

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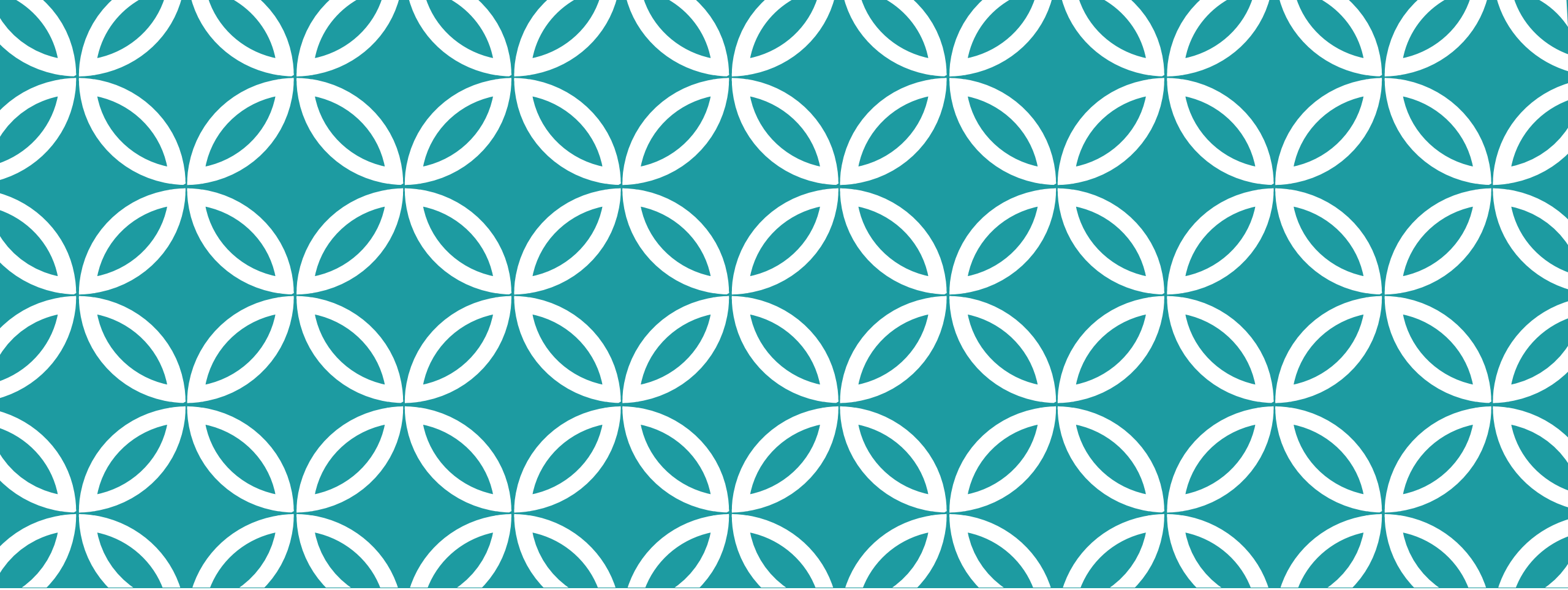


THE FUNCTIONS OF QUANTITATIVE ANALYSIS (STATISTICS)

TYPES OF ANALYSIS

Quantitative Analysis

- Search for statistical relationships between numerically-measured variables
- To generalize from a sample to a population

POPULATION VS. SAMPLE

POPULATION VS. SAMPLE

Population

- The total set of observations/units of analysis (cases, individuals, groups, objects, events) that exist for a specific topic

Sample

- A subset of the observations/units of analysis in the population

THE FUNCTIONS OF QUANTITATIVE ANALYSIS (STATISTICS)

Description (Descriptive Statistics)

- Characterize the distribution of data by reducing to a smaller, more manageable amount

Decision making (Inferential Statistics)

- Make decisions based on data collected on only a small portion (sample) of the larger group we want to study (population)
- Can we generalize our findings from our sample to the population?

INFERENTIAL STATISTICS (DECISION-MAKING)

Statistic

- Estimate (for what's going on in population) based on the sample

Parameter

- Actual measurement value for what's going on in population

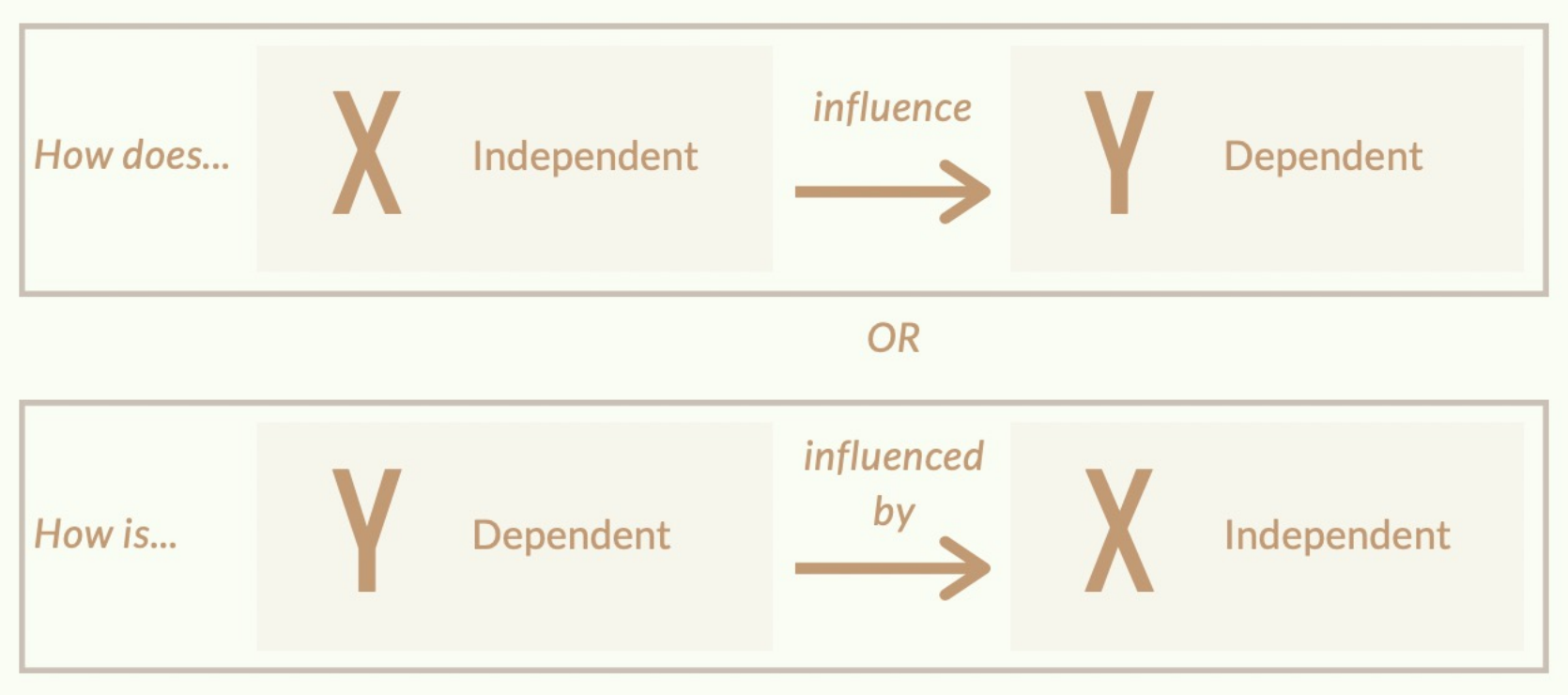
REMINDER:

Social scientists do empirical research by…

…examining relationships

examining relationships between variables, across many **observations**, and develop **explanations** for these relationships

RELATIONSHIPS BETWEEN VARIABLES



DEPENDENT AND INDEPENDENT VARIABLES

Dependent

- The variable *to be* explained
- The "effect"
- The "Y" variable
- The outcome

Independent

- The variable expected to *account for/explain* the dependent variable
- The presumed "cause"
- The "X" variable
- The predictor

THREE CRITERIA FOR CAUSE AND EFFECT: THE PURPOSE OF EMPIRICAL RESEARCH

Association:

- Must be an empirical relationship between the cause and effect

Time ordering:

- Cause must precede the effect

Non-spuriousness:

- This relationship cannot be explained by other factors