Scales of Measurement

Scales of Measurement / Types of Variable

Previously, a simple distinction was made between quantitative and categorical variables. However, there is a more precise method of categorizing variables: it is called **scale of measurement**. The four different scales of measurement, from least to most precise, are

- Nominal
- Ordinal
- Interval
- Ratio

In the video and sections below, each one of these types of variables is described with a comparison of their properties.

Scales of Measurement

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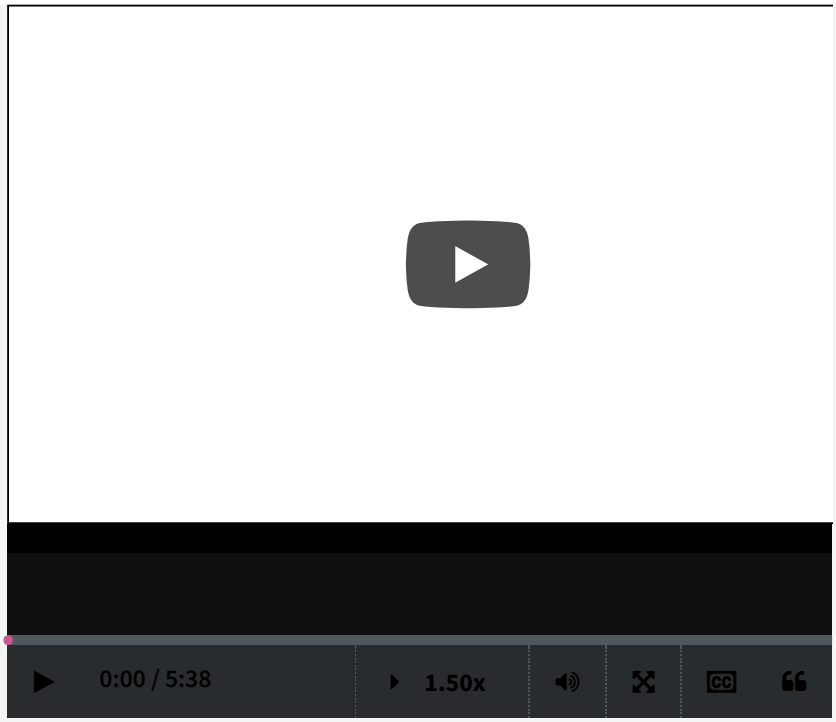

of categorizing variables. It is called scale of measurement. The scales of measurement become increasingly precise with each level while retaining the characteristics of the level below it

Video

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Nominal Scale of Measurement

The **nominal scale of measurement** is a qualitative measure that uses discrete categories to describe a characteristic of the research participants. For each participant, the researcher determines the presence, absence, and type of the attribute. Nominal scales of measurement may have two categories, such as citizen status (citizen/non-citizen), or they can have more than two categories, like religious affiliation (e.g., Agnostic, Buddhist, Jewish, Muslim) or marital status (e.g., divorced, married, single). Often, as described here, the categories have names; however, researchers code them with numbers for use in statistical analyses. These categories are not ordered or ranked in any way.

Learn By Doing

1/1 point (graded)

Which of the following is a nominal scale of measurement?

- The number of minutes it takes participants to run one mile.
- Assigning participants rank numbers (i.e., 1st place, 2nd place), based on the time it takes each of them to run one mile.

- (•) Identifying participants as runners or non-runners. ✔

Answer
Correct:
This measure, like all nominal scales of measurement, assigns subjects to discrete categories; thus, participants are either runner or non-runners.

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Ordinal Scale of Measurement

An **ordinal scale of measurement** rank-orders participants on some scale or attribute, but the difference between numbers does not convey fixed or equal differences. Thus, with ordinal data, we know that a one-unit increase in an ordinal scales represents "more," but we don't know how much more. For example, a group of participants can be rank-ordered from least to most politically active. We know that a person who is ranked as 5 is more politically active than a person who is ranked as 4, but not how much more politically active. The value of the variable is used to order participants according to the strength/presence of the attribute and not to calculate differences between participants.

Learn By Doing

1/1 point (graded)
Which of the following is an ordinal scale of measurement?

- ( ) Temperature in Fahrenheit
- ( ) Number of pets
- (•) Car Condition (Excellent, Good, Fair, Poor) ✔

Answer
Correct:
This measure, like all ordinal scale of measurements, rank-orders participants on some scale or attribute. Thus, the condition of a car is ranked, but the distance between the ranks is unknown.

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Interval Scale of Measurement

The **interval scale of measurement** takes numerical form, and the distance between pairs of consecutive numbers is assumed to be equal. However, interval variables do not have a meaningful zero point; thus, a zero does not mean the absence of the attribute, but rather it is a particular (but arbitrary) point on the scale. A good example of an interval measure is temperature in the Fahrenheit scale: a temperature of zero degrees Fahrenheit is still a temperature, not the absence of temperature. In education, measures like achievement, motivation, and self-concept are considered interval measures; a zero on a measure of such variables does not mean the absence of the characteristic in the participant.

Learn By Doing

1/1 point (graded)
Which of the following is an interval scale of measurement?

- ○ Political affiliation (i.e., Democrat, Republican, Independent)
- ◉ Intelligence (IQ) Scores ✔
- ○ Amount of monthly mortgage payment

Answer
Correct:
Intelligence scores are interval level of measurement, because they take numerical form and the distance between pairs of scores are assumed to be equal, but there is no meaningful zero point; that is, there cannot be a complete absence of intelligence.

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Ratio Scale of Measurement

The **ratio scale of measurement** is similar to the interval scale. As with the interval scale, a number is assigned to a subject that represents the amount of the attribute that the subject has and the difference between consecutive numbers is assumed to be equal. The main difference between interval and ratio measurements has to do with how we interpret a value of zero. For ratio measures, the zero is meaningful and tell us that the attribute is not present in the participant. Examples of ratio measures include a participant's number of children, number of AP courses taken, or cumulative college credits: for each of these variables, a score of zero represents that the participant has none of the attribute.

Learn By Doing

1/1 point (graded)

Which of the following is a ratio scale of measurement?

- Social Security numbers
- Clothing sizes (e.g., Small, Medium, Large)
- Length of room in inches ✔

Answer

Correct:

Length of room in inches is a ratio variable because it uses numbers to represent the amount of a characteristic and it has a meaningful zero.

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The next activity will help you to see whether you understand the different scales of measurement.

Did I Get This

1/1 point (graded)

A researcher classifies subjects' level of anxiety as high, medium, or low. What scale of measurement is this measure?

- Nominal
- Interval
- Ordinal ✔
- Ratio

Answer

Correct:

Ordinal scales of measurement use rank ordering. In this case, the measure ranks individuals into high, medium, and low groups based on each person's level of anxiety.

Submit

Did I Get This

1/1 point (graded)

A researcher measures political affiliation, and records a value of 1 for a Republican, 2 for a Democrat, 3 for an Independent, and 4 for other affiliations. What scale of measurement is this measure?

- (•) Nominal ✔
- ( ) Interval
- ( ) Ordinal
- ( ) Ratio

Answer

Correct:

This measure of political affiliation is nominal. It assigns values to discrete categories and attributes these values to the research subjects.

Submit

Did I Get This

1/1 point (graded)

A researcher observes Teacher A's classroom of 30 students for a 45-minute class. The researcher records the percentage of time students spend working in groups during the class. What scale of measurement is this measure?

- ( ) Nominal
- ( ) Interval
- ( ) Ordinal
- (•) Ratio ✔

Answer

Correct:
Ratio variables use numbers to represent the amount of a characteristic, where zero means the absence of the characteristic. In this case, the measure of time represents the proportion of the class that is group work, where zero means they do not do any group work in this 45-minute period.

Submit

Did I Get This

1/1 point (graded)
Scores on the SAT Math Test (note: the scores on the SAT Math Test range from 200 to 800). What scale of measurement is this measure?

- Nominal
- Interval ✔
- Ordinal
- Ratio

Answer
Correct:
Interval scales of measurement use numbers to represent the amount of a characteristic that a subject has, but do not have a meaningful zero point. Here, a higher SAT Math Test score indicates greater levels of understanding of mathematical concepts.

Submit