MEASUREMENT SCALES

NOMINAL, ORDINAL, INTERVAL, AND RATIO SCALES

- Statistics deals with data and data are the result of measurement…
- The type of measuring scale employed in collecting the data helps determine which statistical inference test is used to analyze the data.
- Theoretically, a measuring scale can have one or more of the following mathematical attributes:
  - Magnitude
  - An equal interval between adjacent units
  - An absolute zero point
- Four (4) types of scales are commonly encountered in the behavioral sciences: nominal, ordinal, interval, and ratio.
  - They differ in the number of mathematical attributes that they possess.

A. NOMINAL SCALES
- A nominal scale is the lowest level of measurement and is most often used with variables that are qualitative (categorical) in nature rather than quantitative (continuous).
- When a nominal scale is used, the variable is divided into its several categories.
  - These categories comprise the “units” of the scale, and objects are “measured” by determining the category to which they belong.
- Measurement with a nominal scale really amounts to classifying the objects and giving them the name (hence, nominal scale) of the category to which they belong.
- It is important to note that because the units of a nominal scale are categories, there is no magnitude relationship between the units of a nominal scale.
  - That is, there is no quantitative relationship between the categories.
- A fundamental property of nominal scales is that of equivalence.
  - All members of a given class are the same from the standpoint of the classification variable.
- An operation often performed in conjunction with nominal measurement is that of counting the instances within each class.
  - The frequency allows us to compare the number of items within each category.
- A nominal scale does not possess any of the mathematical attributes of magnitude, equal interval, or absolute zero point. It merely allows categorization of objects into mutually exclusive categories.

B. ORDINAL SCALES
- An ordinal scale represents the next higher level of measurement.
  - It possesses a relatively low level of the property of magnitude.
  - We rank-order the objects being measured according to whether they possess more, less, or the same amount of the variable being measured.
MEASUREMENT SCALES
NOMINAL, ORDINAL, INTERVAL, AND RATIO SCALES

- Allows determination of whether \( A > B, \ A = B, \) or \( A < B. \)
- Although this scale allows “better than,” “equal to,” or “less than” comparisons, it says nothing about the magnitude of the difference between adjacent units on the scale.
- The ordinal scale does not have the property of equal intervals between adjacent units.
- The scale does not tell the absolute level of the variable (e.g., they all could be high – or – they all could be low).

C. INTERVAL SCALES
- The interval scale represents a higher level of measurement than the ordinal scale.
  - It possesses the properties of magnitude and equal intervals between adjacent units – but does not have an absolute zero point.
  - The interval scale possesses the properties of the ordinal scale and has equal intervals between adjacent units.
    - The phrase “equal intervals between adjacent units” means that there are equal amounts of the variable being measured between adjacent units on the scale.
  - Since with an interval scale there are equal amounts of the variable between adjacent units on the scale, equal differences between the numbers on the scale represent equal differences in the magnitude of the variable.
  - It also follows logically that greater differences between the numbers on the scale represent greater differences in the magnitude of the variable being measured, and smaller differences between the numbers on the scale represent smaller differences in the magnitude of the variable being measured.
  - In addition to being able to determine whether \( A > B, \ A = B, \) or \( A < B, \) and interval scale allows us to determine whether \( A - B = C - D, \ A - B > C - D, \) or \( A - B < C - D. \)

D. RATIO SCALES
- The next, and highest, level of measurement is called a ratio scale.
  - It has all the properties of an interval scale and, in addition, has an absolute zero point.
    - Without an absolute zero point – it is not legitimate to compute ratios with the scale readings.
  - A “zero” on the ratio scale represents the complete absence of…
  - We cannot compute ratios with the interval scale. That is, we cannot say for example that \( 20^\circ \) Celsius is twice as hot as \( 10^\circ \) Celsius.
  - However, on the ratio scale – we can indicate ratios. For example, on the Kelvin scale \( 20^\circ \) is twice as hot as \( 10^\circ \).