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EDITION

Statistics for People Who (Think They) Hate Statistics

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Chapter 2 ☺ ☺ ☺ ☺
Means to an End: Computing and Understanding Averages

What You Will Learn in Chapter 2

- Understanding measures of central tendency
- Computing the mean for a set of scores
- Computing the median for a set of scores
- Computing the mode for a set of scores
- Understanding and applying scales or levels of measurement
- Selecting a measure of central tendency

Measures of Central Tendency

- The AVERAGE is one value that best represents a set of scores
- Another name for AVERAGES is *measures of central tendency*
- Examples include the mean, median, and mode

Computing the Mean

- $\overline{X}$ is the mean value of the group of scores.
- Σ (sigma) tells you to add together whatever follows it.
- *X* is each individual score in the group.
- The *n* is the sample size.

Steps to Computing the Mean

1. List the entire set of values in one or more columns. These are all the *X*s.
2. Compute the sum or total of all of the values.
3. Divide the total or sum by the number of values.

Things to Remember . . .

- The mean is sometimes represented by the letter *M*.
- *n* = sample size N = population size
- Sample mean is the measure of central tendency that best represents the population mean.
- It is also called the *arithmetic mean*.
- Mean is like the fulcrum on a seesaw.
- Mean is VERY sensitive to extreme scores that can skew or distort findings.

Weighted Mean

- Step 1: List all values for which the mean is being calculated. (List them only once.)
- Step 2: List the frequency with which each value occurs.
- Step 3: Multiply the value by the frequency, as shown in the third column.
- Step 4: Sum all of the values in the Value Frequency column.
- Step 5: Divide by the total frequency.

Median

- The **median** is defined as the midpoint in a set of scores.
- It's the point at which one half, or 50%, of the scores fall above, and one half, or 50%, fall below.

Steps to Finding the Median

1) List the values, in order, either from highest to lowest or lowest to highest.

2) Find the middlemost score. That's the median.

BUT . . .

- What if there are two middle scores?

- The median is simply the mean of the two middle values.

A Little About Percentiles . . .

- Percentile ranks are used to define the percentage of cases equal to and below a certain point on a distribution.
- *75th percentile* means that the score received is at or above 75% of all other scores in the distribution.
- Median is always at the 50th percentile.

Critical Thinking

- Why use the median instead of the mean?

Things to Remember

- The mean is the middle point in a set of values, whereas the median is the middle point in a set of cases.

- Because the median cares about the number of cases, extreme scores (i.e., outliers) do **not** impact it.

Computing the Mode

- Mode = most frequently occurring value
- This is the **least** precise measure of central tendency.
- When two values occur the same number of times, there is *bimodal distribution*.

Steps to Finding Mode

- List all values in the distribution, but list each value only once.
- Tally the number of times each value occurs.
- The value occurring the most is the mode.

Example of Finding Mode

Party Affiliation	Number or Frequency
Democrats	90
Republicans	70
Independents	140

Multimodal

- Bimodal = Distribution with two modes
- Trimodal = Distribution with three modes
- Trimodal distributions are unlikely when dealing with a large set of data points, but they are possible.

Scales of Measurement

- Level of measurement dictates what specific measure of central tendency you will use.
- Measurement is the assignment of values to outcomes following a set of rules.
- Each of the four levels has a particular set of characteristics.

Four Flavors of Scales of Measurement

- Nominal
- Ordinal
- Interval
- Ratio

Nominal Level of Measurement

- Defined by the characteristics of an outcome that fit into one and only one class or category
- These are mutually exclusive.
- Examples include gender and political affiliation.

Ordinal Level of Measurement

- The characteristic of things being measured here is that they are ordered.
- Example: Ranking candidates for a job

Interval Level of Measurement

- Based on some underlying continuum, such that we can talk about how much more a higher performance is than a lesser one

- The intervals, spaces, or points along the scale are equal to one another.

Ratio Level of Measurement

- An assessment tool at the **ratio level of measurement** is characterized by the presence of an absolute zero on the scale.

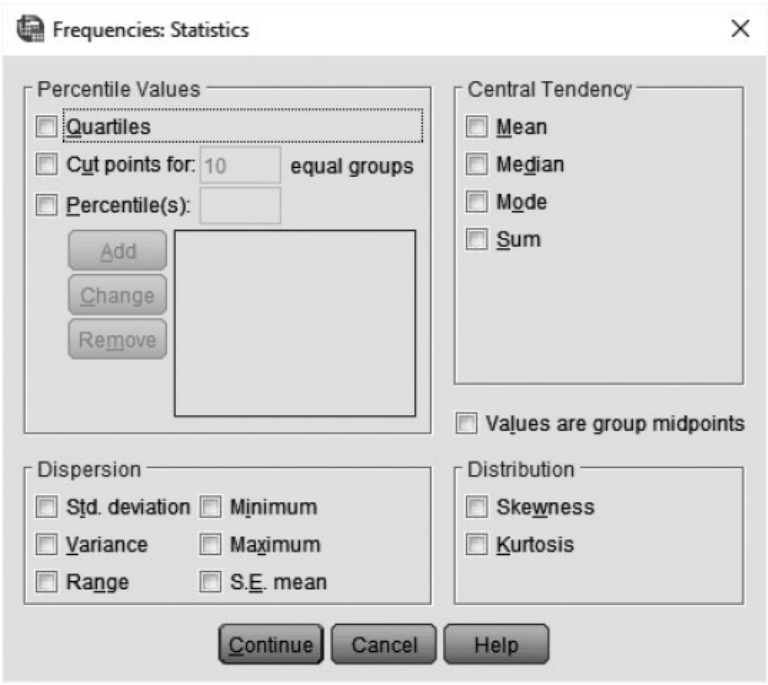
- Examples: Zero molecular movement and zero light

When to Use What . . .

- Use **mode** when the data are qualitative, categorical, or nominal (e.g., eye color or political party) and values can only fit into one category (i.e., mutually exclusive).
- Use **median** when you have extreme scores.
- Use **mean** when the data do **not** include extreme scores (i.e., outliers) and are not qualitative, categorical, or nominal.

Using the Computer: Descriptive Statistics

Figure 2.1 The Frequencies: Statistics Dialog Box From SPSS



The SPSS Output

Figure 2.2 Descriptive Statistics From SPSS

Frequencies

[DataSet1] C:\Textbook Stuff\Stat for People 6e\Chapte

Statistics

Predjudice

N	Valid	20
	Missing	0
Mean		84.70
Median		87.00
Mode		87

Predjudice

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	55	1	5.0	5.0	5.0
	64	1	5.0	5.0	10.0
	67	1	5.0	5.0	15.0
	76	1	5.0	5.0	20.0
	77	1	5.0	5.0	25.0
	81	2	10.0	10.0	35.0
	82	1	5.0	5.0	40.0
	87	4	20.0	20.0	60.0
	89	1	5.0	5.0	65.0
	93	1	5.0	5.0	70.0
	94	2	10.0	10.0	80.0
	96	1	5.0	5.0	85.0
	99	3	15.0	15.0	100.0
	Total	20	100.0	100.0	