

**University of Guelph
Numeracy Project**

Measures of Central Tendency



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Measures of Central Tendency

What are MEASURES OF CENTRAL TENDENCY?

- Measures of central tendency describe the average or midmost score in a distribution of scores.

Measures of Central Tendency

Measures of Central Tendency

- Measures of central tendency provide a lot of important information about a distribution.
- There are 3 types of measures of central tendency:

Mode: the score appearing most often within a distribution.

Median: the score appearing at the centre of a distribution.

Mean: the "average" of a set of scores, in the traditional sense.

- The measure of central tendency that is chosen is often dependent on the shape of the distribution and the type of variable (categorical or measurement) that is being examined.

NOMINAL VARIABLES: Mode

ORDINAL VARIABLES: Mode, Median

INTERVAL VARIABLES: Mode, Median, Mean

RATIO VARIABLES: Mode, Median, Mean

Mode

Mode

- A distribution can have more than one mode.
- A distribution with 2 modes is called bi-modal.

- A distribution with 3 or more modes is called multi-modal.
- The mode is most useful when used with categorical (nominal, or ordinal) variables and when there is a relatively small sample size. The mode can be used with categorical variables because it does not require the data to be in a meaningful order.
- With large samples, it becomes very tedious to determine the mode.

Median

Median

- The median can only be used for ordinal, interval and ratio data. The median cannot be used for nominal data because the categories don't have a meaningful order.
- To find the median, arrange all the scores in order and choose the middle score.

If there is an even number of scores in the distribution, the median is determined by taking the mean of the two middle scores.

In the case of ordinal data, if there is an even number of scores the mean cannot be calculated. In this situation, the lower of the two values is chosen as the median.

Mean

Mean

- The mean is determined by dividing the sum of scores by the total number of scores:

$$\bar{X} = \frac{\Sigma X}{n}$$

- The mean can only be used for interval and ratio variable data because the calculation of the mean requires that there is an equal interval between all the scores.

- The mean is generally the most useful measure of central tendency for interval and ratio data.

There is an exception: When there are outliers that skew the shape of the distribution, the mean will be pulled away from the majority of the scores, and towards an extreme end of the distribution.

In this situation, the mean is not an accurate descriptor of the centre of the distribution, and the median is a more appropriate measure.

Glossary

Categorical variable:	a variable that can be placed into categories, although the categories may not have any logical ordering.
Interval:	a type of measurement variable that has an equal interval between each of the values, but no absolute zero point.
Mean:	the "average" of a set of scores, in the traditional sense.
Measures of central tendency:	describe the average or midmost score in a distribution of scores.
Median:	the score appearing at the centre of a distribution.
Mode:	the score appearing most often within a distribution.
Nominal:	a type of categorical variable where classification is made into unordered categories.
Ordinal:	a type of categorical variable where classification is made into rank ordered categories.
Outlier:	an extremely atypical point that is located at a relatively long distance from the rest of the points.
Ratio:	a type of measurement variable that has an equal interval between each of the values and has an absolute zero point.

References

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