

**University of Guelph
Numeracy Project**

About Variables



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About Variables

What is a VARIABLE?

- A variable is a measurable characteristic of a person, object, or event that is expected to change over time and/or between individuals.
- The concept of a variable is wide-ranging under this definition, with birth weight, IQ score, driving speed, shoe size, and temperature all being suitable examples.

Background

Background

- Essentially, a variable is anything that we want to study variances in over time and/or between individuals/objects/events.
- Different types of data need to be organized and summarized in different ways. Because a variable is such a broad concept, it is divided into two main categories, each with two sub-types. This classification system allows us to categorize data with respect to what we can do with it.

Categorical

Categorical Variables

- A categorical variable is one that we can place into categories, but these categories may not have any logical ordering.
- For example, we can categorize individuals by gender, eye colour or hair colour. We can also categorize people based on what they say is their favourite radio station.
- We are limited in terms of how we can manipulate this data statistically.

Nominal Variables

- Nominal variables are the first of two types of categorical variables.
- Classification is made into unordered categories.
- This is the least informative level of measurement, as the variables cannot be meaningfully added, subtracted, or averaged.

Ordinal Variables

- Ordinal variables are the second of two types of categorical variables.
- Classification is rank ordered on some characteristic. However, there is no indication of how much greater one score is than another. There is also no absolute zero point.

Measurement

Measurement Variables

- A measurement variable is one where numerical values can be assigned and we can order respondents/objects/events according to those values.
- Measurement values allow us greater freedom to use statistical tests; thereby, providing us with more information about the subject of our inquiry.

Interval Variables

- Interval variables are the first of two types of measurement variables.
- The values have equal intervals between them; however, they lack an absolute zero point.
- This prevents us from being able to say that one value is “twice as large” as another value, although this might appear to be true. It also makes the presumption that no one has zero of the ability or trait.

Ratio Variables

- Ratio variables are the second of two types of measurement variables.
- Like an interval variable, a ratio variable has equal intervals between its values.
- Unlike an interval variable, a ratio variable has an absolute zero point.
- This type of variable allows us to perform all statistical operations on the values, making it the most informative of the four types.

Summary Chart

OK to Compute:	Nominal	Ordinal	Interval	Ratio
Frequency Distribution	Yes	Yes	Yes	Yes
Median and Percentiles	No	Yes	Yes	Yes
Add or Subtract	No	No	Yes	Yes
Mean, Standard Deviation, Standard Error of the Mean	No	No	Yes	Yes
Ratio, or Coefficient of Variation	No	No	No	Yes

Glossary

Categorical variable:	one that we can place into categories, but these categories may not have any logical ordering.
Interval variable:	a type of measurement variable where the values have equal intervals between them; however, they lack an absolute zero point.
Measurement variable:	variable where numerical values can be assigned and we can order respondents/objects/events according to those values.
Nominal variable:	a type of categorical variable where classification is made into unordered categories.
Ordinal variable:	a type of classification where classification is rank ordered on some characteristic.
Ratio variable:	a type of measurement variable where there is an equal interval between the values and an absolute zero point.
Variable:	measurable characteristic of a person, object, or event that is expected to change over time and/or between individuals.

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