

Components of a data set

- Element** Entities on which data is collected. Also, "*individual.*"
- ▶ e.g., In a population study, each person in the sample is an element
- Variable** Characteristic of interest for the elements.
- ▶ e.g., the age and height of each person are variables
- Observation** The set of measurements collected for a particular element.

Statistic vs Parameter

- Parameter** A calculated value for an **entire** population (μ is a parameter)
- Statistic** A calculated value for a **sample** of the population (\bar{x} is a statistic)

Types of attributes

Nominal (Categorical)

Attribute is a name; no ordering is implied

- ▶ Football jersey numbers; player #16 is not necessarily better than player #1
- ▶ Person names; "Bill" is not a better name than "Cholmondeley." (Well, alright, it is.)

Ordinal

Ordered, but the distance between ranks is not significant

- ▶ Amount of pain a patient feels. (1 < 2 < 3, but the difference in pain between 1 and 2 isn't necessarily the same as between 2 and 3)
- ▶ Movie ratings

Interval

Ordered; the distance between ranks is significant

- ▶ Temperature (the difference between 10° and 30° is the same as between 40° and 60°)

Ratio

Ordered; the ratio between ranks is significant; attribute has an absolute zero value.

- ▶ *i.e.*, It makes sense to say that rank 2 is twice the value of rank 1.
- ▶ Height, weight, degrees Kelvin (but not Celsius).

Sampling types

- Random** Sample is randomly selected from the population. Every member of the population has an equal chance of being selected.
- ▷ e.g., Pick 10 names from a hat containing all the names of a class.
- Systematic** Every n th member of the population is selected.
- Convenience** Sample selected because it's readily available.
- ▷ e.g., Select the first 10 students to leave the classroom.
- Cluster** Population divided into groups (clusters). Randomly select a collection of clusters; measure every element in the selected clusters.
- Stratified** Population is divided into groups (*strata*) by some characteristic that could influence the variable being measured (e.g., divided into males and females). A sample is taken from every stratum.
- Self-selected (Voluntary)** Sample members volunteer.

Bias

- Unbiased** If a large set of measurements is unbiased, then the mean will be close to the true value.
- Non-response bias** Bias resulting from some of the population not answering.
- Response bias** Bias resulting from some of the population answering falsely.
- ▷ Dare we say "lying?"