

# What is Statistics?

***Statistics* is the systematic study of variation in data: how to measure it, display it, summarize it, model it, and use it to gain new knowledge.**

Data may come from a carefully designed experiment, a sample survey, or from a data bank of regularly kept records. But all data vary.

Even in a carefully controlled experiment results vary to some degree. Results also vary when an experiment is performed under the same conditions.

Measuring devices such as thermometers, scales, and exams are imperfect.

Variability arises from seasonal factors such as the increase in retail sales preceding seasonal holidays and from environmental factors such as the natural warming that takes place during the day.

In surveys variability arises because different people have different opinions, different ages, different cultures, and so on.

Survey results also vary because we only collect data on a part of the group we wish to study—a sample. A different sample would yield different results.

Variability is inherent in various processes—when a coin is tossed it sometimes comes up tails and sometimes heads.

**Variation, Variation, Variation!**