

## probability

## prediction

## sampling

Even when there are plentiful data, it may not be obvious what mathematical model to use to make predictions from them or there may be insufficient computing power to use some models.

When people estimate a statistic, they may also be able to say how far off the estimate might be.

Notice and criticize arguments based on the faulty, incomplete, or misleading use of numbers, such as in instances when a percentage or fraction is given, but not the total sample size (as in "9 out of 10 dentists recommend...").

A physical or mathematical model can be used to estimate the probability of real-world events.

The usefulness of a mathematical model for predicting may be limited by uncertainties in measurements, or by neglect of some important influences.

The larger a well-chosen sample of a population is, the better it estimates population summary statistics. For a well-chosen sample, the size of the sample is much more important than the size of the population. To avoid intentional or

Estimate probabilities of outcomes in familiar situations on the basis of history or the number of possible outcomes.

Be skeptical of claims based on very small samples or biased samples.

Locate information in reference books, back issues of newspapers and magazines, compact disks, and computer databases.

How probability is estimated depends on what is known about the situation. Estimates can be based on data from similar conditions in the past or on the assumption that all the possibilities are known.

The larger a well-chosen sample is, the more accurately it is likely to represent the whole. But there are many ways of choosing a sample that can make it unrepresentative of the whole.

Probabilities are ratios and can be expressed as fractions, percentages, or odds.

Use, interpret, and compare numbers in several equivalent forms such as integers, fractions, decimals, and percents.

Statistical predictions (as for rainy days, accidents) are typically better for how many of a group will experience something than for which members of the group will experience it—and better for how often something will happen than for exactly when.

A small part of something may be special in some way and not give an accurate picture of the whole.

Even very unlikely events may occur fairly often in very large populations.

Events can be described in terms of being more or less likely, impossible, or certain.

Summary predictions are usually more accurate for large collections of events than for just a few.

Some predictions can be based on what is known about the past, assuming that conditions are pretty much the same now.

Sometimes people aren't sure what will happen because they don't know everything that might be having an effect.

Often a person can find out about a group of things by studying just a few of them.

Some things are more likely to happen than others.

Some events can be predicted well and some cannot.

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