

I flip a coin 100 times, and it shows heads every time.

Question: What is the probability that it will show heads on the next flip?

Probability \neq *Statistics*

Probability: mathematical theory that describes uncertainty

Statistics: set of techniques for extracting useful information from data

The probability that the outcome of an experiment is A is $P(A)$

if the experiment is performed a large number of times and the fraction of times that the observed outcome is A is $P(A)$.

The probability that the outcome of an experiment is A is $P(A)$

if the experiment is performed in each parallel universe and the fraction of universes in which the observed outcome is A is $P(A)$.

The probability that the outcome of an experiment is A is $P(A)$

if that is the opinion of an observer *before* the experiment is performed.

The probability that the outcome of an experiment is A is $P(A)$

if $P()$ satisfies a set of conditions.

Let U be a set of *samples* . Let E, E_1, E_2, \dots be subsets of S .

- $0 \leq P(E) \leq 1$
- $P(U) = 1$
- If $E_i \cap E_j$ is the null set, then
$$P(E_i \cup E_j) = P(E_i) + P(E_j)$$