



### Why

We want to talk about an object in some set—and the properties of this object—without knowing the precise identity of the object. Such language is useful in discussing the future, degrees of belief, and arbitrary objects from large populations. When talking about an unknown object, we first enumerate the set of possibilities.

### Definition

We have a set which includes all possible objects. The set is called the *set of possibilities* or *set of outcomes*. We call an element of the set of outcomes a *possibility* or an *outcome*.

Some authors call the set of outcomes the *set of samples* and call an outcome a *sample*. They speak of the set of outcomes as the *sample space*. We prefer the language of outcome because the unknown object is often associated somehow with the future, and its identity will be known in the future.

We often handle several outcomes at once. An *event* is a subset of outcomes. The set of events is the power set (see **Set Powers**) of the set of outcomes.

### Example: coin

We want to talk about the result of flipping a coin. The coin has two sides. When we flip the coin, it lands heads or tails. We model these outcomes with the set  $\{0, 1\}$ . If the coin lands

tails, we say that outcome 0 has occurred. If the coin lands heads, we say that outcome 1 has occurred.

**Example: die**

We want to talk about the result of rolling a die. The die has six sides. When we roll the die, one of the six sides is facing up. We model this uncertain outcome with the set of outcomes  $\{1, 2, 3, 4, 5, 6\}$ . These elements correspond to the number of pips on the side which lands facing up.

