

## 14.2: Randomness in Statistics

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The term “random” is often used colloquially to refer to things that are bizarre or unexpected, but in statistics the term has a very specific meaning: A process is *random* if it is unpredictable. For example, if I flip a fair coin 10 times, the value of the outcome on one flip does not provide me with any information that lets me predict the outcome on the next flip. It’s important to note that the fact that something is unpredictable doesn’t necessarily mean that it is not deterministic. For example, when we flip a coin, the outcome of the flip is determined by the laws of physics; if we knew all of the conditions in enough detail, we should be able to predict the outcome of the flip. However, many factors combine to make the outcome of the coin flip unpredictable in practice.

Psychologists have shown that humans actually have a fairly bad sense of randomness. First, we tend to see patterns when they don’t exist. In the extreme, this leads to the phenomenon of *pareidolia*, in which people will perceive familiar objects within random patterns (such as perceiving a cloud as a human face or seeing the Virgin Mary in a piece of toast). Second, humans tend to think of random processes as self-correcting, which leads us to expect that we are “due for a win” after losing many rounds in a game of chance, a phenomenon known as the “gambler’s fallacy”.

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