

What are the chances of that happening?!

Mathematician Julia Gilroy explains the world of probability.

How risky is it?

In the year following the 9/11 plane attacks, many Americans decided flying was too risky, and drove instead. About 1,600 people died as a result. That's because the chances of dying in a plane crash are 1 in 11 million, but for a car crash they're much higher – 1 in 5,000. The problem is that people feel something is dangerous, but don't understand the true risk.



Plane crashes, terrorist attacks, and murders are big news stories, so we remember them and feel afraid. If the news told us that thousands died that day from bad diet, lack of exercise, and car accidents, we wouldn't forget their dangers so easily. On average, one American dies every day in an accident in the bath. One American dies each year from a shark attack. So, if we were logical, we'd find having a bath more frightening than sharks!

Understanding risk

To understand risk, you need to understand probability. The first person to study it was a 16th century Italian mathematician, Gerolamo Cardano. A big gambler, Cardano wanted to know the chances of winning money at different games. He was the first to show probability as a fraction or percentage, e.g. 1 in 4 or 25%.

Unfortunately, these numbers can confuse us. If you hear that the chances of being killed by lightning are 1 in 300,000, you won't worry about it. If you heard that 24,000 people die from lightning strikes every year, you might be more careful in the next storm.



Don't believe all you read in the papers

Again, newspapers don't help. '40% increase in cancer risk from eating X!' shouts the headline. That's a big increase, so should you stop eating X? Well, not if the risk of getting that cancer is very small before the increase, e.g. 1 in every 1000 people. Even if eating X doubled that risk to 2 in 1000, you'd still be very unlikely to get it.

So, don't believe everything you read about probabilities. In a study of one UK motorway over five months, traffic accidents on Friday 13th were 50% more likely to result in serious injuries than accidents on Friday 6th. How can that be true?! In fact, it's simply chance that it happened on that motorway during that period. If you did a bigger and longer study, there would be no difference.

What a coincidence!

At a party, two people have the same birthday – what a coincidence! Well, not really. If there are 48 people there, it's 95% likely to happen. And probability says that even very unlikely coincidences will happen sometimes. The Bulgarian lottery produced the same six numbers two weeks in a row in 2009. It seems unbelievable. But why? Those numbers were exactly as likely to come out as any others. If you flip a coin, it is possible for it to land heads 20 times in a row (but the chances of it happening are one in a million). And although it then feels like it's more likely to be tails on the 21st throw, it's not – the chances of a heads are always 50%! Probability does feel improbable sometimes!

