



<http://topdrawer.aamt.edu.au/Statistics/Big-ideas/Randomness/Coin-toss>

Transcript of video Randomisation in Coin Tosses

Because the process is random, we can't predict the result of one coin toss with certainty, but we do have an expectation that if we toss it 10 times we will get about half heads and half tails. There will be however, quite a lot of variation about our expectation if we do a small number of tosses. The next few slides show the variation in the number of heads in 10 trials of 10 random tosses of a coin.

First time, we have 6 heads and then 2. Another time, we have 4 and then 3, 6, 5. Look at the percentages as we go: 60%, 50%, 20%, 80%, 70% and 50%. So there is quite a lot of variation there that we see.

(Each screen showing two examples of the number of heads and tails in a single toss, with the percentages.)

Now, if we increase the number of coin tosses, we are going to see the result of what happens to our variation and our expectation in relation to our expectation of 50% of the trials being heads. We are going to start with 20 and then we are going to look at increasing the number of trials each time by adding more and more, and down the bottom of that slide there are the number that we are going to add each time. First, we are going to add 30, then 50, and then we will get up to several thousand.

At 20 tosses we see that we have 60% heads, at 50 it's reduced to 58% heads, in 100 tosses we have 55% heads, and again we have 55% heads when we do 200 tosses. By the time we get to 500 tosses, we have 52% heads, at 1000 tosses we have 51% heads. So we are getting closer and closer. At 2000 tosses 49% heads, at 5000 tosses we have exactly 50% heads, and I would imagine that if you have a simulator that will toss coins somewhat similar to TinkerPlots, which is what I have used here, then by the time you get to 5000 tosses it's going to be very, very unlikely that you don't get 50% heads. Now, you will notice that the numbers are not exactly 2500 each, but the part of 5000 that we have is very, very close to 50% each time.

(Successive slides showing the number of heads and tails, with associated percentages, as the number of tosses increases.)

