

DECISION ANALYSIS

Decision Trees: Booths Risk

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Our task now is to determine which of the booths we would play if we have just one bet. And we can use our spreadsheet to evaluate this, by clicking on this cell in E1 and changing that to the number 1.

Before we go further though. Let's quickly refresh ourselves about how these earnings are computed. And we can do that by choosing one of those cells and then clicking on the formula bar.

Let's just refresh our memory. This formula says, let's look up the number 1 in this big table here. It's going to look for the number 1 in the left-most column. And it finds it in row 16. And then it will return the last value, the cumulative earnings, and return that particular value. So whatever value is in cell E16, will be reflected in cell D4 for the red tent. Let's just press F9 to confirm that.

When you enter the red tent and make a bet. You have your one ticket to place. You're either going to win \$10 or you will lose \$1.

What we would like you to do, is to quickly do, a Monte Carlo simulation of the one bet scenario. And we're going to have you do this, to drive home a particular point, that we would like to have you remember.

First start by erasing the Monte Carlo results we had when we placed 100 bets. And we can choose the Erase button. And we can see that we need to edit our macro so that it includes the results from column K.

So let's, first, choose the View tab [and Macros]. Then let's find the EraseResults macro and edit that. Here it is. Under this sub routine called EraseResults, we start off by selecting some cells in column I and J, and what we need to do is extend that over to column K. So we'll change that to a K. And then the spreadsheet goes down to the last entry and clears the contents. When we finish that, just press the red X, and we exit the Visual Basic editor. And

now we can erase all of our results.

Now before you run your Monte Carlo. Let me ask you to pause for a moment, and consider what values do you think will be filled into these cells?

PAUSE the video: Take a moment and pause your video, then we'll come right back.

Let's see if you were right. Let's go ahead and run the red earnings and play the red booth. And then we'll run the blue booth. I'm going to do that now.

I finished running my simulations and here are the results that I got. Yours may look a little bit different. But I bet you that these cells are identical. When you place one bet, the very worst you could do is lose \$1, and the best you can do is win \$10. And when you play the blue booth, the worst you could do is lose \$20 and win \$100.

These are exactly the same entries that we have over here. And that is because you are placing only one bet.

Let's look at the averages now. As we said before, the average across all of these Monte Carlo trials, is similar to the expected values that we have calculated before. We're off by a little bit. Had we continued to play over and over again, our average would get closer and closer to the expected value.

But here is the rub. When you place one bet these expected values do not come into play. And the reason is, because you cannot earn \$4.50 or \$40. If you play the red booth, you can only win \$10 or you can lose \$1. And if you play the blue booth, you can win \$100 or lose \$20.

We don't really talk about expected values in a case where you have one bet to place, and only one decision to make. The elements of chance are spelled out for you. But what it boils down to is whether you are risk adverse or whether you are risk tolerant.

If you are risk adverse, that means you don't like risk. And so you are going to focus more on what you potentially could lose in making your decision. If you don't want to lose a lot of money, you're going to play in the red booth.

In contrast, if you are risk tolerant, that means you invite some level of risk. And you are going

to focus more on what your winnings could be. If you are risk tolerant you may focus on which of these two options could provide you with the biggest payoff.

Those concepts of risk tolerant and risk aversion are key concepts when you have a decision to make - and where you are not able to make a bet or make that decision over and over and over again.

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