

GUMPTIONWORK

Look, Ma — Watch Me Measure Uncertainty!

You can do this better online:

www.gumptionade.com/measure-uncertainty

I now place two dice on a table in front of you. They appear identical, but one is fixed to land only on three or six. I then offer to bet you ten dollars that you can't guess which of the dice is fixed after rolling just one.

You take the bet. Hey, it's just ten bucks. You pick one up and roll it. It lands on six. This is almost certainly the fixed dice. That was easy.

Before you can say anything, though, I offer to up the bet to one thousand dollars.

You are pretty sure that would be a good bet for you, but...a grand? You are uncertain. At this point you cannot afford to guess. Before you make the big bet, you need to weigh your risk of losing one thousand dollars.

Can you use logic to translate your uncertainty into risk? If you hated FindingPneumo, think of this exercise as preparation for Chapter 9: "Suffer Better." Please proceed:

Since it came up six, the probability I rolled the fixed dice is as follows: _____

You aren't sure? Look at it this way:

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Bayesian Probability Analysis

	FIXED DICE	FAIR DICE
Probability you chose each dice	1 in 2 ($=\frac{1}{2}$)	1 in 2 ($=\frac{1}{2}$)
Probability of rolling a "6" with it	1 in 2 ($=\frac{1}{2}$)	1 in 6 ($=\frac{1}{6}$)
Combining the probabilities	$\frac{1}{2} \times \frac{1}{2}$ ($=\frac{1}{4}$)	$\frac{1}{2} \times \frac{1}{6}$ ($=\frac{1}{12}$)

One quarter is three times larger than one twelfth. Because you rolled a six, you are three times more likely to have picked the fixed dice than the fair dice. This is the same as saying there is a seventy-five percent chance you picked the fixed dice.

You are no longer uncertain. If you bet that the dice you rolled is the fixed one, your risk of losing is twenty-five percent. Take the bet if you can afford to buy a seventy-five percent chance of winning one thousand dollars, accompanied by a twenty-five percent chance of losing that much.

Extra credit: Show yourself why this \$1,000 bet is worth \$500:
