“The Monty Hall Problem

“The “Monty Hall Problem,” as this scenario has come to be called, has inspired a great deal of debate. Is it better to switch or stick after Monty reveals one of the Zonks[a worthless item or a gag gift.]?

Most people approach the problem like this: After you make your choice, Monty eliminates one of the incorrect options, leaving two possibilities[by revealing what is behind one of the remaining two doors]. The prize could be behind either of these two doors[your original choice, or the remaining third door] with equal probability. Therefore, the chances of winning are equal—50/50—whether you stay or switch,

But, consider what happens if you always do one thing or another. **First, consider the strategy of always staying with your original choice.** Your chances of choosing correctly the first time are 1/3[i.e., 1 out 3, or 33%], and Monty doesn’t change this probability when he eliminates one of the other choices. Therefore, in 100 games you will win about 33 of them and lose about 67.

Now consider what happens if you always switch. Again, the probability of having chosen the correct door in the first place is 1/3. Monty eliminates one of the other doors from the running, meaning that if you didn’t pick correctly the first time and you switch, you are guaranteed to win. The probability that you didn’t pick correctly is 1 - 1/3 = 2/3, so you’ll win 67 times out of 100 with this strategy, while losing only 33 times!

Why do people seem to have such a strong inclination to believe that it doesn’t matter whether you switch or stay? It’s possible that we are out-thinking ourselves. “Since Monty always reveals a worthless door,” we think, “he’s not actually telling us anything—the prize might be behind the door I originally picked, or it might be behind the third door, so how can it matter whether I switch or not?”

The problem with this logic is that Monty is giving us information, but we only make use of it if we switch. In fact, if you choose to ignore Monty’s information and switch or stay randomly (that is, switch 50% of the time and stay 50% of the time), you will in fact win half of the time and lose the other half of the time. So in summary:

- If you always choose to stay with your first guess, you will win 33% of the time.
- If you always choose to switch to the alternate door, you’ll win 67% of the time.
- And if you switch half of the time and stay the other half of the time, you will win 50% of the time.

If you play the game 20 times and switch every time, you will probably win more times than you lose (you should win about 13 of the 20 games). Conversely, if you stick to your first choice every time, you will probably lose about 13 of the 20 games. Try it and find out!” [1]

[1] Adapted from Williams, P. *Interactive Statistics for the Behavioral Sciences*. Sunderland, MA: Sinauer Associates, Inc., Publishers, 2004.