

The Compelling Enigma of Monty Hall's Doors...

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Suppose you're on Let's Make a Deal, and you're given the choice of three doors: Behind one door is a car; behind the others, goats. You pick a door, say door #1, and our host, Monty Hall, who knows what's behind the doors, opens another door, say #3, to reveal a goat. Monty then asks, "Do you want to switch to door #2?" Is it to your advantage to take the switch?

First, if the question is purely mathematical, then there is neither an advantage nor a disadvantage to switching your choice. In the initial situation, you have a 1 in 3 chance of randomly picking the car. Once one of the unpicked doors has been opened to reveal a goat, the chance either of the car or of the other goat being behind either of the remaining unopened doors is 1 in 2. Choosing a different door will not change that probability.

If, however, the question is whether you should switch if Monty says, "I'll give you \$5,000 to switch your choice to door #2," then the answer is more complicated. You must now consider the motivation behind Monty's question and your motivation behind playing the game in the first place.

Case A: If the rules of the game specify that, after your initial choice, Monty must always open one door with a goat and offer you money to switch your choice, then the situation is essentially the same as the purely mathematical case above. There is no advantage or disadvantage to switching.

Case B: If Monty does not have to always offer you money to switch your choice, but may and does offer you the choice, then you have to consider his motivation for offering.

Motivation 1: Monty wants to minimize the value of what the show gives away to contestants and so wants to trick you into picking the goat. Note that this interpretation of Monty's motivation isn't really plausible. Though there were no Lexuses [Lexi?] during the show's 15-year tenure (1963-1977), let's just say that if the show were airing today, the value of even an expensive car, a \$60,000 Lexus for example, would be a small percentage of the total cost of the show's production, which would include paying the host somewhere in the neighborhood of \$500,000 per show. Lexus, in fact, would probably give the car to the show in exchange for the glowing description Jay Stewart (I Googled it...) would deliver to the studio audience and all the folks at home during the show.

In this case you probably have picked correctly the first time, or he wouldn't be offering you the money option. Otherwise, if you took the \$5,000 to switch, he would be giving away both the car and the money.

Motivation 2: This motivation makes more sense than #1. Monty is not trying to minimize what he gives away to contestants. Instead, he is trying always to maximize the excitement and surprise of the show.

In this case there are two extreme outcomes:

don't switch → win goat
switch → win car and \$5,000

And two non-extreme outcomes:

don't switch → win car
switch → win \$5,000 and goat

Because extreme cases presumably maximize viewer excitement, and therefore boost ratings, and because there are the same number of possible extreme outcomes and possible non-extreme outcomes, there is no advantage to either switching or not switching.

Motivation 3: *Monty is trying to be unpredictable* – say by sometimes trying not to give away the car and by sometimes trying to give away the car – and because unpredictability is by definition, well, unpredictable, then there is no formula for responding in a way that would maximize your chances of getting a particular outcome. So, again no advantage or disadvantage to switching.

Note that the three motivation scenarios analyzed so far assume that you want to win the car more than the \$5,000 or the goat. The next three motivation options explore the remaining possible choices.

Motivation 4: *You would rather win the \$5,000 than either the car or the goat.*

If Monty offers you the \$5,000, take it. If he doesn't offer you the money for the switch, and you win the car, sell it cheap and fast on eBay, and walk away with considerably more than \$5,000. If you win the goat, write up an analysis like this and sell it to People magazine for \$5,000 and get your photo (with goat) on the cover.

Motivation 5: *You would rather win the goat than either the \$5,000 or the car.*

If Monty offers you the \$5,000, take it. It will be much easier to fly home with the money than with the goat. Back home, you'll be able to buy lots of goats. If you really do want that particular goat, and you happen to accidentally win the car (you couldn't accidentally win the \$5,000 because you'd have to take Monty up on his switching offer), smile and look happy until after the studio session is over. Then, while the camera is still rolling because you've slipped the cameraman \$100, plead with Monty and offer him \$5,000 to swap you the goat for the Lexus. After he agrees, sell the videotape of the negotiation to People magazine for \$5,100 for a story on how you turned the tables on Monty himself. Maybe you could impress the beautiful Carol Merrill so much that she would skip the show's next taping with dull Monty and join you for dinner, and you and the goat for the photo shoot for the cover of the next issue of People magazine.

Motivation 6: *You don't care what you win or even if you win.*

This one is a lack of motivation, and it's moot because you would not have gone on the show in the first place, and you certainly would not have read this entire article....