What is the visual explanation for the Monty Hall Problem?

Authored by

stats writer

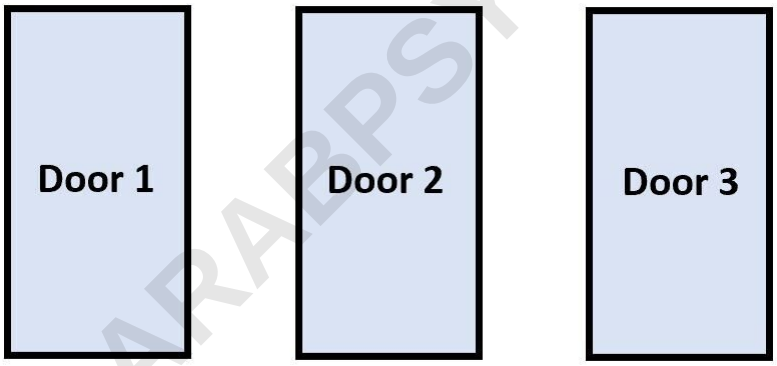
June 29, 2024

The visual explanation for the Monty Hall Problem involves a simple game show scenario where there are three doors, one of which hides a prize. The contestant is asked to choose one door and the host, who knows where the prize is, opens one of the remaining doors to reveal that it does not contain the prize. The contestant is then given the option to switch their initial choice to the remaining unopened door. The visual representation of this problem highlights the counterintuitive nature of the solution, which suggests that switching doors gives the contestant a higher chance of winning the prize. This can be demonstrated through a probability tree diagram or through a simulation of the game show scenario.

The Monty Hall Problem: A Simple Visual Explanation

In an old game show titled *Let's Make a Deal*, host presented contestants with three doors.

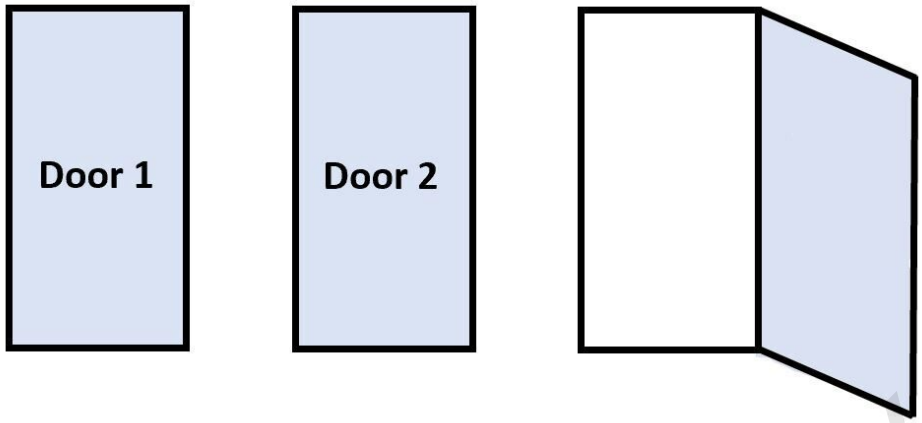
One of the doors contained a prize while the other two did not.



Monty would ask the contestant to choose which door they believed contained the prize.

After the contestant selected a door, Monty would then

open one door that did not contain the prize.



The prize remained in one of the two unopened doors.

Monty would then ask the contestant if they would like to switch doors.

While it might be hard to believe, it turns out that switching doors at this point in the game actually gives you a higher probability of winning.

Keep reading to find out why!

The Monty Hall Problem Explained Visually

To illustrate why switching doors gives you a higher probability of winning, consider the following scenarios where you pick door 1 first.

Scenario 1: You pick door 1 and the prize is actually behind door 1.

In this case, Monty will open either door 2 or 3 and show you that nothing is behind one of those doors. If you stay with door 1, you win.

Scenario 2: You pick door 1 and the prize is actually behind door 2.

In this case, Monty must open door 3 and show you that nothing is behind it. If you stay with door 1, you lose.

Scenario 3: You pick door 1 and the prize is actually behind door 3.

These are all of the possible outcomes if you pick door 1. Notice that if you stay with door 1, you only win one-third of the time. But if you switch, you win two-thirds of the time.

The following table summarizes all of the possible scenarios in this game show along with the outcomes associated with staying and switching:

Statology.org				
Contestant Picks This Door	Prize is Behind This Door	Monty Shows that Prize is Not Behind This Door	Result if Contestant Stays	Result if Contestant Switches
1	1	2 or 3	Win	Lose
1	2	3	Lose	Win
1	3	2	Lose	Win
2	1	3	Lose	Win
2	2	1 or 3	Win	Lose
2	3	1	Lose	Win
3	1	2	Lose	Win
3	2	1	Lose	Win
3	3	1 or 2	Win	Lose
		Win %	33%	66%

From the table we can see that you win 33% of the time when you stay, but you win 66% of the time when you switch.

Thus, switching doors increases the probability that you will win the prize.

Although this doesn't seem to make sense intuitively, the math doesn't lie.

Additional Resources

Check out this video for a nice explanation of the Monty Hall Problem by the Numberphile YouTube channel:

And refer to this interactive online simulator to simulate the Monty Hall Problem yourself: .