# **The Monty Hall Problem**

Hi. Good morning everybody. Today, I'm going to explain the Monty Hall problem to you. Okay? Now this is not as confusing as people think. The Monty Hall problem was based on a 1970s game show called “Let's Make A Deal” and the host was called Monty Hall, hence the name of the problem.

OK. Let's explain it first of all. So, in the game show, you're presented with three doors. Behind one of the doors is a prize. Behind the other two doors is something you don't want. So, behind my doors I have a prize. And behind the other two doors I have a goat. I mean who wants a goat? Hey? They eat everything. Okay. So, what the host does is, he asks you to choose a door. All right? So, let's say we choose door number one. Then the host, who knows where the goats are, reveals what's behind one of the other doors. So, in this case, let’s open door number three, which is, of course, a goat.

Now, what the host does, Monty Hall, he says to you, “Do you want to stick with your choice, door number one, or do you want to change to door number two?” And this is where the problem starts. Should you change or should you stick with your original choice. Now the answer is, you should change. And the why is interesting.

Now, most people think that because you have two doors, the chance that the price … the chance of the prize being behind the door you originally chose is 50% and the chance of the prize being behind the new door is also 50%. 50/50. Doesn't matter if you choose or stay the same. You're going to be right half the time and wrong half the time. But, that's not actually true. We have to look at the probability that the prize isn't behind the door that you chose.

Now, let's go back to the start of the problem. Let's say we've chosen door number one. What is the chance that our prize is behind door number one? Well, of course, it's one third. There are three doors. One door is one third. What is the chance the prize is behind door number two? One third. Door number three? It's one third. Okay? So, the chance that our prize is behind the door we've chosen is one third. Now, what is the chance that the prize is not behind the door that we've chosen? Obviously, there are two other doors, which means the chance the prize is not behind our door is two thirds. OK? Now, that is important. Now, when the host reveals what's behind one of the other doors, this doesn't change. The chance that the prize is behind the door that you've chosen, is still one third in favor or two thirds against. That means, the chance that the prize is behind this door has changed because it's no longer just one third. The chance that the prize isn't behind this door is one third. The chance that the prize is behind this door is now this door plus this door, which is two thirds.

So, the chance the prize is not behind your original door is still two thirds, which means you should always change. You won't always be right, but two times out of every three times you will be right. So, let's change to door number two. What do we get? We get … yeah!!! The prize! Obviously, I set that up. But if you try this yourself, it actually works. If you sit down with a friend, make some doors, make some prizes and try this. If you do it 30 times, 20 times, if you change, the prize will be behind the new door. Ten times it will be behind the old door. You will win more often than you don't.

Many people still have trouble understanding this. So, let's try and make it a little bit clearer. Can’t get these off the board. Let's try to make it a little bit clearer, by using more doors. If I give you 10 doors and I ask you to choose one of the doors. Let's say we choose door number one. What is the chance the door is … what is the chance the prize is behind the door you've just chosen? Well, obviously, it’s 10%. There is a 10% chance the prize is behind any of these doors because there are 10 doors. Okay? What is the chance the prize isn't behind the door you’ve chosen? Well, of course, it's 90% because there is a chance that the prize could be behind the other nine doors. OK? Now, the host Monty Hall, he opens up eight of the other doors for you, to show you eight goats. And then he says to you, “Do you want to change doors?” OK. Now, remember the chance that the prize was not behind the door you'd originally chosen was 90%. That means the chance that the prize is behind door number two is 90%. 10% to 90%. Why would you not change? Of course, you would change. Nine times out of ten, the prize is going to be behind door number two. Okay? So, when you're faced with the Monty Hall problem, you've got to try and change the way you think a little bit. Don't think about the chance of whether the prize is behind the door you've chosen. Think about the chance … the probability that the prize isn't behind the door that you've chosen. And maybe it will be a little bit easier to understand.

Okay. I hope that made things a little bit clearer for you. If you have a look in the description below here, there's a link to the MP3 for this talk and also for the transcript. You can read it, if you want. Okay. Thanks very much. If you want to subscribe, click “SUBSCRIBE”. See you next week. Goodbye.