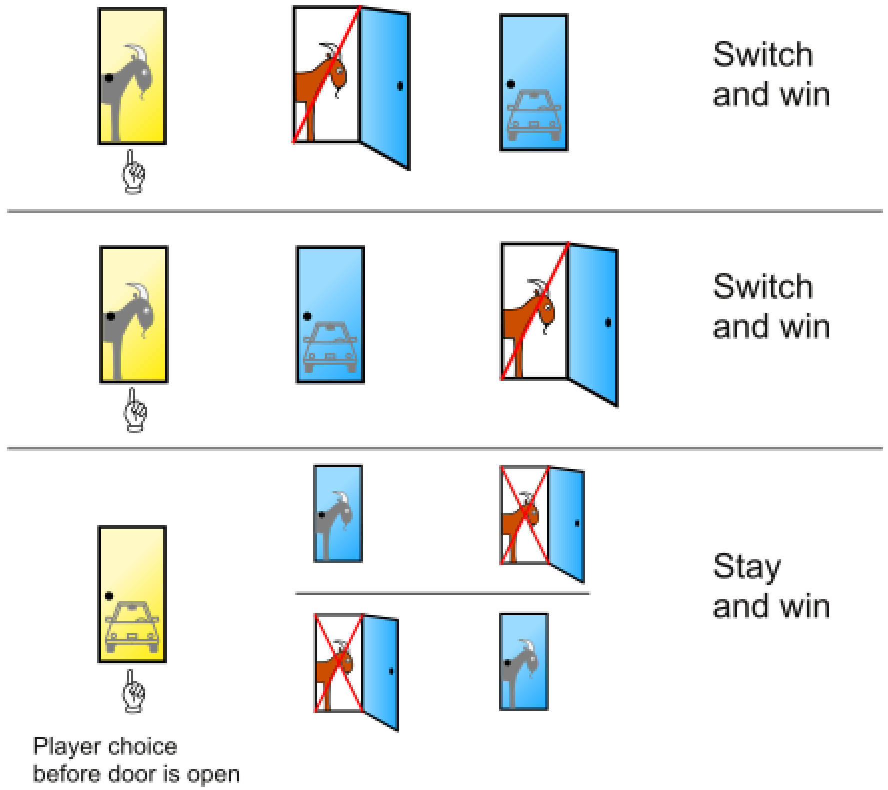
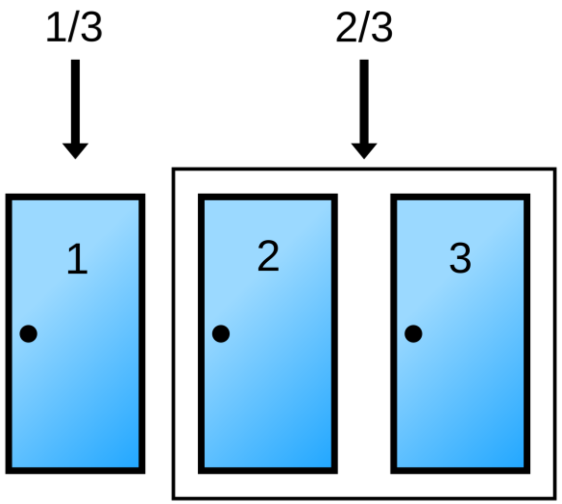
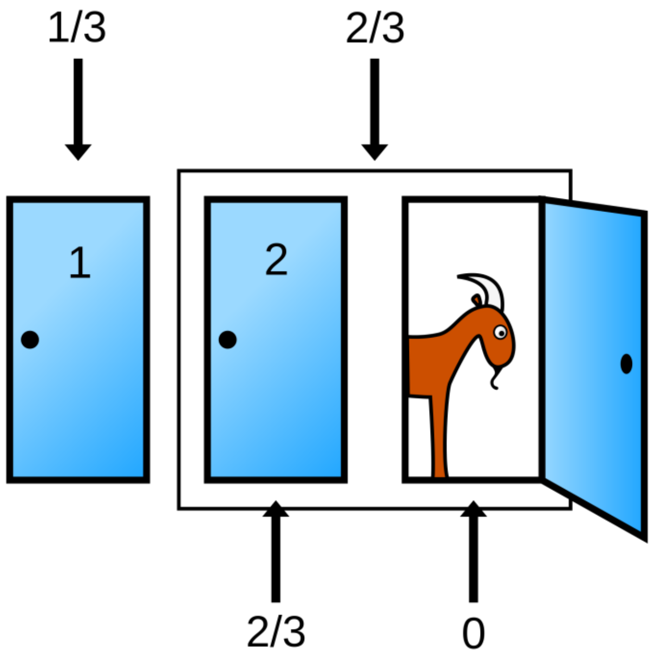
Player choses door #1: Probability of choosing the car = 1/3

Behind door 1	Behind door 2	Behind door 3	Result if staying at door #1	Result if switching to the door offered
Goat	Goat	**Car**	Wins goat	**Wins car**
Goat	**Car**	Goat	Wins goat	**Wins car**
Car	Goat	Goat	**Wins car**	Wins goat







Simulation: Run experiments

```
    #       As such, we can use the "sum" function to get the total number of wins
    #       for each strategy.

    print(f'\n\
    {N:,} games were played \n\
    Chances of winning the car based on the following strategies:\n\
    Remaining with initial selection: {"{:.1%}".format(sum(ChoiceStay)/N)}\n\
    Switching doors: {"{:.1%}".format(sum(ChoiceSwitch)/N)}')
```

```
[2]: ###### Run the Simulation######

     MontyHallSimulation(N=100)
```

```
    100 games were played
    Chances of winning the car based on the following strategies:
    Remaining with initial selection: 34.0%
    Switching doors: 66.0%
```

```
[9]: 1/3
```

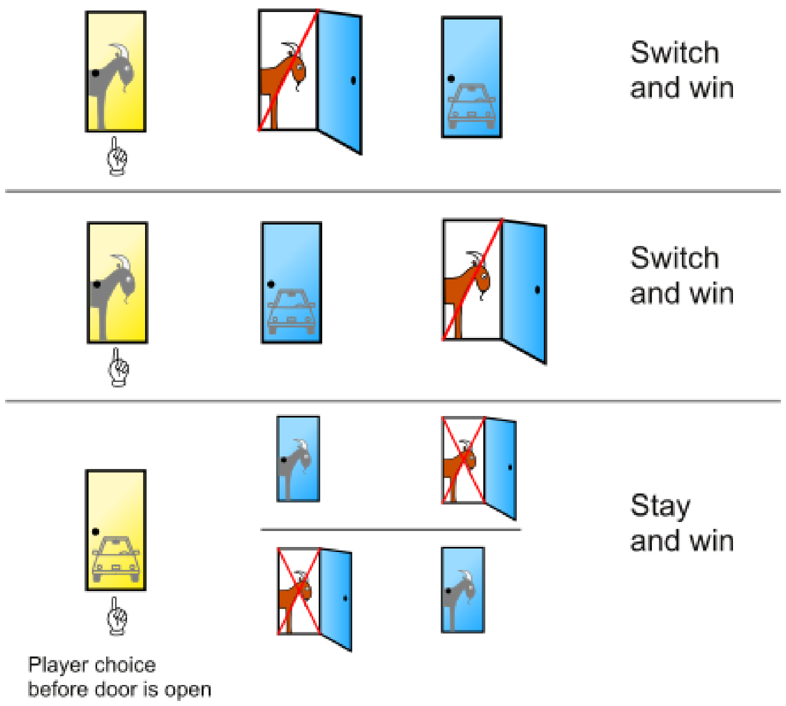
```
[9]: 0.3333333333333333
```

```
[10]: 2/3
```

Conditional Probability

$$P(\text{prize door i}) = \frac{1}{3} \quad \text{for i = 1, 2, 3.}$$

	Car location:		Host opens:	Total probability:	Stay:	Switch:
1/3	Door 1	1/2	Door 2	1/6	Car	Goat
		1/2	Door 3	1/6	Car	Goat
1/3	Door 2	1	Door 3	1/3	Goat	Car
1/3	Door 3	1	Door 2	1/3	Goat	Car



- All possibilities space starting from the fact that the contestant has already chosen Door #1
- No matter which door is chosen, same probabilities

Conditional Probability

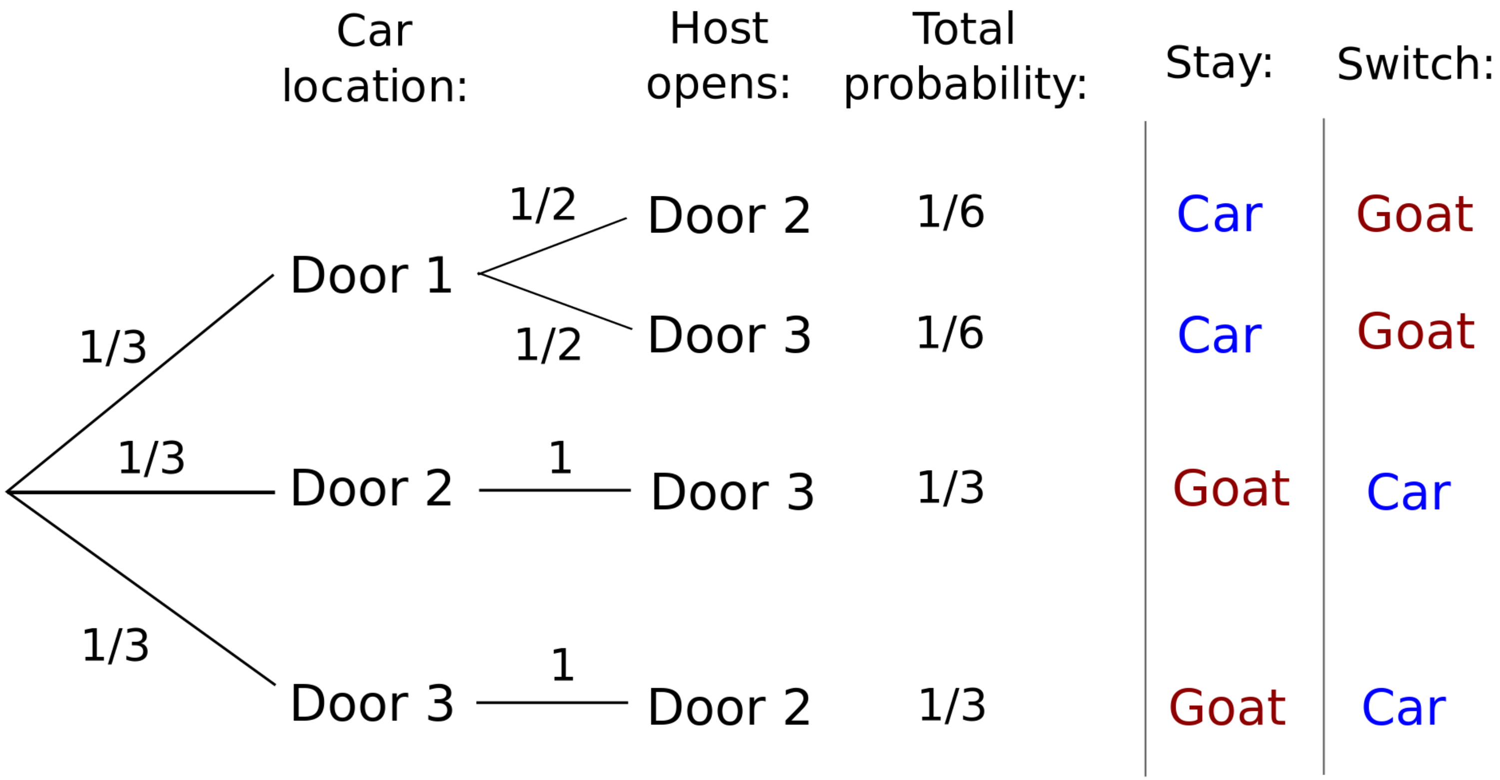
	Car location:		Host opens:	Total probability:	Stay:	Switch:
1/3	Door 1	1/2	Door 2	1/6	Car	Goat
		1/2	Door 3	1/6	Car	Goat
1/3	Door 2	1	Door 3	1/3	Goat	Car
1/3	Door 3	1	Door 2	1/3	Goat	Car

1/6 + 1/6 + 2/6 + 2/6 = 1

Stay and Win: 1/6 + 1/6 = 1/3

Switch and Win: 1/3 + 1/3 = 2/3

Conditional Probability



1/6 + 1/6 + 2/6 + 2/6 = 1

Host Opens Door #3

P (Host Opens Door#3) = sum of the conditional probabilities of host opening door #3 conditional on the prize location

= (1/6) + (1/3) = 1/2

Conditional Probability

$$\Pr(B|A) = \frac{\Pr(A\ AND\ B)}{\Pr(A)}$$

Choose Door #1

Probability of (Winning by Staying) =

Probability of (Car Behind Door #1) GIVEN that (Host Opens Door #3) =

P ((Car Behind Door #1) | (Host Opens Door #3))

$$= \frac{\text{P((Host Opens Door \#3) AND (Car Behind Door \#1))}}{\text{P(Host Opens Door \#3)}} = (1/2 * 1/3) / (1/2) = 1/3$$

Probability of (Winning by Switching) =

Probability of (Car Behind Door #2) GIVEN that (Host Opens Door #3) =

P ((Car Behind Door #2) | (Host Opens Door #3))

$$= \frac{\text{P((Host Opens Door \#3) AND (Car Behind Door \#2))}}{\text{P(Host Opens Door \#3)}} = (1 * 1/3) / (1/2) = 2/3$$