Tuesday Boy

"I have two children, one of whom is a boy. What is the probability that the other is a boy?"

"I have two children, one of whom is a boy born on a Tuesday. What is the probability that the other child is a boy?"

The answers to these are not the same, and both are surprising.

The answer to the first is 1/3 (0.333..), and the answer to the second is 13/27, or about 0.481481.

Here is a way to approach the problems.

With two children the probabilities are distributed this way. We assume a boy or girl is equally likely to be born.

	Second child	
	G	**B**
G	GG	GB
B	BG	BB

First child

"I have two children, the first is a boy, what is the chance that my other child is a boy?"

The first clause limits the domain of the problem. The diagram will look like this,

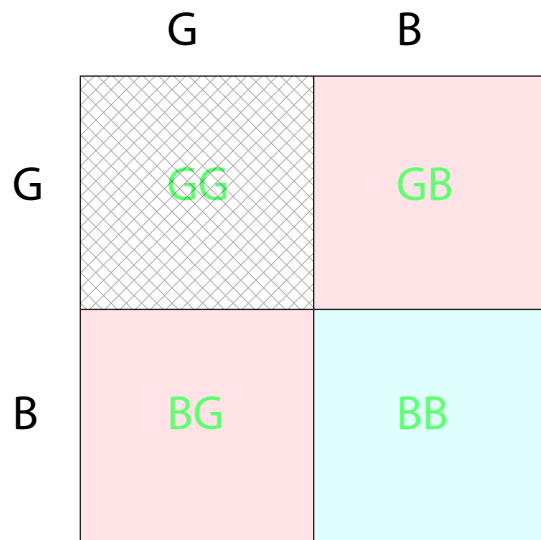|	G	B
G	GG	GB
B	BG	BB
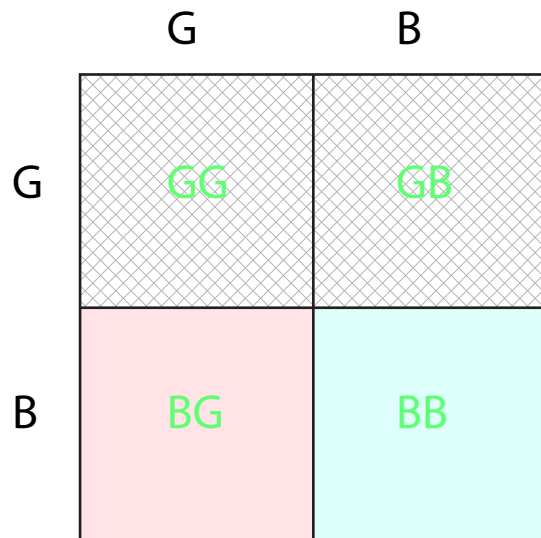
is excluded from the problem
my other child is a girl
my other child is a boy

Within the problem domain it is easy to see that the answer is 1/2 or 0.5

"I have two children, one of whom is a boy. What is the probability that the other is a boy?"

Because the clause does not distinguish between first and second births the excluded part is just that in which neither child is a boy. This is the domain,

	G	B
G	GG	GB
B	BG	BB

The chance that the other child is a boy is 1/3.

"I have two children, one of whom is a boy born on a Tuesday. What is the probability that the other child is a boy?"

The problem domain excludes every state in which neither child is a boy born on Tuesday.
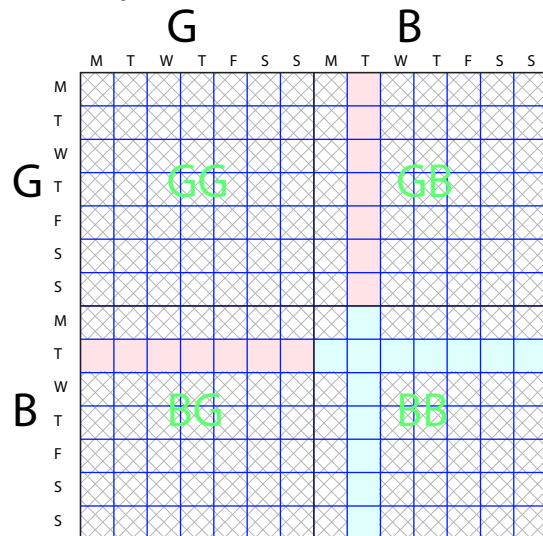
⬚⬚⬚⬚⬚⬚⬚⬚⬚ is excluded from the problem

▭ my other child is a girl

▭ my other child is a boy

The chance that the other child is a boy is the number of blue squares divided by the number of blue squares plus the number of pink squares, 13/27 or 0.481481...

This is reminiscent of the "Monty Hall Problem" in that it goes against one's intuition. One must be careful about how a problem is stated.

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