

The Two Boys Paradox

Math 10120, Spring 2013

February 27, 2013

First scenario

I have two children.

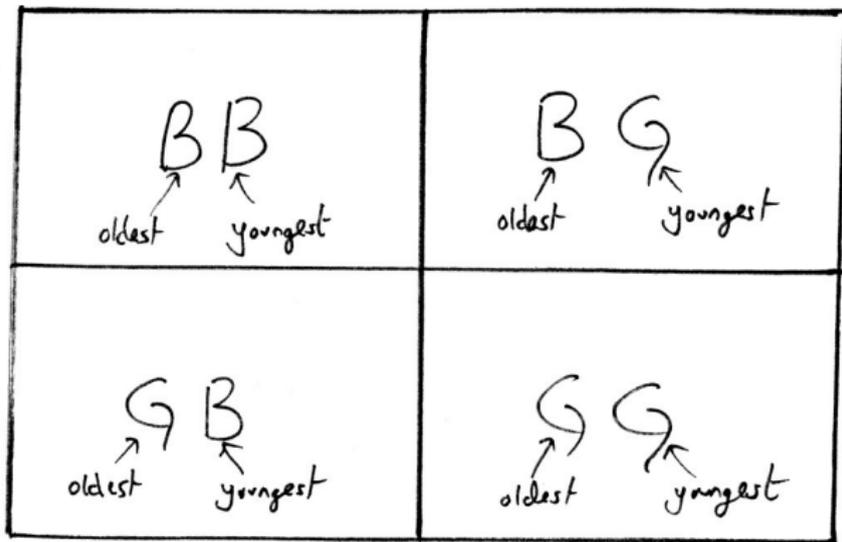
What is the probability that they are both boys?

First scenario

I have two children.

What is the probability that they are both boys?

“I have two children” puts me in one of four equally likely groups:

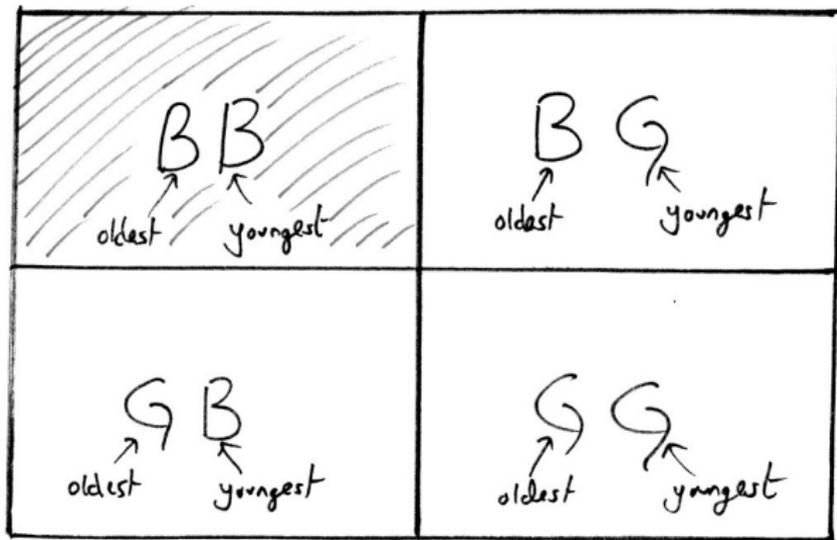


First scenario

I have two children.

What is the probability that they are both boys?

“I have two children” puts me in one of four equally likely groups:



One of these groups leads to two boys, so $p = 1/4 = .25$

Second scenario

I have two children. The eldest is a boy

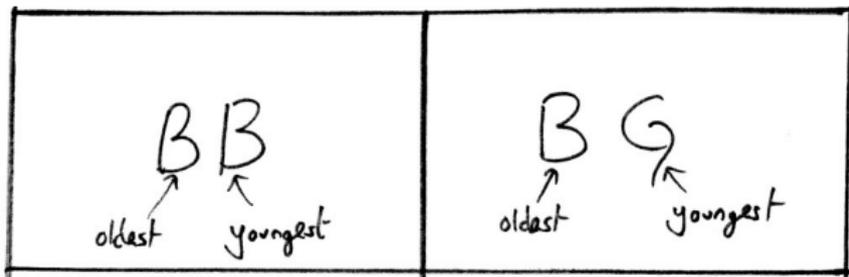
What is the probability that they are both boys?

Second scenario

I have two children. The eldest is a boy

What is the probability that they are both boys?

“The eldest is a boy” puts me in one of **two** equally likely groups:

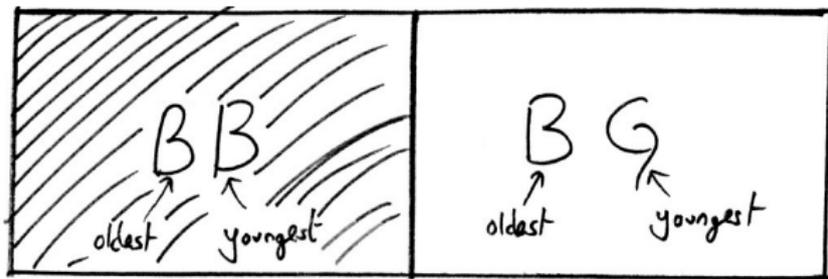


Second scenario

I have two children. The eldest is a boy

What is the probability that they are both boys?

“The eldest is a boy” puts me in one of **two** equally likely groups:



One of these groups leads to two boys, so $p = 1/2 = .5$

Third scenario

I have two children. One of them is a boy

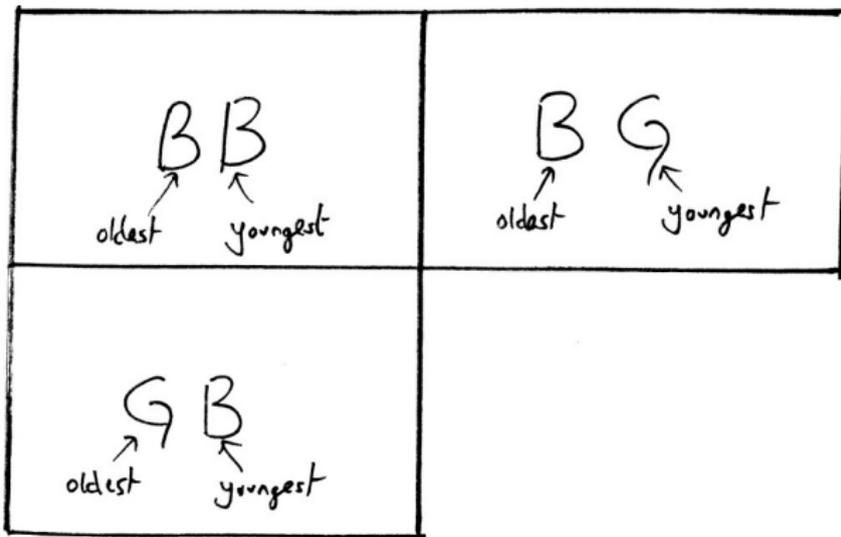
What is the probability that they are both boys?

Third scenario

I have two children. One of them is a boy

What is the probability that they are both boys?

“One of them is a boy” puts me in one of **three** equally likely groups:

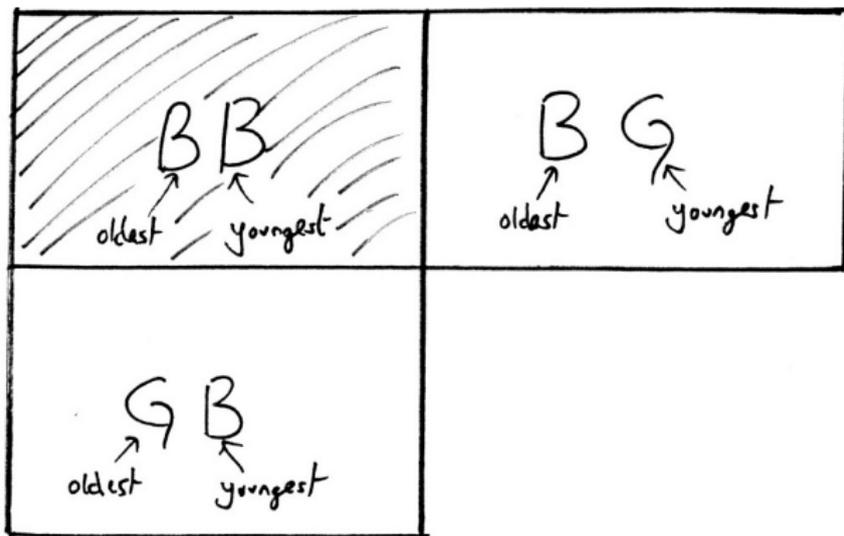


Third scenario

I have two children. One of them is a boy

What is the probability that they are both boys?

“One of them is a boy” puts me in one of **three** equally likely groups:



One of these groups leads to two boys, so $p = 1/3 = .333$

Moral of the story?

Always listen **carefully** to information that you are given!