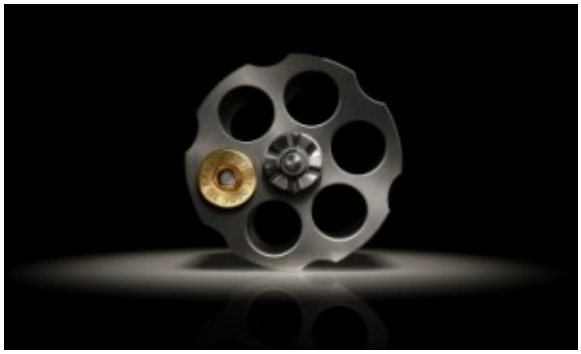
June 2009
Regulars

Puzzle page

Russian roulette



Your mother did tell you to stay away from gambling, but now it's far, far too late to head her advice. You're sitting in a smoke−filled room, your single opponent staring you down. Between you, on a table, there is six−shot revolver, containing exactly one live bullet. Someone has spun the cylinder so neither of you knows whether the next shot will be blank or lethal. Each of you will take one shot at the opponent in turn, and the cylinder will be spun again after each shot. The game ends, obviously, when one of you fires the lethal shot, and the other person is dead. It's your choice whether to go first or second which should you choose? Does it matter?

Solution

Let a be the chance that the person to shoot first wins the game and let b be the chance that the person to shoot second does, so $a+b=1$. Suppose that you go first. The probability b that your opponent wins is equal to the probability p that he or she survives your first shot *times* the probability q that he or she wins the game from

then on, after having survived the first shot. Since 5 of the 6 chambers are empty and each has an equal chance of containing the bullet, we get $p=5/6$. Once your opponent has survived the first round, he or she turns into the player to go first, with probability a of winning the game, so $q=a$. This gives $b=5/6a$. Putting this together with the fact that $a+b=1$ gives $a=6/11$ and $b=5/11$. Hence you have a greater chance of winning if you take the first shot.

This puzzle was inspired by a problem in the book Number Story, which is reviewed in this issue of Plus.

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