

Non transitive dice

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12 years old

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Going second is a better option as each choice that player one can pick, still leaves 2 dice, and one will always have a higher chance of winning, perfect for player 2 to pick, giving player 2 the advantage.

Red die- To begin with, if Player 1 picks the red die (1, 1, 6, 6, 8, 8) Player 2 can pick green (2, 2, 4, 4, 9, 9). Green has a higher chance of winning, $\frac{2}{3}$, because 2 cancels out 1, 9 cancels out 8, we don't even need to continue, as the numbers on the "green team" have already cancelled out most numbers on the "red team". Overall, green has $\frac{2}{3}$ chances of winning, and the remaining chance, is $\frac{1}{3}$, which is lower than $\frac{2}{3}$.

Red- 1, 1, 6, 6, 8, 8 6, 6

Green- 2, 2, 4, 4, 9, 9, 2, 2, 9, 9

This same idea applies to the other dice too. If player 1 picks green instead. Player 2 can pick blue, as blue has a $\frac{2}{3}$ chance of winning, and green is left with $\frac{1}{3}$.

3 cancels out 2 (2 points to blue as there are 2 of each number) 5 cancels out 4 (4 points to blue in total) and finally, 9 cancels out 7 (2 points to green). In the end, we can see that blue has 4 points, and green has 2. Blue wins!

Blue- 3, 3, 5, 5, 7, 7 3, 3, 5, 5, (4 points or 2/3)

Green-2, 2, 4, 4, 9, 9 9, 9, (2 points or 1/3)

Finally, if player 1 picks the blue die, player 2 can pick the red die, in order to get the chance of 2/3 to win, and leaving player 1 with 1/3, making them less likely to win.

Blue 3, 3, 5, 5, 7, 7 3, 3, (2 points)

Red 1, 1, 6, 6, 8, 8 6, 6, 8, 8, (4 points)

It is better to go second, because there is no SUPERIOR dice that can beat anything, its like rock paper scissors.

Take the three dice and give them some element from rock paper scissors

Red-Rock

Blue-Scissors

Green-paper

Red can beat Blue, but not green

Green can beat Red, but not blue

Blue can beat Green, but not red.

Alison wins!