

Probability Puzzle #2: The Problem of Points

Problem Description

Summary

In what proportions should the wagers on an unfinished game of chance be distributed to the players, if one player is in the lead when the game is interrupted (never to resume)?

Scenario

Two players are playing a game of chance in which each point is awarded based on a coin flip. Each player puts \$20 into the pot, and they decide between themselves who will be “heads” and who will be “tails”. A third person (presumably unbiased) repeatedly tosses a coin and awards a point to the winner of each coin flip. The first player to reach 10 points wins the game (and the money).

The game is interrupted and appears unlikely to be resumed. At that moment, Player 1 has 7 points, while Player 2 has 8 points. Not surprisingly, both players have different opinions on how the money should be distributed:

- Player 1 argues that since the game wasn't completed, the bets are off, and each player should take back their own \$20.
- Player 2 argues that since he was in the lead, and would have been the likely winner, he should get all of the money.
- A passing friend volunteers the opinion that since Player 2 has won $8/15^{\text{th}}$ of the points so far, he should be awarded that fraction of the money.

Are any of the above proposals fair? If so, which one would you support, and why? Or, if you don't believe that any of them are fair, can you think of a better scheme for distributing the money?