Gambling Report

April 18, 2020

1 Simulation Parameters

The starting value for Alice is always \$5 and for Bob is either \$5, \$15, or \$50. 1,000,000 games are simulated for each scenario until one party has \$0 left. The starting bet amount is \$1 and each round there is a 50% chance either party wins the pool. The following strategies used are defined below. The simulation source is found at [1]. Section 2 contains the results of running the simulation with each of the six strategies and three different starting value pairs.

Constant A constant bet of \$1 is placed at each round.

Double After Win After Alice wins, the next round she bets double the previous bet. If she wins, the bet remains the same as the previous round.

Maximum The amount of the bet is equal to $minA, B$ where A is the amount of money Alice has and B is the amount Bob has.

Increase w/ Loss After Alice loses, the next round she increments her bet by \$1. If she wins, she decrements her bet the next round by \$1.

Increase w/ Win After Alice wins, the next round she increments her bet by \$1. If she loses, she resets her bet amount to the starting amount (\$1).

Random Amount Alice chooses a uniform random bet value over $[1, minA, B]$.

2 Results

Betting Strategy	Alice Win % (#)	Bob Win % (#)	Average Number of Rounds	Standard Deviation
Constant	49.985% (499,853)	50.015% (500,147)	24.997	20.024
Double After Win	50.018% (500,179)	49.982% (499,821)	5.830	2.531
Maximum	50.058% (500,577)	49.942% (499,423)	1.000	0.000
Increase w/ Loss	49.983% (499,828)	50.017% (500,172)	6.358	4.559
Increase w/ Win	49.970% (499,700)	50.030% (500,300)	9.010	5.464
Random Amount	49.973% (499,728)	50.027% (500,272)	8.334	6.660

Table 1: Gambling results when the starting amount is $A = B = \$5$.

Betting Strategy	Alice Win % (#)	Bob Win % (#)	Average Number of Rounds	Standard Deviation
Constant	24.960% (249,596)	75.040% (750,404)	74.995	78.748
Double After Win	24.953% (249,532)	75.047% (750,468)	6.358	2.576
Maximum	25.020% (250,195)	74.981% (749,805)	1.501	0.500
Increase w/ Loss	25.024% (250,244)	74.976% (749,756)	14.959	12.456
Increase w/ Win	24.974% (249,744)	75.026% (750,256)	17.171	14.341
Random Amount	24.953% (249,526)	75.047% (750,474)	10.973	8.648

Table 2: Gambling results when the starting amount is $A = \$5,\ B = \$15$.

Betting Strategy	Alice Win % (#)	Bob Win % (#)	Average Number of Rounds	Standard Deviation
Constant	9.083% (90,829)	90.917% (909,171)	250.231	458.339
Double After Win	9.061% (90,610)	90.939% (909,390)	6.356	1.925
Maximum	9.100% (91,000)	90.900% (909,000)	2.001	1.414
Increase w/ Loss	9.061% (90,609)	90.939% (909,391)	27.669	34.189
Increase w/ Win	9.073% (90,725)	90.928% (909,275)	44.552	73.046
Random Amount	9.058% (90,580)	90.942% (909,420)	12.253	10.283

Table 3: Gambling results when the starting amount is $A = \$5,\ B = \$50$.

References

[1] [Online].Available: https://github.com/NickChiapputo/InformationTheory/tree/master/FairGambling