Name(s)

Jennifer A. Beaton

Project Number

J1204

Project Title

On the Flip Side...

Abstract

Objectives/Goals

People have wondered throughout the ages if the simple procedure of tossing or flipping a coin truly was random. All mathematicians and other persons testing this up till this time had proven it was random until professor and mathematician Persi Diaconis used a machine to flip the coins and discovered that if a coin is flipped with heads starting out facing up, then it is more likely to land face up, but in every day life, people will not have a coin flipping machine handy to flip their coins for them.

My testing will attempt to discover if Persi Diaconis' theory applies when humans flip coins, and if it does, does it apply on different surfaces.

Methods/Materials

A. Flip the quarter once starting heads up and over the first surface. Then record the ending position, and repeat 250 times. Do the previous instructions again, except the quarter should start tails up; repeat for all surfaces.

B. 5 different surfaces were used of various density and texture.

C. The quarter was flipped 2500 times in Primary testing and 2500 times in Secondary testing, 5000 flips in all.

D. The same quarter was used each time.

E. The same person flipped the quarter for each flip.

Materials: 1 chart, 1 hard surface to write on, 1 writing utensil, 1 Quarter.

Results

Unfortunately, there were almost no definite results. The average percentage for heads in Primary Testing was 50.56%, and 48.92% in Secondary. The average percentage for tails in Primary Testing was 49.44%, and 51.08% in Secondary. All of these percentages are very close to 50%, so the coin toss was still fairly random, although there were many, many runs of a certain side, whether heads or tails. Six of the ten variables in Primary testing agreed with Diaconis' theory that a coin is more likely to land with the side that started face up, landing face up, and only three of ten in Secondary testing agreed.

Conclusions/Discussion

My conclusion is that although Persi Diaconis found that when a machine tosses a coin, it is more likely to land with the side that started face up, to land face up, when a human flips a coin, they introduce much of the randomness usually associated with coin tosses.

Summary Statement

When a human tosses a coin, is it more likely to land heads-up if it starts out heads-up; does the type of surface the coin lands on change the outcome?

Help Received

Father recorded results on tally chart.