

Statistics Project—Expectations for Loaded Dice

Background Problem: How can we decide if a pair of dice is “fair” or “crooked”? If each face of a die is equally likely to end face up then we say the die is “fair”. Otherwise we say the die is “crooked”. Imagine that you are the pit boss for the dice table at a Las Vegas casino and the shooter has rolled 6-1 seven straight times—do you think he has slipped a pair of loaded dice onto your table?

The Question: What outcomes should one expect from crooked dice? One type of crooked dice are called Ace-Six Flats (also known as Bricks). Ace-Six Flats (A6F) are not exactly cubical. They are made with the distance between the one and six sides slightly less than the other opposite side pairs. This makes a one or a six more likely to land face down. The question for this project is how much more likely?

Three Reasonable Hypotheses to Test:

1. The outcome probabilities are proportional to the perimeter of the die face.
2. The outcome probabilities are proportional to the surface area of the die face.
3. Neither of the above is true.

Getting Started: Find a wood or metal worker who can make shaved dice for you. Have him/her make a range of A6Fs for you. Experiment with these. Read the section of your text dealing with binomial distributions and measuring proportions

First Meeting: Prior to the meeting do the “Getting Started” exercise. Meet with your instructor and explain your project. Determine the following for your project—number/type of A6Fs, number of rolls per group, how to compute confidence levels, what confidence levels to use, how to tabulate the results, and what could go wrong. Write a summary of this meeting and turn it in to the instructor.

Conduct Tests and Compute Statistics: Your team should end up with a table of test results and a table of statistics based on the test results.

Third Meeting: Present your results. If there are problems with the testing procedures resolve them and run the tests again. Discuss what conclusions are justified. Discuss every section of the project report and what should be there.

Write Project Report Draft: Use the guidance from the Third Meeting to write your draft report.

Fourth Meeting: Present your draft report to the instructor. Use your instructor’s critique to write the final report.

Write the Project Report.

Additional Project Guidelines:

Due Dates

[Report Format](#)

[Report Writing Cautions.](#)