

Épreuve de section européenne

Rock-Paper-Scissors

Rock-paper-scissors is a hand game played by two people. The game is also known as roshambo, or by other orderings of the three items (with "stone" sometimes substituting for "rock").

The game is often used as a choosing method in a way similar to coin flipping, drawing straws, or throwing dice. Unlike truly random selection methods, however, rock-paper-scissors can be played with a degree of skill by recognizing and exploiting non-random behavior in opponents.

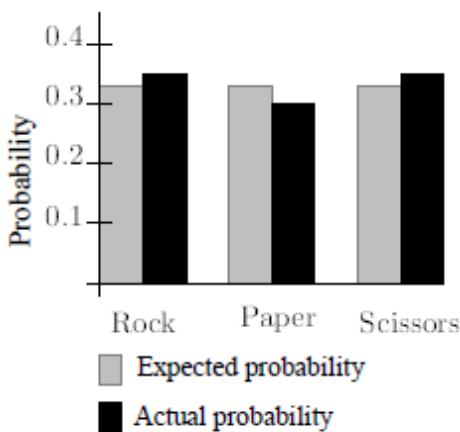
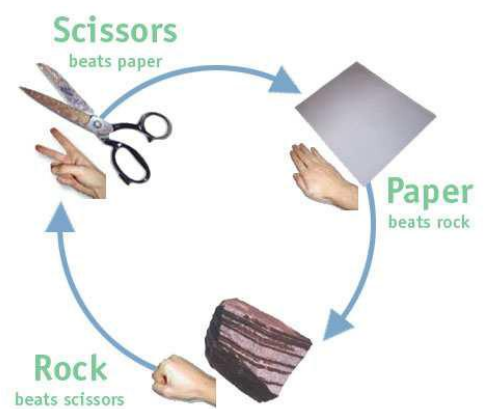
The players usually count aloud to three; on the third count, the players change their hands into one of three gestures, which they then "throw" by extending it towards their opponent. The gestures are :

- Rock, represented by a clenched fist;
- Scissors, represented by two fingers extended and separated;
- Paper, represented by an open hand, with the fingers extended and touching, in order to represent a sheet of paper.

The objective is to select a gesture which defeats that of the opponent. Gestures are resolved as follows:

- Rock blunts or breaks scissors: rock defeats scissors.
- Scissors cut paper: scissors defeat paper.
- Paper captures rock: paper defeats rock.

If both players choose the same gesture, the game is tied and the players throw again. The game is sometimes played as "best of three".



A truly random game of rock-paper-scissors would result in a statistical tie with each player winning, tying and losing one-third of the time. However, people do not play truly randomly and thus can be studied and analyzed.

Statistics show that paper is the least common throw, at just under 30 percent (rock and scissors are basically equal at 35 percent). Which makes rock most effective over a long, long game.

Adapted from various sources. Figure 1 comes from Wikipedia.

Questions

1. Play a single game of rock-paper-scissors against the examiner; if you win, you save yourself from reading the first paragraph of the text aloud !
2. If each player throws each gesture with a probability of one third, what is the probability of winning for one of them ?
3. Draw a tree that corresponds to a truly random game of rock-paper-scissors; what are the odds of winning such a game ?
4. Imagine a computer playing the game with a probability of one third to throw each gesture and you play according to the statistical behaviour shown in black on the second figure; draw a tree that corresponds to such a game. What are your odds of winning in this case ?