SiOWfa15: Science in Our World: Certainty and Controversy

The course website and blog for the Fall 2015 instance of Penn State's SC200 course

Rock, Paper, Scissors: More Than Meets the Eye?

Rock, paper, scissors, shoot! The simple, yet timeless game dates all the way back to the Han Dynasty and is known by many as a method of combining chance and luck in order to determine who gets the last slice of cake, the home side in FIFA, or any other random situation. Although you might think of it as childish, RPS (rock, paper, scissors abbreviated) is actually a mind game comprised of strategy, anticipation, intelligence, and observational skill. Some in fact take it so seriously that they created the USARPS World Championships; before it became extinct, the finals would air on ESPN yearly. It raised so much awareness that Chinese researchers assembled together to crack the science behind RPS.

If you like your odds of guessing at random (33.33%), then statistics reveal that each “weapon” choice will have the same probability in future and previous rounds of the game; this is referred to as a *Nash Equilibrium*. Curiousity about whether the odds of the game could be manipulated led Chinese scientist Zhijian Wang from Zhejiang University to conduct an experiment of his own. After experimenting and tinkering around with the data, he “discovered that gameplay typically consists of predictable patterns.”

The observational experiment began with 360 subjects divided into 60 groups of 6. They played 300 rounds of RPS where each and every move, win, and loss was recorded by the Chinese scientist. Ironically enough, the generated results confirmed that the subjects played rock 100 times, paper 100 times, and scissors 100 times...the Nash Equilibrium! It was also discovered that players that lost tended to rotate from rock to paper to scissors while the consistent winners would stick with one main strategy instead of switching it around. "This game exhibits collective cyclic motions which cannot be understood by the Nash Equilibrium concept but are successfully explained by the empirical data-inspired conditional response mechanism," he said. Other data collected from flowingdata.com uncovered that "males have a tendency to throw rock on their first try, inexperienced RPS players will subconsciously deliver the item that won previously, and paper is thrown least often, so use it as a surprise."

While we might think of it as a game, the concept of RPS lies within nature, as well. The common side-blotched lizard "exhibits a rock-paper-scissors pattern in its mating strategies." There are three color types: orange, blue, and yellow. Scientists have observed the behavior of these reptiles and it has been confirmed that an orange will defeat a blue, a blue will defeat a yellow, and a yellow will beat an orange in a competition for a mate. That's not all, however. Some bacteria also use a RPS strategy during antibiotic production. Doctors Benjamin Kerr and Brendan Bohannan of Stanford University discovered the pattern during a computer simulation in a laboratory. Biologist Benjamin C. Kirkup, Jr. "demonstrated that these antibiotics, "bacterioicins", were active as *Escherichia coli* compete with each other in the intestines of mice, and that the rock-paper-scissors dynamics allowed for the continued competition among strains: antibiotic-producers defeat antibiotic-sensitives; antibiotic-resisters multiply and withstand and out-compete the antibiotic-producers, letting antibiotic-sensitives multiply and out-compete others; until antibiotic-producers multiply again."

I find it extremely intriguing how a game thought of as "elementary" or "basic" is reflected in elements of nature throughout the world. Next time you find yourself in a RPS duel, keep in mind these strategies that will help you to succeed.

HISTORY

The earliest form of Rock, Paper, Scissors was seen in 18th century Japan, called Jan-ken-pon.

WORLD CHAMPIONSHIPS

The World Rock Paper Scissors Society sanctions yearly world championship competitions.

PREVIOUS WINNERS:

2009	TIM CONRAD
2008	MONICAL MARTINEZ
2007	ANDREA FARINA
2006	BOB COOPER

STRATEGY

SCISSORS ROCK PAPER YOU YOUR OPPONENT

1 ROCK-IT:

Males have the tendency to produce rock on their first throw. If you are playing against one, trying using paper.

2 TWISTED SCISSOR:

Experienced RPS throwers will play on your naivety and throw paper, hoping you throw rock. Counter with scissors.

3 COPYCAT:

Inexperienced (or flustered) RPS players will often subconsciously deliver the form that beat their last throw. Counter with the opposite.

ROUND 1

ROUND 2

4 DOUBLE ON THE ROCKS:

When you see a two-Rock run, you know your opponents next move will be Scissors or Paper. People hate being predictable and a firm indication of predictability is to come out with the same throw three times in row. Counter with Rock.

5 FINGER FINDINGS:

As your opponent prepares to throw, watch his fingers carefully. Fingers will move or tense depending on the form they are about to throw.

All fingers are tense

All fingers are loose

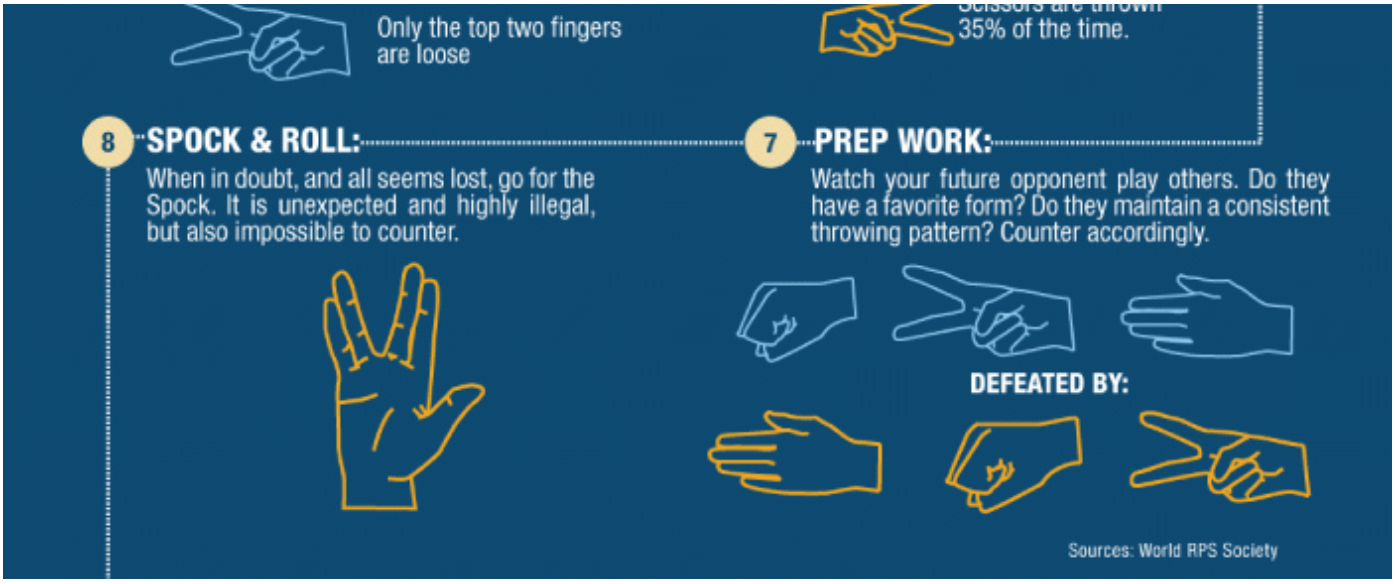
6 PAPER PLEASE:

Paper is thrown the least in a match. Use it as an unexpected option.

Paper is thrown 29.6% of the time.

Rock is thrown 35.4% of the time.

Scissors are thrown



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This entry was posted in Uncategorized on December 3, 2015 [https://sites.psu.edu/siowfa15/2015/12/03/rock-paper-scissors/] by Philip Littleton.

5 thoughts on “Rock, Paper, Scissors: More Than Meets the Eye?”

Kristen Lauren Mckenzie

December 3, 2015 at 6:33 pm

Loved this blog, I was really interested how a little game that decides who drives when I go out with my friends is strategy as well. And with this new found information I will be able to never have to drive. But seriously, I loved how even the simple things have a complex meaning behind it. Who knew that this use to be a world championship competition. I really enjoyed reading this because this is a game that almost everybody encounters in their lives. I know that when I play this game I always pick rock first this gives me a different perspective on picking rock first.

Scott L Katz

December 3, 2015 at 6:21 pm

Honestly this is the best blog post i have read so far, congratulations! Im a huge RPS fan and i also like to think of myself as an elite RPS player. This post has made showed me many more strategies to winning RPS. I also find it very interesting that the RPS laws are found in nature and not just in humans.

sjb5895

December 3, 2015 at 5:41 pm

I have heard about this before in my economics class before. RPS isn’t actually all random, there is an actual strategy behind it. When I read the part about the study they did with the 360 subjects, I became more inclined to believe that this belief behind strategy was real. But can this theory be applied to other things with guessing? I thought of the three doors with the 2 goats and a car example when I read this, and I wonder if this is the same kind of concept where what you decide isn’t actually all random.

Aidan Quinn Graham

December 3, 2015 at 5:36 pm

Well this was one of the more interesting post I've seen, simply because it deals with something so simple yet oddly complex. In reviewing my own "rock paper scissors" tendencies, I find that I play "scissors" far less often than the other two for whatever reason, so this will hopefully make me a better player.

This is also cool because it is an easily conductible experiment that deals with few outcomes and can be easily understood, unlike many other more complicated experiments with many more variables. This makes this experiment very worth while in an intro to science class. Great job!

Rory McGowan
December 3, 2015 at 5:30 pm

Fascinating. I believe that pieces of information like this just go further to show that, in general, our intuition is incredibly lousy. What we perceive as simple may, in fact, be far more complicated. The section of class where individuals tend to choose incorrectly when faced with 3 doors was brought to my attention when I was reading this. That was just another example of something that is multifaceted yet is discounted as being simple