Saving the world with statistics and psychology.

The situation is this. The world has been plunged into chaos as an alien race has sent rockets down to Earth, destroying buildings, cities, entire civilisations along with animals and people. This terror has lasted for many months without humanity ever finding a way to contact them or stop the attacks. The world is running out of time. You are the leader of the planet and everyone left, and you're starting to give up hope.

Then suddenly you receive a basket that comes flying down to earth inside a tiny rocket that doesn't cause any damage, inside is a note saying: "We are coming down to Earth in one hour to claim it for ourselves. All of humanity will be exterminated. However, since this is obviously against your wishes, we are willing to compromise. There is one way to save your precious Earth: Beat me in a game of rock, paper, scissors, best of three. I wish you good luck. Glorb." You read the letter and start to sweat, this is your only chance and you can't mess this up. What are you going to do?

Fortunately, you are intelligent and know that you can use some information in order to maximise your chance of saving humanity. First of all, we need to decipher the rules of the game. 'Best of three' means that you and Glorb will play three games, and whoever wins the greatest majority will be declared the winner. However there are scenarios where we wouldn't get to three games, for example if one person won both of the first two games, the other couldn't possibly get the majority and therefore playing a third game would be pointless. Also, as the alien species could technically just take over the planet and them granting you this chance is a courtesy, in this case we're going to count draws, when they make the difference in the total between the win or the loss, as losses. For instance if it was win, lose, draw, you would be the loser, and even if it was win, draw, draw, you would still lose. This makes the game slightly more difficult than it would regularly be on the playground or in casual scenarios.

Therefore we can work out immediately that, in order to succeed, we need at least two wins. All variations of win, win, draw or win, win, lose or win, win, win will guarantee the results we want, and nothing else will. So the next thing to do is work out what our odds are if we assume the likelihood of each occurrence is 1) Independent to the results of the game before or after it, and 2) Equally likely for each event, so the odds of each event occurring is ⅓ or 33.3 recurring %. There are 9 different ways the first game can go, as there are 3 options for each player to choose between, and 3 x 3 = 9. Because a draw is a loss, there are 3 scenarios that we win and 6 that we lose, again getting us to a ⅓ chance of success. With three independent rounds, we multiply the three options together to get 9 x 9 x 9 = 729 different ways the 3 games could go. This means there is a 1/27 chance (⅓ x ⅓ x ⅓) humanity survives. That's 0.037. That's not good odds.

But the most important thing that we have, the most important piece of information is that these events are *not* independent. Furthermore, the probability of each person throwing a certain move isn't even ⅓ . And this is where we can tip the scales from 1/27 to a lot higher.

The most common first move is rock. There are multiple reasons for this. For starters, when you say the game's name 'Rock, Paper, Scissors', 'Rock' is the first word they heard and therefore will stick in the players mind, and it's the same shape as the fist you make during the countdown to play, whether you throw your move on 'scissors' or the beat after. It can also be a sort of 'panic' throw if they don't have much time to try and work out a tacic. It's even more common with men and this is almost definitely due to the associations people have with each item in the game. Rock is strong, steadfast, the most aggressive play for sure and men tend to go for the throw that makes them seem more 'manly'.

One the other hand, paper is fragile, a very passive throw. In my head, suddenly moving your hand to be flat and open doesn't seem as 'attacking' or 'competitive' as the fist or the scissors. My hypothesis is that rock will be the most common throw overall, followed by scissors and then paper. I also believe that due to the nature of people, the person who wins the first round will be more likely to win the game overall. A common phrase in online gaming is 'a winning streak', this meaning that once a player has won one round, their confidence is boosted and therefore they're more likely to succeed in the next round. However, this could lead to them playing more aggressive throws that a smart player could see through and used to get back on top.

However I can't find an exact statistic online of how common rock is as a first throw anywhere so I decided the best research was to be carried out at my own hand, excuse the pun. I excluded my close friends from being candidates in the experiment as they have heard me talking about this during my free time and therefore know some of the strategies and would have an advantage. Since the hypothesis involved the differences in men and women, I had pairs that consisted of both men, both women, and one of each. I managed to collect a sample frame of 1 pair each. For each game, I asked them to play 3 rounds and collected their results, then I randomly pulled aside one player (I flipped a coin to decide who I would speak to, heads was the player on my left and tails was the player on my right) and told them my strategies. Then I had them play another best-of-three game and recorded the results, to see if this made a difference. This wasn't a very large sample frame and my results could definitely be further proved with more test subjects, but I have limited access and limited resources in my current position.

This is a table of the first results, what should be a completely random game. Whether the game is a win or a loss depends on the result of the person on the left (EG WomanA's result on the first table.)

WomanA vs WomanB:	ManA vs Man B:	WomanC vs ManC:
Paper v Paper = Draw	Scissors v Scissors = Draw	Scissors v Rock = Win
Rock v Scissors = Win	Paper v Paper = Draw	Paper v Scissors = Loss
Rock v Paper = Loss	Paper v Rock= Win	Rock v Paper= Loss

I then told them, (Woman B, Man B, Woman C) this list of theories to see if they could implement them to their success.)

A) Men are most likely to throw Rock
B) Rock is the most common throw overall

C) If your opponent wins a round, they are likely to throw an aggressive move next.

I added one more, an interesting theory that I had read online but wasn't sure it would be very reliable due to it just seeming pretty random and without much proof, reason or foundation.

D) If you win, throw what your losing opponent just threw as your next move.

I only added this because on game three, (ManC vs WomanC) interesting ManC started to implement this strategy on his own, seemingly unconsciously, and won two out of three. The logic seems to be that the winner tends to throw the move that wasn't thrown last time, so scissors if rock and paper were thrown. Therefore it could be a good hypothesis to always throw the move that would beat the thing that wasn't thrown last time, whether you win or lose. Although this does not work for draws, looking through the previous games, never was there a round where the two throws were exactly the same as their previous throws, whether rock vs scissors stayed at rock vs scissors or changed to scissors vs rock. All the second and third rounds included a new throw.

These were the new results: The person with new information is on the left

WomanB vs WomanA:	ManB vs ManA:	WomanC vs ManC:
Rock vs Rock= Draw	Paper vs Rock=Win	Paper vs Rock= Win
Rock vs Paper = Loss	Scissors vs Paper= Win	Scissors vs Scissors= Draw
Rock vs Scissors= Win	Paper vs Rock= Win	Paper vs Rock = Win

The difference is visually obvious and I was thrilled when writing down the results. Sure, there were some losses and draws, but there are multiple occasions where playing the move that beats the move that wasn't played last round, is a successful and therefore, a useful tactic. I tried to think as to why, and I decided that the move that wasn't played last time is probably the one that sticks out in a normal players head when the 'Rock paper scissors' countdown happens. Trying something different, especially if they lost last time and want a new strategy. Furthermore, we saw that the likelihood of Rock being thrown by a man or in general was evident, but it wasn't as pronounced as I could have expected. This is very useful in our scenario as I'm not exactly certain what gender Glorb is.

So, the statistics. By being optimistic based on our results, let's assume that if you use our tactic we just established then you will win ⅔ of the time, based on the four out of six successes in our results. Of the nine possible first games, there is a 6/9 chance it isn't a draw. A draw means 2 things haven't been played so it's very unpredictable as to what will happen next. But whether our first game is a win or a draw, there is a ⅔ chance we win the next one, and then a ⅔ chance we win the final one. So ⅔ * ⅔ * ⅔ is our chance of winning based on our research. This is 8/27, 0.296 or approximately 0.3, or a 30% chance of the survival of humanity.

Are these the odds we want for humanities continual existence? Preferably not, but 30% is a way greater probability of success than our previous statistic of 3.7%, if we were to think of

the game as completely down to chance. The increased probability may still leave the Earth's fate unknown, but you are equipped with valuable information to help you make a smart decision and (hopefully) save us all. Now go forth and challenge your friends. Glorb is arriving soon and you could use all the practise you can get…

By Rachel Dunleavey, 1860 words.