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# Report on squash scoring methods

## Problem

I am investigating which is the better squash scoring method: The PARS or English Scoring. I expect the PARS scoring will be better overall as I think the player with the better ability will win more often. This is because I think there is no biased who gets to win a point based on whether they are serving or not. I also believe the PARS system will be more time efficient and better for television as a point is won every rally.

## Method

I will be simulating 5000 games using a simulation of each scoring method with players of the ability 70 and 30 respectively to see what the probability is that player A (ability 70) wins a match. The higher the probability, the better the scoring system as the player with the higher ability should win the game.

Then I will be testing how each scoring system affects players of varying ability. I will be using the above scoring simulations in a loop. The abilities of ra and rb tested will be 0, 20, 40, 60, 80 and 100. This will be done in a round-robin fashion where all abilities will be simulated against each other.

Finally, I will be measuring the average time taken for games of each scoring method as this will show which one is better for airing on TV to audiences. Furthermore, shorter games means fitness wouldn’t suffer so my assumption would hold more truth.

A study done by the English Institute of Sport says the average rally is 25.98. I have rounded this to 26 for simplicity. In the game function I added 26 seconds after every rally. I then added up the total time and put it in a list while iterating through the 5000 games in my winProbability function. Then I will add the sum of these times and divide them by the total number of games to find the average time.

## Assumptions

* A point is always won at the end of a rally (no lets) with the PARS method.
* The points awarded are fair and unbiased.
* Fitness is not an issue – the ability of each player doesn’t change throughout the game.
* The time for each rally is 26 seconds.

## Results

From simulating 5000 games, the PARS method showed that there was a 0.98 probability that player A would win a game and the English method showed that there was a 0.99 probability that player A would win a game.

When measuring time, both methods had similar game times when one player had a much higher ability than the other (see table below). The PARS Method had very little increase in time when players with similar abilities played. However, the game time increased by over 200 seconds with the English method (roughly 3min 20seconds per game). \*Due to random aspect of games, time will vary negligibly when running the program each time.

|  |  |  |
| --- | --- | --- |
|  | **Time (seconds)** | |
| **Abilities** | **PARS** | **English Scoring** |
| 70 and 30 | 406.78 | 495.64 |
| 45 and 55 | 480.52 | 696.28 |

The results from playing various abilities are below

English Scoring PARS Scoring

Chart, line chart

Description automatically generatedChart, line chart

Description automatically generated

## Conclusions

From my first test I could see that the English scoring method was better as the probability the better player would win a game was higher. However the winning margin was only by 0.01 so I decided to test both scoring methods against all abilities playing each other. These results were very similar from the graphs and proved there was no biased from varying abilities. Finally, I wanted to test the time taken for games to be completed. This showed that the PARS scoring is better as the length of the game was similar in both the closely matched game and the unfairly matched game. The English scoring took longer for both abilities and considerably longer when abilities 70 and 30 played.

From these results I would conclude that the PARS scoring is better as the difference in the length of games was significant. I felt the results of the first test was not significant enough to show which scoring system was better. However, I believe my assumptions affected results as fitness would be a factor, especially in the longer English scoring games. Furthermore, the length of rallies would probably be shorter for games with big differences in ability as the better player should win points easier.

In the future I would test the scoring methods using separate factors of ability and fitness. I would like to include a function where average fitness decreases after a certain time or number of rallies.