

ROGER FEDERER: PERFORMANCE ON THE THREE SURFACES

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ABSTRACT

This paper studies the career graph of the GOAT (Greatest of All Time) in the sport of Lawn Tennis- Roger Federer who has changed the entire course of the sport winning an all-time highest number of Majors (20) along with Rafael Nadal and has been dominating the game since the past two decades.

The main aim of this paper is to analyze his game statistically and study whether this legendary player who is considered to be the King of Grass, truly dominates the game on that surface. This study will analyze what the numbers indicate and with the help of graphs will examine his performance in official matches in the ATP (Association of Tennis Professionals) Tour and compare his game on the three surfaces.

This will be done by comparing his performance on grass, clay and hard courts. This project will be a secondary research project, taken from data collected by official sources, and authentic sites.

The data collected, is to be represented graphically and then studied and interpreted. This analysis aims to show that Roger Federer plays the best on grass courts as compared to hard and clay courts; using official data.

The data collected covers and studies Roger Federer over the years 2000-2016 (since he had taken a hiatus on clay in 2017 and 2018)

Tennis is a sport which is heavily dependent on statistics- the first serve percentageⁱ, number of winnersⁱⁱ, faultsⁱⁱⁱ, break points^{iv} won and many other factors. And so, such a hypothesis can only be proved with the data collected during the matches. I go into this project with the hypothesis:

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H^o: The data provided proves that Roger Federer truly plays his best on grass.

H¹: The data provided disproves the assumption that Roger Federer plays his best on grass

Keywords: Gameplay, statistics, data analytics, Roger Federer, Data Science, Stats

INTRODUCTION

Believed to be traced back to the 12th Century, the game of Lawn Tennis has come a long way from what it was back in the time, called “jeu de paume” or the Game of Palm- a French handball game. Another game of the racquet derived from this old sport, called real tennis in Britain, royal tennis in Australia and court tennis in USA has a few similarities to Lawn tennis although it’s popularity has declined with time.

Lawn Tennis, simply referred to as “tennis” on the other hand has flourished and is played by a multitude of people all over the world. There have been several disputing opinions on the actual year Modern Tennis was invented but 1873 is the officially recognized year when Major Walter Clopton Wingfield introduced a game called *Sphairistikè* which was played on an hourglass shaped court. This sport became a huge sensation all over the world specifically in USA, Europe and even China and the sport evolved into what we call tennis today.

Tennis, after more than a century has seen many changes and has evolved a great deal viz a viz the attire, height of the net, surfaces it is played on and even the playing style.

The greatest tennis tournaments in the world called The Grand Slams (4)- Wimbledon, French Open or Roland Garros, US Open and the Australian Open were inaugurated soon after modern tennis was discovered with the Wimbledon Championships being the oldest of the four.

Originally meant for amateurs, the tournaments took a professional turn in 1926 when the first professional tour was held. But, it was not till the 1968 or what we commonly refer to as the Open Era that Tennis rose in popularity and the rules distinguishing pro’s from amateurs began to be implemented seriously.

The Open Era was a boon for the sport in general and women in particular, as a number of women began to turn pro and take part in tournaments; an increase in their prize money was also a leading factor in the rise of women's tennis.

ROGER FEDERER:

The advent of the Open Era saw talented players and rivalries which are to this date considered legendary. Bjorn Borg, John McEnroe, Jimmy Connors, Pete Sampras, Andre Agassi are a few of the retired talents who's names have left a great impact on the tennis industry along with Rafael Nadal, Novak Djokovic and Andy Murray, the players who have been dominating tennis at present.

Despite having such a plethora of legendary names and players, there is one in particular which stands out; the player also called the G.O.A.T^v of Tennis, the man who has won the highest number of Grand Slams- the most prestigious tournaments- Roger Federer or the King of Grass.

This man, at the young age of 22 got his great break through by winning the Wimbledon Championships, and since then hasn't ever looked back. He has dominated on grass winning 8 Wimbledon, 6 Australian Opens, 5 US Opens and 1 Roland Garros title, bagging in all 20 Grand Slams, a feat which no player has achieved so far except his longtime rival Rafael Nadal. His unparalleled techniques and single handed backhand are not the only reason he's regarded as a legend on the grass, but also because of the wisdom that he shows during his matches by picking and implementing the most apt techniques.

Even at the age of 38, this legend still refuses to back down, dominating the game of tennis at the No. 4 ATP^v rank.

Over the two decades that he has played, Federer has amassed a total of 103 titles which is a feat not many have achieved.

He in his career spanning more than two decades has broken records which will most likely remain unbroken for a long time to come, for feats like winning 5 consecutive titles in two different grand slams which is not a mean feat. It's for such reasons that Federer is regarded as the World's best tennis player.

TYPES OF SURFACES:

The type of surface that one plays on has a huge impact on the way the match unfolds. Each surface comes with its own distinct features which gives the game a heterogeneity, thereby, breaking the humdrumness of the tour.

This difference is owed to the fact that each surface comprises different materials which alter the speed, bounce of the ball, the spin on the ball and even the agility of the players. Tennis courts on the tour are divided into 4 main surfaces- grass, clay, hard and carpet.

This paper aims to study the difference in the statistics of Roger Federer on grass as compared to the other two surfaces and analyze whether or not this legendary player is in fact strongest on grass.

Originally it was played on grass courts solely but as the sport evolved, the variety of surfaces tennis was played on increased; varying from the original grass to clay, synthetic, cemented and those made from asphalt derivatives.

Of the 4 Grand Slams, Wimbledon is played on grass, Roland Garros is played on clay and the US Open and Australian Open are played on hard courts.

Grass Courts: These courts were originally used to play tennis on and were very common but due to the high cost for maintenance they decreased in popularity. Another reason for their decline was the effect of poor weather on these courts was more adverse as compared to the other surfaces, which further hindered the play.

Grass courts are much quicker as compared to hard courts and clay courts and have a lower bounce capacity. These characteristics reduce the rally length and are suitable for hard hitters and big servers who tend to finish points quickly. Grass courts are beneficial for the players who rely on the serve and volley technique.

Clay Courts: The clay courts comprise a plethora of materials which form the sandy-clayey surface we play on. They are made of brick, crushed shale or stone and require a high level of maintenance to keep them in a good condition.

There are two kinds of clay courts- red clay and green clay. The latter are often seen in tennis centers along with hard courts and require a lower level of maintenance as compared to the former.

The clay courts are known for being the slowest of all surfaces where players rely on a greater spin. These courts tend to have a higher bounce leading to longer rallies. This surface benefits baseliners and players who have a tactical bent of mind; those who can withstand the stress of long rallies and are all court players will be stronger on clay than the players who rely on their serves will inevitably find it cumbersome to win points due to the slow speed.

Hard Courts: These are the most common courts and are present in most tennis academies, schools and sports complexes. They act as a middle ground between clay and grass courts, being faster than the former but slower than the grass. It is preferred by players who enjoy a faster game. The trajectory of the ball remains unhindered because of its smooth surface but the bounce is somewhere between that of the clay and grass courts.

These courts are made up of a variety of materials; particularly a hard base such as asphalt or concrete, but the characteristics of each court vary, depending upon the materials used.

These courts are tough on the body owing to their solid surface which lead to knee or joint injuries which is why materials like rubber which absorb the shock and decrease their rigidity is advised. Furthermore, the speed of the courts depends upon the amount of sand that is used in making these courts. More the sand, lesser the speed of the court.

Synthetic Courts: There is a wide range of these courts depending upon the materials used such as artificial turf and hard rubber. Thereby, the conditions of the court vary a lot.

Some synthetic courts are removable and are used in temporary events, although no professional tournament uses them.

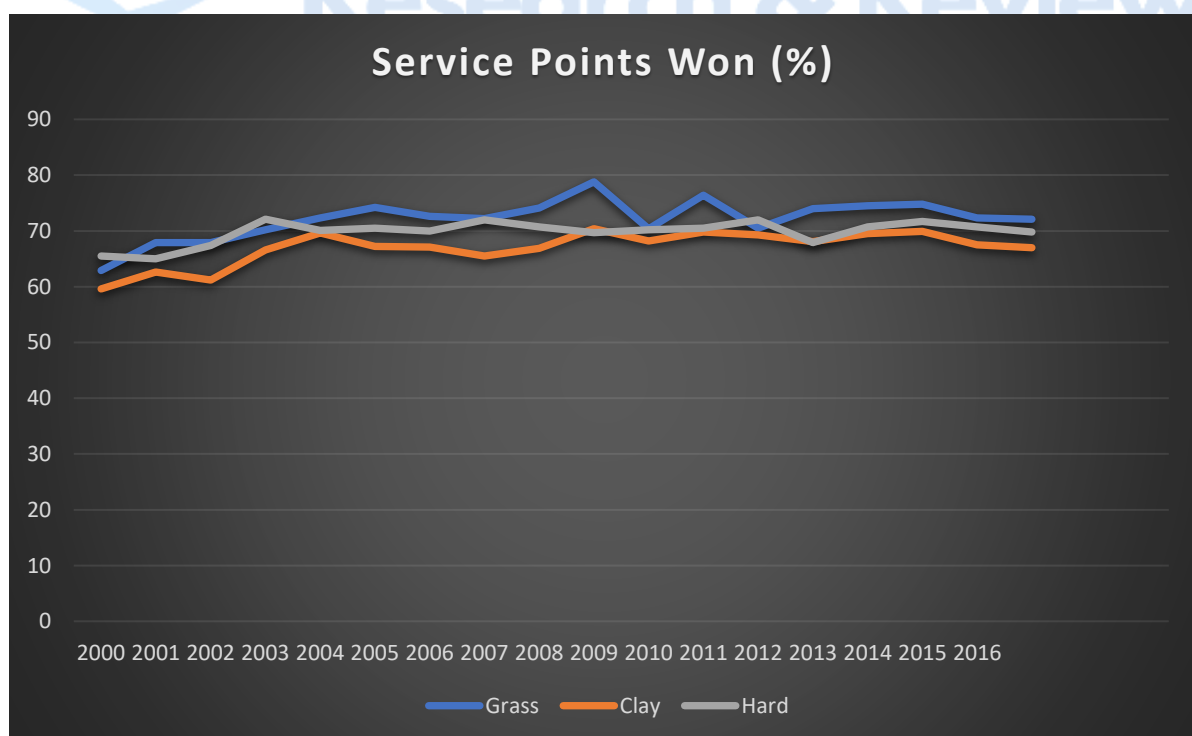
These courts have a lower bounce and their speed is quite fast. Synthetic courts are used in areas where it rains frequently, as the surface absorbs the water making it playable even while it is raining.

These are the 4 main types of surfaces used to play tennis on. Of these, Wimbledon is played on grass, Roland Garros on clay and the US Open and Australian Open are played on hard courts.

RESEARCH METHODOLOGY:

Using the data from [atptour.com](#) and [ultimatetennisstatistics.com](#), the sites which provide complete statistics on player performances over the years, a few graphs were constructed to study the trends of Federer's game on different surfaces- grass, hard courts and clay courts. This is done to study the extent to which Federer is successful on grass as compared to the other two surfaces on the professional tour.

FIGURE 1:

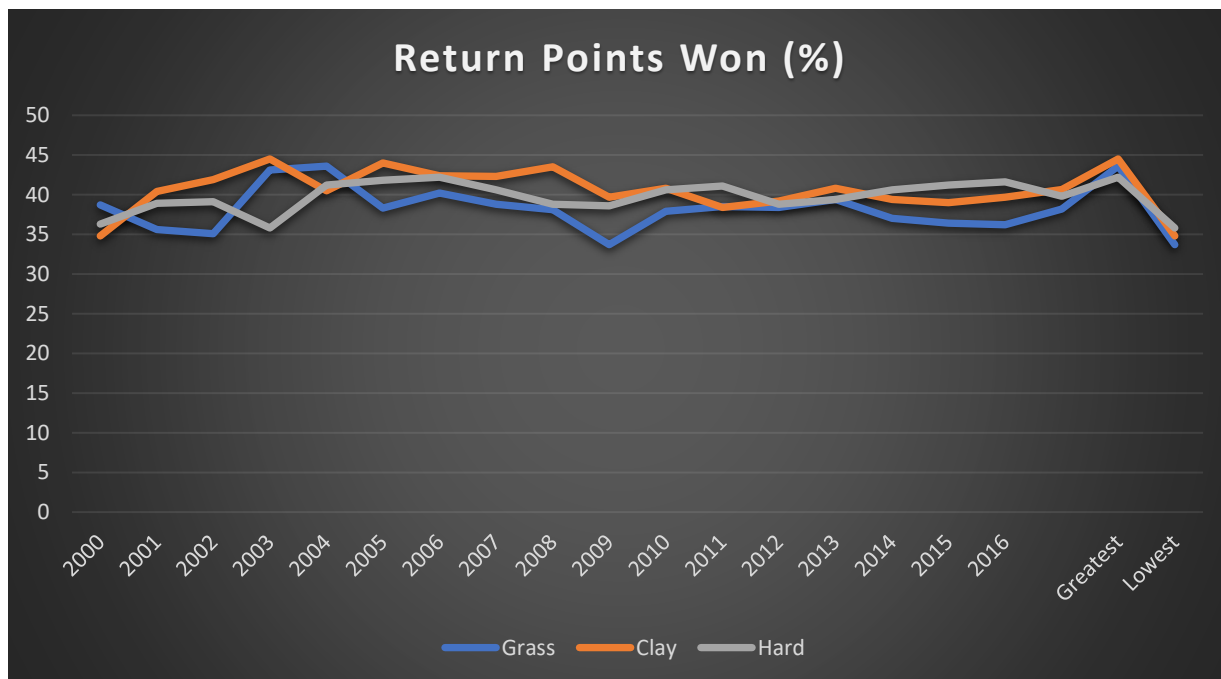


Average Service Points Won(%) on Grass Courts- 72.12%

Average Service Points Won(%) on Clay Courts- 67%

Average Service Points Won(%) on Hard Courts- 69.81%

FIGURE 2:

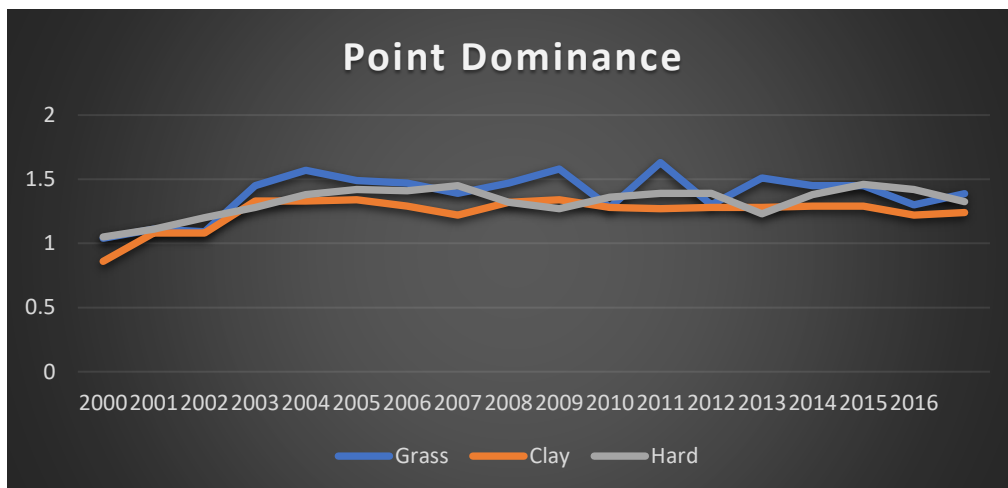


Average Return Points Won(%) on Grass Courts- 38.18%

Average Return Points Won(%) on Clay Courts- 40.66%

Average Return Points Won(%) on Hard Courts- 39.8%

FIGURE 3:

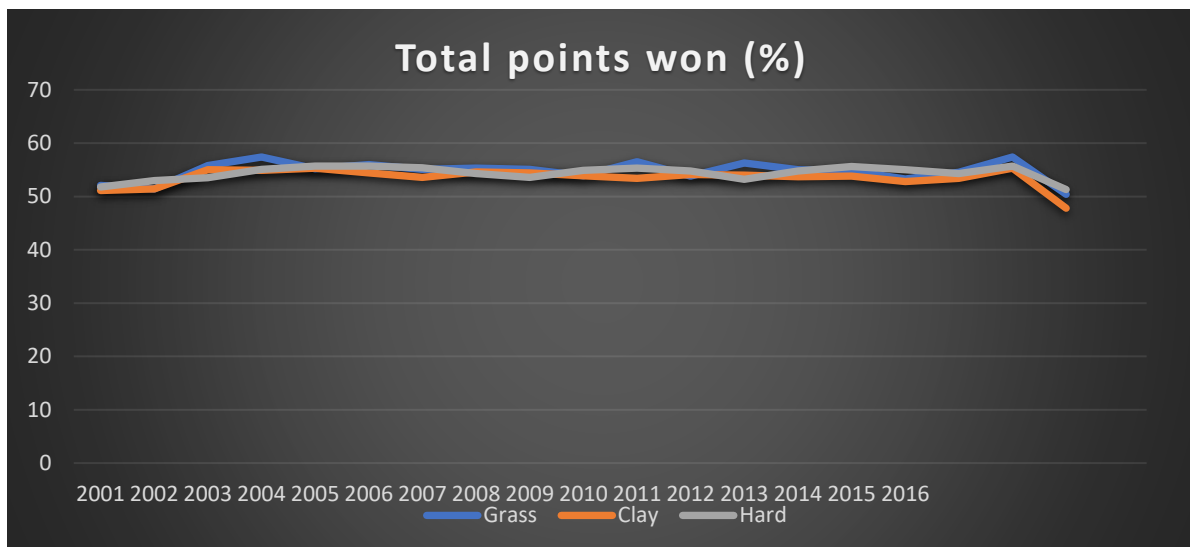


Average Point Dominance on Grass- 1.39

Average Point Dominance on Clay- 1.24

Average Point Dominance on Hard- 1.32

FIGURE 4:

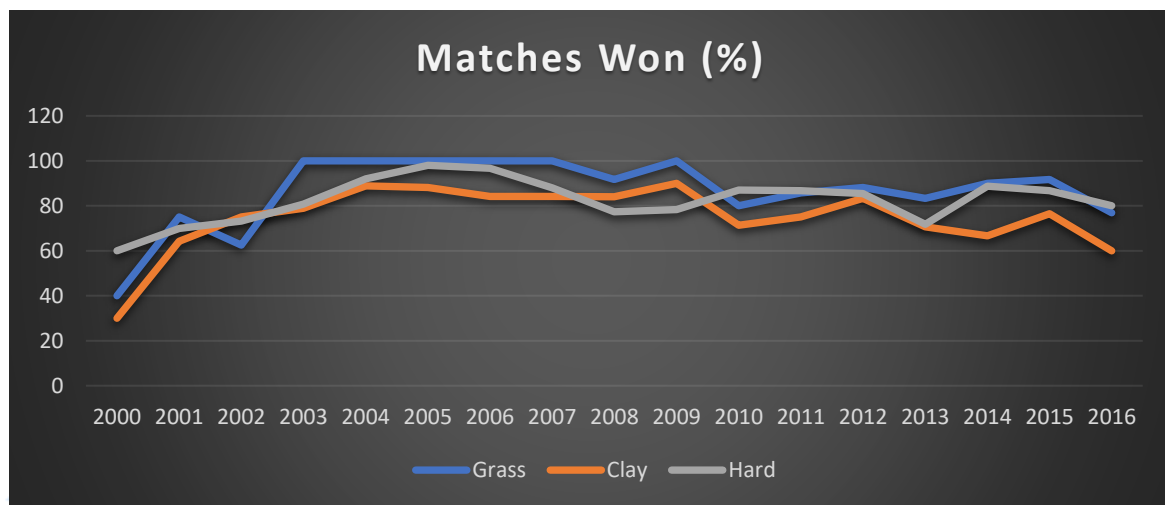


Average of Total Points won on Grass(%)- 54.55%

Average of Total Points won on Clay(%)- 53.42%

Average of Total Points won on Hard(%)- 54.29%

FIGURE 5:



Average matches won on Grass(%)- 86.18%

Average matches won on Clay(%)- 74.78%

Average matches won on Hard(%)- 82.39%

ANALYSIS

Figure 1: Service Points Won(%)- When studying the percentage of service points won it's clear that Federer had an upper hand in the grass courts. The other two surfaces have a fairly good percentage of points won but upon calculating Federer's average over the 16 years it was noticed that grass courts brought out the best in hi- having an average of **72.12%** with Hard courts at **69%** and Clay courts with the least average of **67%**.

In 2009 there was a sudden peak in the percentage of points won- **78.8%** on grass, it being Federer's highest percentage on any surface during those 16 years.

Figure 2: Return Points Won(%)- In Fig. 2, Clay was the surface which had the highest percentage of average return points won from 2000-2016 with **40.66%**, followed by hard surface with **39.8%**. Grass on the other hand had the lowest average percentage- **38.18%**.

Clay had the overall highest percentage between all the surfaces in the year 2003- **44.5%** and Grass, while having its maximum percentage greater than that of Hard, had the overall least percentage of return points won in the year 2009 with **33.7%**.

Figure 3: Point Dominance-Figure 3 studies the point difference which is a ratio of the percentage of points won by the player to the percentage of points lost on his/her own serve. It studies the player's game on the opponent's serve.

In this figure Federer has the greatest average point dominance on grass- **1.39**, followed by hard- **1.32**. Clay is the surface with the lowest point dominance of **1.24**.

Figure 4: Total Points Won (%)- The figure depicts the trends in the percentage of total points won in the years 2000-2016, on the three surfaces- grass, hard and clay.

The average percentage of total points won was the highest on grass with **54.55%**, followed by hard with **54.29%**. Clay had the least average percentage of total points won at **53.42%**.

Of all the yearly averages of the total points won(%) on all surfaces, Grass had the highest of **57.4%** in 2004 and Clay had the lowest percentage of **47.8%** in 2000.

Figure 5: Matches won(%)-Fig. 5 shows the average percentage of matches won annually on the three surfaces- grass, hard and clay. This is one of the most important graphical representations because the success and failure in a match is based on the wins that a player gets.

There is a great difference between the average percentage of matches won on Grass, Clay and Hard surfaces(2000-2016) with the greatest percentage being on Grass- **86.18%**, followed by Hard- **82.39%** which is nearly 4 points less than grass; a huge difference. Once again Clay has the lowest percentage of matches won- **74.78%**.

The difference between the percentages of matches won on clay and grass is enormous, about 12 points, which in tennis is not a small number.

Fig. 5 has shown that Federer got 100% wins in 6 years of the years, from 2003-2007 and 2009- the highest possible value.

CONCLUSION:

After analyzing the graphs which were constructed from the data collected from 2000-2016, it was clear that grass had the highest overall average in the percentage of service points won, point difference, percentage of total points won and the percentage of matches won. Clay on the other hand had the least average in these graphs while hard courts had percentages greater than clay but less than grass.

The underperformance on clay could be because of the extreme threat that Rafael Nadal posed to Federer and the other players on the tour, having bagged the majority of tour titles on the surface.

Federer's game is such that the shorter the points, greater the chances of him winning the match; and Clay being the slowest surface might not be the ideal surface for Federer.

This being said, in Graph 2- Percentage of Return points won, the results were quite the opposite- Clay had the highest percentage followed by hard courts and grass having the least average percentage. This could be because returning a serve is a highly difficult play which is favorable to the server, whose serve decides the outcome of the point. The longer the rally, the greater the chance for both the players to try and assert their dominance. So, Clay being the slowest surface has its own advantages which caused these unexpected results.

Overall, the most important data set was percentage of matches won (Graph 5)- and since grass had the greatest percentage, with a large difference from both the hard and clay surfaces, it can

be said that **Grass is the ideal surface for Roger Federer, and it indeed is his strongest surface.**

Hence, the Null Hypothesis (H^0) has been proven and

ENDNOTES

ⁱ The percentage of first serves which went in.

ⁱⁱ Unreturned shot

ⁱⁱⁱ Unsuccessful serve that doesn't start the point, when the ball does not land in the service box

^{iv} Point if won by the receiver, causes a break in the service

^v Greatest of all time

^{vi} Association of Tennis Professionals



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