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## **A COMPARISON OF SERVICE EFFICIENCY BETWEEN PLAYERS OF MALE AND FEMALE DOUBLES AT PROFESSIONAL TENNIS TOURNAMENTS**

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### ABSTRACT

Male and female players have a different quality of service. For example, men can reach a higher service speed, or use more ball spin. Tennis service has also a different efficiency on different surfaces. Every surface has specific characteristics and has different effects on ball impact and ball bounce. The aim of our study was to compare the amount of service points won between male and female players in men's and women's doubles at ATP (Association of Tennis Professionals) and WTA (Women Tennis Association) tournaments on three different surfaces. We observed a total of 303 matches. Matches were played on clay, hard and grass courts. With the help of match records, we found that men won around 10% service points more than women. Results indicate that women's doubles matches show greater differences in performance between opponents. Men also need to win more service points than women, to win a match. Fast surfaces provide a greater advantage for serving teams, both for men and women. The lowest serve efficiency was reached on clay (slow surface) both in the men's and women's doubles.

**Keywords:** tennis; serve; surface; men; women; ATP; WTA

**DOI:** 10.14712/23366052.2015.32

### INTRODUCTION

The service is the most frequent stroke in tennis singles, representing 45% (French Open) to 60% (Wimbledon) of the total number of strokes in a match (Johnson et al., 2006; O'Donoghue & Ingram, 2001). In doubles matches the service is one of the most decisive factors; so the serving players should aim to win their service games. However, the receiving team is also trying to be as successful as possible. Return of service is therefore also one of the most important game activities of an individual. Even on the slowest surface (clay courts), serving and returning remain strokes that largely influence the result of a match (Gillet et al., 2009).

The main difference between singles and doubles is that ball placement is more important in doubles. Two players on each end of the court mean less space, in which to hit the ball (Cayer, 2004). Carboch (2007) argues that, over the last 20 years, the doubles game has changed. Ball speed in rallies is higher, which makes net play activities (i.e. approach volleys and volleys) more difficult (Black & Van de Braam, 2012). Therefore, less net play activity occurs in doubles compared to previous years, and we see more strokes from the baseline. This is especially true in women's doubles (Black & Van de Braam, 2012; Carboch, 2007). According to Cayer (2004) doubles partners must know each other. The basic tactic is to maximize the partner's strength and to minimize his or her potential weaknesses. Scoring in doubles is similar to that in singles. However, on the international level, the doubles is played with "No-Ad" scoring (i.e. if the score comes to "deuce" in the game, the following point determines the game winner). Also, the final set is played as a "Match Tie-break" till 10 points (ITF, 2012).

The quality of the team and its success is determined not only by the sum of the qualities of both partners, but also by their mutual communication, supplementation and complementation during the match (Kočíb & Matějka, 2008). When a player hits the ball, he must consider what the position of his opponents and his partner is. Tactics in doubles is more complicated than in singles. In doubles the player reacts to the actions of three other players. The fundamental difference from singles is that, in doubles, in addition to individual game activities, there are also various forms of cooperation between partners (Kočíb & Matějka, 2008).

Women's service doesn't reach such velocities as the men's service. The reasons for the lower motor performance of women are determined by the size, composition and structure of a woman's body. The relatively narrower shoulders, wider hips, shorter limbs and lower centre of gravity means less favorable biomechanical prerequisites for many physical activities. Women also have less muscle mass, on which depends the maximum force that can be developed (Crespo & Miley, 2002).

Carboch (2007) says that service and return constitute 56% of all strokes in men's doubles; and 42% in women's doubles. Ball flight duration from the server to receiver is between 0,5–1,2 s depending on the quality of service, its initial velocity and the court surface (Dunlop, 2000; Kleinöder, 1997). Kleinöder (2001) reported the average time of ball flight after the service on a clay court, which was 913 ms during the first service and 1158 ms during the second service. However on a hard court (faster surface), the average time of the first service was 720 ms and 868 ms of the second service. A faster surface provides much less time to respond, and serving on faster surfaces becomes an even greater advantage. Filipic et al. (2011) argue that match records, such as umpires' scorecards, may provide valuable information for scientist, coaches and players.

The aim of our study was to compare the amount of service points won between male and female professional players in men's and women's doubles at ATP and WTA tournaments on three different surfaces.

## METHODS

We compared service points in men's and women's doubles matches on the three basic surfaces, on which professional tennis tournaments are played, i.e. clay, hard court

and grass surfaces. We analyzed altogether 303 doubles matches from professional tournaments. There were 153 matches from the ATP circuit tournaments (51 matches played on clay, 51 on hard court and 51 on grass). Another 150 matches were played on WTA circuit tournaments (51 on clay, 51 on hard court and 48 on grass). We randomly chose four tournaments on each surface. We observed all normally finished matches, and excluded unfinished matches. We used median (Mdn) to determine the mean value of players' doubles ranking in observed matches, and to determine degree of variance we used quartile deviation (Q). In all 153 ATP matches, the median player ranking was Mdn = 42 (Q = 28). In 48 matches played on a grass surface, the players median ranking Mdn = 51.5 (Q = 33); in 51 matches on a hard surface Mdn = 38 (Q = 20); and in 51 matches on a clay surface Mdn = 50 (Q = 31). On grass courts a total of 5,914 points were played. On hard courts 6,290 points were played and on a clay surface 6,075 points were played.

In 150 WTA matches the median of players' ranking was Mdn = 68 (Q = 38). In 48 matches played on a grass surface the players' ranking was Mdn = 68.5 (Q = 39); in 51 matches on a hard surface Mdn = 58 (Q = 28.5); in 51 matches played on a clay surface Mdn = 79.5 (Q = 48.5). On grass courts a total of 5,448 points were played. On hard courts 5,891 points and on a clay surface 5,672 points.

Data was obtained through official statistical records of each match available online (ProtENNISlive, 2014), where the chair umpire always marked points on an electronic match record through a PDA device. Data evaluation was carried out using descriptive statistics and using analysis of variance (ANOVA) and post-hoc analysis (Tukey's HSD) and independent samples t-tests. The significance level was  $\alpha = 0.05$ .

## RESULTS

Altogether, men played 18,538 points (average per match 121.2), which is more points per match compared to women. Women played 17,011 points (average per match 114.2). Detailed average scores on different surfaces are shown in table 1.

**Table 1.** Average number of total points per match

	<b>Grass court</b>	<b>Hard court</b>	<b>Clay court</b>
Men	121.0	123.3	119.1
Women	113.5	115.5	111.2

Both in men's and women's doubles, the number of points won during own service reached the highest success on a grass surface (table 2). The lowest number of points gained during own service was reached on a clay surface. An independent-samples t-test was conducted to compare men's service efficiency and women's service efficiency. There was a significant difference in the scores for men's service efficiency M = 66.2% (SD = 8.82) and women's service efficiency M = 57.2% (SD = 9.35);  $t(604) = 12.2$ ;  $p < 0.001$ . These results suggest that men's service is more efficient during the match, which means that, it is more difficult to win a game as a receiving team in men's doubles.

**Table 2.** Average percentage of service points won on different surfaces

	<b>Grass court</b>	<b>Hard court</b>	<b>Clay court</b>
Men	68.9%	66.1%	63.5%
Women	58.8%	57.0%	55.8%

Differences among surfaces and gender were analyzed by analysis of variance. There was a statistically significant difference between groups as determined by one-way analysis of variance  $F(5.600) = 35.7, p < 0.001$ . A Tukey HSD post-hoc test revealed that on grass surface, men's service efficiency was significantly higher ( $M = 68.9\%$ ,  $SD = 8.17$ ) than women's service efficiency ( $M = 58.8\%$ ,  $SD = 9.37$ );  $p < 0.001$ . Similar findings occurred on hard courts. Men's service efficiency was significantly higher ( $M = 66.1\%$ ,  $SD = 8.24$ ) than women's service efficiency ( $M = 57.0\%$ ,  $SD = 9.00$ );  $p < 0.001$ . On a clay surface, men's service efficiency was also significantly higher ( $M = 63.5\%$ ,  $SD = 9.23$ ) compared to women ( $M = 55.8\%$ ,  $SD = 9.53$ );  $p < 0.001$ .

Analysis of match winners and losers showed that most service points won was achieved on grass courts (see table 3). An independent-samples t-test compared men's service efficiency and women's service efficiency of winners only. There was a significant difference in the scores for men's service efficiency  $M = 71.3\%$  ( $SD = 5.98$ ) and women's service efficiency  $M = 63.1\%$  ( $SD = 7.38$ );  $t(286.274) = 10.63$ ;  $p < 0.001$ . Analysis of variance of winning teams' service points won of the revealed a significant main effect between groups  $F(5.297) 28.63, p < 0.001$ . Post-hoc tests showed a significant effect between genders on grass (men  $M = 73.7\%$ ,  $SD = 5.47$ ; women  $M = 65.3\%$ ,  $SD = 6.49$ )  $p < 0.001$ ; on hard courts (men  $M = 71.3\%$ ,  $SD = 5.47$ ; women  $M = 62.1\%$ ,  $SD = 7.46$ )  $p < 0.001$ ; and on clay (men  $M = 68.8\%$ ,  $SD = 6.04$ ; women  $M = 58.6\%$ ,  $SD = 7.74$ )  $p < 0.001$ . This shows that men have to win more service points to win the match.

**Table 3.** Winners' and losers' percentage of service points won

	<b>Winners</b>	<b>Losers</b>	<b>Winners</b>	<b>Losers</b>	<b>Winners</b>	<b>Losers</b>
	Grass court		Hard court		Clay court	
Service points won – men	<b>73.7%</b>	<b>64.2%</b>	<b>71.4%</b>	<b>60.8%</b>	<b>68.8%</b>	<b>58.2%</b>
Min. – men	61%	43%	60%	39%	54%	31%
Max. – men	83%	78%	87%	78%	82%	72%
Service points won – women	<b>65.3%</b>	<b>52.3%</b>	<b>62.1%</b>	<b>51.8%</b>	<b>61.9%</b>	<b>49.8%</b>
Min. – women	54%	31%	46%	32%	44%	30%
Max. – women	80%	66%	80%	70%	82%	63%

We also analyzed losing teams. Overall, losers won less service points than winners. Independent-samples t-test compared service efficiency of both men and women losers. There was a significant difference in the scores for men's service efficiency  $M = 61.1\%$  ( $SD = 8.24$ ) and women's service efficiency  $M = 51.3\%$  ( $SD = 7.11$ );  $t(296.288) = 11.11$ ;  $p < 0.001$ . Analysis of variance of service points won of the losing teams revealed a significant main effect between groups  $F(5.297) 29.87, p < 0.001$ . Post-hoc tests showed a significant effect between genders

on grass (men M = 64.2%, SD = 7.69; women M = 52.3%, SD = 6.97)  $p < 0.001$ ; on hard surface (men M = 60.8%, SD = 7.10; women M = 51.8%, SD = 7.29)  $p < 0.001$ ; and on clay (men M = 58.2%, SD = 8.80; women M = 49.8%, SD = 6.96)  $p < 0.001$ . That means that men won significantly more service points than women on all the surfaces.

Table 4 shows that the most service points to win a match is required on grass courts and the least points on clay. Men recorded a smaller difference between winners and losers of average service points won than women. This indicates that men's doubles show greater differences in performance between opponents than women's doubles, on all the surfaces. It also means that women's matches are shorter according to points played during the match. The lowest value recorded is of losers in women's doubles (28.1 – which equals a team winning a maximum of 7 games per match on their own service). However, the actual number of service games won is even smaller in most of the matches, because some of the service points won were reached in games won by the opponents.

**Table 4.** Average number of service points won per match on different surfaces

	Winners	Losers	Winners	Losers	Winners	Losers
	Grass court		Hard court		Clay court	
Service points won per match – men	44.1	40.0	42.5	39.6	40.4	35.0
Service points won per match – women	36.3	30.2	35.3	30.5	34.2	28.1

## DISCUSSION

We observed altogether 303 doubles matches on three different surfaces of ATP and WTA tournaments. The results showed significant differences between men's and women's service efficiency. In general, men win 8–10% service points more than women. The reasons for this are that men can serve faster and have better accuracy of service placement. Men are also able to use their supremacy after their service (net approach, poaching, etc.). Even though men have a better return reaction compared to women, it doesn't compensate the receivers for the advantage of the service. The results shows that grass and hard surface increase the service advantage of both men and women. The clay court differences of service points won are from 1.2% (women, clay vs. hard) to 5.4% (men, clay vs. grass). Katić et al. (2011) compare efficiency at Grand Slams (i.e. French Open (clay) and Wimbledon (grass)) in singles matches. Similar to our findings, they show that the percentage of service points won is around 65%.

The greatest differences of service points won between winners and losers are in women's matches on grass courts (13.0%) and clay courts (12.1%). In men's matches it is around 10%. The differences of service points won between the winners and losers confirm that the service gives a greater advantage to men than to women. An interesting fact is that even 78% (in men's matches) of service points won was not enough to win the match (70% in case of women's matches). However, in some of the women's doubles it was enough to win only less than 50% of service points and still win the match. This has occurred only in women's doubles.

Katić et al. (2011) showed the differences in service efficiency between the winners and the losers at Wimbledon and the French Open. They indicate that, in singles matches

at Wimbledon, the winners won 72% service points and the losers 59%. In the French Open it was 70% of service points won for the winners and 58% for the losers. These are similar results, but on the grass courts we obtained slightly higher numbers, especially the grass court losers, who won 64.2% of service points. We assume that the service gives greater advantage to serving teams in doubles on fast surfaces, and on clay surface the singles service efficiency is similar to doubles.

In another study Filipčič et al. (2008) found that in singles matches played on clay courts, men winners won 70% of service points and losers 57%. However, in women's singles matches the winners reached 68% of service points won, and the losers only 53%. The findings of the men's service points won are almost the same as we showed. However, in women's matches, service points' efficiency on clay courts is much higher in singles than in doubles. This means that the service provides a greater advantage on clay courts in women's singles than in women's doubles.

Cross & Pollard (2009) report that most aces and most games per set is achieved in Wimbledon (grass surface). In our case, we can only compare average points per match, as in doubles the final set is played as a Match Tie-break, which is different from singles matches. There were also differences between men's and women's doubles. On average, 7 points more per match are played in men's doubles matches, and also men need to win more service points. This means that women's doubles matches show greater differences in performance between opponents. In men's doubles, it is faster serving that is the advantage, but also their better return – these factors influence the statistical numbers in both directions. The serve on different surfaces has influence on the outcome of the match. We suggest that players should practice serving and returning during preparation even more when they expect to play on hard and grass surfaces.

## CONCLUSION

The aim of our study was to compare the amount of service points won between male and female players in men's and women's tennis doubles at ATP and WTA tournaments on three different surfaces. The efficiency of men's service is about 10% higher compared to women. Men's doubles show smaller differences in performance between opponents. Compared to women's doubles as men's matches are in the average 7 points longer. Men also need to win more service points than women. The difference of service points won between the losers and winners was greater in women's matches. Fast surfaces provide a greater advantage for serving teams, both for men and women. Therefore it is important to practice serve and return strokes prior to playing matches on these surfaces. The lowest serve efficiency was reached on a clay (slow surface) both in the men's and women's doubles.

## ACKNOWLEDGMENTS

This project was supported by PRVOUK P38.

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