

# Analysis of the game characteristics of a final juniors (male) match U14 at World Junior Tennis Finals in 2017 (case study)

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## Abstract

*Analysis of the course of a match serves as a feedback tool in many sports. In tennis, the most common method is analysis of the game characteristics, which is being used before the match as well as during the post-match analysis. Currently a specialized computer software is being used which replaces previously used manual analysis methods. The advantage of using the software is less time-consuming, immediate data processing and gaining results. One of the most common software is IBM Slam Tracker, which is being used in all Grand Slam tournaments. In our research we chose 13 of the most significant game characteristics used by this software. The aim of the research was the analysis of the game characteristics of the best world junior players ( $n = 4$ ), participants of the final matches between Switzerland (CH) and Spain (ES) on WJTF 2017 in Prostějov. The chosen game characteristics were analysed from recorded video of the final matches using the Dartfish 9.0 software and the differences between winners and defeated players were determined. Also the comparison of the game characteristics between junior finalists of WJTF 2017 and the men finalist of Roland Garros 2017 was made. It was found that both final matches of WJTF 2017 were equable with minimal differences in the amount of total points won by winner and defeated player. Winners of both matches gained one break point more than the defeated players. In the first match, the winning player had the lower amount of unforced errors and winners but he kept a high percentage of first serve. The winning player of the second match scored more winners although he made more enforced errors. Comparing the game characteristics of junior and adult players it was found that the winning players of RG 2017 (unlike the winner of the final of WJTF) scored more winners and made less enforced errors than his opponent. The significant difference between the winning and defeated player was detected in points won after serve and return points won (in favor of winning player). In junior final matches, the break points were decisive but the amounts of points won after serve and return points were almost identical for both winning and defeated players.*

**Key words:** *analysis, game characteristics, juniors, software Dartfish, tennis*

## INTRODUCTION

Analysis of the game characteristics is a significant element of feedback for both coaches, trainers and players in a range of collective and individual ball games. In tennis, the usage of analysis of the game characteristics became a part of training process, not only as a tool for pre-match preparation and the choice of appropriate strategy and tactics, but also part of an analysis after the match. Many coaches use the analysis of game characteristics to reveal the strengths and weaknesses of the players and to subsequently use this knowledge in training (Schönborn, 2012). Sanz and Terroba (2012) mention that the most important element in the game characteristics analysis process are not all available information but their correct interpretation and transfer to training practice. According to Crespo and Miley (2003) the analysis of the game characteristics allows to define the training goals, set the strategy and the tactics, form the physical readiness and analyze opponent's game. Filipčič, Čakš and Filipčič (2011) state that statistical analysis of the game characteristics allows us to better understand the win or loss causes in the match. The

manual methods were used for analysis of the game characteristics (Bykanova-Yudanov, 2011; Schönborn, 2012) which were gradually replaced by special computer programs such as SIMI Scout, Dartfish, Silicon Coach, Tennis Analytics, TennisStats, due to rapid development of information technology (Hui, Lijuan & Jinju, 2010). Analysis from the most prestigious tournaments are available online, both during and after the match. The previously mentioned IBM Slam Tracker is being used on all four Grand Slam tournaments. At these tournaments, the analysis results are available to individual players and trainers after the match. Game statistics from currently running tournaments (but also from tournaments that have already ended) can also be found on specialized web sites, including [www.matchstat.com](http://www.matchstat.com), [www.atpworldtour.com](http://www.atpworldtour.com) or [www.onscourt.info](http://www.onscourt.info). The evaluation is carried out on the principle of marking selected game activities during the game, or from the video.

A number of tennis experts deal with the problematics of game characteristics analysis in tennis, e.g. Brody (2004) who analyzed tennis serve in his study and found out that the high percentage of points won after serve is decisive for the win of serving games, not the high percentage of serve in. Choi, O'Donoghue and Hughes (2009) came into a conclusion that the winning players are usually better only in some game characteristics, and the final statistics may not match the course of the match. A large amount of data from 72 men's Grand Slam tournaments in 1991–2009 was analyzed by Cross and Pollard (2009), who found out that a third of all rallies is finished by the winners and another third ended with unforced errors. In another study, the same authors (Cross & Pollard, 2011) presented a fact that in men's tennis the amount of aces is continually increasing over the years whilst a number of double faults is decreasing. Authors O'Donoghue and Ingram, as well as O'Donoghue and Ballantyne (in Filipčič et al., 2011) found a significant difference in the character of men and women serve. Men's serve is faster and more risky therefore they achieve lower percentage of serve in but also higher percentage of points won after serve. The differences in men and women tennis were also a subject of Research for Cross (2014) who analyzed data from all four Grand Slam tournaments in the year of 2009 and came to the conclusion that men make less unforced errors and score more winners than women. Reid, Morgan and Whiteside (2016) processed the results of the Australian Open data analysis in 2012–14 and noted that men serves and hit the ball during the rallye faster, but women have a faster return.

Based on the synthesis of the findings, the aim of the research was defined consisting of analyzing the game characteristics of the best juniors – participants of the World Junior Tennis Finals (WJTF) 2017 in Prostějov (Czech Republic) and comparing with the game characteristics of adult players. With regard to the research objective, we have formulated two research questions:

1. What is the difference in the level of game characteristics of winning and defeated players in the WJTF 2017 final matches?
2. Are there any significant differences in the level of game characteristics of the best world juniors (WJTF 2017) and adult players – Roland Garros 2017 finalists?

The text conceptually follows up on previously published works by Mrlik (2012), Bačo (2012), Perutka (2012), Polach et al. (2015) and Janak et al. (2017) dealing with the analysis of junior game characteristics in 2009–2017.

## METHODS

The basis for the game characteristics analysis of the final matches (August 12, 2017) of the junior teams of Switzerland and Spain ( $n = 4$ ) at the WJTF 2017 (male) were video recordings of both matches. The research data were obtained from the recordings of each match by the observation method using the Dartfish 9.0 software. Individual game characteristics were selected based on the analysis of foreign studies, publications and statistical software, especially considering game characteristics which are used in IBM Slam Tracker software.

Statistical testing of the significance of the differences between the game characteristics of the winning and defeated players (e.g. using tests of differences of mean values - t-test, ANOVA, Mann-Whitney U Test) will be possible only for larger groups of tested subjects during following years.

Based on the consultations with tennis trainers and experts the 13 most important game characteristics were selected:

- 1) number of aces
- 2) number of double faults
- 3) success rate of first serve in (%)
- 4) number of points won after first serve
- 5) number of points won after second serve
- 6) number of return points won
- 7) number of forehand winners
- 8) number of backhand winners
- 9) number of forehand unforced errors
- 10) number of backhand unforced errors
- 11) number of net points won
- 12) success rate of breakpoints won (%)
- 13) number of total points won

The research data obtained from two final single matches were compiled into tables which enabled to compare the individual game characteristics of both the winner and the defeated player. The analyzed game characteristics of the juniors (WJTF 2017) were then compared with the WJTF 2014 junior finals and the game characteristics of the men single's finalists of the Roland Garros 2017 tournament. The purpose of this comparison was to compare the game character of the best world junior and adult players on clay.

## RESULTS

### Analysis of the 1st match

Participants of the first final match were second players of their teams DRY (ES) and YA (CH). The player of Spain has won (4:6, 6:3, 6:4). The results of game characteristics analysis are listed in Table 1.

**Table 1:** Analysis of game characteristics (first match)

Set/match	First set (4:6)		Second set (6:3)		Third set (6:4)		Match (4:6, 6:3, 6:4)	
	<b>DRY (ES)</b>	<b>YA (CH)</b>	<b>DRY (ES)</b>	<b>YA (CH)</b>	<b>DRY (ES)</b>	<b>YA (CH)</b>	<b>DRY (ES)</b>	<b>YA (CH)</b>
1. Aces	0	0	0	0	0	0	0	0
2. Double faults	2	1	0	2	2	2	4	5
3. First serve in (%)	17/25 68 %	23/29 79 %	20/28 71 %	21/24 88 %	20/28 71 %	26/32 81 %	57/81 70 %	70/85 82 %
4. Points won after first srv.	6	11	13	9	12	11	31	31
5. Points won after second srv.	5	5	5	3	4	5	14	13
6. Return points won	13	14	14	10	18	13	45	37
7. Winners - forehand	2	11	5	1	4	3	11	15
8. Winners - backhand	0	1	1	3	0	3	1	7
9. UE - forehand	5	12	2	4	3	12	10	28
10. UE - backhand	3	5	3	3	5	1	11	9
11. Net points won	0	1	3	2	3	2	6	5
12. Breakpoints won (%)	2/4 50 %	3/4 75 %	2/2 100 %	1/1 100 %	3/11 27 %	2/2 100 %	7/17 41 %	6/7 86 %
13. Total points won	25	32	31	23	33	30	89	85

Notes: bold text ... winning player; UE ... unforced errors

Table 1 lists game statistics for both sets and for the whole match. The ratio of sets and partial characteristics shows a tight match with almost the same number of games played in each set (10, 9, 10). The equality of the match is also proved by the difference in the number of total points won (13), the winning player scored only 4 points more than defeated player. Aspects that most likely determined the final result of the match were the number of forehand unforced errors (DRY 10 errors vs. YA 28 errors), return points won (DRY 45 points vs. YA 37 points) and break points won (DRY 7 vs. YA 6). It is worth mentioning the highly above-average first serve in (82%) of the Swiss player YA, which suggests that he relied on the “safe serve”.

This characteristics further escalated in the second set, when YA achieved rarely seen 88% of the success serve. Both players scored almost the same number of points won after serve (DRY 45 vs. YA 44). A bigger difference was found in the number of return points won, the winning player was more successful (DRY 45 vs. YA 37). On the other hand, the defeated player YA scored more winners (a total of 22 vs. 12), but he made significantly more unforced errors (37 vs. 21). Based on the observation of the match and the analysis of the game characteristics, it can be said that the most dominant hit of the whole match was the forehand of the Swiss player YA. Especially in the first set, when a third of the total points won were gained by forehand winners (11/32). At the same time, in this set he made 12 unforced errors from forehand and total 28 in the whole match. In total, he played 22 winners and 37 unforced errors. A more consistent game was played by a winning player DRY who made 22 unforced errors (10 forehand and 11 backhand) during the match and played 12 winners (11 forehand and 1 backhand, the forehand was a dominant hit again).

It can be stated that both players have a significantly higher occurrence of unforced errors over the winners. In the game characteristics of break points won, the winning player earned only 1 break point more, which probably resulted in his win, eventhough he needed 17 opportunities to get seven break points in total, while his opponent turned 6 of 7 break opportunities. In this

case, the success rate was not important. It has to be noted that the winning player won 11 break points out of 17 opportunities in the final set, putting pressure on the opponent and getting an important break.

### Analysis of the 2nd match

In the second match, CAG from Spain and JK from Switzerland competed. The Swiss player was more successful (6:4, 7:6 /4/). The analysis of the results is presented in Table 2.

**Table 2:** Analysis of observed game characteristics (second match)

Set/match	1 First set (4:6)		Second set (6:7)		Match (4:6, 6:7)	
Game characteristics/Players	CAG (ES)	JK (CH)	CAG (ES)	JK (CH)	CAG (ES)	JK (CH)
1. Aces	0	0	1	2	1	2
2. Double faults	1	1	4	4	5	5
3. First serve in (%)	19/28 68 %	20/33 61 %	19/34 56 %	23/35 66 %	38/62 61 %	43/68 63 %
4. Points won after first srv.	10	11	10	11	20	22
5. Points won after second srv.	4	7	9	9	13	16
6. Return points won	15	14	15	16	30	30
7. Winners - forehand	3	6	5	6	8	12
8. Winners - backhand	1	1	1	2	2	3
9. UE - forehand	8	9	5	8	13	17
10. UE - backhand	7	6	3	8	10	14
11. Net points won	2	2	3	3	5	5
12. Breakpoints won (%)	2/4 50 %	3/3 100 %	3/4 75 %	3/4 75 %	5/8 63 %	6/7 86 %
13. Total points won	29	32	37	40	66	72

Notes: bold text ... winning player; UE ... unforced errors

Table 2 shows the basic game characteristics of the second match. Statistics of each set enable simple orientation during the whole match. The column on the right contains a summary of the statistics of the entire match. Looking on the overall table, it can also be stated that the match was tight, both through the course and at the end. There are only six points difference in the number of total points won. This time the player with a more aggressive game was the more successful one as he scored more winners (CAG 10 vs. JK 15) and also made more unforced errors (CAG 23 vs. JK 31). The decisive game characteristic was a number of break points won (CAG 5 vs. JK 6) as points won after serve, return points won and net points won were almost identical. The winners and unforced errors were important factors in this match. The numbers of forehand and backhand winners shows that forehand was more dominant hit. Both players scored four times more forehand winners than backhand winners (CAG 8, resp. 2 vs. JK 12, resp. 3). For both forehand and backhand unforced errors prevailed over winners. The winning player scored more winners but also made more unforced errors. A number of break opportunities (CAG 8 vs. JK 7) as well as break points won (CAG 5 vs. JK 6) indicate the equality of the decisive game characteristic of this match. JK as the winning player won one break point more (CAG 2 vs. JK 3) than his opponent which led to his victory. The second set ended up with tie-break where both players broke the opponents serve three times in total.

## Comparison of the final matches of WJTF 2017

**Table 3:** Comparison of game characteristics of both final matches

Matches	1. zápas (4:6, 6:3, 6:4)		2. zápas (4:6, 6:7)	
	<b>DRY (ES)</b>	<b>YA (CH)</b>	<b>CAG (ES)</b>	<b>JK (CH)</b>
1. Aces	0	0	1	2
2. Double faults	4	5	5	5
3. First serve in (%)	57/81 70 %	70/85 82 %	38/62 61 %	43/68 63 %
4. Points won after first srv.	31	31	20	22
5. Points won after second srv.	14	13	13	16
6. Return points won	45	37	30	30
7. Winners - forehand	11	15	8	12
8. Winners - backhand	1	7	2	3
9. UE - forehand	10	28	13	17
10. UE - backhand	11	9	10	14
11. Net points won	6	5	5	5
12. Breakpoints won (%)	7/17 41 %	6/7 86 %	5/8 63 %	6/7 86 %
13. Total points won	89	85	66	72

Notes: bold text ... winning player; UE ... unforced errors

Table 3 shows a comparison of the analyzed game characteristics of both final matches. The limit of this comparison is the different result of the matches. The first match lasted three sets and the numbers of games played (29 vs. 23) and total points won (174 vs. 138) were higher. It was unique by an above-average success rate of first serve (DRY 70% vs YA 82%) and almost the same number of total points won (DRY 89 vs YA 85). The decisive factor was the number of break points won (DRY 7 vs. YA 6), the Spanish player DRY obtained one breakpoint more so he won the entire match. Ultimately, a player with fewer unforced errors (DRY 22 vs. YA 37) and winners (DRY 12 vs. YA 22) won the match. The more aggressive player JK was more successful in the second match. He scored more winners (CAG 10 vs. JK 15) but also made more unforced errors (CAG 23 vs. JK 31). Both players won comparable points after serve (CAG 33 vs. JK 38) and the identical number of return points (CAG 30 vs. JK 30). Just as in the first match, the decisive factor was the number of break points won, with the winning player JK obtaining one break point more (CAG 5 vs. JK 6). In both matches, the number of unforced errors (58 and 54) prevailed over the number of winners (34 and 25). The number of double faults (9 and 10) and net points won (11 and 10) were also similar.

### Comparison of game characteristics of first and second match with final matches of WJTF 2014

Table 4 compares the results of game characteristics analysis of WJTF 2014 finals (Janák et al., 2017) and WJTF 2017 finals. In WJTF 2014 boys category, the teams of Canada and Germany competed in finals. The first match between NK (DE) and FA (CA) ended with victory of the Canadian player 7:6, 7:5. In the second match, German player RM defeated Canadian NM 6:1, 6:2.

**Table 4:** Comparison of game characteristics of WJTF 2017 and WJTF 2014 final matches

Matches	First match (2017)		Second match (2017)		First match (2014)		Second match (2014)	
	<b>DRY (ES)</b>	<b>YA (CH)</b>	<b>CAG (ES)</b>	<b>JK (CH)</b>	<b>NK (DE)</b>	<b>FA (CA)</b>	<b>RM (DE)</b>	<b>NM (CA)</b>
1. Aces	0	0	1	2	0	3	5	0
2. Double faults	4	5	5	5	1	3	2	7
3. First serve in (%)	57/81 70 %	70/85 82 %	38/62 61 %	43/68 63 %	64/83 77 %	61/93 65 %	26/37 70 %	18/30 56 %
4. Points won after first srv.	31	31	20	22	33	35	19	7
5. Points won after second srv.	14	13	13	16	12	19	7	5
6. Return points won	45	37	30	30	43	38	18	11
7. Winners - forehand	11	15	8	12	2	16	5	4
8. Winners - backhand	1	7	2	3	5	1	0	3
9. UE - forehand	10	28	13	17	7	19	4	5
10. UE - backhand	11	9	10	14	26	29	3	13
11. Net points won	6	5	5	5	1	11	0	0
12. Breakpoints won (%)	7/17 41 %	6/7 86 %	5/8 63 %	6/7 86 %	4/9 50 %	5/12 42 %	5/6 88 %	1/1 100 %
13. Total points won	89	85	66	72	88	96	55	26

Notes: bold text ... winning player; UE ... unforced errors

While first matches of WJTF 2017 (DRY vs. YA and CAG vs. JK) and WJTF 2014 (NK vs. FA) were very tight (as well as the second match of WJTF 2017), the second match of WJTF 2014 had a clear course and the number of total points (81) was much lower than in the other matches (174, 138 and 184). The winning player RM of the second match of WJTF 2014 gained 5 break points, the defeated player won only 1. In other matches, this game characteristics was decisive and the winning players won just one break point more than the defeated players (DRY 7 vs. YA 6, CAG 5 vs. JK 6, NK 4 vs. FA 5). The participants of the WJTF 2017 final matches DRY, YA, CAG and JK were more active, scored more winners (59 vs. 36) and net points won (21 vs 12). More dominant hit of all WJTF 2014 and WJTF 2017 final players was forehand which is supported by the comparison of forehand winners (73) and backhand winners (22).

### Comparison of game characteristics of first and second match with the Roland Garros men's single finals 2017

The results listed in Table 5 contain less game characteristics, since the statistics of the RG 2017 final match do not distinguish between forehand and backhand winners and the forehand and backhand unforced errors neither do net points won. When comparing the game characteristics of junior participants WJTF 2017 and finalists of RG 2017 it is necessary to consider the fact that the RG tournament is played on three winning sets. Therefore, the total number of points won is generally higher.

**Table 5:** Comparison of game characteristics of junior finals of WJTF 2017 and men's single RG 2017 final

Matches	First match		Second match		RG 2017	
	<b>DRY (ES)</b>	<b>YA (CH)</b>	<b>CAG (ES)</b>	<b>JK (CH)</b>	<b>SW (CH)</b>	<b>RN (ES)</b>
1. Aces	0	0	1	2	1	4
2. Double faults	4	5	5	5	0	0
3. First serve in (%)	57/81 70 %	70/85 82 %	38/62 61 %	43/68 63 %	50/86 58 %	42/65 65 %
4. Points won after first srv.	31	31	20	22	26	35
5. Points won after second srv.	14	13	13	16	16	15
6. Return points won	45	37	30	30	15	44
7. Winners	12	22	10	15	19	27
8. UE	21	37	23	31	29	12
9. Breakpoints won (%)	7/17 41 %	6/7 86 %	5/8 63 %	6/7 86 %	0/1 0 %	6/13 46 %
10. Total points won	89	85	66	72	57	94

Notes: bold text ... winning player; UE ... unforced errors

The RG final between the defeated player SW and the winning player RN was very clear (6:2, 6:3, 6:1) and therefore the number of total points won (151) is comparable to the 2nd match of WJTF 2017 (138) and even lower than numbers of the first match of WJTF 2017 (174). Table 5 also shows that the RG 2017 finalists did not make a single double fault, while the juniors made 9, respectively 10 during WJTF 2017 finals. The difference in the level of some game characteristics (serve and return) between the winning and defeated player is evident especially in the men's single finals (RG 2017). The winning player RN scored almost three times more return points than his opponent (RN 44 vs. SW 15) and obtained 6 break points whilst the defeated player SW did not get any. Another difference between the game characteristics of the WJTF and RG finals is in the ratio of winners and unforced errors. The winning adult player RN scored more winners (27) and made fewer unforced errors (12) than his rival SW (19 winners and 29 unforced errors). The winning player of junior tournament was more successful due to fewer unforced errors (DRY 21 vs. YA 37), but also fewer winners (DRY 12 vs. YA 22) in the first match, or more winners (CAG 10 vs. JK 15) but also more unforced errors (CAG 23 vs. JK 31) in second match. An interesting fact is that in both WJTF 2017 and RG 2017 finals players from Switzerland and Spain participated, indicating a high level of tennis players in these countries.

## DISCUSSION

Filipčić, Filipčić and Berendijaš (2008) analyzed the game characteristics on Roland Garros 2005 and found that the winning players played more aggressively, scored more aces and gained more net points, also made less double faults, unforced errors and reached a higher percentage of first serve in than their opponents. The authors Cross and Pollard (2009) analyzed 127 matches at the Grand Slam Tournaments during 1991–2009 and found that the number of aces is generally increasing due to the increasing serve speed, while the number of double faults decreases. They also found that most of the aces are achieved each year in Wimbledon, the US Open, the Australian Open and the least at the French Open, which corresponds with the speed of the courts at these tournaments. In their research, Filipčić, Čakš and Filipčić (2011) analyzed a total of 17 093 matches of 57 women tennis players using SPSS software in order to determine in which



game characteristics there are significant differences between the winning and the defeated player. They found that the winning players gain significantly more points won after serve and total points won than the defeated players. Conclusions from the analysis of the game characteristics of the final RG 2011 were also drawn by Schönborn (2012), who found that the winning player RN was more successful with a twice less number of unforced errors than his defeated opponent. Almost 7000 matches from 1991–2010 were analyzed by Filipčič et al. (2015) who aimed to find differences in game characteristics of players with a positive and negative ratio of won and lost matches. Players with a positive ratio reached more than 72% of first serve success rate (players with a negative ratio reached less than 69%), scored more aces, made less double faults, and won more games after their serve. Mrlík (2012), Bačo (2012) and Perutka (2012) analyzed the game characteristics of the junior male finals at WJTF in 2009–11. The results of their studies show that the decisive characteristics in this age category are the numbers of winners and unforced errors, where more successful were players with fewer unforced errors but also a smaller number of winners. Similar findings have been made by Polach et al. (2016) who analyzed WJTF 2013's junior male characteristics and compared the data with the Roland Garros 2013 men's single finals. The authors found that juniors get to break points and also are able to obtain opponent's serve more often comparing to men tennis players. Therefore in junior tennis, serve is not as important and dominant factor as in adult category

## CONCLUSION

Based on the results of the game characteristics analysis of the two WJTF 2017 final matches, it can be stated that the differences in the level of the game characteristics of the winning and defeated players were relatively small. Both final matches were tight with a minimal difference in the number of total points won between the winning and the defeated player. The winning players in both matches won one break point more than defeated players, the first match was won by the player with fewer unforced errors and winners, in the other match the winning player gained more winners and unforced errors. When comparing the level of game characteristics of juniors and adult players, it was found that the winning player of the RG 2017 final, unlike the juniors, had a significantly higher number of winners and a smaller number of unforced errors than their opponents. In the adult category, a serve has a significantly higher impact on the result of the match than in juniors. In the RG 2017 Men's final match, there was a big difference between the winning and the defeated player in the return points won and points won after serve. In the junior finals, the obtained break points decided the matches, but the number of points won after serve and return points won were almost identical for the winning and defeated players.

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