SCORING ABILITIES IN THE GAME OF TENNIS – A PRAGMATIC STUDY OF UNIQUE CASES

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ABSTRACT

Purpose. Many studies analyzing the game of tennis overlook assessing such variables as the pure ability to play the game or the skill needed to take an opponent by surprise. This can be quantified in terms of a player's shot flexibility, variability, velocity, or by the conscious or intuitive adaptability one can possess towards anticipating return shots, how best to hit the ball in order to keep it in play, as well as the buildup of delivering a shot or in scoring a point. The aim of the study was to identify the ability to score points in tennis based on an original set of assessment criteria that were used to measure the different effective plays against an opponent. This included measuring the variability, spatial flexibility and variability of shots taken, as well as the willingness to make risky plays. **Methods.** The study analyzed the match play of two elite tennis players, Roger Federer and Novak Djokovic, who competed against one another in the final of the 2007 US Open and the semi-final of 2008 Australian Open. Video recording of the two games was used to score and measure the proposed criteria. **Results.** The study found numerous quantitative and qualitative aspects that could assess the performance of the players. This included measuring the variety, spatial flexibility and variability of shots taken, as well as the willingness to make risky plays. Shot variety, flexibility and variability, as well as the amount of risk taken during game play, were quantifiable in nature. Taking into account the high sporting level of the players, the obtained results are undoubtedly of considerable educational value. **Conclusion.** The results allow for the conclusion that the teaching process in tennis demands the introduction of significant modifications aimed at the rationalization of technique and the introduction of criteria that can measure player effectiveness.

Key words: ability criteria, variability, flexibility, risk level, strategy, game analysis

Introduction

The rivalry that exists in sport is defined by the interdependence of skillful, as well as unforeseeable and risky play that requires a mindset capable of not only delivering offensive actions but also anticipating an opponent's defensive strategy. This includes the uncertain, individual and often contradictory goals that are involved in a sport, all while being congruent to the established rules and strategies of the game. The skillful ability to compete in a structured sport is an important aspect of game play, and this in itself is based on an unlimited number of combinations and variations that can be played out at different speeds with an entirely flexible use of game space.

The process of learning how to play tennis requires the systematic monitoring of the effectiveness of certain plays used in the game and, in particular, the skills that condition one's efficiency. In practice, such an analysis uses mostly quantitative indicators such as the number of scored points or the number of won games and sets, which are set against the effective use of other game elements such as the first and second services, or dynamic aspects of the game that take into consideration the amount of shots that are scored as a point or hit the net. In some cases the amount of errors a player commits

is also taken into account. These quantitative analyses of the content that makes up tennis typically refer to the ability to take various shots, but do this without taking into consideration the situational and aiming context. Such quantitative analyses of tennis can be found in the studies by O'Donoghue and Ingram [1], and Filipčič et al. [2].

Studies that have been published on tennis also touch upon several other aspects. Some researchers have attempted to develop adequate tools to research the game [3–9], while others have researched the strategy and tactics used in tennis [10–12] or conducted a game analysis by way of statistical measures [13–15]. Recently, a number of studies have been conducted analyzing examples of "practical implementation", or the use of a tactical approach in teaching the game [16]. Additional studies conducted with this approach in mind have also appeared, with the aim to analyze this facet in a scientific light. An example of this can be the growing number of reports on such topics as situational awareness in tennis [17] or the ability to disguise one's shot strategy or the anticipation of an opponent's moves [18, 19].

The search for relevant skills from a tactical point of view, even with those associated with mental function, is another interesting aspect. McPherson and Kernodle [20] examined the thoughts of a player immediately after scoring a point and just before scoring another one. The results they obtained were found to differentiate in terms of sporting level and found a relationship

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between tactical thinking and the effectiveness one exhibits during a match. However, attention should be brought to the fact the above-mentioned studies omitted assessing game skills, which can be understood as ways to take an opponent by surprise, or aspects such as game flexibility, game diversity or the use of a variation of conscious or intuitive movements in order to hit the ball and keep it in play, as well as the anticipatory period prior to taking a shot and scoring a point [21–25].

Therefore, the aim of the study was to take these aspects into consideration and set out the following research objectives:

– develop a pragmatic method aimed at identifying the game plays used in tennis
– develop the criteria that can be used to assess the skills needed to score points in tennis
– identify the skills needed to score points in tennis by analyzing players who compete at the highest level

Material and methods

The study was based on a research procedure outlined by Panfil defined as the pragmatic study of unique cases [25], inspired from practical and methodological reasons. From a practical point of view there is a lack of an objectified method that can quantify unique cases (events, processes, states) through a pragmatic dimension. However, the use of methodological inspiration has been seen in economics, social psychology and also in such pedagogical methods as case studies or analysis of individual cases.

The structure of the test procedure

An important condition that would provide the proper background for objectively analyzing the game of tennis was the selection of a unique case that could best be researched. In such a case it is important to be absolutely sure that the choice is not accidental but instead based on reasonable objective data. One way of being certain in this regard can be by the selection of athletes who hold an indisputable ranking as one of the best in the world, documented by a record number of titles in some of the world's most prestigious competitions. The use of research instruments that can guarantee the uniqueness of the selected test subject should therefore be official documents (ranking list) confirming the objective criteria that determine their uniqueness, which can be further corroborated by the opinions of independent experts.

The identification of the uniqueness of a unique event requires, in turn, the selection and description of hypothetical factors (variables) that best describe this event to the highest possible degree, while being original enough in order to provide a new light on the analyzed problem. In this sense, the variables can be actions, behaviors or dispositions that can be critical in the identification of the distinctness of the studied phenomena. The next step of using such an objectified method would be to choose and describe the criteria needed to analyze the variables, which can be, for example, skill and efficiency. The research instruments as well as the selection process of the variables and their quantification criteria can be decided upon by experts, especially in the form of brainstorming sessions, whose end result should be the selection of the above-mentioned data necessary to conduct the analysis.

The next stage of the study is formal in nature and is based on the quantitative identification of the variables based on the accepted criteria. The research instruments necessary in this regard can be based on the recording of data, often performed by the use of specially designed computer software. The information collected, after basic statistical calculations, can be formalized into tables, charts or recognize that what is average. The next step of the research process would be the pragmatic interpretation of the results. This phase of the process again requires the involvement of experts, whose knowledge, imagination and intuition can qualitatively identify the relationship between the studied variables. Specific algorithms can then be identified by the use of the amassed data.

In this way is it possible to separate, based on the adopted criteria, what can be considered universal and thus related to other unique cases as well as disclose what clearly distinguishes them from each other. In addition, the precise and quantified description of the unique cases provides a completely different perspective to recognize that what is average, and therefore provide a new basis for further development. The research instruments accumulated at this phase of research are thus pragmatic in nature, meaning it has been bound by the purpose of the study, as based on the interpretation of the obtained results together with a formalized basis of the found dependencies and relationships.

The fundamental goal of the proposed test procedure is based on the obtained results and the formulation of practical directives. These practical directives, by organizing the system of attained knowledge, can contribute to the rationalization of the examined subject as a unique object and also show the direction of the desired effects in relation to an average case.

Concepts and criteria for characterizing the plays used in tennis and the corresponding criteria that can be used to analyze the skills needed to create a point-scoring situation

Among the criteria for identifying the skills used in tennis, one that stands out is the ability to take an opponent by surprise. As such, this aspect was treated as the primary criterion. Among the different ways one can

be unanticipated by their opponent, some studies have proposed to use such criteria as accuracy, flexibility, diversity, speed, deception and combined game play elements [22, 23]. Modifying the criteria as per Panfil in order to take into account the subject under research, or in other words towards evaluating the abilities needed to create a point-scoring situation in tennis, this study was also expanded to analyze the following criteria: the variability of different shots, spatial flexibility and the willingness to incur risk.

The variability of different shots

A classical division of tennis strokes (motor activity) was used in the study covering all the possible ways of hitting and, therefore, directing the ball to the other side of the court. A detailed list of the possible strokes is found in literature on the subject [26–28]. The variability of different plays used in tennis were treated as the ability to adapt to offensive situations in which they were able to create a point-scoring situation. These involved the use of the different shots described in the literature mentioned above. Variability in this case was determined by the number of different types of strokes used by players in creating a point-scoring situation.

Spatial zones on the court and player flexibility

In order to determine the locations from which the tennis player hit the ball as well as the where the ball was directed, the tennis court was conventionally divided in zones (Fig. 1). Among the long axis the court was divided into three areas of the same size: two side
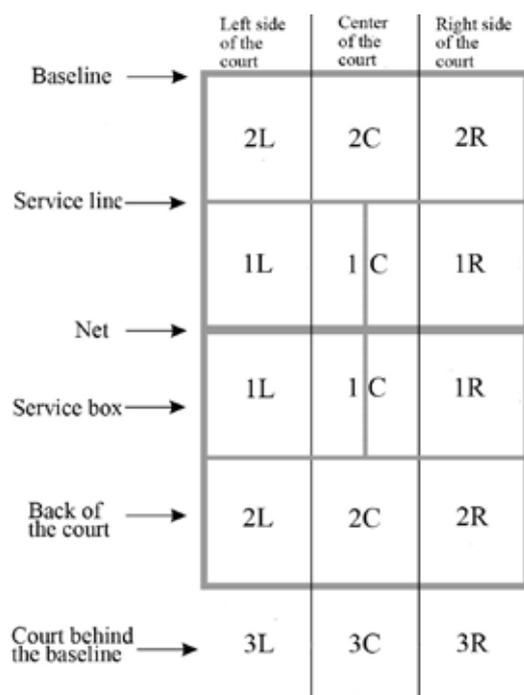
Figure 1. Division of the court into zones

zones (2 × 1/3 of the court) and one center zone (1 × 1/3 of the court). Crosswise, the court was divided by the tennis net, the service lines and the baselines. The zone between the net and the service line was named the "service box" and divided into three parts (left, center and right), while the space between the service line and the baseline was called the "back of the court" and also divided into three parts (left, center and right). In addition, the sides from which the ball was hit was designated as the area between the baseline and the end of the court (fence) and named the "court behind the baseline" and also divided into left, center and right sections.

Player flexibility was understood as the skill to use the above-mentioned shots to deal with different offensive situations, i.e., a point-scoring situation, and assessing it on the basis of how the player reacted to achieve this goal by the spatial area he and his opponent had available. This was identified by the zones from which the player hit the ball and where the ball was directed.

The degree of risk undertaken in the game

Given the limited area of the court, further divided by the net as well as outlined by the rules of the game, the risk of hitting the ball was defined as the probability of committing two kinds of errors, when the ball hit the net or hitting the ball when it was out. The probability of committing such an error (risk) increases with a decreasing distance between the moving ball and the net or the line marking the boundary of the court. Situations where the ball landed at a distance one-half to one meter from the base or side line or just over the net were defined as **risky play**. In situations where the ball landed at a distance of no more than half a meter from the base or side line or played closely above the net were defined as **very risky play**. Hits that caused the ball to hit the line were defined as **line**.

The risk of creating a point-scoring situation was assessed by the number of times the ball was hit before creating a point-scoring situation by taking into consideration the location of hitting the ball (the distance from the line defining the area of play) and the flight of the ball (directly over the net at a high speed).

Fixed and dynamic elements of the game

Data on the assumed criteria (variability, flexibility and the degree of incurred risk) was assessed by breaking them down as either fixed or dynamic elements of game play.

Fixed elements of game play were serves and, after the second action ended after the first, the second and third hits after the service, but only if the rally of hitting the ball back and forth was closely linked to the predominance of the received serve.

The dynamic elements of the game were treated as those in the final rally of hits that occurred before scoring a point; this type of game play could be attributed as having a specific goal. Depending on the situation, the dynamic elements of game play could include the rally from the fourth, third or second ball prior to scoring a point or could include only the last hit. The dynamic sequence of shots always began with the shot that created a situational advantage or if this was the one (last) hit before scoring a point. This analysis included only those situations which scored a point.

The selection of a unique case – test subjects

Analysis was performed on two elite tennis players, Roger Federer and Novak Djokovic, who competed against each other in the final of the 2007 US Open and in the semifinal of the 2008 Australian Open. For this end, publicly available broadcasts made by Eurosport were used, with data recorded with Microsoft Excel software. Table 1 provides the basic characteristics of the players. Both Djokovic and Federer were among the most highly ranked players in the world (Association of Tennis Professionals).

Table 1. Characteristics of the players

	Federer	Djokovic
Age (date of birth)	30 (08/08/1981)	24 (22/05/1987)
Place of birth	Basel, Switzerland	Belgrade, Serbia
Residence	Bottmingen, Switzerland	Monte Carlo, Monaco
Height	185 cm	188 cm
Mass	85 kg	80 kg
Hand dominance	right	right
Professional player since	1998	2003
Wins/losses	785/185	381/107
Number of wins between each other	14	9
Number of career titles	67	27
Grand Slams	16 (world record)	3
2007 ranking	1	3
2008 ranking	2	3
Current ranking	3	1
Awarded prize money	63 656 798 USD	28 569 675 USD

Results

A pragmatic interpretation of the results

The results presented below show only those intentional plays that created a successful point-scoring situ-

ation. The accepted criteria first allowed the identification of the overall strategy that was adopted by the players, referring to both their dynamism and creativity in creating a point-scoring situation. Secondly, the use of the criteria that could evaluate the diversity and spatial flexibility in creating a point-scoring situation (shots) made it possible, on the one hand, to show the similar elements shared by the players, and on the other hand, to reveal their uniqueness and, therefore, originality. Lastly, the adoption of criteria that can measure the degree of risk taken by the players in creating a point-scoring situation allowed these parameters to be quantified, which given the elite level of the players, could provide an important benchmark for other tennis players.

Strategies to create point-scoring situations by the players

Analysis of the overall strategy used by the players found that 65% of the points (Tab. 2) were scored after creating a point-scoring situation using both fixed and dynamic elements of the game (the remaining points where either scored through faults or by accident). The ratio of points scored using fixed and dynamic elements of game play was 7 to 3 for Federer and 8 to 2 for Djokovic. Therefore, the players predominantly used fixed game elements in an largely efficient manner, with Federer 25% more likely to exploit the dynamic elements of the game. For both players, in both the fixed and dynamic elements of game play, most points were earned after one or two hits.

Table 2. The number of points scored
by the use of different point-scoring strategies

Criteria	Federer	Djokovic
Total number of points scored in a match	224	220
After creating a point-scoring situation using:	146	141
Fixed game elements:	103	109
After service	67	71
After two hits	25	31
After three hits	9	7
After four hits	2	0
Dynamic game elements:	43	32
After one (last) hit	34	20
After two hits	5	8
After three hits	3	1
After four hits	1	3

Variability of shots taken in creating point-scoring situations

Analysis of the variability of the shots taken (Tab. 3) found that the ratio of using forehand and backhand

Table 3. Distribution of shots used to create point-scoring situations

Player	Type of shot													
	Forehand	Backhand	Forehand volley	Backhand volley	Forehand drive volley	Forehand volley stop	Backhand volley stop	Backhand drive volley	Forehand lob	Backhand lob	Smash	Backhand smash	Forehand half-volley	Backhand half-volley
Federer	60	24	4	5	2	0	0	0	0	0	10	2	0	0
Djokovic	46	37	7	1	0	0	0	0	1	0	4	0	0	0

Table 4. Distribution of shots used in the fixed elements of game play

Player	Type of shot													
	Forehand	Backhand	Forehand volley	Backhand volley	Forehand drive volley	Forehand volley stop	Backhand volley stop	Backhand drive volley	Forehand lob	Backhand lob	Smash	Backhand smash	Forehand half-volley	Backhand half-volley
Federer	28	8	1	4	2	0	0	0	0	0	5	1	0	0
Djokovic	20	19	4	1	0	0	0	0	0	0	1	0	0	0

Table 5. Distribution of shots used in the dynamic elements of game play

Player	Type of shot													
	Forehand	Backhand	Forehand volley	Backhand volley	Forehand drive volley	Forehand volley stop	Backhand volley stop	Backhand drive volley	Forehand lob	Backhand lob	Smash	Backhand smash	Forehand half-volley	Backhand half-volley
Federer	32	16	3	1	0	0	0	0	0	0	5	1	0	0
Djokovic	26	18	3	0	0	0	0	0	1	0	3	0	0	0

strokes was varied: for Federer the ratio was 72% to 28%, and 58% to 42% for Djokovic. Federer used the smash more frequently (12 times) than Djokovic (four times), which means he forced his opponent to use the smash more often and, therefore, scored a point.

Analysis of the variability of the shots taken was broken into those that occurred in the fixed (Tab. 4) and dynamic (Tab. 5) elements of game play. This found that the ratio of forehand to backhand strokes used in the fixed elements of the game was also varied between the players: 75% to 25% for Federer, and 55% to 45% for Djokovic. However, the use of forehand and backhand strokes during the dynamic elements of the game were less varied and found to be 70% to 30% for Federer, and 65% to 35% for Djokovic.

The use of the court in creating point-scoring situations – spatial flexibility

Analysis of the locations from which the players scored points (Tab. 6) finds that Djokovic was more flexible in this regard as he scored more than four points when hitting the ball from eight zones, in which two zones were the most commonly used (zones 2C and 2L). Federer, on the other hand, scored more than four points only from five zones, of which four zones were the most commonly used to create point-scoring situations (3C, 3L, 2C and 1C). It should be noted that the place from where the ball is received is determined by the direction of the ball hit by the opponent.

Analysis of the zones from which the players took shots and scored points during the fixed elements of game play found that all of the zones were used, with Djokovic favoring the 2C zone, while Federer preferred zones 2C, 3L and 1C, scoring seven or more points from these zones (Tab. 6). During the dynamic elements of the game, the players also used all of the available zones, but Federer was found to be more flexible in this regard, who from five zones scored five or more points and from three zones scored two or three times; Djokovic only scored five or more points from two zones, and used four zones to score a point two to three times (Tab. 6).

Taking into account the places, or zones, that the players scored a winning point (Tab. 7), Federer was more flexible in using the available space closest to the net (service box) of his opponent. Here, Federer scored

Table 6. Places on the court on which the players scored points in both fixed and dynamic elements of game play

Court zones	Federer			Djokovic		
	fixed game elements	dynamic game elements	both fixed and dynamic elements	fixed game elements	dynamic game elements	both fixed and dynamic elements
3R	1	2	3	0	9	9
3C	2	6	8	2	4	6
3L	7	12	19	4	2	6
2R	3	6	9	5	1	6
2C	11	5	16	13	2	15
2L	2	3	5	4	9	13
1R	2	2	4	5	1	6
1C	7	7	14	4	3	7
1L	1	0	1	1	1	2

Table 7. Places on the court (zones) from which players hit the ball to score a point in both fixed and dynamic elements of game play

Court zones	Federer			Djokovic		
	fixed game elements	dynamic game elements	both fixed and dynamic elements	fixed game elements	dynamic game elements	both fixed and dynamic elements
2R	19	12	31	14	10	24
2C	0	2	2	1	2	3
2L	14	14	28	19	17	36
1R	1	5	6	2	1	2
1C	0	2	2	1	0	1
1L	2	5	7	2	2	4

Table 8. Places that the players used to score a winning service

	Federer			Djokovic		
	out wide	into the body	down the T	out wide	into the body	down the T
First ace	10	0	12	10	0	9
Second ace	0	0	0	0	0	0
Second serve forced error	13	7	18	19	8	21
First serve forced error	1	3	1	1	3	0
Total	24	10	31	30	11	30

15 points in the service box zones while Djokovic only seven. The flexibility in aiming shots toward the back of the court were similar for both players, although Djokovic more frequently aimed for the 2L zone, while Federer concentrated more on the 2R zone. For the zones that were used to score a winning point with fixed elements of game play (Tab. 7), both Federer and Djokovic presented similar, relatively low spatial flexibility, as evidenced by mostly hitting the ball towards the side zones (2R and 2L). The only observed differences in this regard was that Federer preferred to hit the ball towards 2R, while Djokovic to the 2L zone. Taking into account the places where the ball was aimed in order to score a point during the dynamic element of game play (Tab. 7), Fe-

derer showed more spatial flexibility especially in using the area closest located to the net, scoring 12 points in comparison to three by Djokovic.

Observation of the game space from which the players scored a winning service (Tab. 8) revealed that the subjects also presented similar spatial flexibility. Only during the so-called "out wide" serve did Djokovic show a higher level of activity by scoring 30 points compared to the 24 made by Federer.

Analysis of the dominant directions of winning plays (Tab. 9) found that 14 directions were the most commonly used to create a point-scoring situation, with the two most dominant being 2C to 2L and 2C do 2R. A total of seven directions were found to differentiate between

Table 9. Dominant directions of winning plays (more than four points) in the fixed and dynamic elements of game play

Direction of play		Federer			Djokovic		
		fixed game elements	dynamic game elements	both fixed and dynamic elements	fixed game elements	dynamic game elements	both fixed and dynamic elements
3L	2L	4	7	11	2	1	3
3L	2R	3	2	5	0	1	1
3R	2L	1	1	2	0	6	6
2L	2L	1	0	1	3	4	7
2L	2R	2	1	3	1	5	6
2C	2L	4	2	6	6	0	6
2C	2R	7	2	9	7	1	8
2R	2R	2	4	6	3	0	3
1C	2R	3	2	5	1	0	1

Table 10. Use of shots with different levels of risk in both fixed and dynamic elements of game play

	Federer			Djokovic		
	fixed game elements	dynamic game elements	both fixed and dynamic elements	fixed game elements	dynamic game elements	both fixed and dynamic elements
Number of shots taken 50 cm to 100 cm from a line	12	14	26	12	14	26
Number of shots taken up to 50 cm from a line	7	11	18	7	11	18
Number of shots that hit a line	4	6	10	3	5	8
Total	23	31	54	22	30	52

the two players: Federer preferred to score with 2L to 2C, 2C to 2R, 3L to 2R and 3L to 2L; Djokovic preferred 3R to 2L, 2L to 2L and 2L to 2R.

When considering the differences between the fixed and dynamic elements of game play, Djokovic more flexibly used his spatial surroundings in fixed game elements, hitting the ball in 20 directions compared to 16 by Federer, with the largest difference being in Djokovic's favor as they were closest to the net. However, Federer featured more flexibility in creating point-scoring situations during the dynamic elements of play by scoring a point using 23 directions compared to Djokovic's 17. In addition, Federer hit the ball as many as 11 times in this desired directions at least twice, while Djokovic performed similarly only five times. The differences in this regard were more in favor of Federer, playing both near the net and in the central areas of the court.

The scope of using different shots at different levels of risk in point-scoring situations

An assessment of the degree of risk incurred (Tab. 10) revealed that 68% of Federer's points and 74% of Djokovic's points were scored by using shots with different levels of risk, i.e., near or on the line, or low over the net at a high speed. It seems that taking risky shots is an important component of effectively playing modern tennis. In the dynamic elements of the game, shots taken with a higher risk were more frequent in the fixed elements of game play, particularly those taken at a distance of less than 50 cm from a line. The number of risky shots and the ability to take advantage of such risky situations in scoring points was similar for both Federer and Djokovic.

Discussion

An overview of the available literature found that no studies have been conducted similar to the research presented here. There of course exist a number of reports that have studied various aspects of the game of tennis. However, it should be noted that such a pragmatic, comprehensive assessment of a player's shots (activity) by analyzing the variability, flexibility and risk incurred, through a division of both fixed and dynamic game play elements, is entirely original in character and, therefore, cannot be easily compared to any study currently available. Hence, a discussion about the results obtained in this study can be presented as an in-depth analysis based more on interpreting the accumulated data and in answering the question: why do players create point-

scoring situations in such a way and not differently? Therefore, this part of the paper will feature a more practical analysis that would be of greater use to coaches.

When analyzing the strategies used by the players, attention should be paid to the very large share of point-scoring situations created in relation to the amount of points they scored: for Federer this ratio was 146 to 224 (65%) while for Djokovic 141 to 220 (64%). Such a ratio clearly highlights a certain standard in creating point-scoring situations and discredits the idea that tennis players play passively, i.e., game play focused only on waiting for the opponent to make a mistake.

A comparison of the number of points scored in the fixed elements of game play to those that are dynamic also found a difference in their distribution. Djokovic scored 102 points (71 + 31) either as winning services or by the second hit after the service, while Federer scored 92 points this way (67 + 25). The opposite can be seen when comparing the points scored in the dynamic elements of game play by using one decisive strike; the difference in this regard in favor of Federer was 14 points (34–20). These results may indicate that the players have certain preferences in creating point-scoring situations or the result of specific dispositions possessed by the players, allowing Djokovic to better score points when servicing or immediately after the service, while Federer is better during the rally – especially after a single, perfect hit.

A comparison of the amount of point-scoring situations created by the players, in the fixed/dynamic elements of game play, clearly indicate an equifinality of their adopted strategies. Analysis conducted on the variability of the used shots in creating point-scoring situations indicate that the forehand and backhand are both used, although Federer was found to prefer the forehand (60/24 points), while Djokovic used both strokes more equally (46/37).

Some differences in creating point-scoring situations can also be seen when comparing the share of all the other strokes used by the players (excluding forehand/backhand shots); Federer employed the other types of shots 22 times, Djokovic only 13.

The disproportion between Federer's use of the forehand to backhand increased in the fixed elements of game play. It is probable that the "post-service" situational advantage he possessed allowed him to use the forehand more often to perform better shots. For Djokovic this was slightly different, where the distribution of forehand/backhand shots in the fixed elements of game play were almost identical (20/19). These differences undoubtedly show the greater versatility of Djokovic in this aspect. However, this situation is revered when we consider the extent of using other tennis strokes in creating point-scoring situations; in this case greater versatility can be attributed to Federer.

Analysis of the players' spatial flexibility, i.e., the degree of utilizing the available game space in creating a point-scoring situation, found that the places from which Federer scored the most points was from the back left side of the court with a forehand/backhand proportion of 3/7. This does not necessarily indicate Federer's preference for playing in this part of the court, only that he was forced by the opponent to accept a number of balls on a side where he is theoretically weaker, as they require the use of the backhand.

The amassed data have also indicated that both players frequently score points from the 2C zone (center back of the court), especially during fixed game elements. This occurrence could stem from the fact that this area frequently receives the opponent's returns when playing in an unbalanced position. As was found, Djokovic preferred to score points (13 points) using the backhand, in zone 2L, more than Federer.

The significant number of Federer's hits from the 1C zone (14 points) could be attributed to the number of finals shots taken by this player, such as the volley or smash (22).

The assessment of the players' spatial flexibility, broken down into both fixed and dynamic elements of game play, draws attention to the number of points scored by Federer in the dynamic sequences, notably from the left court behind the baseline (3L) – 12 points. Based on the direction of his shots, Federer scored the most points from this part of the court with long shots taken in a straight line (11 towards 2L) and also diagonally (5 towards 2R). This fact clearly demonstrates the uniqueness of Federer to score points from this part of the court, as Djokovic did not present similar results. Djokovic's preferred locations in which he scored points during dynamic game play were in the corners of the court (3R – 9 points, 2L – 9 points), which is tied to the favorable use of an angled shot from these ends of the court.

Observation of the locations where shots were directed found that there is a clear tendency in both players to score points by directing the ball to the far sides of the court (2R and 2L). While the places where the players hit the ball pointed to their variability, the places from which they took the shot, regardless whether they were in fixed or dynamic elements of game play, were most commonly placed in the corners of the court, for Federer this was 31 + 28, for Djokovic 24 + 26.

The direction of the winning services for both players was found to be almost identical. The equal distribution of shots aimed to the outside, inside as well as center of the service box may point to the players trying to maintain an even probability of choosing which side the ball will be aimed, as this proportion would give the opponent the smallest possible chance of guessing their intention.

The direction of the scoring shots generally found a high level of differentiation. Federer played more often in the 3L zone and interchanged this with 2L eleven times, and with 2R five times. In addition, it was observed that both players chose the same range of direc-

tions in game play after the services, from 2C to 2R, but Djokovic also took diagonal shots in dynamic game play, from 2L to 2R five times, and from 3R to 2L six times.

The almost identical results of the amount of risk the players incurred to create point-scoring situations demonstrate the required need for this kind of game play. Fast, level and just above the net shots directed as close as possible to the baseline are what best define an elite player. The results found that 37% of all point-scoring situations were risky plays, and can be considered a benchmark for future analysis.

Conclusions

The method used in this study, aimed at assessing the ability to create point-scoring situations, allows for the formulation of a number of practical directives as, first of all, they can in a universally and quantifiable manner quantify the ways one can flexibly score points while making use of the available space. Second, the common aspects that were uncovered (the range of making risky plays, the type of shots used to score points) can set a standard based on what some of the best players in the world do. Third, this method also reveals the specific areas (variability, spatial flexibility) that differentiate the skill levels of some of the most elite players in the world, which clearly indicates an equifinality of their adopted strategies. The obtained results allow for the conclusion that the varied and flexible use of the available game space, as well performing risky plays in a practical manner, are important indicators of an athlete's skill. This in turn demands the introduction of significant modifications aimed at the rationalization of tennis technique and the introduction of criteria that can measure player effectiveness.

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