

Original Research

Influence of the tactical formation on serve and follow-through parameters in professional padel

Iván Martín-Miguel¹, Bernardino Javier Sánchez-Alcaraz², Jesús Ramón-Llín³, Diego Muñoz¹¹ Sport Sciences Faculty, Department of Physical Education and Sport, Universidad de Extremadura² Sport Sciences Faculty, Department of Physical Activity and Sport, University of Murcia³ Faculty of Teaching, Department of Physical Education, Artistic and Music, University of Valencia* Correspondence: (BJSA) bjavier.sanchez@um.es  ORCID ID n^o: 0000-0001-7788-5175

Received: 16/02/2024; Accepted: 20/06/2024; Published: 30/06/2024

Abstract: The aim were to analyse the effect of the tactical formation of the serving pair on serving and follow-through parameters in professional padel. 1089 points distributed in 217 men's matches (19 sets), corresponding to 8 matches of the World Padel Tour circuit played in 2020, were analysed by systematic observation. The results show that from the left side ($p=0.002$), in both formation the side wall is the predominant direction and independently of the player serving ($p<0.05$). From the right side ($p=0.000$), when the server is the player on the right ($p=0.008$) in conventional, looks for the side wall in more occasions and when it is the player on the left ($p=0.000$) in Australian, the "T" is the predominant direction. Regardless of the side and player serving, when conventional was used, the direction of the squeeze was side wall more than 66% of the time. Finally, there are also significant differences ($p<0.05$) depending on the second shot after the return, with the exception of the smash ($p>0.05$), being the backhand volley the predominant one in both tactical situations. In conclusion, the serving situation influences the tactical parameters of the serve and return allowing the creation of specific strategies during the game.

Keywords: racquet sports; performance analysis; service

1. Introduction

Padel is a racket sport played on a 20x10-metre court surrounded by glass walls or walls and an electro-welded mesh of 4 and 3 metres high (International Padel Federation, 2020). In Spain, since the 1990s, there has been an increase in the number of sports facilities for its practice (Muñoz et al., 2016) and also in the number of federative licences

and practitioners at all levels (Courel-Ibáñez, Sánchez-Alcaraz, García, & Echegaray, 2017).

Moreover, due to the popularity and increase in the number of players, it has also led to an increase in the number of scientific publications in this field in recent times (Sánchez-Alcaraz, Cañas, & Courel-Ibáñez, 2015; Sánchez-Alcaraz, Cánovas, Sánchez-Pay, & Muñoz, 2023), which have analysed different aspects, physiological (Mellado-



Arbelo & Baiget, 2022), psychological (Díaz-García et al., 2021, 2023), and health by analysing the injuries produced by the practice of this sport (Muñoz, Coronado, Robles-Gil, Martín, & Escudero-Tena, 2022). However, research in padel has mainly focused on describing parameters related to performance in competition, focusing mainly on four fundamental areas: temporal structure (Sánchez-Alcaraz, Courel-Ibáñez, Díaz, Grijota, & Muñoz, 2019; Courel-Ibáñez, Sánchez-Alcaraz, & Cañas, 2017); outcome analysis (Escudero-Tena, Almonacid et al., 2022; Muñoz, Toro-Román et al., 2022); on-court movements (Priego et al., 2013; Ramón-Llín et al., 2020) and game actions (Courel-Ibáñez, Sánchez-Alcaraz, & Cañas, 2015; Courel-Ibáñez, Sánchez-Alcaraz, & Muñoz, 2019). In addition to various reviews in the areas indicated (Martín-Miguel, Escudero-Tena, Muñoz, & Sánchez-Alcaraz, 2023; Sánchez-Alcaraz, Courel-Ibáñez, & Cañas, 2018; Sánchez-Alcaraz, Cánovas et al., 2023).

Despite the large number of studies that analyse the different demands in competition, there is a scarcity of articles that focus on the analysis of the serve (Ramón-Llín, Guzmán, Martínez-Gallego, Vučković et al., 2021), return (Escudero-Tena, Ibáñez, Vaquero-Castillo, et al., 2023) or the shot following the return (Escudero-Tena, Ibáñez, Parraca, Sánchez-Alcaraz, & Muñoz, 2023). The serve and the return are actions that have great importance in the outcome of the match in racket sports (Guillet, Leroy, Thouvarecq, & Stein, 2009), in tennis, the serve is considered one of the most decisive gestures that swing the match to one side or the other (Reid, McMurtrie, & Crespo, 2010; O'donoghue, 2001).

The serve in padel is different from tennis due to the rules, which must be at waist height or below after the ball bounces on the ground (International Padel Federation, 2020), preventing the use of so much force compared to tennis, so, together with the fact that it is a sport that is played with a partner, the tactic to be used is very important. There are two tactics used when serving depending on where the partner is positioned: conventional (the server's partner is positioned on the opposite side to where the serve is made) or Australian (the server's partner is positioned on the serving side) (Ramón-Llín et al., 2019) and different serving directions: side wall, "T" or medium (Sánchez-Alcaraz, Muñoz et al., 2020), which have different technical and tactical advantages, so a better understanding of player behavior during the serve is very important for the design of training exercises and for the development of game strategies (Kilit, Şenel, Arslan, & Can, 2016). For instance, the number of points won is greater when conventional and serves to the side wall are employed (Martín-Miguel, Muñoz, Lupo, & Sánchez-Alcaraz, 2024), as well as in gold and non-gold points, and when the serve is made from the left side (Escudero-Tena, Galatti, Sánchez-Alcaraz, Muñoz, & Ibáñez, 2023). On the opposite side, an analysis of the serve-return for better understanding and use, allows to gain a tactical advantage (Sánchez-Alcaraz, Muñoz et al., 2020) in order to be able to get positions close to the net and have a better chance of getting the point (Sánchez-Alcaraz, Courel-Ibáñez et al., 2020).

Although the relationship between serve formation and its relationship in function of

serve direction, side of play, as well as the variables of serve movement and percentage of points won, have been studied previously (Ramón-Llín, Guzmán, Martínez-Gallego, Muñoz et al., 2021b; Ramón-Llín, Guzmán, Martínez-Gallego, Vučković, et al., 2021), in our review we did not find any study that analysed the effect of serve formation considering its influence on the player who plays the third stroke in professional circuit players, nor its relationship with the type of stroke after the serve-return. Therefore, knowledge of the actions and dynamics of both the serve and the return is very useful to optimise tactical performance during competition and training. Therefore, the aim were to analyse the effect of the tactical formation of the serving pair on serving and follow-through parameters in professional padel, such as direction of the serve, court side of the serve, serving player, player after serve-return and type of stroke after the serve-return. The primary hypothesis is that the variables associated with the serve, such as the direction of the serve, are contingent upon the tactics employed, the player serving, as well as the first player and the first stroke following the serve-return.

2. Materials and Methods

Research design— The research design follows an empirical methodology, specifically a descriptive strategy. It falls under the observational category, being nomothetic, punctual, and multidimensional (Thomas, Martin,, Etnier, & Silverman, 2022).

Sample— The sample included 1089 points distributed in 217 men's matches (19 sets), corresponding to 8 matches (2 quarterfinals, 3 semifinals and 3 finals) of the World Padel Tour (WPT) circuit played

during the 2020 season. The matches were played following the official rules of play (International Padel Federation, 2020). The study was conducted according to the guidelines of the Declaration of Helsinki, and approved by the Ethics Committee.

Study variables— The variables analysed were as follow:

- Tactical formation of the serving pair. Following Ramón-Llín et al. (2019), the service pair could use two types of tactical formation at the beginning of the point:

- o Conventional formation. In this type of strategy, the server's partner is positioned on the opposite side of the court from where the serve is made (Figure 1).

- o Australian formation. In this type of strategy, the server's partner is positioned on the same side of the court from where the serve is made (Figure 2).

- Direction of the serve. The classification proposed by Sánchez-Alcaraz, Muñoz et al. (2020) was used, distinguishing between serves directed to the side wall and serves directed to the "T" (Figure 1).

- Court side of the serve. The side of the court at the time of the serve was recorded and classified as right or left side (Figure 1).

- Serving player: The right player returns in deuce score and spend more time playing on the right side whereas the left player returns in advantage score and spends more time playing on the left side.

- Player after serve-return. In this category we distinguish between the player serving and the serving partner, in order to determine who is the player who hits the next shot after the opponents' serve-return.

- Type of stroke after serve-return. The classification proposed by Sánchez-Alcaraz,

Muñoz et al. (2022) was used, distinguishing 5 of them:

- o Volley. A stroke without a bounce that is made with a short up-and-down movement of the racket. Differentiating between the forehand volley (a stroke hit on the player's dominant side) and the backhand volley (a stroke hit on the player's non-dominant side).

- o Bandeja. A stroke hit without bouncing that is hit from the player's dominant side, usually further away from the net. It is considered an intermediate stroke between the smash and the forehand volley, as the point of impact is lower than the flat smash and higher than the volley.

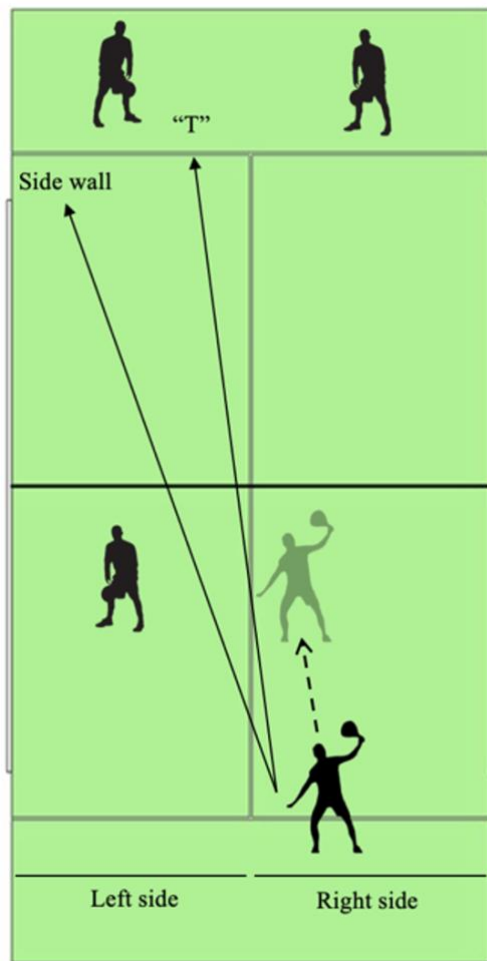
- o Flat smash. A stroke without a bounce over the player's head, with an up and down motion of the racket with a flat spin.

- o Off the wall smash. A stroke hit at the background after the ball has bounced on the ground and then on the wall.

Process— Firstly, the matches to be analysed were selected, which included 2 quarterfinals, 3 semifinals and 3 finals of different WPT tournaments (Marbella Open, Valencia open, Menorca and Las Rozas de Madrid), all of them related to the year 2020. The matches analysed are broadcast in streaming and subsequently stored on the official website of the WPT, from where they were obtained for the observation, collection and processing of the data. The data were recorded by systematic observation, using the specialised software LINCE (Gabin, Camerino, Anguera, & Castañer, 2012). For data collection, 2 graduates in Physical Activity and Sport Sciences, both specialised in padel and after specific training to perform this task, were trained. At the end of the

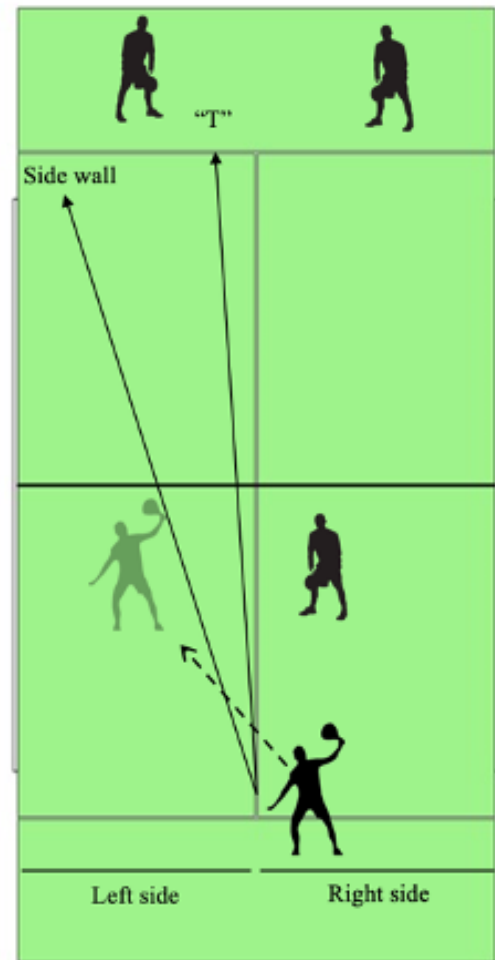
training process, each observer analysed the same set with the aim of calculating the inter-observer reliability through the Multirater Kappa Free (Randolph, 2005), obtaining values above 0.80. To ensure the consistency of the data, intra-observer reliability was assessed at the end of the observation process, obtaining minimum values of 0.80. The kappa values obtained allowed us to consider the degree of agreement as very high (>0.80) (Altman, 1991).

Statistical Analysis— First, a descriptive exploration of the data obtained was carried out and the frequency (n) and percentage (%) of the total sample were calculated. To compare the different tactical positions used by the serving players and their relationship with the direction of the serve, the side of the court, the player after the serve-return, the type of stroke made after the return and the serving player, the Pearson Chi-Square test was used, with subsequent Z-tests for comparison of column proportions with Bonferroni significance adjustment. Corrected typed residuals (CSR) were calculated to analyse the significance of these relationships (Field, 2018). Effect size was calculated from Crammer's V, where values of 0.1 represented a small effect, 0.3 a medium effect and 0.5 and above a large effect (Fritz, Morris, Richler, 2012). A significance level of $p < 0.05$ was established. All data were analysed with the statistical package IBM SPSS 22.0 for Microsoft (Armonk, NY: IBM Corp.).



CONVENTIONAL FORMATION

Figure 1. Delimitation of the direction of the serve (side wall or "T"); court side (left side or right side) in conventional formation.



AUSTRALIAN FORMATION

Figure 2. Delimitation of the direction of the serve (side wall or "T"); court side (left side or right side) in Australian formation.

3. Results

Effect of the tactical formation on the serve direction for each serve side - As shown in table 1, the tactical formation of the serving pair significantly affected serve direction, both when serving from the right side ($X^2=27.9$; $p<0.001$; $V=0.222$) and from the left side ($X^2=10.0$; $p=0.001$; $V=0.139$). Thus, both when serving from the left and right side, the Australian formation is used significantly more when serving to the "T", while when serving to the side wall, the conventional formation is used significantly more.

Effect of the tactical formation on the serve direction for each serving player - The tactical formation of the serving pair significantly

affected the direction of the serve, both when serving from the right player ($X^2=6.941$; $p<0.05$; $V=0.117$) and from the left player ($X^2=34.423$; $p<0.05$; $V=0.243$) (Table 2). As in the previous section, both the right and left players significantly used the conventional formation when serving towards the side wall, while the Australian formation was significantly used when serving at the "T".

Effect of the tactical formation on the serve direction for each serving player after serve-return - As can be seen in Table 3 the tactical formation of the serving pair significantly affected serve direction, both when the hit after serve-return was made by the serving player ($X^2=10.161$; $p<0.05$; $V=0.127$) and the serving's partner ($X^2=35.220$; $p<0.05$;

V=0.276). As in the previous section, both the serving player and the serving's partner receive a greater use of the conventional strategy from their opponents when they are served to the side wall, while when they are served to the "T" the servers make greater use of the Australian formation.

Effect of the player after serve-return on the serve direction for each tactical formation - As can be seen in Table 4 the player after serve-return had a significant relationship with serve direction, for the Australian formation ($X^2=4.525$; $p<0.05$; $V=0.094$) but not for the conventional formation ($X^2=1.959$; $p=0.162$;

$V=0.058$). In this way, when serving to the side wall the probability of the server's partner hitting after serve-return is higher in both tactical formations, but significantly so in the Australian formation, while when serving to the "T" the opposite occurs, that is, there is a higher probability of the server's partner hitting after serve-return when serving to the "T" in the Australian formation.

Analysis of the shot type after serve-return - Figure 3 shows the first stroke after the return depending on the direction of the serve and the court formation used (Australian or conventional).

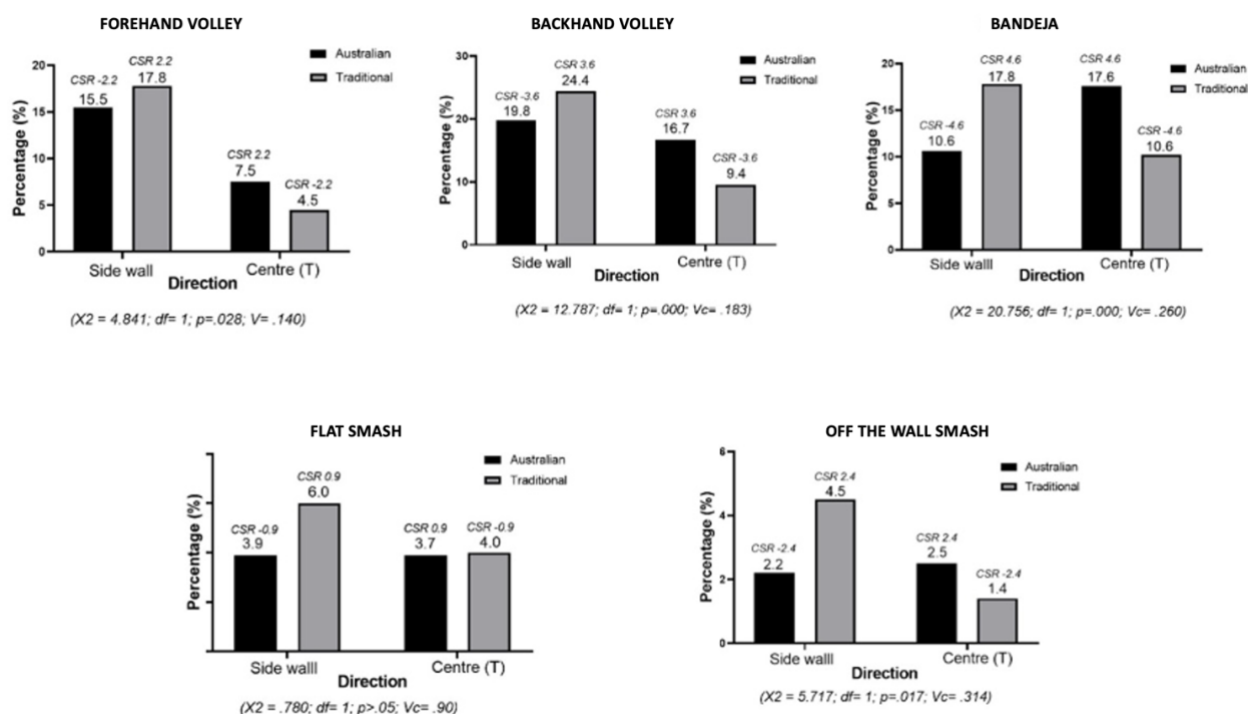


Figure 3. Differences in first stroke after the serve-return as a function of serve direction and tactical formation (frequencies and percentages).

In this sense, significant differences are observed in the forehand volley: ($X^2=4.841$; $df=1$; $p<0.05$; $V=0.140$), backhand volley: ($X^2=12.787$; $p<0.05$; $V=0.183$), bandeja: ($X^2=20.756$; $df=1$; $p<0.05$; $V=0.260$) and off the wall smash: ($X^2=5.717$; $p<0.05$; $V=0.314$), but not in the flat smash: ($X^2=0.780$; $p>0.05$; $V=0.090$).

Summary of results for high-probability scenarios (over 66%) -

a. Serving situations when the serving pair uses conventional formation:

1. If the serve is made from the right side (deuce), 69% goes in the direction of the side wall.
2. If the serve is made from the left side (advantage), 71% goes in the direction of the side wall.
3. If the serve is made by the right player, 70% goes to the side wall.

4. If the serve is made by the left player, 71% of the time it goes in the direction of the side wall.

b. Situations when the serving pair uses Australian formation:

1. If the serve is from the side wall direction, 68 % it shall be the serving player who hits the serve after the return.

2. If the serve is made with a T direction, 73% it will be the serving's partner who makes the hit after the rest.

Summary of situations in the type of stroke after the serve-return (3rd shot of the rally) -

1. When the serving pair uses a conventional formation and serves with side wall direction, the most likely shot to be hit after the return is: 1º Backhand volley (24%), 2º Bandeja (18%) and 3º Forehand volley (10%)

2. When the serving pair uses the Australian formation and serves to the "T" the most likely shot they are likely to hit after the return is the Bandeja (18%).

3. When the serving pair uses the Australian formation and serves to the side wall the most likely stroke to be hit after the return is: 1st the backhand volley (20%) and 2nd the forehand volley (15%).

4. Discussion

The aim of the study were to analyse the effect of the tactical formation of the serving pair on serving and follow-through parameters in professional padel. The results of this research indicate differences in the direction of the serve depending on the tactical formation used by the serving pair.

Relationship among tactical formation serving, serve direction, side and player serving -
The serving pair, when using the conventional formation, clearly looks for serve to the side wall as opposed to the "T" regardless of the serving side, being 38.6% higher from the right side and 43% higher from the left side as indicated by other

studies (Sánchez-Alcaraz, Ramón-Llín, González, Martínez-Gallego, & Sánchez-Pay, 2022). The higher number of serves to the side wall could be due to the lower number of winning points that are achieved after hitting from a side wall (Conde-Ripoll, Llanos, García, & Sánchez-Alcaraz, 2021) and from an open double wall (Sánchez-Alcaraz, Ferrer, Zurano, Muñoz, Ramón-Llín, 2021) compared to a background stroke. In this way, the aim of this direction is to continue to obtain an advantage at the net, since it is in this area where the greatest number of point winners are achieved (Ramón-Llín et al., 2022).

On the other hand, when the service pair serves in Australian formation, the direction of the serve varies according to the side of play of the service player. When that player plays on the left side of the court, although the difference between both directions is only 6.4%, the serving direction is slightly higher to the "T" in front of the side wall, the greater distance to cover the parallel in front of the center of the court (Ramón-Llín, Guzmán, Llana, Vučković, & James, 2013) could be the reason for the predominant serve to the "T". On the other hand, when the server is the right player, although the difference between both directions is 8%, the predominant direction is to the side wall, even though the distance to cover is also greater to cover the spaces as in the previous case, the laterality of the players, since generally the players playing on this side are right-handed, having to perform a backhand side wall, thus increasing the complexity and the probability of committing an error (Courel-Ibáñez & Sánchez-Alcaraz, 2018) may be the cause of assuming this risk of serving to the side wall. Therefore, when players serve with this tactic, the direction of the serve from the right side depends on the quality of the serve and skill of the receiver with the backhand.

Table 1. Differences in the direction of the serve in padel depending on the place of the serve and the tactical formation used (frequencies and percentages)

Serving side	Direction	Australian	Conventional	Sig.
Right side	Side wall	140 (47.5%) a	190 (69.3%) b	.000
	T	155 (52.5%) a	84 (30.7%) b	
Left side	Side wall	125 (58.1%) a	218 (71.5%) b	.002
	T	90 (41.9%) a	87 (28.5%) b	

Sig: p-value; a, b: indicate significant differences in the Z tests for comparison of column proportions from $p < 0.05$ adjusted according to Bonferroni.

Table 2. Differences in the direction of the serve in padel as a function of the player serving and the tactical formation used (frequencies and percentages)

Serving player	Direction	Australian	Conventional	Sig.
Right player	Side wall	128 (59%) a	203 (70.2%) b	.008
	T	89 (41%) a	86 (29.8%) b	
Left player	Side wall	137 (46.8%) a	205 (70.7%) b	.000
	T	156 (53.2%) a	85 (29.3%) b	

Sig: p-value; a, b: indicate significant differences in the Z tests for comparison of column proportions from $p < 0.05$ adjusted according to Bonferroni.

Table 3. Differences in the tactical formation serving as a function of the direction of the serve and the player who hits the ball after serve-return (frequencies and percentages)

Player after serve-return	Direction	Australian	Conventional	Sig.
Serving player	Side wall	195 (55.1%) a	184 (67.6%) b	.001
	T	159 (44.9%) a	88 (32.4%) b	
Server's partner	Side wall	70 (44.9%) a	234 (73%) b	.000
	T	86 (55.1%) a	83 (27%) b	

Sig: p-value; a, b: indicate significant differences in the Z tests for comparison of column proportions from $p < 0.05$ adjusted according to Bonferroni.

Table 4. Differences in the serve direction according to the tactical formation used and the player who hits the ball after serve-return (frequencies and percentages)

Tactical formation	Player after serve-return	Side wall	T	Sig.
Australian	Serving player	195(73.6%) a	159 (64.9%) b	.033
	Serving partner	70 (26.4%) a	86 (35.1%) b	
Conventional	Serving player	184 (45.1%) a	88 (51.5%) b	.162
	Serving partner	224 (54.9%) a	83 (48.5%) b	

Sig: p-value; a, b: indicate significant differences in the Z tests for comparison of column proportions from $p < 0.05$ adjusted according to Bonferroni.

The possible serving directions depending on the strategy used also condition the serve-return of the opposing pair. When the serving pair plays in the Australian formation, the server is the recipient of most of the serve-return since the serving player, in addition to being located 5 meters from the net, compared to his partner who is already positioned in that area (Ramón-Llín, Guzmán, Martínez-Gallego, Vučković, et al., 2021), together with the greater distance he has to travel in order to occupy his area at the net (Ramón-Llín, Guzmán, Llana et al., 2021), becomes the predominant player to hit after the serve-return of the opposing pair, regardless of the direction to the "T" or side wall, since the opposing pair wants to take advantage of the space generated by this tactic and the less favourable position of the serving pair to be able to hold the net, making the server in this arrangement the player who travels the greatest distance throughout the match (Ramón-Llín et al., 2013; Ramón-Llín, Guzmán, Llana et al., 2021). The conclusions about the distance to the net of the player in the Australian formation support what Ramón-Llín, Guzmán, Llana et al. (2021) and Ramón-Llín et al. (2020) indicate, that players with a lower level are those who travel less distance during the match, probably due to the greater use of a conventional formation versus Australian in comparison with players of an advanced level (Ramón-Llín, Guzmán, Martínez-Gallego, Vučković et al., 2021).

Previous research analysing the direction of the serve depending on the side of the court and the tactical formation agree with the data obtained in this study, except in the direction of the predominant serve from the right side in the Australian formation where they indicate that the predominant direction is to the side wall instead of to the "T" (Ramón-Llín, Guzmán, Martínez-Gallego, Muñoz et al., 2021), these differences

may be due to the equality in the direction of this serve, whose difference depends on the type of tournament analysed. In spite of this, in general terms, the serve to the side wall is the predominant direction as opposed to the "T", as indicated by other studies (Sánchez-Alcaraz, Muñoz et al., 2020).

On the other hand, when the serve is made in a conventional formation and has a direction to the side wall, the player after the serve-return is more balanced than in Australian, with the return down the line being superior when the serve goes to the wall looking for the serving partner, results that agree with those proposed by Sánchez-Alcaraz, Muñoz et al. (2020) where the down the line serve-return is predominant. When the serve is directed towards the "T", the direction of the return is balanced between the server and the server's partner, as the return can have a direction towards the center of the court looking to generate indecision in the partner at the net (Sánchez-Alcaraz, Muñoz et al., 2023) alternating the hitting between the two members of the serving pair depending on the return.

Analysis of the shot type after serve-return -

With respect to the first stroke after the serve-return, the volley is the main stroke after the serve-return in both conventional and Australian formation when the opponent's serve look the side wall, coinciding with what Ramón-Llín et al. (2019) show that most of the serve-returns are flat. The backhand volley is predominant in both cases, the search for this stroke by the return pair may be due to the fact that the volley is the gesture, along with the groundstrokes, that most errors are made (Sánchez-Alcaraz, Muñoz et al., 2022), with the backhand volley being superior to the forehand volley (Escudero-Tena, Muñoz, Sánchez-Alcaraz, García-Rubio, & Ibáñez, 2022), thus looking a less effective hit by the servers to subsequently achieve a better advantage in the point, since the return does not produce

winners (Sánchez-Alcaraz, Muñoz et al., 2020). Furthermore, as indicated by Sánchez-Alcaraz, Muñoz et al. (2023), the center of the court at the net is the area where most shots are hit in both men's and women's padel, so the return to this area from a less favourable position such as the side wall, aims to find both the forehand and backhand volley, as well as generating uncertainty in the serving pair to see who hits the ball. On the other hand, when the serve is directed towards the "T", the *bandeja* is the predominant stroke after the serve-return, because the return pair wants to be able to reach offensive positions, since the net area is where most of the points are obtained (Ramón-Llín et al., 2022), therefore, the lob becomes the most useful shot to obtain offensive positions (Escudero-Tena, Fernández-Cortes, García-Rubio, Ibáñez, 2020) and a serve-return after the rebound off the back wall or after a direct hit is the most effective without committing an unforced error (Sánchez-Alcaraz, Muñoz et al., 2020), so the serving pair returns the lob with a *bandeja* to continue holding the net (Sánchez-Alcaraz, Pérez-Puche et al., 2020).

This study has some limitations that should be taken into account when interpreting the results. Although the number of serves analysed is higher than in previous studies, and they have been analysed in different rounds of play, the sample of matches to be analysed should be extended for future research in order to be able to compare with different players. Furthermore, although the direction of the serve-return is analysed, future research should consider analyse the height of the serve-return to be able to draw more complete conclusions. In this sense, the type of shot at serve-return (*tense* or *lob*) could be very interesting to determine training strategies for serve and the third shot. In addition, a greater differentiation between serves to the centre or to the player's body and differentiating between right-handed and left-handed players could be important

to be more specific in the process training, because of the high level of the players. A further noteworthy limitation is the analysis of only men's matches, which precludes the extrapolation of the results to women's padel. Consequently, comparisons between the two genders in terms of tactics cannot be made, and this issue should be addressed in future studies.

5. Practical Applications.

The results obtained are of great practical application, and should be taken into account by coaches when planning training sessions and creating an adequate tactic in competition. They are also of benefit to players, who can use them to gain a better understanding of the dynamics of the game. The data provide a more detailed understanding of the most frequent serve directions depending on the side of the court, tactical training and the most frequent first shot after the serve-return, allowing a greater volume of training to be included in the actions that are most repeated, for example, serves to the 'T' plus a *bandeja*. Furthermore, it enables anticipation of the possible directions of the ball in competition, both for the serving pair and the returner, based on the aforementioned variables. This allows for the creation of a play that may favour the interests of the pair.

6. Conclusions

In conclusions, this may be the first study to relate serving strategy to the type of stroke made after the serve and return and the player who makes the stroke after the serve and return, in professional circuit players. This study has allowed us to obtain more detailed results about the different variables of the serve depending on the tactic formation used and its results have great application to training and competition. The results indicate that the direction of the serve in the conventional formation is superior to

the side wall versus the "T" from both the right and left side. The direction of the serve in the Australian formation depends on the side of serve, being superior to the side wall from the left side and superior to the "T" from the right side. Similarly, the serve-return also depends on the tactic used, the server is the main player after the return, especially after the serve to the side wall in both tactical arrangements, whereas the server's partner, in Australian formation receives more returns from the "T" and more returns from the wall in conventional formation. The backhand volley is the most used stroke after the serve-return in both tactical situations when the serve is directed to the wall. On the other hand, when the serve is directed to the "T" the first stroke after the serve-return is mainly a bandeja.

Funding: This research received no external funding.

Conflicts of Interest: The authors declare no conflict of interest.

References

- Altman, D. G. (1991). *Practical statistics for medical research*. Chapman and Hall. [Research/Altman/p/book/9780412276309](https://doi.org/10.1002/9780412276309).
- Courel-Ibáñez, J., & Sánchez-Alcaraz, B. J. (2018). The role of hand dominance in padel: Performance profiles of professional players. *Motricidade*, 14, 33-41. <https://doi.org/10.6063/MOTRICIDADE.14306>
- Courel-Ibáñez, J., Sánchez-Alcaraz, J. B., & Cañas, J. (2015). Effectiveness at the net as a predictor of final match outcome in professional padel players. *International Journal of Performance Analysis in Sport*, 15(2), 632-640.
- Courel-Ibáñez, J., Sánchez-Alcaraz, B. J., & Cañas, J. (2017). Game performance and length of rally in professional padel players. *Journal of Human Kinetics*, 55, 161-169. <https://doi.org/10.1515/hukin-2016-0045>
- Courel-Ibáñez, J., Sánchez-Alcaraz, B. J., García, S., & Echegaray, M. (2017). Evolution of the padel in Spain according to the gender and age of the players. *Cultura, Ciencia y Deporte*, 12(34), 39-46. <https://doi.org/10.12800/ccd.v12i34.830>
- Courel-Ibáñez, J., Sánchez-Alcaraz, B. J., & Muñoz, D. (2019). Exploring game dynamics in padel: Implications for assessment and training. *Journal of Strength and Conditioning Research*, 33(7), 1971-1977. <https://doi.org/10.1519/JSC.0000000000002126>
- Conde-Ripoll, R., Llanos, M.B., García, J.M., & Sánchez-Alcaraz, B.J. (2021). Analysis of wall strokes in profesional padel. *Revista de Entrenamiento Deportivo*, 35(2), 3-11.
- Díaz-García, J., González-Ponce, I., López-Gajardo, M. A., Manzano-Rodríguez, D., Lobo-Triviño, D., Rubio-Morales, A., & García-Calvo, T. (2023). How mentally fatiguing is play a semiprofessional padel competition? A study of gender differences. *Padel Scientific Journal*, 1(1), 7-22. <https://doi.org/10.17398/2952-2218.1.7>
- Díaz-García, J., González-Ponce, I., López-Gajardo, M. Á., Van Cutsem, J., Roelands, B., & García-Calvo, T. (2021). How mentally fatiguing are consecutive World Padel Tour matches? *International Journal of Environmental Research and Public Health*, 18(17), 9059. <https://doi.org/10.3390/ijerph18179059>
- Escudero-Tena, A., Almonacid, B., Martínez, J., Martínez-Gallego, R., Sánchez-Alcaraz, B. J., & Muñoz, D. (2022). Analysis of finishing actions in men's and women's professional padel. *International Journal of Sports Science & Coaching*, 19(3), 1384-1389. <https://doi.org/10.1177/17479541221139970>
- Escudero-Tena, A., Galatti, L., Sánchez-Alcaraz, B. J., Muñoz, D., & Ibáñez, S. J. (2023). Effect of the golden points and non-golden points on performance parameters in professional padel. *International Journal of Sports Science & Coaching*, 19(3), 1314-1323. <https://doi.org/10.1177/17479541231161288>

- Escudero-Tena, A., Ibáñez, S.J., Parraca, J.A., Sánchez-Alcaraz, B.J., & Muñoz, D. (2023). Influence of the importance of the point and service tactical position in the shot following return in men's and women's professional padel. *International Journal of Sports Science & Coaching*, 19(3), 1357-1365. <https://doi.org/10.1177/17479541231163535>
- Escudero-Tena, A., Ibáñez, S.J., Vaquero-Castillo, A., Sánchez-Alcaraz, B.J., Ramón-Llin, J., & Muñoz, D. (2023). Analysis of the return in professional men's and women's padel. *International Journal of Sports Science & Coaching*, 19(3), 1375-1383. <https://doi.org/10.1177/17479541231167752>
- Escudero-Tena, A., Muñoz, D., Sánchez-Alcaraz, B. J., García-Rubio, J., & Ibáñez, S. J. (2022). Analysis of errors and winners in men's and women's professional padel. *Applied Sciences*, 12(16), 8125. <https://doi.org/10.3390/app12168125>
- Escudero-Tena, A., Fernández-Cortes, J., García-Rubio, J., & Ibáñez, S. J. (2020). Use and efficacy of the lob to achieve the offensive position in women's professional padel. Analysis of the 2018 WPT finals. *International Journal of Environmental Research and Public Health*, 17(11), 4061. <https://doi.org/10.3390/ijerph17114061>
- Field, A. (2018) *Discovering Statistics Using IBM SPSS Statistics*. 5th Edition, SAGE Publications Ltd., London.
- Fritz, C. O., Morris, P. E., & Richler, J. J. (2012). Effect size estimates: Current use, calculations, and interpretation. *Journal of Experimental Psychology: General*, 141(1), 2–18. <https://doi.org/10.1037/a0024338>
- Gabin, B., Camerino, O., Anguera, M. T., & Castañer, M. (2012). Lince: Multiplatform sport analysis software. *Procedia - Social and Behavioral Sciences*, 46, 4692–4694. <https://doi.org/10.1016/j.sbspro.2012.06.320>
- Gillet, E., Leroy, D., Thouvarecq, R., & Stein, J.F. (2009). A Notational Analysis of Elite Tennis Serve and Serve-Return Strategies on Slow Surface. *Journal of Strength and Conditioning Research*, 23(2), 532-539. <https://doi.org/10.1519/JSC.0b013e31818efe29>
- International Padel Federation. (2020). Rules of padel. FIP. Recuperado de <https://www.padelfip.com/es/>
- Kilit, B., Şenel, Ö., Arslan, E., & Can, S. (2016). Physiological responses and match characteristics in professional tennis players during a one-hour simulated tennis match. *Journal of Human Kinetics*, 51(1), 83-92. <https://doi.org/10.1515/hukin-2015-0173>
- Martín-Miguel, I., Escudero-Tena, A., Muñoz, D., & Sánchez-Alcaraz, B. J. (2023). Performance analysis in padel: A systematic review. *Journal of Human Kinetics*, 89, 213-230. <https://doi.org/10.5114/jhk/168640>
- Martín-Miguel, I, Muñoz D., Lupo, C., & Sánchez-Alcaraz, B.J. (2024). Absence of association between serve and winning point in professional padel. *Journal of Sports Medicine and Physical Fitness*, 64, 103-10. <https://doi.org/10.23736/S0022-4707.23.15291-1>
- Mellado-Arbelo, O., & Baiget, E. (2022). Activity profile and physiological demand of padel match play: a systematic review. *Kinesiology*, 54(1), 51-61.
- Muñoz, D., Coronado, M., Robles-Gil, M.C., Martín, M., & Escudero-Tena, A. (2022). Incidence of upper body injuries in amateur padel players. *International Journal of Environmental Research and Public Health*, 19, 16858.
- Muñoz, D., Sánchez-Alcaraz, B.J., Courel-Ibáñez, J., Romero, E., Grijota, F. J., & Diaz, J. (2016). Study about profile and distribution of padel courts in the Autonomous Community of Extremadura. *E-Balónmano.com Revista de Ciencias Del Deporte*, 12(3), 223–230.
- Muñoz, D., Toro-Román, V., Vergara, I., Romero, A., Fernández de Ossó Fuente, A. I., & Sánchez-Alcaraz, B. J. (2022). Analysis of the golden point and its relationship with performance in male and female professional padel. *Retos: Nuevas Tendencias En Educación Física, Deportes y Recreación*, 45,

- 275-281.
<https://doi.org/10.47197/retos.v45i0.92388>
- O'donoghue, P. G. (2001). The Most Important Points in Grand Slam Singles Tennis. *Research Quarterly for Exercise and Sport*, 72(2), 125-131.
<https://doi.org/10.1080/02701367.2001.10608942>
- Priego, J., Melis, J. O., Belloch, S. L., Soriano, P. P., García, J. C. G., & Almenara, M. S. (2013). Padel: A Quantitative study of the shots and movements in the high-performance. *Journal of Human Sport and Exercise*, 8(4), 925-931.
- Ramón-Llin, J., Guzmán, J. F., Llana, S., Martínez-Gallego, R., James, N., & Vučković, G. (2019). The effect of the return of serve on the server pair's movement parameters and rally outcome in padel using cluster analysis. *Frontiers in Psychology*, 10, 1194.
<https://doi.org/10.3389/fpsyg.2019.01194>
- Ramón-Llín, J., Guzmán, J. F., Muñoz, D., Martínez-Gallego, R., Sánchez-Pay, A., & Sánchez-Alcaraz, B. J. (2022). Sequential analysis of final point strokes in padel using a decision tree. *Revista Internacional de Medicina y Ciencias de la Actividad Física y del Deporte*, 22(88), 933-947.
<https://doi.org/10.15366/rimcafd2022.88.013>
- Ramón-Llin, J., Guzmán, J., Llana, S., Vučković, G., & James, N. (2013). Comparison of distance covered in paddle in the serve team according to performance level. *Journal of Human Sport and Exercise*, 8(3), 738-742.
<https://doi.org/10.4100/jhse.2013.8.Proc3.20>
- Ramón-Llín, J., Guzmán, J., Llana, S., Vuckovic, G., Muñoz, D., y Sánchez-Alcaraz, B. J. (2021). Analysis of distance covered in padel based on level of play and number of points per match. *Retos: Nuevas Tendencias En Educación Física, Deportes y Recreación*, 39, 205–209.
<https://doi.org/10.47197/retos.v0i39.79322>
- Ramón-Llin, J., Guzmán, J., Martínez-Gallego, R., Muñoz, D., Sánchez-Pay, A., Sánchez-Alcaraz, B.J. (2021). Analysis of the on-court situation of the players in the serve and ints relationship with the direccion, side of the court and the result of the point in high-level padel. *Retos: Nuevas Tendencias En Educación Física, Deportes y Recreación*, 41, 399-405.
- Ramón-Llin, J., Guzmán, J., Martínez-Gallego, R., Vučković, G., Muñoz, D., & Sánchez-Alcaraz, B. J. (2021). Comparison of service tactic formation on players' movements and point outcome between national and beginner level padel. *PLOS ONE*, 16(10), e0250225.
<https://doi.org/10.1371/journal.pone.0250225>
- Ramón-Llin, J., Llana, S., Guzmán, J., Vuckovic, G., Muñoz, D., Sánchez-Alcaraz, B.J. (2020). Analysis of the distance travelled in padel as a fuction of the different strategies roles and the level of play of the players. *Acción Motriz*, 25, 59-67.
- Randolph, J. J. (2005). Free-Marginal multirater kappa (multirater K[free]): An alternative to fleiss' fixed-marginal multirater kappa. *Joensuu Learning and Instruction Symposium*.
<http://eric.ed.gov/?id=ED490661>
- Reid, M., McMurtrie, D., & Crespo, M. (2010). Title: The relationship between match statistics and top 100 ranking in professional men's tennis. *International Journal of Performance Analysis in Sport*, 10(2), 131-138.
<https://doi.org/10.1080/24748668.2010.11868509>
- Sánchez-Alcaraz, B.J., Cánovas, J., Sánchez-Pay, A., & Muñoz, D. (2023). Research in padel. Systematic review. *Padel Scientific Journal*, 1(1), 81-118. <https://doi.org/10.17398/2952-2218.1.39>
- Sánchez-Alcaraz, B. J., Cañas, J. y Courel-Ibáñez, J. (2015). Analysis of scientific research in padel. *Agón, International Journal of Sport Sciences*, 5(1), 44-54.
- Sánchez-Alcaraz, B.J., Courel-Ibáñez, J., & Cañas, J. (2018). Temporal structure, on-court movement and game actions in padel: a systematic review. *Retos: Nuevas Tendencias En Educación Física, Deporte y Recreación*, 33, 308-312

- Sánchez-Alcaraz, B. J., Courel-Ibáñez, J., Díaz, J., Grijota, F. J., & Muñoz, D. (2019). Effects of the outcome differentials and point importance on temporal structure in first-category. *Journal of Sport and Health Research*, 11(2), 151–160.
- Sánchez-Alcaraz, B. J., Courel-Ibáñez, J., Muñoz, D., Infantes-Córdoba, P., Sáenz de Zumarán, F., & Sánchez-Pay, A. (2020). Analysis of attacking actions in professional men's paddle tennis. *Apunts Educación Física y Deportes*, 141, 29-34. [https://doi.org/10.5672/apunts.2014-0983.es.\(2020/4\).142.04](https://doi.org/10.5672/apunts.2014-0983.es.(2020/4).142.04)
- Sánchez-Alcaraz, B.J., Muñoz, D., Escudero-Tena, A., Martín-Miguel, I., & Martínez-García, J. (2023). Analysis of hitting zones in professional padel. *Kronos*, 21(2), 1-9.
- Sánchez-Alcaraz, B. J., Muñoz, D., Pradas, F., Ramón-Llin, J., Cañas, J., & Sánchez-Pay, A. (2020). Analysis of serve and serve-return strategies in elite male and female padel. *Applied Sciences*, 10(19), 6693. <https://doi.org/10.3390/app10196693>
- Sánchez-Alcaraz, B.J., Muñoz, D., Sánchez-Pay, A., Martín-Miguel, I., Piedra, D., & Barriocanal, I. (2022). Analysis of winning strokes and errors in professional padel. *Revista Iberoamericana de Ciencias de la Actividad Física y el Deporte*, 11(3), 85-97.
- Sánchez-Alcaraz, B. J., Pérez-Puche, D. T., Pradas, F., Ramón-Llín, J., Sánchez-Pay, A., & Muñoz, D. (2020). Analysis of performance parameters of the smash in male and female professional padel. *International Journal of Environmental Research and Public Health*, 17(19), 7027. <https://doi.org/10.3390/ijerph17197027>
- Sánchez-Alcaraz, B. J., Ramón-Llin, J., González, R., Martínez-Gallego, R., & Sánchez-Pay, A. (2022). Analysis of the lob action in professional men's and women's padel: A pilot study. *Padel Scientific Journal*, 1(1), 39-54. <https://doi.org/10.17398/2952-2218.1.39>
- Sánchez-Alcaraz, B.J., Ferrer, F., Zurano, A., Muñoz, D., Ramón-Llin, J. (2021). Analysis of the double open wall stroke in professional padel. Differences between genders. *Acción Motriz*, 25, 113-122.
- Thomas, J. R., Martin, P., Etnier, J. L., & Silverman, S. J. (2022). Research methods in physical activity. *Human kinetics*.