

OFFENSIVE PLAYERS VS DEFENSIVE PLAYERS: A TECHNICAL AND TACTICAL ANALYSIS OF TABLE TENNIS MATCHES

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Abstract The purpose of the present study was to record and compare the techniques and tactics of the serve, reception, and third hit between offensive and defensive male players at an elite level. The research sample consists of a total of 42 individual matches (3,174) from the last four years between players with offensive and defensive styles from World International tournaments organized by the ITTF. The data analyzed included: the service execution grip, the placement of service execution, the type of technique during reception, the placement of executing reception, and the third hit. The matches were recorded using video analysis. Non-parametric χ^2 test was applied for statistical data processing, and statistically significant differences were found between offensive and defensive players. Offensive players, use the Forehand grip in service almost exclusively. When playing with defensive style players, their first choice in service and reception is Backhand-Long, while mainly use the Forehand-Push in reception and, most preferably, the Forehand-Topspin in the third ball respectively. Defensive players rely more on the Backhand grip in service, serve closer to the net, and defend against serves by sending the ball to the final line of the table, while the Backhand-Chop is the first choice in reception and service, and the hit after service. The findings of this study could be used by coaches and players as important elements for improving training and providing effective guidance during such competitions.

Key words: table tennis, technical, tactical, offensive, defensive, video analysis

Introduction

Table tennis is among the most popular sports worldwide and counts over 300 million players globally (Gu et al., 2019). In high, competitive sports levels, it is a very complex and intricate sport in terms of technique and tactics (Bankoz & Winiarski, 2017). The attempts made during a table tennis match are of short duration, high

intensity, with continuous changes in rhythm and direction, requiring players to be alert at all times, as they must move constantly and hit the ball which moves at high speed (Pradas et al., 2015). Various aspects of table tennis are the subject of numerous studies. Several studies focus on techniques, tactics, mental, psychological, and physical actions during the game (Faber, 2006). Analyzing matches in terms of technique and tactics provides useful information for both players and coaches that can significantly determine the final outcome of a match (Wu Xiao & Escobar, 2007). Observing and analyzing games can not only provide useful information for a specific match but also contribute to training sessions by facilitating a better development of the game (Nicolakakis et al., 2021). Research in table tennis regarding technique and tactics has always been a fundamental subject of study in China. Today, technical and tactical analysis has become a necessary task for sports in the super powers of the sport such as China, Germany, and Japan (Funchs et al., 2018). Table tennis players constantly plan different technical and tactical moves according to their personal playing style as well as the opponent's playing style, making decisions in a very short period of time (Munivrana et al., 2015; Nicolakakis et al., 2023). By collecting the necessary data from table tennis matches, coaches and players can gather valuable insights for technical and tactical improvement, refer to specific data, and extract the necessary information to help them draw their final conclusions (Baca, 2003). Numerous studies focus on various technical and tactical aspects of the game, with the main ones focusing on service, reception, and errors (Malagoli-Lanzoni et al., 2014). In racket sports, especially in table tennis, service and reception are the most important factors and greatly influence the final outcome of the winning point (Djokic, et al., 2020). The service strategy is a decisive factor for victory and varies depending on the type of grip, the direction of the ball, the type of topspin, and the length (Drianovski & Otcheva, 2002). The most common and frequent way of analyzing a table tennis game is the analysis of the three phases. The analysis of the serve, the reception, and the third hit by the service athlete (Wu et al., 1998). Through video analysis of top-level players, it has been recorded that the key to victory is for the athlete to gain the advantage during the first three hits, something that relies heavily on the serve and the reception (Ma et al., 2015). A study conducted by Djokic et al. (2017) at the 2015 European Games in Baku explored the relationship between service and receiving of winners and defeated table tennis players. A total of 46 matches, 4,649 rallies (best of seven) were evaluated among the top 45 European players. The results of the survey showed significant differences between winners and defeated in terms of service and reception. The winners earned points when service successfully at 60.6% and lost points at 39.3%, while the losers earned fewer points when performing services at 46.7% and lost more points at 53.2%. Table tennis players mainly use two playing styles: offensive (OFF) and defensive (DEF) (Geske et al., 2010). Technical and tactical moves and more generally the style of play in table tennis are significantly affected by the equipment and specialized materials (rubbers, blades) used by the players. The main characteristic of offensive players is the hit Forehand Topspin which is the most frequent and aggressive hit by which the athlete has the ability to hit the ball at a high velocity with a fast rotation (Qian et al., 2016). On the other hand, players with defensive playing style tend to play further away from the final line of the table and have a slower playing style using different hits with the main hit being the Backhand Chop. In the bibliography of table tennis, while there are plenty of studies analysing offensive players' matches, there is not a satisfactory number of studies focusing on players with defensive style of play, most likely due to the difficulty of defending style but also the small number of players with the particular style compared to players with offensive style. The purpose of this study was to record and compare technical and tactical choices in the service, reception and third hit between elite level offensive and defensive male players.

Method

Participants

The conduction of this study involved the analysis of a total of 42 matches (3,174 points) of the last two years (2022–2023) from 18 WTT Contender Series organized by WTT. More specifically, it focused on matches in which offensive style players competed against defensive style players. All players belonged to the adult male category (33 ±12 years old) and were ranked among the top 180 in the ITTF ranking list. Out of the 49 players, the first 24 (49%) were in the top 50 positions, the next 15 players (30,6%) were ranked between positions 51 and 100, while the remaining 10 players (20,4%) were ranked between positions 101 and 180. Matches from all tournament stages were analyzed, starting from the round of 64, 32, and 16, as well as the quarterfinals, semifinals, and finals. A total of 9 defensive players using pimple-out rubber on the Backhand and 40 offensive players using pimple-in rubber on both the Forehand and Backhand participated in the research. Due to the small number of defensive players present in the world table tennis competition, it was decided that each defensive-style athlete could be measured from 4 to 5 times while the abundance of offensive players enabled measuring each one of them from 1 to 2 times. In 21 matches, the offensive players emerged as the winners while victory was taken by the defensive players in the remaining 21. The analysis of these specific matches does not include all encounters between defensive and offensive players but represents a most representative sample.

Measuring instruments

The data was collected and analyzed through the official WTT (World Table Tennis) YouTube channel on matches that had such an appropriate viewing angle that would allow no doubts about the reliability of the study. For the purposes of the research, a LED 64" display screen was also used.

Procedure

For the analysis of the data on techniques and tactics, the matches were reviewed in very slow motion by both the researcher and a highly experienced table tennis coach, watching together at the same time on the same TV LED 64". Only after reaching a consensus was the data recorded in the analysis diagram and entered into the SPSS 20 program. The whole process was done manually observing each particular point won. The analysis of the matches always started from the first service and ended with the completion of the last point. The observation protocol was created by the researcher with specific parameters taken from international bibliography. The variables analyzed between the offensive style players and the defensive style players were: (a) Service grip: Forehand Grip, Backhand Grip, (b) Placement of Service: Backhand Short, Middle Short, Forehand Short; Backhand Inside/Out; Middle Inside/Out; Forehand Long, Middle Long, Forehand Long; (c) Reception of service: Forehand Push, Back Hand Push; Forehand Flick, Back hand Flick; Forehand Topspin; Backhand Topspin; Forehand Chop; Backhand Chop, (d) Third Ball: Forehand Push.

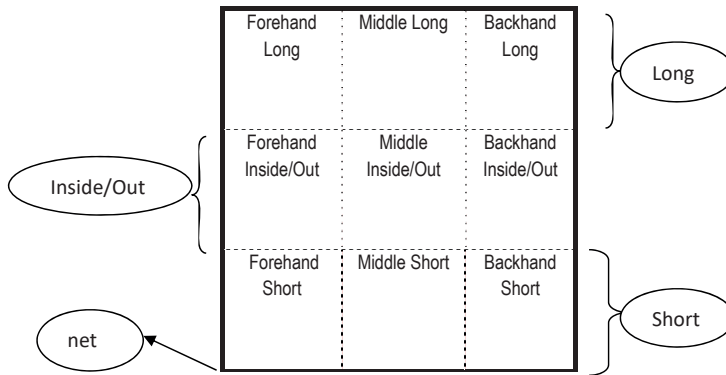


Figure 1. The table tennis service and reception areas.

Statistical analysis

In order to achieve the reliability of the research, two very experienced coaches assisted in data collection, and only when their opinions on the sample came to an agreement, the data was collected directly in Microsoft Excel. The analyses were performed with the SPSS 20 software. For the statistical analysis of the data the non-parametric chi-square (χ^2) test was used for each categorical dependent variable to identify statistically significant differences between the classifications within each variable. For selected pairs of the categorical dependent variables chi-square (χ^2) test of independence was also applied to examine statistically significant relationships between them. The level of significance was set as $p < .05$.

Results

The application of the non-parametric chi-square (χ^2) test showed significant differences in all variables between offensive and defensive players. With regard to the relationship between handling the racket grip during the execution of the serve and the style of the players, a statistically significant difference was observed between the players of offensive and defensive style [$\chi^2(1) = 914,855; p < 0,05$] (Table 1). Comparing offensive and defensive players showed statistically significant differences in terms of the service area [$\chi^2(8) = 251,837; p < 0,05$] (Table 2). Comparing the offenders with the defensive players again revealed statistically significant dissimilarities in the movement upon reception [$\chi^2(7) = 1864,108; p < 0,05$] (Table 3). Regarding the reception placement, there were again statistically significant differences comparing the players of offensive and defensive style [$\chi^2(8) = 254,058; p < 0,05$] (Table 4). Finally, statistically significant differences were also found in the third ball [$\chi^2(7) = 1309,797; p < 0,05$] (Table 5).

Table 1. Service grip performance results between offensive and defensive players ($p < 0,05$)

	Offensive Players	Defensive Players
Forehand Grip	92%	41.6%
Backhand Grip	8%	58.4%

Table 2. Service placement results between offensive and defensive players ($p < 0,05$)

	Offensive Players	Defensive Players
Backhand Short	9.4 %	14.7%
Middle Short	9.7%	17.6%
Forehand Short	14.7%	18.3%
Backhand Inside/Out	11.8%	8%
Middle Inside/Out	11.3%	7.2%
Forehand Inside/Out	4.2%	9.7%
Backhand Long	30.7%	13.9%
Middle Long	7.5%	7.8%
Forehand Long	0.7%	0%

Table 3. Results of hitting successful receptions of offensive and defensive players ($p < 0,05$)

	Offensive Players	Defensive Players
Forehand Push	40.9%	10%
Backhand Push	16.5%	11.5%
Forehand Flick	8%	0.4%
Backhand Flick	3.6%	0%
Forehand Topspin	18.7%	1.4%
Backhand Topspin	12%	1.1%
Forehand Chop	0.1%	3%
Backhand Chop	0.2%	72.5%

Table 4. Results of service reception placement between offensive and defensive players ($p < 0,05$)

	Offensive Players	Defensive Players
Backhand Short	3.6 %	2%
Middle Short	8.1%	1.9%
Forehand Short	5.6%	2.6%
Backhand Inside/Out	3.2%	0.4%
Middle Inside/Out	1.1%	3%
Forehand Inside/Out	1.5%	1.2%
Backhand Long	53%	44.5%
Middle Long	12.7%	16.4%
Forehand Long	11.3%	28.1%

Table 5. Results of hitting during third ball between offensive and defensive players ($p < 0,05$)

	Offensive Players	Defensive Players
Forehand Push	5.6%	4.7%
Backhand Push	7%	3.2%
Forehand Flick	0.5%	0.5%
Backhand Flick	1.2%	0%
Forehand Topspin	80%	23.9%
Backhand Topspin	3.4%	3.5%
Forehand Chop	1.7%	2.9%
Backhand Chop	0.6%	61.4%

Discussion

In the present study, comparing the percentages between offensive and defensive male's players in table tennis, statistically significant differences were found between them in all the variables under consideration, showing that there are substantial differences between offensive and defensive players in terms of techniques and tactics. Regarding the service grip, it was found that the dominant service for offensive players is the one with a Forehand grip while defence-style players appear to trust both Forehand and Backhand, with the Backhand grip being the most chosen (Table 1). In general, research shows that high-level players mainly choose the Forehand grip for their service (Djokic et al., 2015). There were also statistically significant differences in the choice of the service placement between the defensive and the offensive players (Table 2). Through the analysis in this study, it appeared that approximately half of the serves from defensive to offensive players are "Short" and specifically on all sides of the playing table (Forehand, Middle, Backhand) with a similar percentage while the second choice of defensive players in the placement of the service is Backhand-Long. The same findings were also reached by Pradas et al. (2023) who studied male table tennis players, as the most common choice for serving was near the net in the "Short" area. On the contrary, the choices of the offensive players against the defensive are quite different. Backhand-Long is by far their first choice – most likely to manifest attack after their service- followed by the Forehand-Short, Backhand-Inside/Out and Middle/Out. Similar research on young offensive players regarding service placement agrees with the present one as it shows that the dominant services are the ones targeting the area near the net (Mulloy et al., 2014). The reception also plays a particularly important role in the development of a table tennis match. The initial three strokes, the three techniques (topspin and attack, short touch, and twist), along with the three placements (Backhand-Long, Forehand-Long, and Middle-Long), played a crucial role in influencing the outcome of the table tennis match. According to Table 3, offensive and defensive players have statistically significant differences in the way they reception the service. An overwhelming percentage of defensive players maintain the Backhand – Chop as their main reception placement, followed by the Forehand & Backhand Push ones. The above actions are not surprising as they generally relate to defensive tactics. When offensive players reception services from defensive ones, the Forehand-Push is their first choice, Forehand-Topsin their second, and to a slight extent followed by the Forehand Push. A common element of the above results of both styles is the Forehand & Backhand Push hit which shows that it is one of the most useful in table tennis. Similar results on reception tactics and specifically on the Push were found by Nikolakakis et al. (2015) in a similar study conducted on young female players. According to Djokic et al. (2019) the Forehand Push (Forehand backspin hit) appears to be once again the top choice for receiving among elite European male athletes. As for the placement of reception, a huge percentage in both categories of players chooses the Backhand-Long first, while according to the percentages (Table 4), they appear to trust as their second and third options the areas near the final line of the game table (Long Area) with the defensive players insisting more on the Forehand-Long. Finally, similar differences were found in the third ball, the hit of the service athlete after the service (Table 5). Players with an offensive style prefer the Forehand – Topspin with an overwhelming percentage of up to 80%, while players of a defensive style initially choose the Backhand – Chop and, as their second option, the Forehand-Topspin. The Forehand-Topspin is one of the most important and common moves used by table tennis players during a match (Qian et al., 2016). As the results of this study showed, there are statistically significant differences in the grip of service execution and in all the parameters of the first three hits, between players with an offensive and defensive style of play. It is worth noting that there are statistically significant differences in the first three hits, as both defensive and offensive players attempt to impose their strategy and tactics

at the beginning of each point. The first three hits are the key to achieving this goal. This study will be useful for both players and table tennis coaches who face defensive and offensive style of play. In addition to the handling of the first three hits of the two different game styles, other parameters of a match have to be recorded in future studies. Also, apart from the men's division, the female's division and the developmental ages regarding the style of attack and defence should be studied.

Conclusions

Summarizing the results of this study, it appears that offensive players use the Forehand grip, while defensive ones use both grips tending more towards the Backhand one. The latter mainly serve near the net and the Backhand-Long area while the former, when dealing with defensive players, serve more in the Backhand-Long, Forehand-Short and Inside/Out area. The reception of defence-style players is based on the Backhand-Chop move with complementary moves being the Forehand & Backhand Push. Offensive players rely more on the Forehand-Push move followed by the Forehand-Topspin and Backhand-Topspin moves in reception when dealing with defensive style opponents. Regarding the reception placement, Backhand-Long is the first choice of both defensive and offensive players, and more generally, the areas on the final line of the table. Finally, in the third ball, offensive players most often use the Forehand-Topspin while the defensive players prefer the Backhand-Chop. The above findings are expected to help modern coaches and players to understand more deeply the importance of tactics and certain technical hits in matches between defensive and offensive players which is expected to positively influence the way of training through special exercises but also the provision of more meaningful instructions during a match.

Suggestions for Future Research

Future research should conduct a comparative analysis between male and female players to examine potential physiological and biomechanical differences, with effect sizes reported to quantify the magnitude of these variations. Beyond identifying differences, studies should aim to explain the underlying mechanisms responsible for these variations. This could involve exploring physiological factors such as muscle fiber type distribution, strength, power output, and cardiorespiratory capacity, as well as biomechanical factors like movement patterns, technique, and coordination, using kinematic and kinetic analyses for deeper insights. Additionally, future research should investigate neuromuscular control differences, including reaction time, motor control, and sensorimotor integration, along with the role of sex hormones in influencing athletic performance.

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