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FOOTWORK TECHNIQUES USED IN TABLE TENNIS: A QUALITATIVE ANALYSIS

Abstract

INTRODUCTION

Footwork and steps (one step, side to side, slide step, "turn" step, cross step, and combinations of these steps) are fundamental in table tennis. Players should use the best technique for guarantying the shortest time to arrive in the right position, that gives the possibility to play the best shot.

AIM OF THE STUDY

This study aims to define the different footwork techniques used by table tennis players. To compare different footwork techniques for giving useful suggestions to coaches and implementing better training for players, from a technical and physical point of view.

METHODS

- 1. Analysis of 2 matches of 4 male players from 2006 World Team Table Tennis Championships (videos recorded from television). During that competition the players were the n° 1 (Wang Liqin), 2 (Timo Boll), 4 (Ma Lin) and 56 (Christian Suss) in the world ranking. Analysis of the matches: L. Ma vs T. Boll, and L.Q. Wang vs C. Suss.*
- 2. To record the 5 different types of steps defined and the 16 types of shots (drive and back) was used a 16 x 5 table. To carry out this analysis it has always been taken into account the last step before the shot or before the attempt to hit the ball.*
- 3. The analysis of the frequencies of the different types of steps were performed and percentages calculated.*
- 4. The non-parametric Chi Square test were performed to identify significant differences ($\alpha=0.01$) in the use of footwork techniques by the 4 players considered.*

RESULTS

The results allow a qualitative description of the various step movements.

The most frequent step is the one step with a frequency of 37.3%; the second one is the turn step with a frequency of 21.1%; they are followed by the chassè 15.2%; the stroke without stop 11.5 %; the slide step 7.5% and the crossover 7.3%.

Chi Square analysis, by comparing the use of different types of steps by the players, shows significant differences between them ($\chi^2 (15) = 40.63, p<0.01$). A single match analysis shows that between Boll and Lin there are not significant differences in the steps used ($\chi^2 (5) = 14.01, p>0.01$); while between Wang and Suss the differences in steps movements are significant ($\chi^2 (5) = 26.62, p<0.01$).

DISCUSSION

Analysis of the matches suggests inter individual differences in the characteristics of the steps movements. The "one step" is especially used to hit the ball in the forehand and backhand push to return the service. The "turn step" is used to prepare the forehand top spin. The Timo Boll vs Ma Lin match shows a similar use of steps by players whereas in the Wang Liqin vs Christian Suss match, the first player (the winner of the match) uses the "turn step" more frequently than the other player. Further studies on a larger number of matches, using the same methods, will permit a better understanding in the use of footwork techniques.

Key words: *table tennis, footwork technique*

1. Introduction

Table tennis is an extremely complex sport and its development never stops.

Analyzing table tennis is immediately possible to notice that it includes the most important characteristics of sports in general: techniques, game plan, physical and psychological skills.

These are fundamental skills and it should be underlined the importance of studying, developing and training them in order to reach high agonistic degrees.

This paper is based on already done studies [Leach J., 1971] [Trupkovic J., 1978], and aims to get deeper in technique's development.

A good technique, considered as carrying out in the best way a specific movement, is the main base for building up a good player. Moreover, its development is affected by lot of factors: scientific knowledge, rules, tools, experience. This is the reason why lot of studies aim to develop its teaching and learning.

The training aims to get closer to a pattern considering the player's personal skills, for building up a specific personal technique, or a personal style.

This process starts from a basic level technique, it goes through a standard pattern built up on the best player's analysis and finally it should fit on the player personal style and become as close as possible to a pattern.

The table tennis technique is based on different types of strokes and movements or steps.

Regarding the strokes' technique, different studies have been carried out: on the ITTF "Level 1 coaching manual" [2003] Tepper G. clearly defined a standard classification of the different types of strokes, describing the execution technique. Moreover, Ripoll H. [1989-1990] considered the strokes' psycho-motor aspects and Rodano R. [1991] the biomechanics ones.

The most important thing, considering the best players technique, is the best execution of movements and steps, for reaching in the shortest time the right position, and playing the best stroke.

This is the reason why movements and steps are considered the most important technical aspects for table tennis [Deniso P., 1992] and it is fundamental to get deeper in their analysis.

2. Aims of the study

This study has three main aims:

1. create a clear and overall standard definition of the different types of steps and movements used in table tennis
2. construct the best standard technique pattern of steps and movements, analysing some high level players' matches
3. suggest a good method for studying and analysing different players' techniques in order to improve training and obtain better high agonistic results

3. Methods

1. Analysis of two "2006 World Team Table tennis Championships" semifinal matches ,Bremen, Germany (videos recorded from television)
2. The players analysed were the n° 1 (Wang Liqin), n° 2 (Timo Boll), n°4 (Ma Lin) and n° 56 (Christian Suss) in the world ranking
3. The analysis is based on two matches: Ma Lin vs Timo Boll and Wang Liqin vs Christian Suss
4. Data have been recorded in a 16x5 table in which different types of steps and strokes have been taken into account

Footwork

One of the main characteristics of “modern” high level table tennis is high speed.

A good moving technique is the starting point for reaching in the shortest time the right position and playing the best stroke.

The different steps’ classification below is based on a right hand player but it could be referred also to a left hand one in a perfectly symmetric way. This classification has been mainly based on the moving technique independently from the step’s direction. Before going through the steps’ description is necessary to give a definition of the ready position.

3.1.1. Ready position

The ready position is an important base stance as all possible strokes must be easily reached. The feet should be shoulder width apart or slightly wider, knees bent, body leaning slightly forward and the weight on the front part of the foot to provide balance and readiness for movement. Variations of the ready position exist according to the style of play of the player [Tepper G., 2003].

The four players considered are all forehand attackers, Ma Lin is the only one playing with the Chinese style pengrip.

So that their ready position can be described as follows: standing close to backhand corner with the left leg forward for right-handers, so that the majority of balls can be played with the forehand.

3.1.2. Steps’ classification

1. One step
2. Short and medium steps
 - a. side to side or “chassé”
 - b. slide step
 - c. turn step
3. Crossover

1. **One step** is a small step played starting from the ready position or during other game phases, keeping one foot still and moving the other one towards the ball. The foot that plays the movement should immediately come back into the ready position. One step footwork is used when the ball is played very quickly by the opponent and there is insufficient time to get into the right position for playing the stroke. This type of step is mainly played to return short services or balls played very close to the net.

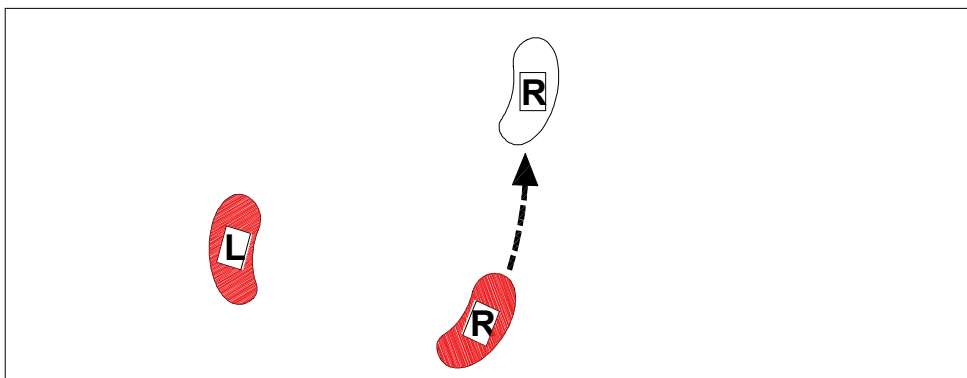


Figure 1 *One step*

2. **Short and medium steps:** all those movements played from the ready position or during other game phases and involving the movement of both feet. These steps

allow players to cover short or medium distances, towards the ball for playing the strokes, with very high speed

- a. **Side to side or "chassé"**: if the movement is on the right side, the left foot moves first and has to get close to the right one, which will move on the right side. So that, at the end of the movement the player will get back on the ready position.

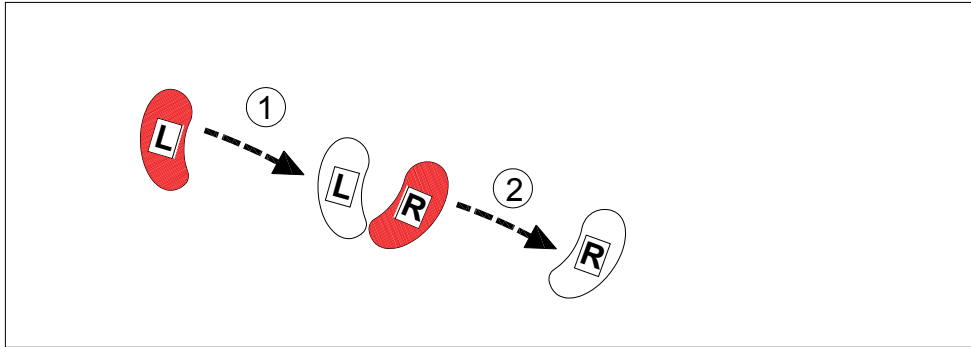


Figure 2 *Chassé*

- b. **Slide step**: if the movement is on the right side the right foot moves first, followed by the left one which will slide in the same direction. So that, at the end of the movement the player will get back on the ready position.

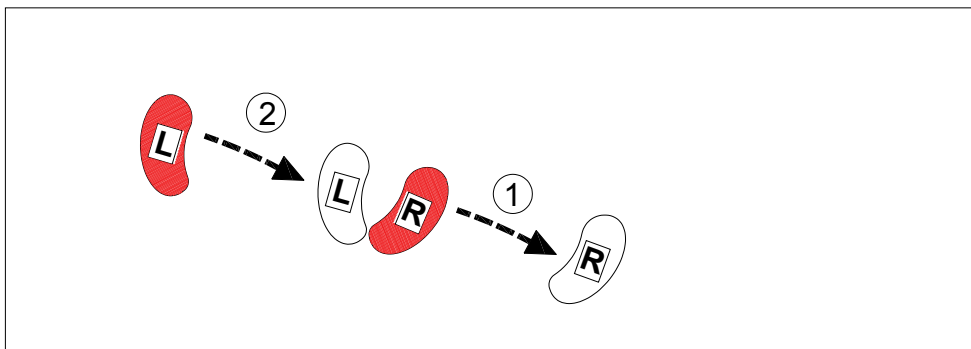


Figure 3 *Slide step*

- c. **Turn step**: is the movement played by a player who wants to play a forehand stroke from the backhand corner. This step could be done following the chassé or slide step technique. It is especially useful for playing the forehand topspin from the backhand corner.

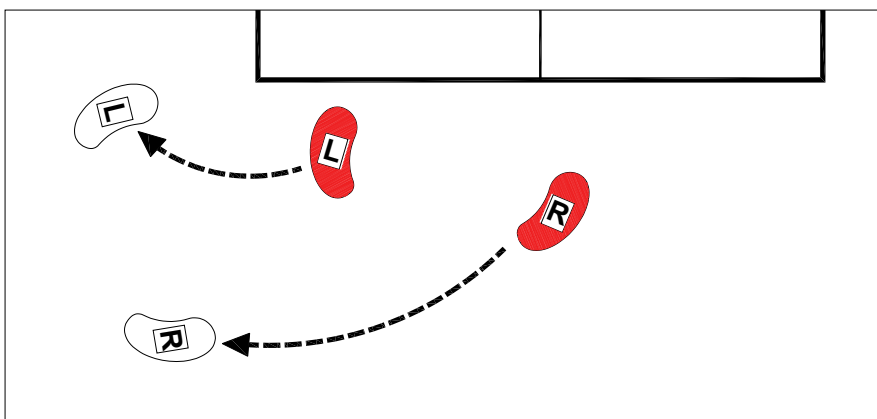


Figure 4 *Turn step*

3. **Crossover:** is used when the player has to cover a long distance in a short time. Crossover footwork should not be used for short distances. The player is in the backhand corner waiting to cover most of the table with the forehand. The player initiates movement to the right by tacking a step with the right leg into a wide stance. The left leg crosses over in front of the right leg as contact is made. As the follow-through is completed the right leg is brought forward. At the end the right leg finishes in a wide position ready to push back to the left [Tepper G., 2003].

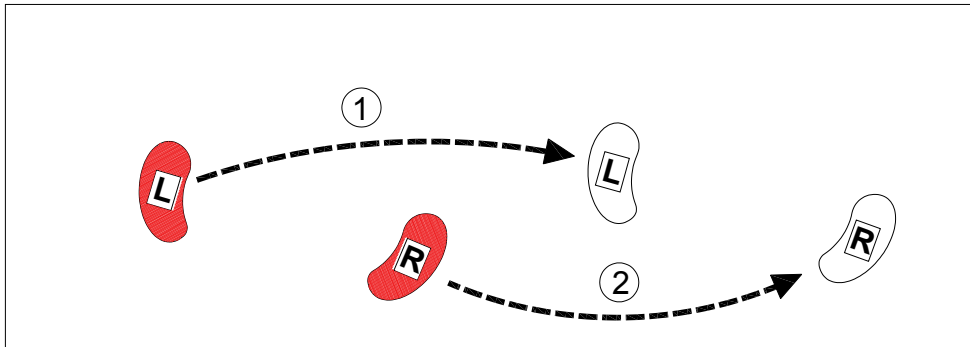


Figure 5 *Crossover*

3.2. Strokes

Regarding the strokes, it follows a list without description:

1. Forehand Topspin
2. Backhand Topspin
3. Forehand Push
4. Backhand Push
5. Forehand Block
6. Backhand Block
7. Forehand Topspin counter Topspin
8. Backhand Topspin counter Topspin
9. Forehand flick
10. Backhand flick
11. Forehand smash
12. Backhand smash
13. Forehand drive
14. Backhand drive
15. Forehand lob
16. Backhand lob

3.3. Methodological aspects

Into the following table have been also considered, together with steps, the services, distinguishing between the forehand ones and the backhand ones. Moreover have been collected data referred to "steps without stroke" and "strokes without step".

Covering a long distance, more than one step could be involved into the movement, it is important to underlie that for carrying out this analysis it has always been taken into account the last step before the stroke, or before the attempt to hit the ball.

Data have been collected looking at matches with the slow motion and looking at one player each time.

4. Results

One table for each player has been created and then data have been collected all together in the following table.

Table 1 Data collected for the four players considered

Forehand service	144	Short and medium step				Crossover	Stroke without step	N row	Forehand plus Backhand
Backhand service	0	One step	Chassé	Slide step	Turn step				
Topspin	F	17	10	15	53	16	3	114	167
	B	20	8	10	-	0	15	53	
Push (back)	F	89	7	0	15	1	0	112	145
	B	32	0	0	-	0	1	33	
Block	F	0	1	0	1	1	1	4	72
	B	10	16	12	-	0	30	68	
Topspin counter Topspin	F	5	20	2	36	12	9	84	94
	B	1	5	0	-	1	3	10	
Flick	F	19	2	1	4	0	0	26	45
	B	18	1	0	-	0	0	19	
Smash	F	0	0	0	1	0	0	1	1
	B	0	0	0	-	0	0	0	
Drive	F	0	0	0	0	0	0	0	9
	B	1	4	0	-	0	4	9	
Lob	F	0	0	0	0	1	0	1	2
	B	0	1	0	-	0	0	1	
Step without stroke		2	12	3	11	10	0	38	38
N column		214	87	43	121	42	66	573	573

In the following figure different steps' frequencies have been calculated in percentages:

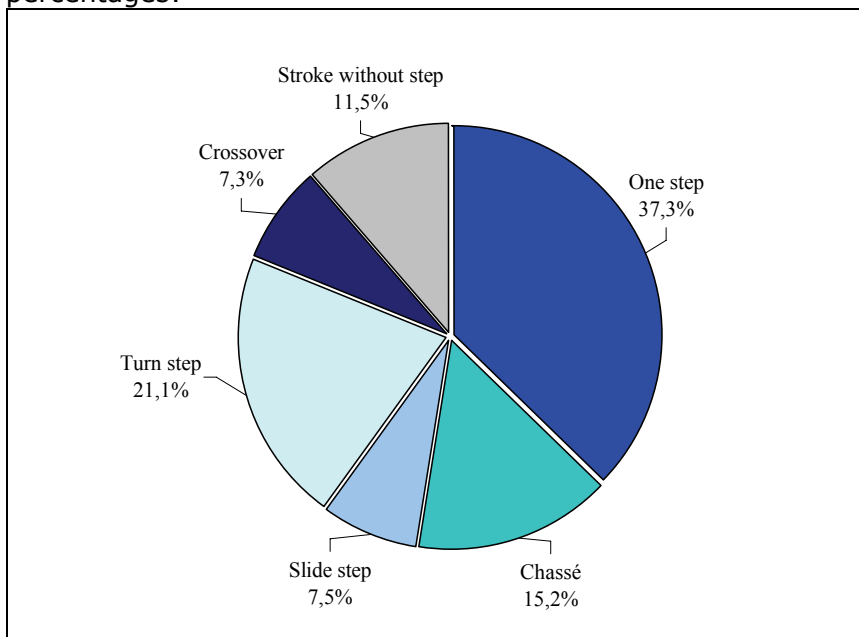


Figure 6 Different steps' percentage frequencies

The results allow a qualitative description of the various step movements.

The most frequent step is the one step with a frequency of 37.3%; the second one is the turn step with a frequency of 21.1%; they are followed by the chassé 15.2%; the stroke without step 11.5 %; the slide step 7.5% and the crossover 7.3%.

The following graph considers the analysis of the different steps used by the four players considered:

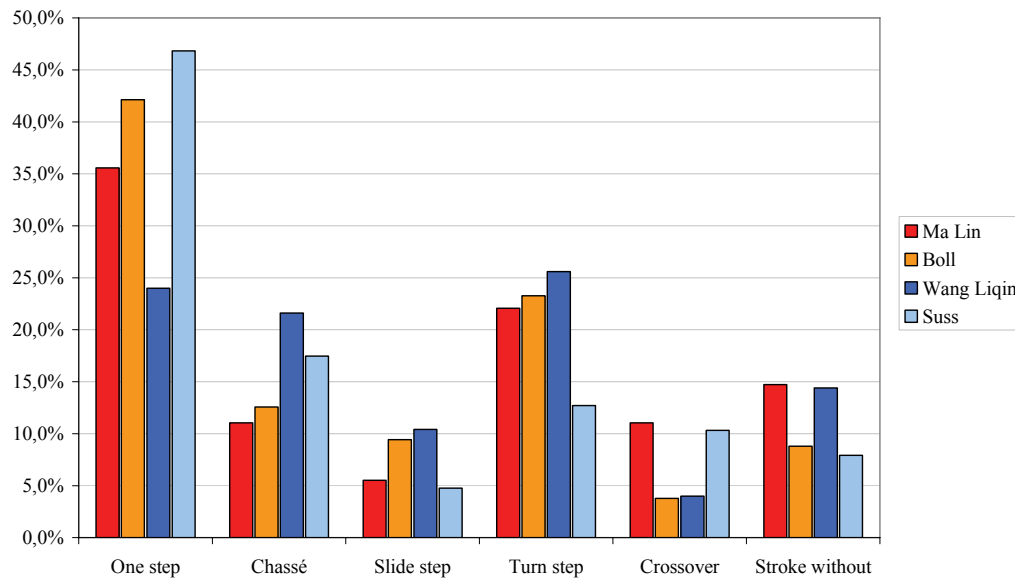


Figure 7 Rates between total number of steps and different types of steps for each player

5. Conclusions

In order to define all the technical features of table tennis it is necessary to develop a comprehensive and standard language at international level.

This enables setting and developing a method for studying and analysing the different movements. They are very important but they are not recognised as much as strokes.

To this purpose a best pattern should be taken as a reference, which is composed by the best players on the world ranking. The different players' games have been watched in slow motion in order to permit an accurate data collection.

The major problems emerged regard in particular the difficulty in recognising and discerning: "steps without stroke", "stroke without step", and "the last step before the attempt to hit the ball" especially if it is considered a situation in which lot of different quick steps' combinations are involved.

The statistical results, of the analysis carried out on the four world players, allow a quantitative description of the various step movements.

The most frequent step is the "one step" with a frequency of 37,3%; the second one is the "turn step" with a frequency of 21,1%; they are followed by the "chasse" 15,2%; the "stroke without step" 11,5 %; the "slide step" 7,5% and the "crossover" 7,3%.

Through these results it has been possible, for example, to deny the "chassé" as the most used step.

Moreover the analysis of the matches suggests inter individual differences in the characteristics of the steps movements. For example the "one step" is especially used to stroke the ball in the forehand and backhand push to return the service. The "turn step" is used to prepare the forehand top spin or to make a counter topspin.

While block often doesn't need any step.

Lot of similar conclusions can be drawn from this analysis and they permit to underline differences in the use of steps and to find out which are the most useful steps in order to improve the training and the basic technique.

Finally the non-parametric Chi Square test were performed to identify significant differences ($\alpha=0.01$) in the use of footwork techniques by the 4 players considered.

Chi Square analysis, by comparing the use of different types of steps by the players, shows significant differences between them ($\chi^2 (15) = 40.63, p<0.01$). A single match analysis shows that between Boll and Lin there are not significant differences in the steps used ($\chi^2 (5) = 14.01, p>0.01$); while between Wang and Suss the differences in steps movements are significant ($\chi^2 (5) = 26.62, p<0.01$). The Timo Boll vs Ma Lin match shows a similar use of steps by players whereas in the Wang Liqin vs Christian Suss match, the first player (the winner of the match) uses the "turn step" more frequently than the other player.

Comparing different players' technique can also allow a deep analysis of the game plan and further studies on a larger number of matches, using the same methods, will permit a better understanding in the use of footwork techniques.

6. REFERENCES

- Deniso P., Fruscione P., Quintiliani M., "Tennistavolo. Preparazione fisica, tecnica e didattica", Società stampa sportiva. Roma, 1992.
- Leach J., ("Better table tennis"), Manuale pratico di Tennistavolo, Il Castello, Milano, 1971.
- Lobietti R, Merni F., "Blocking footwork techniques used by male and female volleyball players are different", Journal of Human Movement Studies, 2006, 51 (5), p.307-320.
- Rodano R., Del Rossi D., Manoni A., De Leva P., Mallozzi L., Carvelli E., "Cinematica nel tennistavolo: applicazione di un sistema di elaborazione automatica dell'immagine televisiva ELITE allo studio della cinematica del tennistavolo", Scuola dello sport, 1991, n° 21, p. 50-56.
- Ripoll H., "Comprendere ed agire: la soluzione del conflitto semantico-sensomotorio nello sport", Scuola dello sport. Parte prima: 1989, n° 17, p. 23-28. Parte seconda: 1990, n° 18, p. 38-43.
- Tepper G., "ITTF Level 1 Coaching manual" 2003. www.ittf.com
- Trupkovic J., "Wege zum leistungstischtennis", Druckhaus Gebh, 1978.