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Performance analysis through the use of temporal activity patterns of elite players in beach tennis

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ABSTRACT

Pérez-Turpin JA, Grau D, Santos-Bailón D. Performance analysis through the use of temporal activity patterns of elite players in beach tennis. *J Hum Sport Exerc*. Vol.8, No. Proc3, pp. S694-S701, 2013. In order to identify the real components of beach tennis performance, we need to know the time structure of the competition. This study was designed to identify the distribution of time in real and absolute play during the matches, sets and points played by professional beach tennis players. To do so, we made video recordings of 12 players playing four matches at the Spain Beach Tennis Championships (Barcelona 2009). We measured the total length of the matches, sets, games and points while differentiating real playing time. We observed that the absolute time per match was 43min 2sec±15min 32sec, while real playing time was 8min 49,75sec±4min 51,16sec. The average length of the total duration of the sets was 15min 36,25sec±8min 21,9sec and real playing time was 4min 24,86sec±2min 26,41sec. The average length of the total duration of the games was 1min 42,6sec±1min 3,45sec and real playing time was 29,03sec±16,99sec. The average time taken to play a point was 4,56sec±2,99sec. An improved understanding of absolute and real playing time provides valuable information that allows us to create specific training patterns for beach tennis. **Key words:** REAL TIME, ABSOLUTE TIME, MALE, BEACH TENNIS.

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INTRODUCTION

If we return to the origins of the shovels we can see that it is a universal game, since different types of shovels and ball games meet in old cultures such as Chinese, Japanese or the Inca Empire. In Spain (Ruiz, 1996) a Spanish researcher has already described shoveling games as the game of kings and princes; as we can find in the popular chronicles of the Court of the King of Castile Henry I and Philip the Handsome, as in France. We highlight Louis XIV of France who practiced this amazing game in the gorgeous gardens of the palace of Versailles. A direct precedent of these games of shove, trowel and racket was "Jeu de Paume" (palm game) played from 1505 with shovels (Gerald Ruiz, 1996), previously the ball was struck with the palm of the hand, such as in the vasque and in the valencian pelota (ball), and even as in tennis.

In this fully documented discipline, since the French revolution 310, in EPSN° 2004 Lionel Croignier Michel Peter described some rules of the game as it was played 1 against 1, 2 against 2 and 3 against 3, passing the ball firstly with the hand and then, in 1505 wood shovels started to be used.

Tennis beach is in Italy where this sport has firmly been installed. In Spain, tennis beach has started in the North-East coast (Tarragona), being Torredembarra the first city where matches started to be played in the seventies (Compte, 2007).

Beach Tennis is a fast growing sport which is increasingly attracting a huge interest all around the world. The ITF Beach Tennis Tour (BTT) is not an exception and, since it has began in 2008, we have already seen an increase in the number of matches held in the ITF BTT calendar. This trend is expected to succeed in the future as in different countries would not be able to succumb to the irresistible nature of the game.

In this sense, we highlight the scientific researches carried out on tennis beach which are very small. Among all the different aspects to be analyzed, we can find one which is related to the times of real and absolute game. In the last years, the temporary analysis from different observational methodologies has lead to a better understand of the temporary relationships in different sports such as hockey (Spencer et al., 2004), soccer room (Barber, 2003) or badminton (Cabello & Padial, 2002). These analyses were made in real situations of competition and are much more useful when they are related to other aspects, such as the number of jumps or displacements, since they will allow matching the frequency to the duration, contributing to collect quality and excellent information for trainers and sportsmen.

Nowadays, time factor is still unknown during the competition in male tennis beach, this is the main purpose of this case study, quantify the total duration of matches, sets, games and points, differentiating them from the real-time gaming.

METHODOLOGY

Throughout the case study, 12 players were filmed during four matches, 8 sets played in the Spanish Beach tennis Championship (Campeonato de España de Tenis Playa) hold in Barcelona, 2009. In picture 1, general characteristics of the sample can be seen.

Table 1. Characteristics of the sample.

Age (years)	25,5 \pm 7,06
Height (m)	1,845 \pm 2,66
Weight (kg)	78 \pm 5,93

Table 2. Times of game

	Absolute (Average \pmDE)	Real (Average \pmDE)
Match	43min 2sec \pm 15min 32sec	8min 49,75sec \pm 4min 51,16sec
Seth	15min 36,25sec \pm 8min 21,9sec	4min 24,86sec \pm 2min 26,41sec
Game	1min 42,6sec \pm 1min 3,45sec	29,03sec \pm 16,99sec
Point	-	4,56sec \pm 2,99sec

The recording was made with two video cameras (1 Sony Dcrvx2100e and 1 Sony Trv738e) placed differently, grandstand was placed approximately 15 m from the playground, displaying a cross-sectional view, and the second one was placed in the back part of the playground, 10m from the edge of the field which compares the line of the bottom, obtaining a longitudinal vision (Liebermann et al., 2002). Each camera was calibrated using four placed markers with different form that allowed creating a frame of reference that exceeded 30% the real margins of the playground, with the aim of catching all the actions in where the ball exceeded the limits of the field.

The duration of each point was registered by each camera, which had a time accountant, specified in minutes, seconds and tenths of seconds. The parameters used for each temporary registry were, for the beginning, the starting point arbitration whistle, and for end, it was used the arbitration whistle to conclude the point (Tilp et al., 2006). The right coordinates used between temporary space of real and absolute game were reconstructed using a matrix of dimensional registry. Temporary sequences of real game, considered a time interval in which the ball is in game (TRgame) were calculated reducing them from the absolute gaming time (TAgame). Periods of real time and absolute time were analyzed during the match, set time, game time and point time.

The synchronization of both cameras avoided errors of temporary adjustment, since an analysis made of both recording at the same time, was made. In addition, the intraobservant and interobservant trustworthiness were also considered and carried out. Both analyses were made using a software called SportsCode 2007. The methodological steps were the following:

- Recording and digitalization of the image.
- Creation of a system of categories through a matrix of codes concerning absolute time (TA) and real time (TR) (Barber, 2003).
- An image capture for each code of the matrix.

- d) A combination of the codes of the matrix to obtain the time of performance in beach tennis, taking into account different studies made about the performance in beach volley (García-Tormo et al., 2006; Molina, 2007).

This analysis was carried out by two experienced researchers that recorded every single match at least 3 times, in order to avoid mistakes in the scoreboard.

Analysis of data

All data was compiled in the Microsoft Excel using different categories: time by point scored, time by game, time by set and total time of the match (Monge, 2007). Through the statistical package SPSS v.13 were calculated statistics, frequencies and distributions. According to the sample size, the non-parametric test of Mann-Whitney for both independent samples was also made. Descriptive analyses considered the average and the standard deviation according to the quantitative variables. The level of statistical meaning was settled down in 0,05 and a very significant one was in 0,01.

RESULTS

The average of time calculated by match was 43min 2sec±15min 32sec, whereas the average of real time per match was 8min 49,75sec±4min 51,16sec. The differences between the absolute and the real time calculated in each match are really significant.

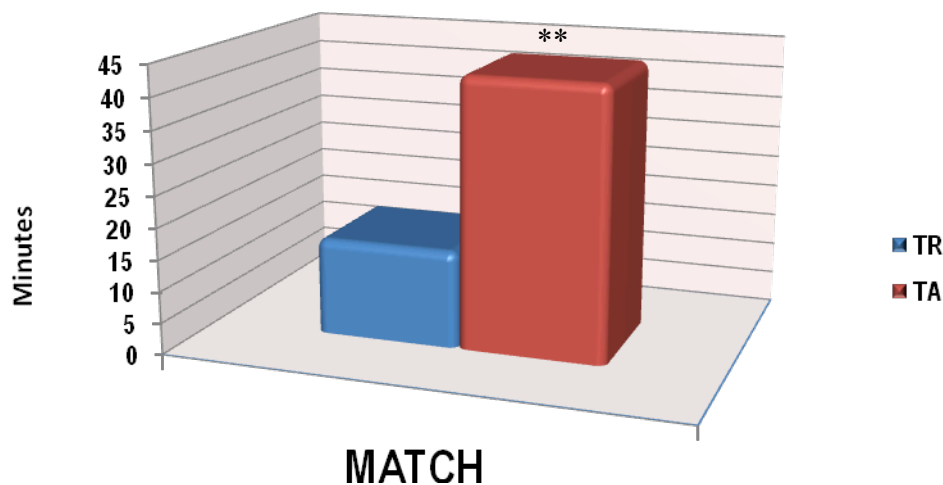


Figure 1. Distribution of the absolute time (TA) and the real time (TR) average per match. (** $p < 0,01$).

According to the set, the average calculated of the total time duration was 15min 36,25sec±8min 21,9sec and the average of the real time was 4min 24,86sec±2min 26,41sec. In the following bar chart (figure 2) we can see times used in each set.

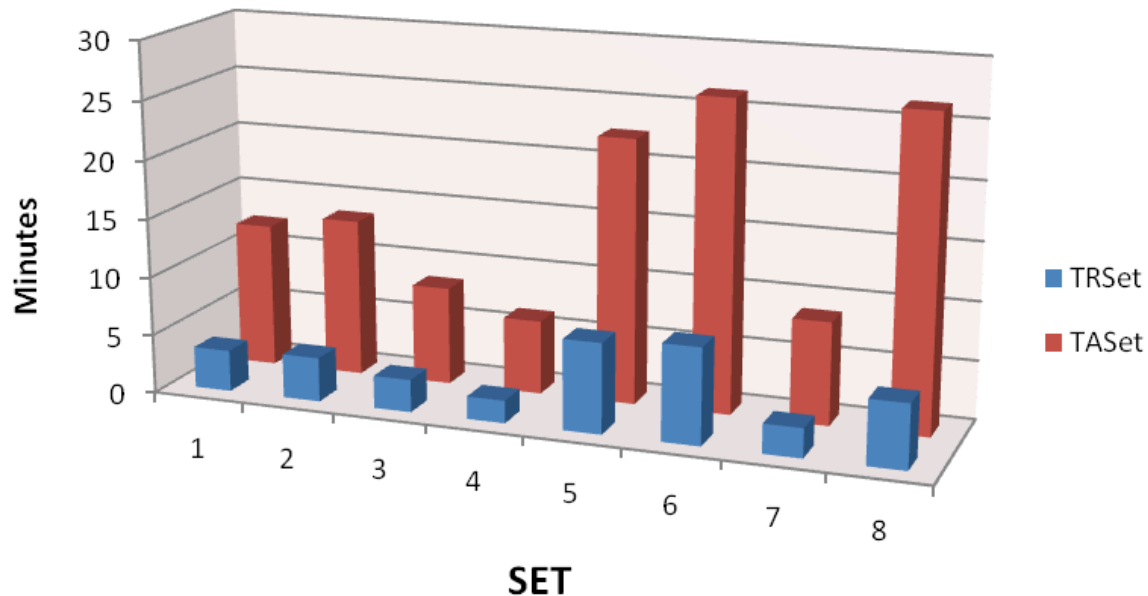


Figure 2. Distribution of the absolute time (TA) and the real time (TR) average per sets.

The average of the total time duration of all games was 1min 42,6sec \pm 1min 3,45sec and the real one was 29,03sec \pm 16,99sec. The average time used to score a point was 4,56sec \pm 2,99sec. In figure 3 we can see the times per games of a set.

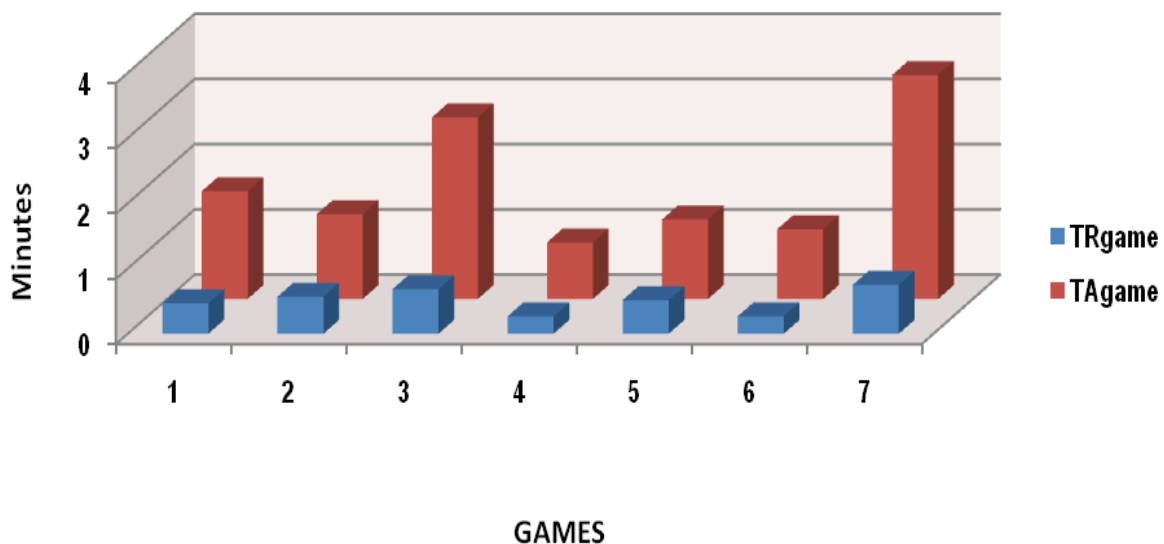


Figure 3. Distribution of the absolute time (TA) and the real time (TR) average per games of a set.

In figure 4 we can see distribution percentage according to the average of time used for both: absolute and real, both calculated for just one match.

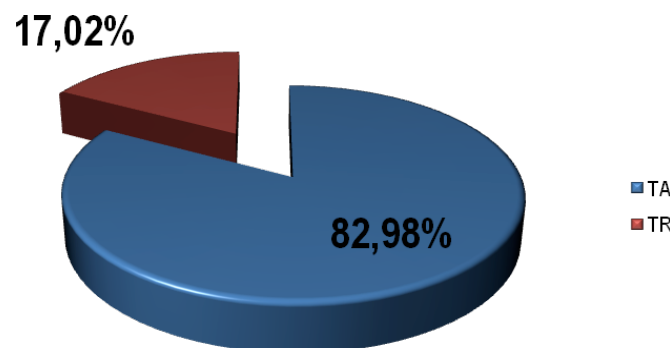


Figure 4. Percentage distribution of the absolute time (TA) and the real time (TR) average per match.

DISCUSSION

These results obtained indicate that game situations in which was a strong demand, according to the intensity, have a duration of $4,56\text{sec} \pm 2,99\text{sec}$; that happens during $29,03\text{sec} \pm 16,99\text{sec}$ in the games and during $4\text{min } 24,86\text{sec} \pm 2\text{min } 26,41\text{sec}$ in sets, this can increase up to $8\text{min } 49,75\text{sec} \pm 4\text{min } 51,16\text{sec}$ per match. The rest of the time (82,98%) would be composed by light activities and with less intensity and activity such as walking or standing up. The composition of the physical training models must highly considered the volume and the intensity of training (Morante, 2003) and this must be in accordance with the particular characteristics of the sport modality.

The information described in this case study can be useful to structure and adjust skill models to reality, adjusting the volume and the intensity of the training to the real playing time. The temporal reality of this analysis can propose new ways to optimize the results of the players in the competition, even proposing competitive models of preparation that can find new keys to succeed (Kenny et al., 2008). In addition, this case study can be deepened if we compare playing times and the number of jumps done.

The results about the real temporal structure were similar to those presented by Cabello & Padial (2002), in men's badminton. In this way, it can be considered that beach volley is based on anaerobic explosive actions, as has been stated in different case studies about indoor soccer or badminton (Barber, 2003; Cabello & Padial, 2002).

It is also possible to establish the connection between the real times of each play and the dimensions of the playing field (Giatsis et al., 2003). Taking as a reference those from the beach volley the dimensions of the individual playing space that correspond to each player are ± 32 square meters of surface from the total space of the playing field (Pérez-Turpin et al., 2007).

This information and the real time can help to a better understanding of the space-time relationship, two variables required to calculate all aspects related to the high competition on travel-speed parameters. Nevertheless, we must be cautious and we should only extract the appropriate implications.

CONCLUSIONS

The improved knowledge of the absolute and the real time of the playing time is very important to identify patterns for training in specific men's tennis beach and thereof, it can be extended to additional researches about physiological responses of the player to any competitive efforts. For that reason, once the real duration of the matches, sets, games and points have been analyzed and temporarily quantified through an observational methodology, we can start to design methods of training, based on the real conditions of the competition, making special reference to volume parameters and intensity of the heat.

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