# Beach volley traits and trends in three consecutive Olympic competitions 

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#### Abstract

The purpose of the present study was to track the basic traits and trends in beach volleyball games played in the last three Olympics. To this purpose the set and game scores, as well as the time durations of all 320 beach volley games played by men and women in the three consecutive Olympics of Athens 2004, Beijing 2008 and London 2012 were recorded. The odds of two to three set games remained relatively constant to the value of 2:1, throughout the three Olympiads, as well as the mean number of points played both in two set games ( $74.6 \pm 6.1$ ) and three set games (104.3 $\pm 7.4$ ), but there was a significant decrease of the mean game time. For the two set games this time was reduced from $42.6 \pm 4.9$ minutes to $38.3 \pm 4.7$ minutes, while for three set games it was reduced from $61.7 \pm 6.6$ minutes to $55.5 \pm 5.8$ minutes. This is the consequence of the significant reduction of mean rally duration from $34.7 \pm 2.8$ seconds to $31.3 \pm 2.1$ seconds. The mean rally duration in the men's games remained significantly greater than the mean rally duration in the women's games by roughly 1.5 seconds. Overall in two set games the proportion of sets with the minimal two-point difference is $22.6 \%$, while in three set games it rises to $37.0 \%$. In conclusion beach volley matches played in the last three Olympics rarely last longer than one hour, they take place in more "natural" conditions and a high proportion of them is being decided in the third tiebreaker-set also having a high proportion of sets with a tight point difference. These facts rank beach volley as played in the Olympics as a very competitive sport event, enjoyable and exciting to watch, both as a spectator and as a TV watcher.


Keywords: Beach volleyball; Time characteristics; Olympics.

## 1 Introduction

Beach volleyball is probably the most classical example of a sport starting as a purely recreational entertainment, played, as its name implies on sand beaches with the minimal requirement of a net and a ball and subsequently raising its status as one of the events included in the Olympic Games. At the 1992 Olympic Games in Barcelona beach volleyball was included as a demonstration event, and has been an official Olympic sport since 1996 in Atlanta. After the Sydney 2000 Olympic the Fédération Internationale de Volleyball (FIVB) modified the scoring system used in beach volleyball from side-out to a rally point system and the match format was changed to best of three sets for all matches (FIVB official website). Another notable change was the testing of new court dimensions (reduced from $9 \times 18$ meters to $8 \times 16$ meters). All matches in the next three Olympics (Athens 2004, Beijing 2008 and London 2012) were played with the same rules. The major goal was to facilitate the comprehension of the game and to stabilize match duration (Palao, Valades, \& Ortega, 2012). Similar changes were already earlier introduced in the rules of indoor volleyball (FIVB, 1999), again with the aim to make the game more

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attractive and spectacular for the spectators (Kountouris et al., 2001; Van Aartrijk, 2000) and to fix the duration of the game within certain limits that would meet the demands of television broadcasts (Kountouris \& Laios, 2000a,b; Urena, 2000).

In a 2003 article (Gatsis, 2003) it was concluded that the rally point system increased total match duration, especially due to the third set and the matches were more wavering and spectacular as more sets finished with the minimum difference of points. However, the physical demands of the game were increased due to the greater number of rallies.

With regards to differences between 2-0 and 2-1 games Giatsis and Zahariadis (2008) performed discriminant function analysis in order to determine which skill(s) contributed significantly to winning in matches with 2-0 and 2-1 scores. Results showed that in 2-0 matches winners had better performance than losers in almost all technical skills. Specifically, opponents' attack errors were the most important factor contributing to winners' win. In matches won by 2-1 sets, winners had better performance than losers only in the total of points won. Contrary to matches won by 2-0 sets, in 2-1 matches it was not possible to establish a model indicating that a technical skill could act as predictor for the wining teams' win in relation to losing teams. With regards to the reduction in the dimension of the court Rongland and Grydeland (2006) showed a significant reduction in serve efficiency and attack efficiency after the change of regulations, as well as a significant increase in block actions and block efficiency. The results indicated that the change of rules and court dimension only to a certain extent have led to the expected intentions of FIVB, as the field defense actions nor showed an increase in number nor in efficiency. The present study analyzes the basic characteristics of high level beach volleyball games played in the last three consecutive Olympic Games, in order to expose which of them are basic traits, remaining constant across time, gender and qualifying or final stage and which change obeying some kind of trend. The purpose of this analysis is to provide an interpretation at least at the basic level, of the high popularity enjoyed by beach volley at the international level.

## 2 Method

### 2.1 Sample data procedure

Data was collected from the official score sheets of all 320 men's and women's matches from the three competitions. The matches in the three Olympics were played under the same rules. Only one match from the 2004 Athens Olympics was not included in the final analysis due to injury of one of the players. From the remaining 319 matches the data that were recorded were the set scores, the final game scores and the total match duration. Dividing the total number of rallies played in each match by the total match duration a new variable was calculated - the mean rally duration. Also, each set was characterized whether the final score had the minimal two-point difference or not. The analysis of the games was conducted with the VirtualDub software (VirtualDub, 2007).

### 2.2 Statistical analysis

Statistical analysis was performed separately for two and three set games. Mean values of total number of points per match, total match duration and mean point duration were checked with chi-square, ANOVA and t-tests for equality among the three Olympiads, the two genders and the two stages (qualifying and final). Differences in the proportions of sets with a minimal two-point difference among sets and two and three set games were checked with the binomial test. Statistical significance was set 0.05.

## 3 Results

From the 319 matches analyzed 213 (66.8\%) ended in 2-0 set wins and the remaining 106 (33.2\%) were decided in the third tiebreaker-set. These $2: 1$ odds, as the chi-square tests showed, remained practically constant throughout the three Olympiads and were also independent of the gender and the stage. The mean number of points played both in two set games ( $74.6 \pm 6.1$ ) and three set games (104.3 $\pm 7.4$ ), also remained, as the ANOVA tests showed, independent of the Olympiad, gender and stage. The mean number of points played in the first and second sets was practically equal ( $37.8 \pm 4.2$ versus $37.8 \pm 4.3$, $t$-test, $p=N S$ ), while the mean number of points played in the third set was $26.7 \pm 3.2$. Conversely there was a significant reduction in the total match duration. For the two set games this time was reduced from $42.6 \pm 4.9$ minutes to $38.2 \pm 4.7$ minutes $\left(F_{(2,210)}=14.4\right.$, $p<0.01$ ), while for three set games it was reduced from $61.7 \pm 6.6$ minutes to $55.5 \pm 5.8$ minutes $\left(F_{(2,103)}=11.5, p<0.01\right)$. As Figure 1 shows, for the two set games the significant reduction in the total match duration was evidenced from the Beijing 2008 to the London 2012 Olympics, while for the three set games the significant reduction was observed from the Athens 2004 to the Beijing 2008 Olympics. This is the consequence of the significant reduction of mean point duration $\left(F_{(2,316)}=44.9, p<0.01\right)$. In the Athens 2004 Olympics the mean phase duration was $34.7 \pm 2.8$ seconds and it fell significantly to $33.2 \pm 2.9$ seconds in the Beijing 2008 Olympics, while a further significant reduction to $31.3 \pm 2.1$ seconds was observed in the London 2012 Olympics.


Figure 1. Average match durations for two and three set games in the tree Olympics. Asterisks denote statistically significant reduction in the total match duration in comparison to the previous Olympiad.

Average match durations for two and three set games in the three Olympics. Asterisks denote statistically significant reduction in the total match duration in comparison to the previous Olympiad. The mean point duration in the men's games remained significantly
greater than the mean point duration in the women's games throughout the three Olympics ( $33.8 \pm 2.9$ versus $32.3 \pm 2.8$ seconds, ( $\left(t_{(317)}=4.8, p<0.01\right.$ ) and was also independent of the final score and the stage. In 81/319 (25.4\%) of the games the first set was settled with the minimal two-point difference. This proportion was slightly greater for the second sets (90/319, 28.2\%). Finally, from the 106 third sets played 37 of them (34.9\%) were decided with the minimal two-point difference.


Figure 2. Proportion of sets ending with the minim two-point difference in the first and second sets depending on the final game outcome.

Proportion of sets ending with the minim two-point difference in the first and second sets depending on the final game outcome. However, as Figure 2 shows, the proportion of sets with a minimal two-point difference in the first and second sets is highly dependent on whether it was a two set or a three-set game. In the first set only $23.0 \%$ of the two set games had a minimal two-point difference, while in the three set games this proportion was significantly greater at $30.2 \%$ (binomial test, $p<0.05$ ). Even more striking are differences in the second set, where only $21.2 \%$ of the two set games had a minimal twopoint difference, while in the three set games this proportion was more than double at 42.5\% (binomial test, $p<0.01$ ). Actually, this proportion (42.5\%) is significantly higher than the corresponding proportion found in the occurring in the first set ( $30.2 \%$ - binomial test, $p<0.01$ ) and it is even significantly greater than the proportion reported for the third set ( $34.9 \%$ binomial test, $p<0.05$ ), which incidentally is played to 15 and not to 21 points. Overall in two set games the proportion of sets with the minimal two-point difference is $22.6 \%$, while in three set games it rises to $37.0 \%$ (binomial test, $p<0.01$ ).

## 4 Discussion

Beach volleyball games, like any other game played with similar rules, carries an inherent indeterminacy in their total match duration with two set games lasting about 40 minutes and three set games reaching and sometimes going beyond 60 minutes. This may pose problems in the timely organization of tournaments and their TV broadcasting. The rather constant 2:1 odds of two to three set beach volleyball games may prove a useful guide to
the people responsible for the programming of events especially in high-level competitions, such as the Olympics.

The significant decrease in the mean phase duration is evidently a consequence of the improvement of the existing and perhaps the introduction of new attacking techniques, which are yet to be counterbalanced by matching defensive measures. It may be true that attack in beach volleyball cannot be as powerful and diverse as in indoor volleyball, nevertheless defense in beach volleyball is even more demanding. The dimensions of the court of the defending team in beach volley ( $8 \times 8=64$ square meters) may be less than for indoor volley ( $9 \times 9=81$ square meters), however each of the two players has to defend on average 64/2=32 square meters, while the analogy in indoor volley is only $81 / 6=13.5$ square meters. The difference is enormous, considering also that movement in the sand on barefoot is appreciably encumbered. Also, it seems that men fare better in their defensive duties than women. The explanation of the significantly greater proportion of third sets ending with the minimal two-point difference, in comparison to the first and second sets is twofold. Firstly, the third set is played to 15 points while the other two set are played to 21 points thus smaller point differences in the third set are basically more probable. Secondly, the third set is a consequence that the two teams have won one set each, thus it is to be expected that they are more balanced and competitive. The last point is, as results have shown, bears its mark on the outcome not only of the third, but also of the first and especially of the second set, since three set games have a significantly larger proportion of sets with their final result being at the minimal two-point difference. In conclusion, judging from the facts that beach volley matches played in the last three Olympics rarely last longer than one hour, take place in more "natural" conditions, in juxtaposition with a high proportion being decided in the third tiebreaker-set and, most important, with a very high proportion of sets with a tight point difference, rank beach volley as played in the Olympics as a very competitive sport event, enjoyable and exciting to watch, both as a spectator and as a TVwatcher.

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