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Time characteristics of four consecutive Olympic Volleyball competitions, after the implementation of the new regulations

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Abstract

The purpose of the present study was to investigate the time characteristics in elite volleyball in four consecutive Olympic competitions after the implementation of the new regulations, both in men and women. Data concerns set and match points and duration and total match duration from all Olympic volleyball competitions (Sidney 2000, Athens 2004, Beijing 2008 and London 2012). In total 312 matches were analyzed. Results indicated a continuous significant increase in the set and match durations, both in men and women. This is a consequence of the teams' primary commitment to performance improvement in the defense tactics and the special attention given to the avoidance of faults. In conclusion the implementation of the new rules as from 2000, especially those related with the change to the rally point system, with each set played to 25 points and the introduction of libero players have forced volleyball coaches and players to reevaluate their strategies and tactics in the goal of winning a rally, a set and a game. The collateral prolongation of the rallies together with the increased uncertainness of the outcome has undeniably made the game more spectacular and intriguing to watch.
Keywords: volleyball, time characteristics, rules.

1 Introduction

In the Olympic Games Volleyball tournament of Sydney 2000 the participating teams were obliged for the first time to compete according to a series of new rules, instituted by the Federation International of Volleyball (F.I.V.B., 1999). These rules became compulsory to all countries-members of the federation from 01-01-2000. The same rules applied in all consecutive Olympic Games Volleyball tournaments (Athens 2004, Beijing 2008 and London 2012). In a previous article that compared time characteristics of the game between the Sydney and Athens Olympic Games Volleyball tournaments, it was indicated that four years later in Athens time characteristics continued to be influenced by the impact of the new regulations (Kountouris, 2005). The present study follows the basic characteristics of the game including in the analysis the matches of the Beijing 2008 and London 2012 Olympics.

At the beginning of the new century, when FIVB established the new regulations, the plan was to shape a game more competitive, therefore more attractive and comprehensible for the spectators (Kountouris et al., 2001) and a game within certain time limits that would meet the demands of television broadcasts (Kountouris & Laios, 2000a,b; Urena, 2000). The implementation of the new rules put into practice a new specialization for volleyball players, namely the libero player (Aggelonidis et al., 2003), but the main reason was to fix the duration of the game for broadcasting reasons. Towards this end a new point system was applied, named the "Rally Point System" (RPS). According to RPS the team that wins a rally scores a point, irrespective of whether it was serving or receiving. The game is won by the team that first wins three sets, so the total number of sets played can vary from three to five. All sets expect the fifth deciding one; will be won by the team that first scores 25 points with a minimum of two point advantage. The fifth set will be won by the team that first scores 15 points with a minimum two point's advantage (F.I.V.B., 1999). The RPS proved to be more benevolent to the weaker teams, in that with the new system their chances of winning a point, a set, or even the game, were enhanced (Kountouris & Laios, 2000a).

From the beginning of 1990's the most important topic in volleyball was whether F.I.V.B. would establish a new rally scoring system. A number of coaches were against this rule, because it would oblige them to reevaluate their strategies and tactics and to develop new ones (Thinnes, 1992). This rule, however, eventually became a reality. The result, as was expectedly planned, was to have shorter sets due to a significant decrease of the number of rallies per set in comparison to the previous system (Kountouris & Laios, 2000b; Van Aartrijk, 2000).

Therefore, teams try to adapt their play, as much as possible, to the new conditions of the game and primarily to avoid mistakes that would give effortless points to the opponents. All game strategies are coordinated effectively and tactical cooperation or individual actions are well prepared to support maximum performance (Froehner & Zimmerman, 1996 a, b, c). Therefore the teams' tendency to perform perfectly every skill and tactic of the game became even more demanding, so as to avoid scoring disadvantages (Ahrabi-Fard & Huddleston, 1996). The scoring disadvantage arises from the fact that there is a two-point difference when a team loses a point instead of winning it. It was assumed that such a tendency would eventually lead to increased rally duration, because of the player's effort to keep the ball "alive" in wait for the opportunity to gain the point. In additional the men's teams in Athens Olympic Volleyball competitions demonstrated a strong tendency of improvement of dig efficiency (Laios & Kountouris, 2005).

This article focuses on these notions, and investigates whether there are notable

changes in match and set duration in elite men's and women's volleyball games within the four consecutive Olympic Games volleyball competitions.

2 Method

2.1 Sample and procedure

Data was collected from the official score sheets and official bulletins of F.I.V.B of 312 men's and women's matches from all competitions. In each competition there were 38 men's and 38 women's matches. These included 30 matches from the preliminary round, 4 from quarter final, and 2 from the semi-final and final rounds. Also included are the eight classification matches for the fifth to eighth positions from the Sidney competition. F.I.V.B. decided that these matches in the Olympic Games, beginning from Athens, would not be held. All competitions were held with the same regulations, which provided identical conditions with regards to the interruption time among sets and the number and length of the time-outs. The elite teams were present at all competitions.

2.2 Data

The data collected and processed from the official score sheets and official bulletins of F.I.V.B., were the set, match and total match duration, the number of points played per set and per match, as well as the final match result. Set duration represented the playing time of each set of the match, including all time-outs. The time-outs that can be requested in each set are two per team and last for 30 seconds. The two technical time-outs have duration of 60 seconds each, during sets 1 through 4, and are applied automatically when the leading team reaches the 8th and 16th points of each set. In the fifth set there are no technical time-outs (F.I.V.B., 2011-12, rule, 15.4.1). Match duration is equal to the sum of the duration of the individual sets minus the three minutes breaks among sets. Total match duration includes the match duration plus the time for breaks among the played sets.

2.3 Statistical analysis

Statistical analysis was performed separately for men and for women. Distributions of set scores across the four Olympics were tested with the chi-square test. Match durations with the same set scores (3-0, 3-1 or 3-2) across the four Olympics were subjected to ANOVA followed by post-hoc pairwise comparisons with Bonferroni corrections. Statistical significance was set at the 0.05 level.

Dividing the match duration in seconds by the total number of rallies we obtain a crude estimate of the time interval between two consecutive serve executions. Actually this time interval is somewhat inflated, since in the set duration are also included the time-outs intervals. However, since the rules have remained the same, any observable differences across the four Olympics will be totally attributed to differences of the actual play time of the rallies.

3 Results

In 161 from the overall total of 312 games (51.6%) the final score was 3-0 with mean total match duration 75.7±8.8 minutes. There were 91 games (29.2%) with a final score of 3-1 with mean total match duration 106.7±9.5 minutes. Finally there were 60 games (19.2%) with a final score of 3-2 with mean total match duration 129.6±11.9 minutes. As figures 1 & 2 show the distributions of the set scores across the four Olympics did show

some irregularities, although the chi-square test has shown that neither for men, nor for women did these differences achieve statistical significance.

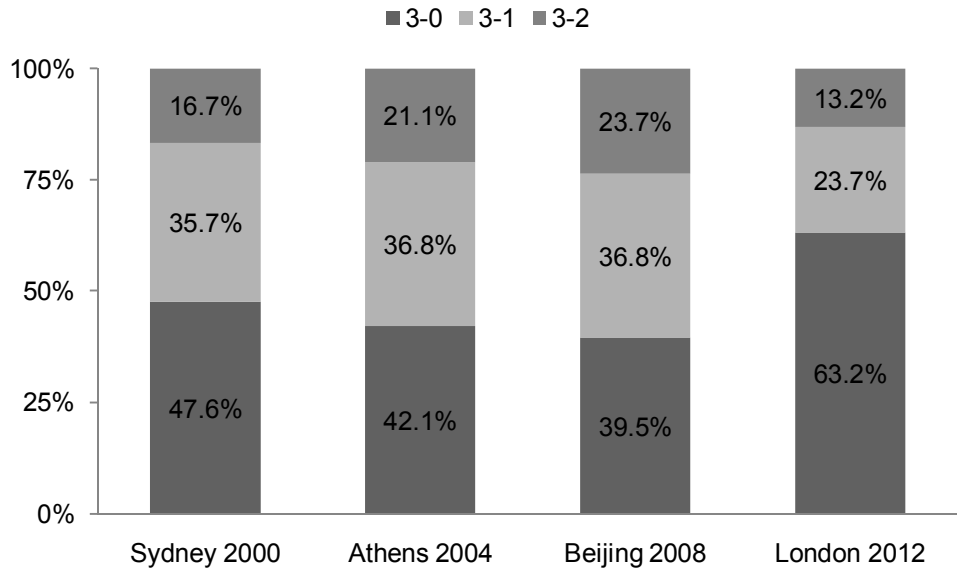

Figure 1. Distribution of the games depending on the final set scores for men across the four Olympics.

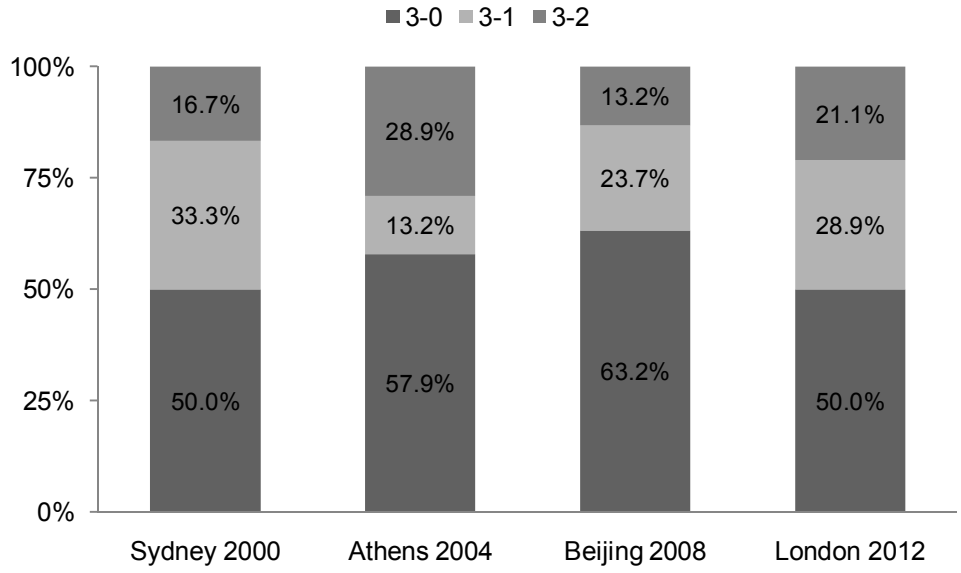

Figure 2. Distribution of the games depending on the final set scores for women across the four Olympics.

As it can be seen from figures 3 & 4 and corroborated by ANOVA analysis, match durations have significantly increased across the four Olympics, especially from Sydney 2000 to Athens 2004 and from Beijing 2008 to London 2012. Overall 3-0 games have increased from around 63 minutes by an additional 13 minutes totaling to 76 minutes; 3-

1 games have increased from around 89 minutes by an additional 17 minutes totaling to 106 minutes and 3-2 games have increased from around 104 minutes by an additional 23 minutes totaling to 127 minutes. It is interesting to note that 3-1 games in London 2012 lasted as long as 3-2 games in Sydney 2000.

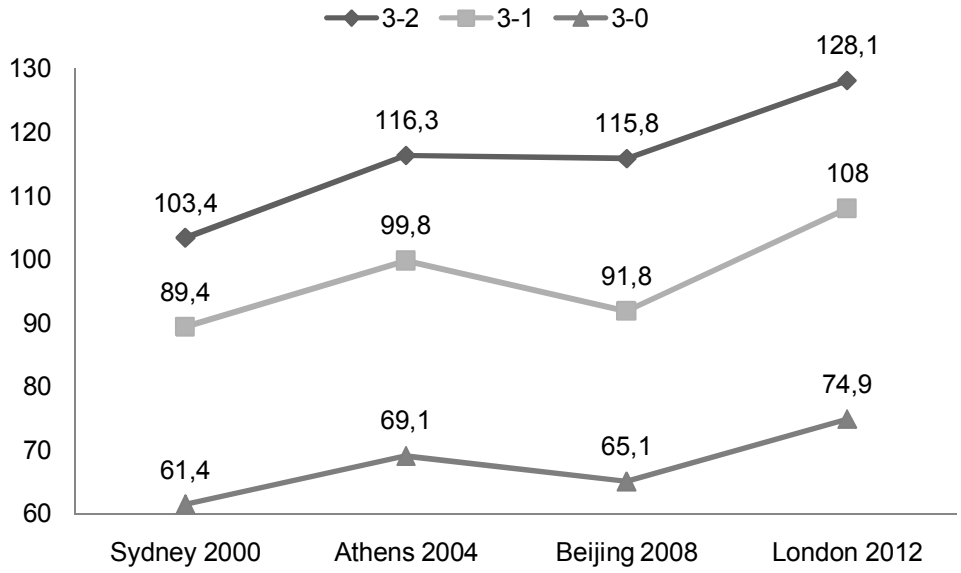

Figure 3. Mean match durations (in minutes) for three, four and five-set games for men across the four Olympics.

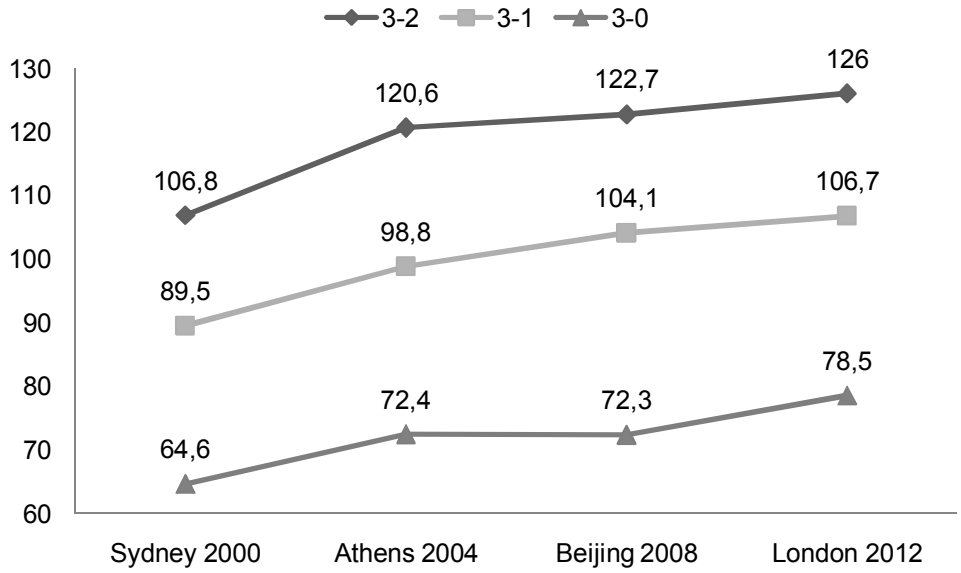

Figure 4. Mean match durations (in minutes) for three, four and five-set games for women across the four Olympics.

Overall the mean set duration for each of the first four sets increased from around 22 minutes in Sydney 2000 to 26 minutes in London 2012, with the first set being generally shorter in duration than the other three sets. Likewise the fifth sets increased from around 15 minutes in Sydney 2000 to 17.5 minutes in London 2012.
On the contrary, as figures 5 & 6 show, the average total number of rallies played, depending on the final set score, has remained practically the same across the four Olympics. Overall the mean total number of rallies played in each of the four sets was around 45 for each of the first four sets and 29 for the fifth set.

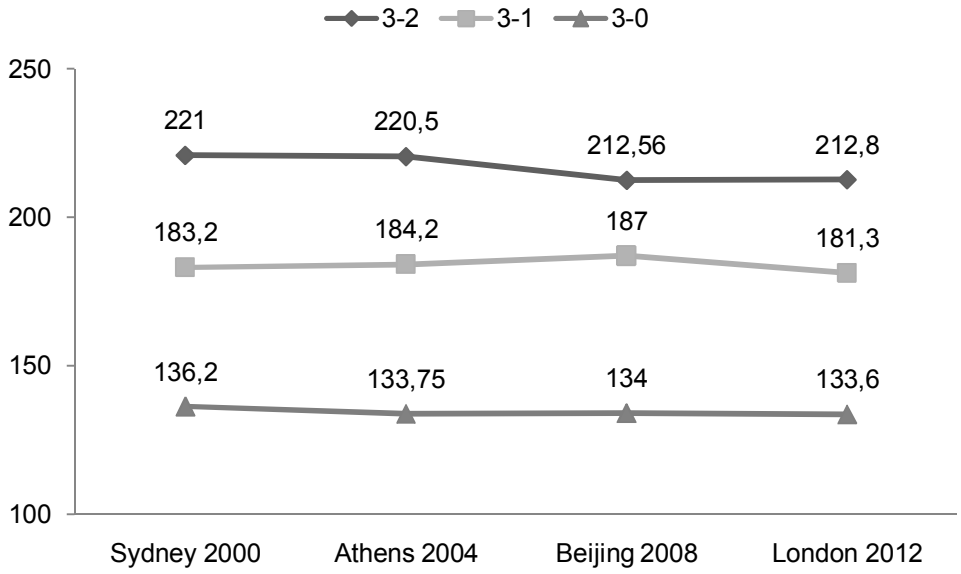

Figure 5. Mean total rallies for three, four and five-set games for men across the four Olympics.

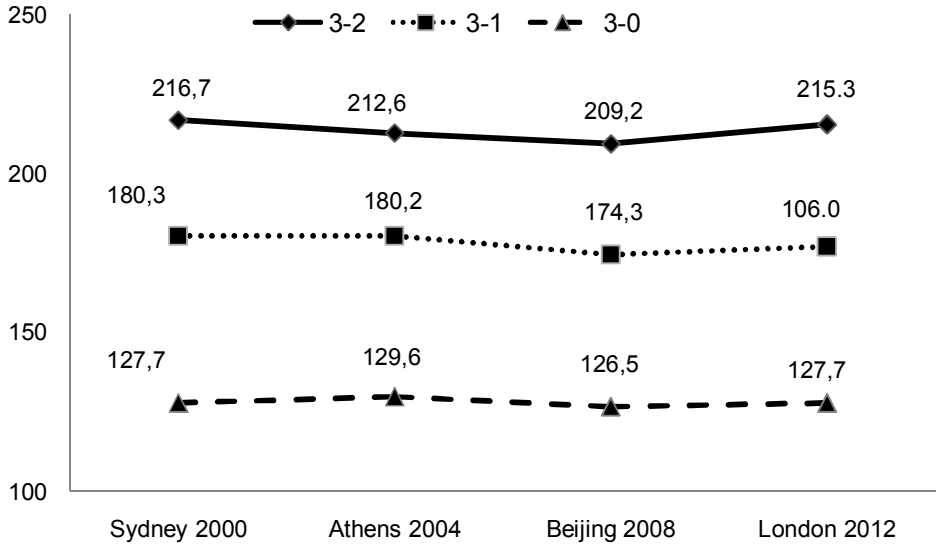

Figure 6. Mean total rallies for three, four and five-set games for men across the four Olympics.

Combining the above two results of the significant increase of the set duration in conjunction with stability of the total number of rallies played, the obvious conclusion is that there is a significant increase of the rally duration. This can be visually observed from figures 7 & 8 and confirmed by the results of the ANOVA procedure with difference between two consecutive serves as the dependent variable and the Olympics as the independent variable (for men, $F(3,152)=96.4$, $p<0.001$, for women, $F(3,152)=79.4$, $p<0.01$). Overall from the Sydney 2000 Olympics to the London 2012 Olympics there is an absolute increase of the rally duration of around six-and-a-half seconds.

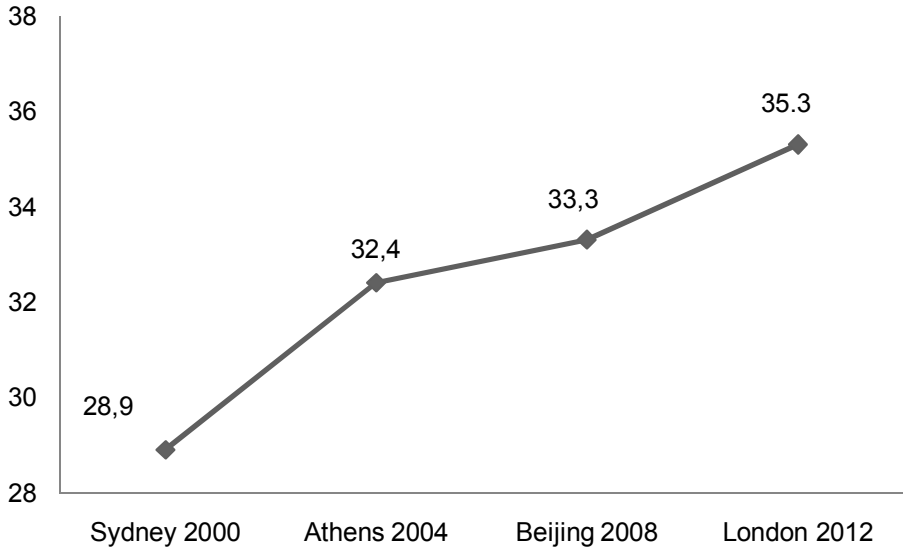

Figure 7. Mean difference between two consecutive serves (in seconds) for men across the four Olympics.

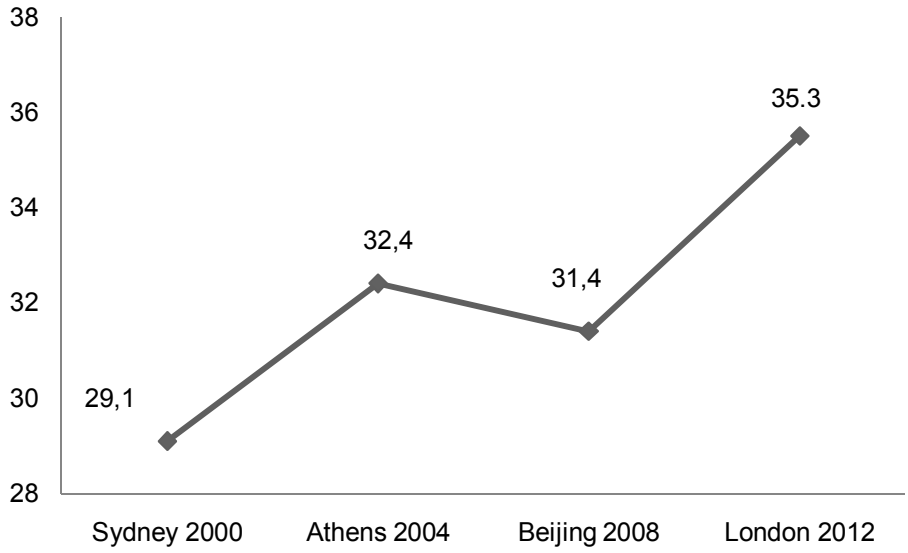

Figure 8. Mean difference between two consecutive serves (in seconds) for women across the four Olympics.

4 Discussion

Four-set games take an additional half-hour to complete in comparison to three-set games, while five-set games require an extra time of around twenty-three minutes in comparison to four set games. Considering that there cannot be a safe prediction of the final number of sets that will be played in a particular volleyball game, the scheduling of consecutive games in a competition taking into consideration the requirements for TV-broadcasting is not an easy task.

Notwithstanding the indirect way of its calculation, without doubt in the four Olympics we have witnessed an increasing rally time duration, both in men and women. As it has already been discussed, the primary reason for these trends is the implementation on the new rules in the game of volleyball, the most notable of which is the rally point system (RPS). The significant decrease of the number of rallies per set, in conjunction with the fact that in the RPS there is a two-point difference when a team loses a point instead of winning it, have dramatically changed the attitude of volleyball coaches and players toward the game. To make a comparison, they had to adapt from a 400 meter low hurdle race to a 100 or 110 meter high hurdle race.

Evidently the primary adaptation was related with performance improvement in the defense tasks and the special attention committed to the avoidance of faults. Toward this end, the introduction of the libero player proved to quite helpful. Moreover, the specialization of the players and the extension of the second libero in the players of the team (F.I.V.B., 2010, rule 19.4.1), using the one with the specialization of receiver and the other as defender will probably result in a further increase of the rally duration and consequently the duration of the set and the match.

Finally, the two and a half full rotations per set and one and a half full rotation at the fifth set on average (Laios & Kountouris, 2010), perhaps leads the coaches to adapt their

training to these demands of the game and consequently we shall see players with higher level performance, which help the extension of the rally duration.
In conclusion the implementation of the new rules as from 2000, especially those related with the implementation of the rally point system, with each set played to 25 points and the introduction of libero players have forced volleyball coaches and players to reevaluate their strategies and tactics in the goal of winning a rally, a set and a game. The collateral prolongation of the rallies together with the increased uncertainness of the outcome has undeniably made the game more spectacular and intriguing to watch.

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