CASE REPORT
SCIENCE OF MARTIAL ARTS

The general individual technical-tactical profile of the multi-medallist judo athlete Teddy Riner's

Authors' Contribution:
A Study Design
B Data Collection
C Statistical Analysis
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Abstract

Background & study aim: Analysis of the effectiveness of offensive and defensive actions during the highest rank judo tournaments not only allows execution of individual technical-tactical profiles (TTP). Indirectly it provides knowledge about individual properties of training (in general or specific sense). The aim of the study is individual technical-tactical profile Teddy Riner's based on general indicators.

Material & Methods: The research analyzes consisted of technical elements applied by judokas Tedy Riner during the Olympic Games and the World Championships in period 2007-2014. The fights were recorded by audio-visual means and then marked graphically. Selected indices of TTP were determined (versatility, activity, efficiency, effectiveness). The values of TTP indices helped to characterize the athlete's individual training profile. The scope of techniques applied by him – both effective and ineffective – was specified as well as the frequency of his and his opponents' attacks. The efficiency values for both attack and defence were determined. Effectiveness, expressed as the referees' points awarded for judo techniques used during the fight, was another component of his individual assessment.

Results: During all the analysed fights the athlete was characterized by a greater frequency of performed attacks than his opponents and by 100% efficiency of defence. He did not allow his opponents to effectively implement any technique. The range of applied techniques varied in subsequent meetings.

Conclusions: Analysis of selected indices in TTP defining Teddy Riner's fighting efficiency allows demonstrating his growing advantage over the opponents during successive World Championships. The lowest values of indices, achieved during the competition in consecutive Olympic Games, may have been caused by participation of a selected group of athletes in this event and a greater responsibility resulting from the prestige of this competition.

Keywords: activity index • efficiency index • effectiveness index • versatility index

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Indices of technical-tactical preparation – describe individual features of the competitors taking part in sport competitions. The value of those indices allows to determine both dominant features of the preparation and its disadvantages.

Profile of individual training – individual profile connected with technical-tactical preparation is an important factor in searching for the model value. Analysis of judokas' technical-tactical preparation (TTP) allows specifying typical values of TTP indices, whose diagnosis ensures the validity of special preparation, taking into account individuation of TTP.

Waza – a technique or movement which is based on a standard form and is used to challenge and defeat the opponent [26].

Ne waza – judo fainting in horizontal posture.

Japanese terms judo techniques used in the text:

Leg techniques (sub classification: ***ashi waza***):

kouchi-gari – small inside clip

ouchi-gari – big inside clip

osoto-gari – big outside clip

Hip techniques (sub classification: ***goshi waza***):

daki age –hugging high lift. (forbidden in competition.)

uchi-mata – thigh throw

soto-makikomi – big outer wraparound

Hip techniques – (sub classification: ***te waza***):

kata guruma – shoulder wheel

kibisu gaeshi – one-hand reversal

kuchiki taoshi – single leg takedown

morote gari – two-hand reap

obi otoshi – belt drop

seoi otoshi – back drop

sukui nage – scoop throw

tai otoshi – body drop

yama arashi – mountain storm

Introduction

Multi-medallist, French judo athletes Tedy Riner is an example of the ability to maintain the very high level of sports mastery in the long-term cycle (2007-2014). Riner's sports achievements allow placing him among the most prominent representatives of this sport discipline. In his sports career won the gold and the bronze medal in the Olympic Games, seven gold and two silver medals at the World Championships, four European Championship medals, nine gold medals at IJF World Tour: Masters/Grand Slam/Grand Prix and many other medals in numerous judo competitions. His still ongoing sports career suggests that the records in the number of medals and titles during the World Championships and the Olympic Games set by him may be unattainable in subsequent years for future trainees of this sport.

This athlete's excellent physical conditions facilitated his successes while fighting in the heavyweight category (+100 kg) and in the open category; they were also supplemented by effective technical preparation coming from the long traditions of French judo. Many great predecessors did not reach as many successes at major sports events, even though they also had excellent physical conditions and impressed with great and effective technical training [1-3].

Angelo Parisi (France, Great Britain) won four Olympic medals (1972 bronze in category open, 1980 gold in category +95 kg and silver in open, 1984 silver in category +95 kg (was 31 years old then). Dutch multi-medallist Willem Ruska in the age of 32 has won two Olympic gold medals in 1972 in category +93 kg and open, earlier in 1966 he won 2 gold medals of the World Championship and 1 silver, 7 gold, 2 silver and 1 bronze of the European Championship.

Two-fold Olympic Champions: Hitoshi Saito (Japan) 1984, 1988 in category +95 kg (was 23-, 27 years old), World Champion open category 1983, silver medallist 1985 category +95 kg; Peter Seinserbacher (Austria) 1984, 1988 (was 24-, 28 years old) in category –86 kg, since 1980 won gold medal World Championship, 1 gold, 3 silver, 4 bronze European Championship; Waldemar Legień (Poland) 1988 (–78 kg), 1992 (86 kg) was 25-, 29 years old, since 1985 won 3 bronze medals World Championship, 1 gold, 1 silver, 1 bronze European Championship [4].

Registration of fights at the biggest sporting events helped determine the values of selected indices of technical-tactical preparation (TTP) characterizing the athlete and an objective assessment of how to solve the fight during subsequent sporting events.

The aim of the study is individual technical-tactical profile Teddy Riner's based on general indicators.

Material and methods

During the 10 analysed competitions (the Olympic Games and the World Championships) the athlete fought 54 fights, of which he won 52 fights (96%). Six hundred attacks performed by Teddy Riner (by means of judo techniques) were registered, including 55 attacks evaluated by a referee. During these meetings his opponents made 331 attacks that were not scored. His opponents received 63 warnings for breaching the rules of sports judo, while Teddy Riner received 14 warnings. The fights were recorded with standard audio-video means, and then multiple viewing of the registered fights allowed identifying technical elements marked with a graphic method [5].

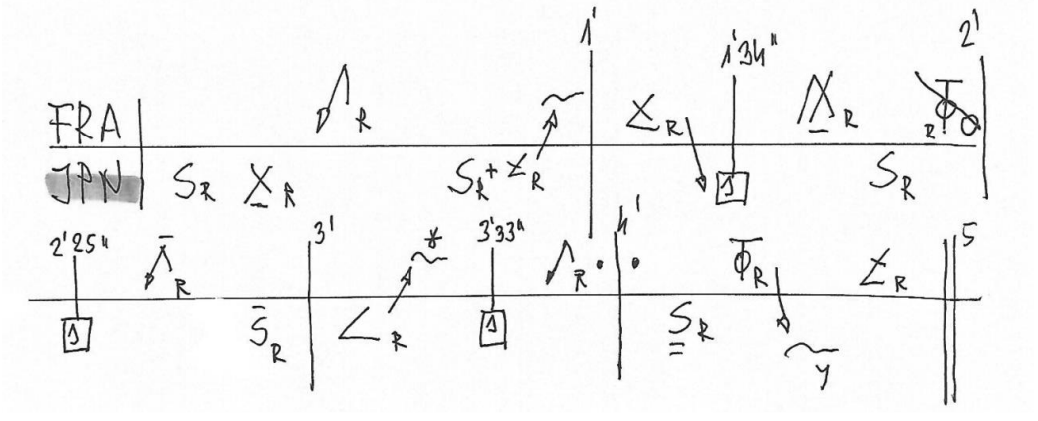

Figure 1. Graphic notation of Teddy Riner's judo fights with Japanese athlete.

Below is presented a description of Teddy Riner's graphically recorded fights during the World Championships finals in 2014 (Figure 1). JPN (Japanese athlete) performs an attack with right foot on *ouchi gari* and then a dangerous attack on *osoto gari*; FRA athlete attempts to implement *kouchi gari*. JPN athlete attempted another *ouchi gari* with the right foot, not very correctly joining this attack with *soto makikomi*, in response to which FRA athlete takes a dominant position for a few seconds in *ne-waza* – this is the first minute of the fight. In the second minute FRA athlete attempts *soto makikomi* to the right; defending JPN athlete takes the fight to the ground. For an incorrect defence the referee leading the fight gives JPN representative the first *shido* warning in 1'34" minute of the fight. FRA athlete makes an impressive attempt to execute the *uchimata* throw with the right leg, then JPN athlete makes another attempt at *ouchi gari* with the right leg. FRA athlete attacks *osoto gari* with the right leg, and then, already after stopping the action by the referee, he correctly performs *sumi gaeshi* (*obi tori gaeshi*). Starting the third minute of the fight JPN athlete receives another penalty from the referee, *shido* for incorrect defense (in 2'25"). By the end of the third minute of the fight FRA athlete attempts to perform an attack on *kouchi gari*, and JPN athlete attacks on *kouchi gari* and *ouchi gari*. JPN athlete begins the fourth minute of the fight with an attack on *tai otoshi* made on one knee (*seoi otoshi*), after which FRA athlete tries to take over the initiative of fighting on the ground (*ne-waza*). JPN athlete yet again (third time) receives a *shido* warning for another incorrect defence in 3'33". The fourth minute fight and the beginning of the fifth minute are FRA athlete's fake attacks by *kouchi gari*, then JPN athlete performs a very dangerous attack on *ouchi gari*, which is close to scoring, then FRA athlete makes an attack on *sumi gaeshi*, after which JPN athlete takes the initiative to fight on the ground. In the last seconds of fighting attacking on *osoto gari* FRA athlete passes to *soto makikomi*.

Registration was carried out by two experienced judo coaches by making comparisons and adjustments in the recorded technical elements on the basis of the adopted rules for objective observation of fighting to get the most reliable data [6, 7]. Discrepancies between the registrants did not exceed 0.91 and 0.92 of the kappa index [8]. The study excluded an analysis of indices from the World Championships in 2007 due to lack of full film registration of all fights.

The collected results observation allowed determining selected indices of TTP characterizing the athlete's way of fighting: (1) *versatility index*; (2) *activity index*; (3) *efficiency index*; (4) *effectiveness index*.

Determination of versatility indices

Setting about an individual assessment of TTP during sports competitions the range of techniques was determined using indices of overall, effective and faked versatility. Determining the scope of analysed judo techniques, which would provide a fixed denominator for the presented formulas, was of vital importance for the value of this index. Based on Kodokan Judo classification of techniques [9, 10], one may enumerate 94 techniques (67 throws and 27 grapplings). However, the sports rules and the practice of sports competition while fighting limits the number of techniques used during sports competitions, e.g. there is a ban on such techniques as: *kani basami*, *kawazu gake*, *daki age*, *dojime*, *morote gari*, *kuchiki taoshi*, *kibisu gaeshi*, *kata guruma*, *sukui nage*, and negligible presence of such techniques as: *yama arashi*, *obi otoshi*, *tawara gaeshi* and others.

In the present paper the techniques analysed during the competition were limited to fifty, and this value was the fixed denominator of the determined versatility indices. The value of versatility indices was calculated on the basis of the formulae:

$$Vo = Xo/50 \cdot 100\%$$

and:

$$Ve = Xe/50 \cdot 100\%$$

$$Vf = Vo - We$$

where: Vo – overall versatility index; Ve – effective versatility index; Vf – faked versatility index; Xo – the number of applied techniques (in practice, there is also a combination of certain varieties of throws or grapplings such as *seoi nage*, *kosoto gari* or *kesa gatame;* Xe – the number of effectively used techniques; We – efficiency versatility index; 50 – the number of analysed techniques.

Determination of activity indices

The next of the analysed indices was activity, which allows determining the differences in the frequency of attacks performed by the studied athlete and his opponents. The value of this index can depend on the athlete's performance and his fitness preparation [11-13]. The activity index was determined on the basis of the formulae:

Sutemi-waza – sacrifice techniques:

Ma-sutemi –forward sacrifice projections:

sumi gaeshi – corner reversal

obi-tori-gaeshi – corner reversal with shank belt

tawara gaeshi rice – *bag reversal throw*

Yoko-sutemi – side sacrifice projections:

kani basami – crab or scissors throw

kawazu gake – one-leg entanglement

Katame-waza – grappling techniques that include holds, locks, and joint manipulation [26]

Osaekomi-waza – pins or matholds

kesa-gatame – scarf hold

Shime-waza – chokes or strangles:

do-jime – *trunk strangle*

Kansetsu-waza – joint locks

juji-gatame – crossmark hold

Tokui-waza – "favourite" or "best" technique. It's the throw that fits naturally to athlete body type.

Ippon – one point. Achieved through the execution of a valid technique on the opponent [26].

Waza-ari – a judo term for a technique that cannot be regarded as a full *ippon*, but is very close [26].

Yuko – effective/moderate advantage refers to a point which is awarded in accordance with the judgment of a technique. In the case of an *osae komi waza* (hold-down techniques), a *yuko* is awarded when a contestant pins the opponent for 20 seconds or longer, but less than 25 seconds.

Shido – instruction/light penalty (penalties for rules violations are ranked in the following ascending order of severity: *chui*, *keikku*, *hansoku make*).

Aa = sum of A / n
Ao = sum of a / n
A = Aa – Ao

where: Aa – attack activity index; sum of A – the number of the athlete's registered attacks; n – the number of analysed fight; Ao – the opponents' activity index (activity of defence); sum of a – the number of registered attacks performed by opponents; A – activity index.

Determination of efficiency indices

The frequency of the efficiently used techniques can be evaluated by means of other TTP indices. The efficiency of attack and the efficiency of defence were defined as proportions between undertaken attempts to implement a technique and the successful attacks (attacks for which judges' points were awarded). The values of these indicators should be determined by analysing actions in attack and in defence with application of the formulae:

Ea = sum of AE /sum of AT·100%

where: Ea – the efficiency of attack index; sum of AE – the sum of the analysed athlete's efficient attacks; sum of AT – the total sum of the attacks carried out by the analysed athlete

and:

Ed = 1 (100%) – sum of Ae / sum of At·100%

where: 1 (100%) – the value of defence before the start of fight; Ed – the efficiency of defence index; the sum of Ae – the sum of efficient attacks carried out by the studied athlete's opponents; the sum of At – the total sum of all attacks carried out by the studied athlete's opponents.

Determination of effectiveness indices

Effectiveness indices were determined based on the judges' points awarded for effectively executed techniques and the lost points (techniques effectively performed by opponents) calculated per one fight. Calculations were made as follows:

Sa = 5·M + 7·M + 10·M / n
So = 5·m + 7·m + 10·m / n
S = Sa – So

where: Sa – effectiveness of attack index; 5, 7, 10 – points values of effective attacks (*yuko*, *waza-ari*, *ippon*); M – the number of effective attacks carried out by the studied athlete; n – the number of analysed fights; So – the opponent's effectiveness of attack index (effectiveness of defence); m – the number of effective attacks carried out by studied athlete's opponents; S – the effectiveness index (final effectiveness).

Judges' penalties used during sports competitions were determined just as the effectiveness of the attack and defence (Sa and So), based on the point value of the received penalties. Spelling and naming of judo techniques are presented based on English-Japanese Kodokan dictionary [14].

Results

An assessment of the values of *overall, effective and faked versatility* allowed specifying the range of techniques used by Teddy Riner while fighting. The highest values of *overall* and *faked versatility* were recorded during the Olympic Games in 2008 and the World Championships in 2010 (in both the heavyweight and the open category). The lowest values of these two indices were found for the World Championships in 2014, 2011 and 2013. The widest range of efficiently used techniques (*efficient versatility*) characterized the athlete during the World Championships in 2008, the World Championships in 2010 (in fighting in the 100 kg category) and the World Championships in 2013. The lowest values of this index were identified during the Olympic Games in 2012, the World Championships in 2009 and 2010 in the open category (Figure 2).

Evaluating the *activity index* of the athlete and his opponents, it was found that the highest values for these indices were achieved in the initial period of sports rivalry (between 2008-2010) and the lowest values were found during the World Championships in 2011, 2013 and 2014 (Figure 3).

Also during the World Championships in 2011, 2013 and 2014 the highest values of the *efficiency of attack index* were found, while the lowest values of this index were specified for the Olympics Games in 2012 and the World Championships in 2009 and 2010 (in the open category). In all the analysed competitions none of Teddy Riner's opponents could perform a successful attack, which allowed specifying 100% value of the *efficiency* of his *defence* (Figure 4).

The *effectiveness of attacks* was determined by the value of points awarded for performed techniques, and it reached the highest ratings during the World

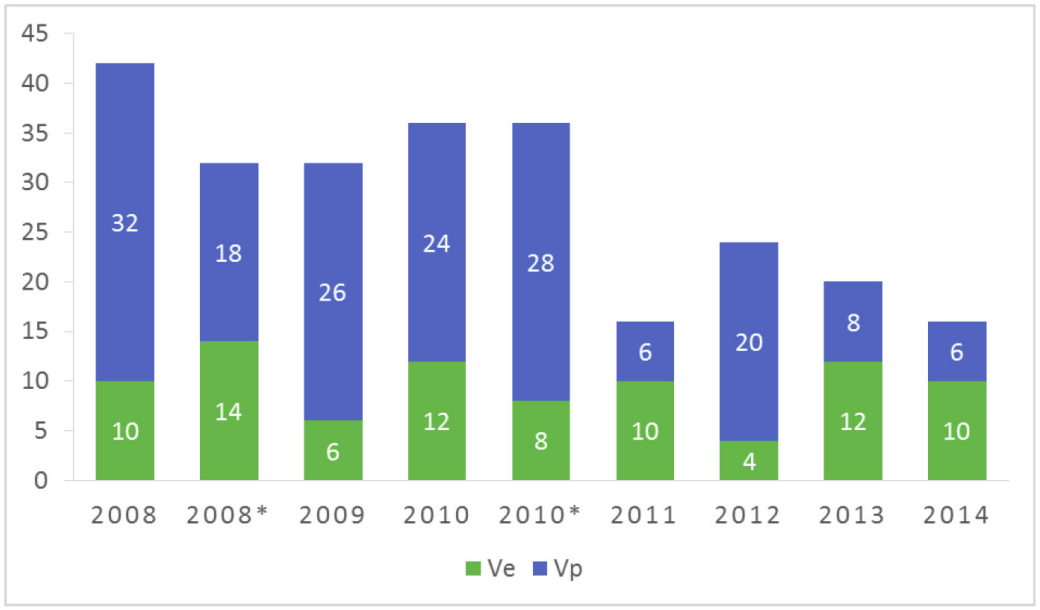

Figure 2. The values of versatility indices in subsequent competitions (Vo, Ve, Vf)

* the World Championship in the open category

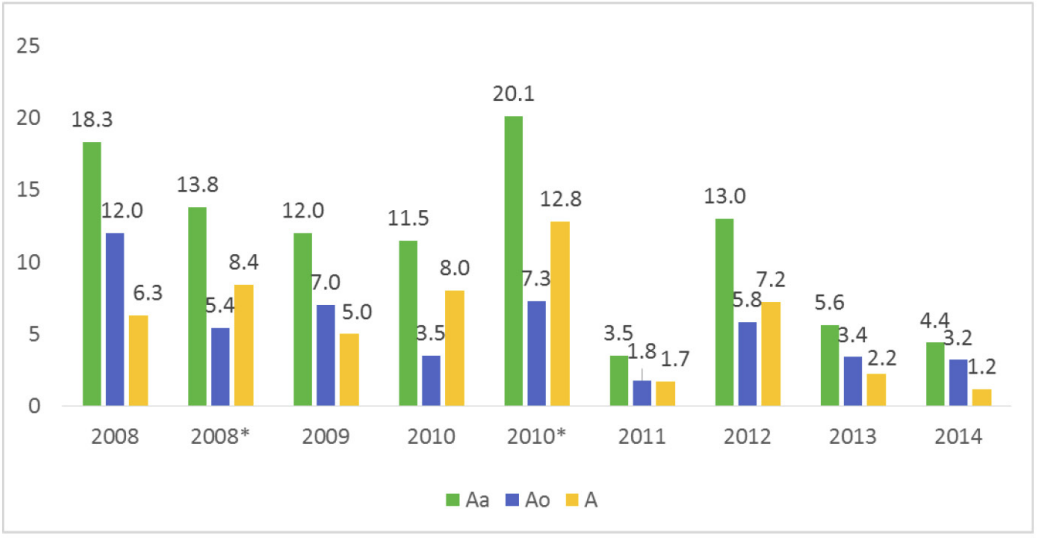

Figure 3. The values activity indices in the subsequent competitions (Aa, Ao, A)

Championships in 2008, 2010 (+100kg category) and 2014. The lowest values of this index were found during the Olympic Games in 2008 and 2012, and the World Championships in 2009. The highest values of points received for the opponents' penalties were during the World Championships in 2009 and 2010 and the Olympics in 2012 (Figure 5).

The points lost by Tedy Riner had low values of the So index and they resulted from the few penalties received at the initial stage of sports competition (Figure 6).

During competitions in subsequent World Championships the overall time of all fights and the average time of one fight decreased, also the time of fights and the average time of fights fought during the Olympic Games in which Teddy Riner participated extended (Table 1).

Figure 4. The value of efficiency indices in subsequent competitions (Ea, Ed)

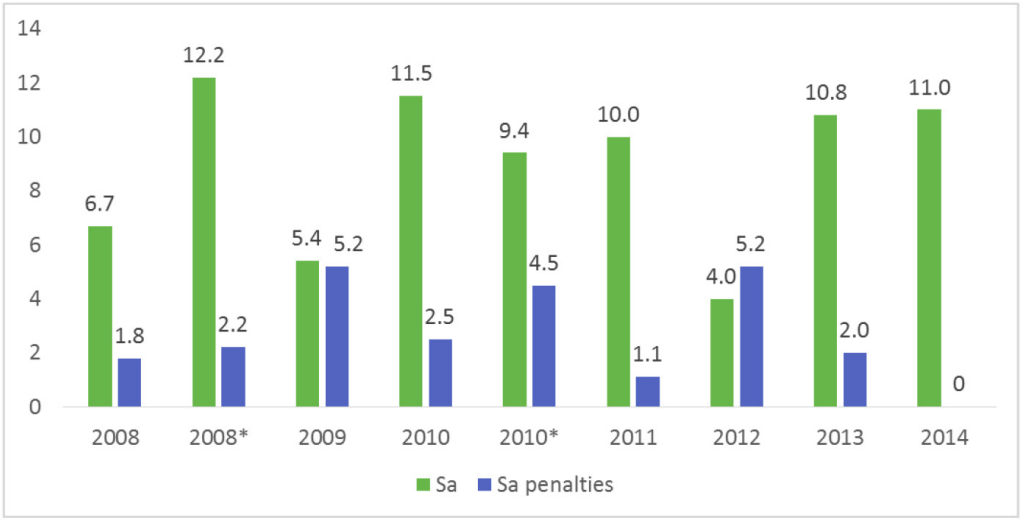

Figure 5. The value of the effectiveness of attack index and Tedy Riner's opponents' penalties (Sa).

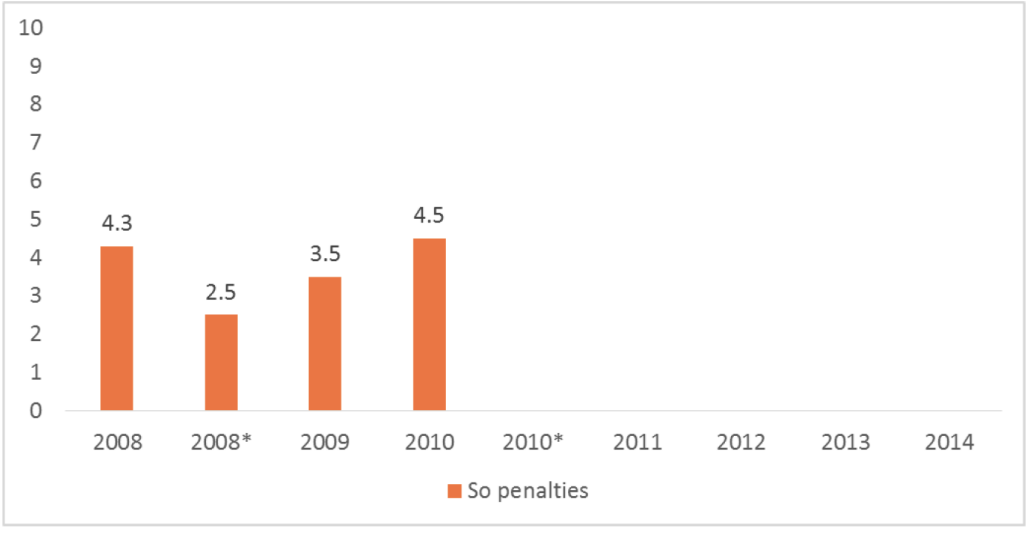

Figure 6. The value of penalties received by Tedy Riner (So).

Table 1. The World Championships and Olympic Games in which Tedy Riner participated

Subsequent fights	Subsequent years of the analysed World Championships and the Olympic Games									
	2007	2008	2008*	2009	2010	2010*	2011	2012	2013	2014
Number of fights-	5	6	5	5	6	6	6	5	5	5
Total time	18′27″	34′44″	13′43″	18′47″	20′28″	25′43″	11′15″	24′19″	11′37″	8′34″
Average time of 1fight	3′41″	5′47″	2′47″	3′45″	3′25″	4′17″	1′53″	4′52″	2′20″	1′43″

* World Championships in the open category

Discussion

In assessing the level of technical-tactical preparation, actions both in attack and in defence were taken into consideration and the fact that the scope of the applied judo techniques which Tedy Riner used during the successive analysed competitions may also have been influenced by his opponents' predispositions and preparation [15-22].

The values of *overall, effective and faked versatility indices* did not have a permanent nature due to the different conditions that resulted from fights with different opponents. One can, however, note that in the early years of rivalry the athlete more often and to a greater extent used techniques known as secondary or opening, which did not produce point value and only made way to perform a decisive attack. This phenomenon is illustrated by high values of *overall and faked versatility indices* found during the Beijing Olympics in 2008 and the World Championships in Tokyo 2010. With passage of time and stabilization of athletic achievement, the athlete used a much smaller range of techniques that did not provide effective point ratings. During the World Championships in 2011, 2013 and 2014 *overall and faked versatility indices* had the lowest values, which meant that for an effective attack he did not need the application of a wide range of so-called preparatory techniques or those opening way for a decisive attack (bringing a specific point value).

Also in the same period there was certain stabilization of the frequency of performed attacks, which affected a decrease in the values of *activity indices*. The frequency of attacks performed by the athlete and his opponents during the World Championships in 2011, 2013 and 2014 decreased in comparison to the analysed period in which he won his first great successes. However, in all the analysed competitions he had a positive balance of attacks, dominating over his opponents also in the number of judo techniques. Similarly, the efficiency of attacks during the last three World Championships reached the highest values, proving that, more than in the previous period, the performed attacks produced measurable referee's points for the used techniques, as his opponents could not effectively neutralize his attacks.

The athlete's sports successes during the largest competitions were also due to his exceptional skills in effective defence. Throughout the whole analysed period of participation in these competitions, he did not lose any points for effectively made attack in fights with many strongest fighters from all over the world. Therefore, throughout the whole period of analysed competitions the value of his *defence efficiency index* was 100%. The quality of attacks, expressed as the value of referees' points awarded for effectively performed judo techniques, defined as the *effectiveness of attack index* allowed finding that he received the most referees' points for effectively performed judo techniques during the World Championships in 2010 and in 2008 (in the +100 kg category). High values of this index were also identified during the last registered World Championships. The athlete received lower values in the *effectiveness of attack* during the Olympic Games and the World Championships in 2009. His increasing tactical maturity during successive competitions is also proved by a dropping number of points lost through judges' penalties, little received in the early years of rivalry. During the analysed period there were several changes in the rules of sports judo fight [23-25].

Teddy Riner's dominance in subsequent competitions also relied on imposing the pressure of fight that led to his gaining advantage also by penalties against his opponents. As a result of constantly growing advantage over other opponents, also the time of the fights to defend consecutive World Championship titles shortened. The total time of all the fights fought by Teddy Riner during the last three World

Championships was a little over eleven minutes, and he won these fights, on average, before half of the regular time fight. The extended time of his fights during the Olympic Games may have been caused by a far more even level of his opponents, who needed to qualify to participate in the Olympics in preceding eliminations.

Teddy Riner constantly takes part in sports competition, and he himself will have to decide when to finish his professional career, because now one cannot point to an athlete who can break a streak of his great successes. Of course, one should not forget that the course of a sports career is influenced by many other objective factors and the athlete's health. Further observations of Teddy Riner will raise emotions and admiration for his mastery of the martial art – judo.

The detailed profile would consist to combinations of specific techniques, preferred by athlete (*tokui-waza*) including the degree of the effectiveness. For example the Olympic Champion Paweł Nastula (Poland) in 1991-1992 from 59 *ippon* eight times made *seoi nage* and eight times *juji gatame* [18].

Conclusions

Analysis of selected indices in TTP defining Teddy Riner's fighting efficiency allows demonstrating his growing advantage over the opponents during successive World Championships. The lowest values of indices, achieved during the competition in consecutive Olympic Games, may have been caused by participation of a selected group of athletes in this event and a greater responsibility resulting from the prestige of this competition. The changing values of indices were caused by factors coming from the way of fighting and the opponents' TTP.

Conflict of interest

The authors declare that they have no conflict of interest.

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