



MAJOR TRENDS IN THE WORLD JUDO SPORT DEVELOPMENT

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ABSTRACT

Judo's sporting success, as a fight between attack and defense, is largely driven by the mastery of the sporting technical means. The classic *Kyu/Dan* system which includes all the initial technical characteristics remained. At the same time, only a limited number of grips are used in competitive conditions. The main aim of this study is to define the general pattern in the technical development of this sport and at the same time assessing the place of the best Judoka in the total number of judo practitioners. Therefore, it is of particular interest to discover the trends in the development of sporting technical mastery. On the basis of a large-scale statistical analysis, trends in the development, usability and effectiveness of competition techniques have been evaluated.

The individual characteristics of the best competitors by weight category are also analyzed. Along with the general patterns and trends, the features of the main leading schools in world judo are also distinguished.

The results obtained and their analysis can contribute to adequate development and planning initial training programs and to applying a science based approach to sports technical intelligence in elite judoka mastery.

Key words: Kyu/Dan, techniques, individual approach, technical mastership

INTRODUCTION

High performance in any sports discipline depends on a different combination of motor and mental qualities, sports technical skills, etc. In some sports, this set is relatively limited to the extent that competitions are a test for assessing one particular quality. With the continuous evolution of competitive style, for the right training of “top” athletes, we need a better understanding of judo skills and their trend in top competitions. The sport of judo has a diametrically opposite characteristic. Moreover, success here depends not only on the qualities of the individual athlete, but also on those of the opponent, as well as on their interaction. It turns out that basic mathematical relations (such as transitivity) in this sport have no logical force.

A single combat, as a fight between attack and defense, is largely determined by the mastery

of the technical skills in sport. The need for improvement of technical and tactical preparation of contestants has caused that some additional criteria of joint classification have also been used in practice: based on the direction of *Kuzushi* (the action taken by one contestant in order to throw the other contestant out of balance), presence of body rotation performed by a thrower and tactical situation when performing a throw i.e. a single attack, combination or counterattack (1). In most cases, evaluation is sought through the parameters of volume, variety, efficiency, etc. These features are well developed by the classic *Kyu/Dan* system in judo. Success in judo depends on some variables that are technical and tactical-related and that determine the unpredictability and effectiveness during (2).

Another characteristic of this sport is that after its initial creation on the basis of traditional Japanese schools, soon after its spread, judo was enriched with many techniques of national fighting's in other countries. The vitality of the various techniques in judo was naturally established during the international

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competitions. Therefore, it is of particular interest to discover the contemporary trends in the development of technical skills in high sport mastery. It should be recalled that the very first tournaments led to major changes to the basic principles underlying the creation of the sport. For instance, the need to introduce weight categories and gradually enlarge them became clear. Therefore, one can conclude that body weight of judokas is a very important performance factor in a judo match and one of the crucial elements of tactical preparation in judo (3). Today it is even found that the categories differ not only in power, but also in the technical parameters of the competitors.

The common patterns and sought trends are usually revealed by statistical characteristics. On the other hand, the champions naturally deviate from the general parameters and statistically derived regularities. Therefore, as the main objective of this study, we set ourselves the task of defining the general pattern in the sporting technical development of this sport and at the same time assessing the place of the best judo players. Therefore, we set as the main aim of this study the task of defining the general pattern in the technical development of this sport and at the same time assessing the place of the best judoka in the total number of judo practitioners.

METHODS

For the purposes of this study, the methods of video-computer analysis were used. The number and effectiveness of the techniques used during the most significant International competitions (World Championships and Olympic Games) were evaluated. The data were processed with the means of mathematical statistics regarding gender, categories, nationality and rank list of the

competitors. Changes to the sports rules have been taken into account. Changing rules of competition require an objective assessment of the current elements of this preparation (4). There is a visible tendency for the sport to become more attractive, i.e. to stimulate and tolerate high-scoring techniques, limiting the time for *Ne-waza*. This has led to intolerance to passive play and false attacks, which in turn increased the dynamics of the sport. These changes put new requirements towards all aspects of the judo training process. It also aids in surprising opponents by increasing the variety of possible grasp combinations (5).

RESULTS

As baseline data, we used Hoare's research (6) to perform a comparative historical analysis of the effectiveness of the techniques (**Table 1**).

Table 1. Comparative historical analysis (7)

#	Cluster	Technique	Total
1	Te-waza	Morote-seoi-nage	88
2	Ashi-waza	Uchi-mata	76
3	Ashi-waza	O-soto-gari	71
4	Ashi-waza	O-uchi-gari	43
5	Te-waza	Tai-otoshi	43
6	Koshi-waza	Harai-goshi	35
7	Ashi-waza	Ko-soto-gari	31
8	Ashi-waza	Ko-uchi-gari	25
9	Te-waza	Ipon-Seoi-nage	16
10	Ashi-waza	Tsurikomi-ashi	11

The list of techniques in Table 1 includes 80 percent of the throws during a competition, a total of 512 scores completed during three consecutive World Championships.

The current picture of the frequency of the techniques used and their effectiveness is presented in the statistics from the 2018 Baku World Championship (**Table 2**).

Table 2. 2018 Baku World Championship

#	cluster	technique	waza-ari	ippon	total	%
1	Te-waza	Seoi-nage	56	23	79	10.35%
2	Ashi-waza	Uchi-mata	43	23	66	8.65%
3	Te-waza	Sumi-otoshi	52	11	63	8.26%
4	Koshi-waza	Sode-tsurikomi-goshi	25	19	44	5.77%
5	Ashi-waza	O-uchi-gari	30	14	44	5.77%
6	Te-waza	Ippon-seoi-nage	26	8	34	4.46%
7	Ashi-waza	Ko-soto-gake	18	14	32	4.19%
8	Ashi-waza	Ko-uchi-gari	19	10	29	3.80%
9	Ashi-waza	Ko-soto-gari	20	7	27	3.50%
10	Ashi-waza	O-soto-gari	15	12	27	3.50%

Of particular interest is the comparative analysis of the frequency of use of technical actions and their effectiveness during the last

World Championships and Olympic Games (Table 3), (Legend)

Table 3. The ten most effective techniques

№	OG 2012	WC 2014	WC 2015	OG 2016	WC 2017	WC 2018
1	Morote-seoi-	Uchi-mata	Eri-seoi-nage	Uchi-mata	Eri-seoi-nage	Eri-seoi-nage
2	Uchi-mata	Seoi-nage	Uchi-mata	Sode-tsurikomi-	Uchi-mata	Uchi-mata
3	Ippon-seoi-nage	-seoi-nage	Sode-tsurikomi	Ippon-seoi-nage	Sumi-gaeshi	Sumi-otoshi
4	Harai-goshi	Sode-tsurikomi-	O-uchi-gari	O-uchi-gari	Sode-tsuru	Sode-tsurikomi
5	O-uchi-gari	Eri-seoi-nage	Sumi-gaeshi	Eri-seoi-nage	O-uchi-gari	O-uchi-gari
6	Ko-uchi-gari	Harai-goshi	O-soto-gari	Sumi-gaeshi	Uki-waza	Ippon-seoi-
7	Yoko-tomoe	O-uchi-gari	Morote-seoi-	O-soto-gari	Soto-maki-komi	Ko-soto-gake
8	Sumi-gaeshi	Sumi-gaeshi	Soto-maki-komi	Morote-seoi-	Morote-seoi-	Ko-uchi-gari
9	Eri-seoi-	Soto-maki-komi	Ko-uchi-gari	Harai-goshi	Tai-otoshi	Ko-soto-gari
10	Sode-tsurikimi-	Ko-uchi-gari	Tai -otoshi	Uki-Waza	Yoko-tomoe-	Tai-otoshi

Legend: OG 2012 – Olympic Games London, UK; WC 2014 – World Championship Chelyabinsk, Russia; WC 2015 - World Championship Astana, Kazakhstan; OG2016 - Olympic Games Rio de Janeiro, Brazil; WC 2017 - World Championship Budapest, Hungary; WC 2018 – World Championship Baku, Azerbaijan.

The developments as a result of the rule changes are illustrated in Figure 1. The figure presents the contemporary picture of the

structure of the achieved victories. Gone are the days when most victories were achieved in *Ne-waza*.

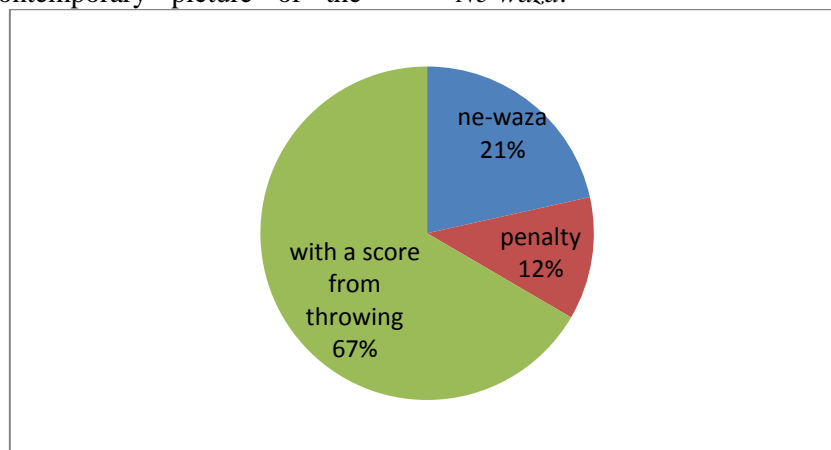


Figure 1. Ratio of victories achieved in Baku

The analysis of the top ten most effective techniques shows that five of them have a maximum point score, while at the same time those having registered 100% efficiency are single performances and have no statistically significant meaning (Table 4).

Table 4. Single performances with maximum point score

Cluster	Technique	Ippon
Ashi-waza	O-guruma	1
Te-waza	Obi-tori-gaeshi	1
Yoko-sutemi-waza	Hane-makikomi	1
Ashi-waza	O-soto-otoshi	1

Given that the competitive result is conditioned by the perfect mastery of a limited number of techniques, those who are more effective deserve attention. On this basis, the *Ippon-seoi-nage* and *Uchi-mata* techniques are fundamental to the whole system of sports and technical skills (Table 3). This picture should not lead to favouring certain techniques, but to sharpening attention to these techniques, as they not only have very high efficiency, but also show remarkable, constantly maintained in all types of tournaments, high frequency and efficiency of use. To these characteristics of *Ippon-seoi-nage* and *Uchi-mata* we must add their fundamental role in the biomechanical structuring of all tori throwing techniques The

data provides evidence for males being able to use both *Ashi-waza* and *Te-waza* techniques at a similar level of effectiveness, however females are shown to depend highly on *Ashi-waza* techniques (over 50% of all female *Nage-waza* scores) (7). Recent studies have shown that super elite judokas used a greater number of throwing techniques which resulted in scores, additionally the number of different throwing techniques and the variability of directions in which techniques were applied were significantly correlated with the number of wins and the number of points and *Ippon* scored (8).

The summary statistical analysis of sports achievements outlines some of the strongest national schools with stable ranking of all major championships - Japan, Russia, France, South Korea, Brazil, Azerbaijan and Georgia. These countries have on the whole most homogeneous teams. The second group of countries that rely on 3-4 competitors to win medals includes Hungary, Poland, England, Netherlands, Belgium, Cuba, etc. A third group is emerging which relies on separate competitors to represent the high positions of sport, such as Finland, the USA, Italy, Spain, the DPRK, Bulgaria and others. In the conditions of such a fierce competition, in order to secure one medal from World Championship or Olympic medal, the team must have at least 3-4 competitors with real potential for winning the prize.

Technically, two major problems emerge - on one hand; this is a high degree of individualization and, on the other, the variability generated by sports and technical intelligence in the development of the fight between attack and defense. The conducted statistical analysis also outlines a tendency for improvement of the tactical preparation of the technique - the form of maneuvering, grips, movement, harassment and more (**Table 5**) (**Legend**). Thus, techniques such as *Ko-uchi-gari*, *Ko-soto-gake*, *O-uchi-gari*, *Sasae-tsuri-komi-ashi* and the like are applied too often, but mostly as preparatory and tactical helpers, in addition to the main ones who ultimately carry the point scores. The direct effectiveness of these techniques amounts to about 30% of that of *Ipon-seoi-nage* and *Uchi-mata*. On the other hand, techniques such as *Tomoe-nage*, *Tani-otoshi*, *Soto-makikomi*, *Ura-nage* and others are used much less frequently, in individual cases, as a "specialty"

of individual competitors and with different effectiveness in the different categories. Regardless of the global trends, several major schools can be distinguished, which have their own peculiarities.

The Asian school with the typical representatives of Japan and South Korea is most pronounced, the representatives of Mongolia and some other representatives of the former USSR countries such as Uzbekistan and Kazakhstan have also their own distinctiveness. The latter are strongly influenced by their national fighting practices. We can conditionally divide the European school into Western European school with representatives from France, Germany, Italy, Spain; Central European school: Poland, Hungary, Romania, Slovenia, as well as Eastern European school with prominent representatives such as Russia, Georgia, Azerbaijan. Of course, this division is too conditional due to the numerous competitors' participations.

In the Asian school, the most typical representatives are the Japan judoka, who give a specific look to the world picture of judo. Closest to them are the South Korean judoka. The major characteristic of this school is the exceptional mastery of different techniques of judo in both *Tachi-waza* and *Ne-waza* positions. A weakness of Asian judoka in the recent past was their less physical fitness compared to Europeans, but at the moment they have overcome this deficiency and rely again on their "pure" techniques. The Japanese competitors performed the most effective attacks by using leg throws which call for the reaping actions of legs either from inside or outside *Uchi* and *Soto*. Using these techniques put the competitors in a better position to carry out attacks and changing their direction (9). Asian judokas are very agile and maneuverable in applying the technique, mostly on the go and with ease. They apply combinations in every counter-attack and defense of their opponent. Their typical characteristic is that they always attack with maximum force, complete the technique or skillfully combine in accordance with the defensive reaction of the opponent. They almost always impose the same grip that is comfortable for them and endeavor to keep it.

Table 5. Techniques by categories Baku 2018

Cat/ kg	NAME	WR L	Fav. Technique	Baku 2018	
				Technique	Final
48	BILODID Daria- UKR, age-18	2	AW/O-uchi-gari	AW/O-uchi-gari, AW/O-uchi-gari, AW/O-uchi-gari	AW/O-uchi-gari
52	ABE Uta, JPN, age-19	3	AW/Uchi-mata	YSW/Uchi-mata-makikomi, KW/ Sode-tsurikomi-goshi	AW/Uchi-mata
57	YOSHIDA Tsukasa JPN, age- 23	1	AW/Uchi-mata	TW/Yama-arashi, AW/Uchi-mata	KW/Harai-goshi, AW/Ko-soto-gake
63	AGBEGNENOU Clarisse FRA, age- 26	1	AW/Osoto-gari	TW/Sumi-otoshi, MSW/Ura- nage, KW/Utsuri-goshi, AW/O- uchi-gari	YSW/Harai- makikomi
70	ARAI Chizuru JPN, age-25	1	AW/Uchi-mata	AW/Uchi-mata, AW/O-uchi- gaeshi, KW/O-goshi, AW/O- uchi-gari	AW/Uchi-mata
78	HAMADA Shori JPN, age-28	3	AW/Uchi-mata	AW/Harai-goshi-gaeshi, AW/O-uchi-gari	HSK/3 rd shido
+78	ASAHINA Sarah JPN, age-22	2	KW/Harai- goshi	AW/Hiza-guruma, AW/Sasae- tsurikomi-ashi, AW/Hiza-guruma	HSK/3 rd shido
60	TAKATO Naohisa, JPN, age-26,	2	MSW/Tomoe- nage	AW/Uchi-mata, AW/Ko-soto- gari, AW/Ko-uchi-gari,	AW/Ko-uchi-gari
66	ABE Hifumi, JPN, age-22	3	TW/Seoi-nage	KW/Sode-tsurikomi-goshi, AW/Uchi-mata, AW/O-uchi-gari, TW/Seoi-nage, TW/Tai-otoshi, TW/Seoi-nage	AW/Uchi-mata
73	AN Changrim KOR, age-25	3	TW/Seoi-nage	AW/Ko-soto-gari, TW/Seoi-nage, TW/Seoi-nage, TW/Seoi-nage	AW/Ko-soto-gake
81	MOLLAEI Saeid IRI, age-27	1	KW/Harai- goshi	TW/Uki-otoshi, TW/Kata- guruma, AW/De-ashi-harai, TW/Kata- guruma, YSW/O-soto-makikomi	TW/Kata-guruma, YSW/Harai- makikomi
90	SHERAZADISH VILI Nikoloz ESP, age-23	1	TW/Uchi-mata- sukashi	AW/Uchi-mata, AW/O-uchi-gari, AW/Uchi-mata, KW/Sode- tsurikomi-goshi, TW/Sumi-otoshi	YSW/Tani-otoshi, AW/Uchi-mata
100	CHO Guham KOR, age-27	2	TW/Ipon-seoi- nage	AW/Ko-uchi-gari, TW/Ipon-seoi- nage, TW/ Seoi-nage,	TW/Ipon-seoi- nage
+100	TUSHISHVILI Guram, GEO, age-24	1	AW/Harai- goshi-gaeshi	AW/O-soto-gari, TW/Ipon-seoi- nage, AW/Ko-uchi-gari, TW/Ippon-seoi-nage	TW/Ipon-seoi- nage

Legend: WRL – position 14.08.2019; TW – **Te-waza** (hand techniques); AW – **Ashi-waza** (foot/leg techniques); KW – **Koshi-waza** (hip techniques); MSW – **Ma-sutemi-waza** (Supine sacrifice techniques); YSW – **Yoko-sutemi-waza** (Side sacrifice techniques)

CONCLUSIONS

After the initial period of imitation of the Japanese techniques (despite the intense exchange of experience and globalization in the world of sport), several leading judo schools - Asian, Russian and European - could be identified. Despite the existence of different schools, the practice has unified the sporting technical means in terms of frequency and

effectiveness of their application. High sports technical mastership requires a scientific approach to optimally individualize the biomechanical structure of motor activities - maximum effective use of individual characteristics such as anthropometry, topography of muscle force, psychomotor development, etc. There is a significant difference between the technical training

systems depending on the level of competitors. Elite judoka actually only use 2 - 3 techniques. At the same time, for the purposes of the regulatory exams, they are required to demonstrate, in the form of “kata”, the whole of the *Kyu/Dan* system. Modern methods of scientific and technical intelligence require the implementation of periodic changes in the structural construction of the techniques used. In this sense, the statistics refer only to the general trends, while the champions have their own individual style and they do not always follow the general logic.

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