CLASSIFICATION OF JUDO THROWING TECHNIQUES ACCORDING TO THEIR IMPORTANCE IN JUDO MATCH

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Abstract:

Analysis of judo throwing techniques, as the most important attacking structures in a judo match, can help experts to improve training process. The aim of this paper was to analyse and classify throwing techniques from the aspect of their importance in judo matches. For this purpose eight judo experts assessed the importance of throwing techniques in seven official senior weight categories for men. Sample of entities consisted of 40 throwing techniques and the sample of variables consisted of seven weight categories. Cluster analysis was used for the classification of throwing techniques. The Euclidean distance method and Ward's method of cluster mergers was used. The differences between the established groups were tested by discriminant analysis. Unlike in some other classifications, a smaller number of groups was formed. According to the criterion of importance two main groups of throws were identified (group A and B). Group B contains the most important and the most applicable throws in current judo matches, whereas group A contains less important throwing techniques. Group A has been divided into two significantly different subgroups and group B into three significantly different subgroups. The proposed classification clearly distinguishes throwing techniques according to their performance importance and provides a clearer insight into the technical structure of judo sport. The results of this research can be useful to judo experts for the selection of the most rational methods of the technical and tactical preparation and for the establishment of new and modern approaches to judo training.

Key words: *weight categories, cluster analysis, applicability of throwing techniques, judo training*

Introduction

Classification into groups, as a scientific method, solves the problems of systematization of elements of a certain area and represents an important theoretical basis for the study in any scientific discipline. Classification helps the similar in the different and the different in the similar to be recognized. The most common reasons for classifying entities in groups are as follows: visibility of data, data compression, and typology determination (Furjan Mandic, 2000).

In judo sport there are several relevant classifications of throwing techniques. The main criteria for the classification, in most of them, are biomechanical parameters (Koizumi, 1960; Gleeson, 1967; Geesink, 1977; Sacripanti 1989; Kano, 1994). Although biomechanical parameters are useful for better understanding of different types of throws, they are less important from the tactical aspect of judo training. Since the tactical preparation is an important part of judo training, it is crucial to know the most important facts related to performance or situational effectiveness in a match. Judokas are divided by weight categories, and various studies

have demonstrated that there is a difference in the frequency of use of certain throwing techniques between different weight category (Franchnini & Sterkowicz, 2000; Boguszewski & Boguszewska, 2006; Marek, Laskowski, Tabakov, & Smaruj, 2013). 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.

Techniques of throws are the most important attack elements in judo and analysis from the standpoint of their importance in different weight categories seems to be a logical step in further analysis of throws. The main goal of this paper was to perform a comprehensive classification of all throwing techniques usable in a judo bout according to the criterion of their importance to different weight categories.

Methods

Subject sample

Forty throwing techniques, recognized by the official rules of the International Judo Federation

(IJF) represented the subject sample. All other throws that exist in judo but are not allowed in official judo match were not a part of this research.

Variables

The sample of variables consisted of seven official weight categories for men: up to 60 kg, up to 66 kg, up to 73 kg, up to 81 kg, up to 90 kg, up to 100 kg and over 100 kg of body weight.

Procedures

A measurement instrument, questionnaire, was designed according to which eight judo experts assessed importance of throwing techniques to the defined variables. Team of eight international judo experts was recruited specially for this research (one from Brazil, Italy and Poland, three from Japan and two from Croatia). Every expert had to satisfy two out of three criteria: to be a lecturer teaching judo at a higher education institution somewhere in the world; to be a coach or a member of coaching team of elite judo competitors – members of a national team; to be elite judo ex-competitor and a member of a national team. The experts were previously

introduced to the methodology of the research and they assessed importance of throwing techniques to a particular weight category with grades from 1 to 5, in a way that 1 ment a very little importance of a technique to each variable, while the grade 5 ment a very great importance of a particular technique to each variable. Importance was defined as the applicability, application rate and performance effectiveness of a throwing technique.

Statistical analysis

Based on the scores of their importance to performance within a particular weight category, throwing techniques were classified into homoge-neous groups using cluster analysis. The Euclidean distance method and Ward's method of cluster mergers was used. The differences between the obtained groups were tested by discriminant analysis.

Results

Figure 1 shows that at the Euclidean distance of twelve units two groups of throwing techniques can be identified: group A and group B.
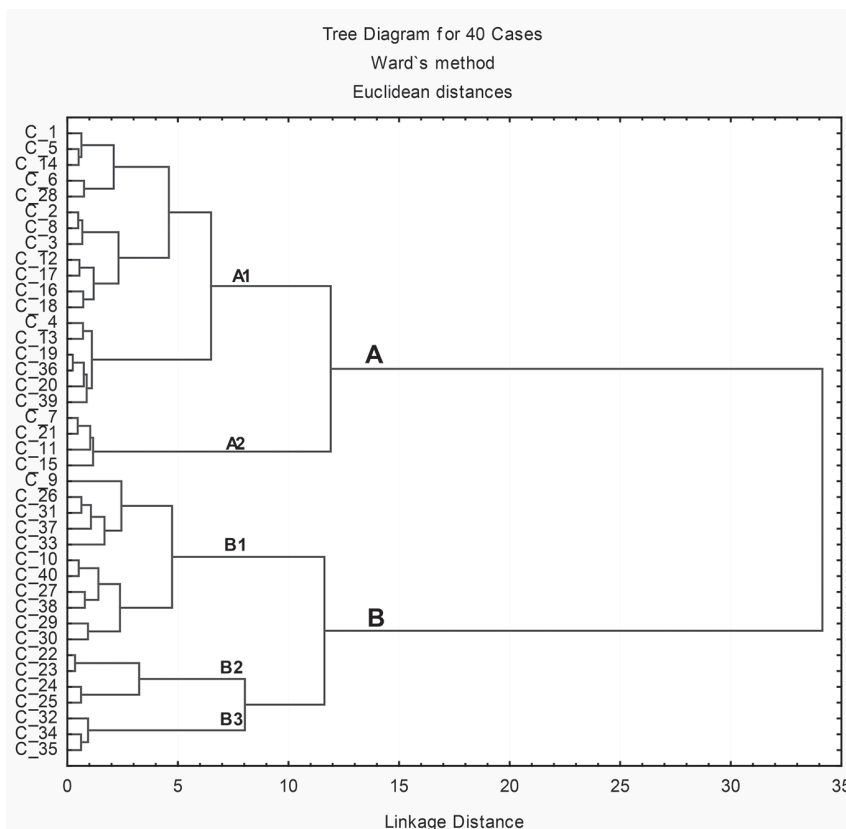

Figure 1. Diagram of dividing throwing techniques into clusters

Table 1. Discriminant analysis of groups A and B

Eigenvalue	Canonicl - R	Wilks' Lambda	Chi-Sqr.	df	p-value
2.374870	.838864	.296308	41.96431	7	**.000001**

Group A contains twenty-two throwing techniques, and group B eighteen throwing techniques.

The difference between the defined groups was statistically significant at the significance level of .01 (Table 1).

A more detailed analysis of the structure of isolated groups reveals the presence of several sub-groups at the Euclidean distance of seven units.

Group A is divided into two sub-groups (Table 2), and group B into three sub-groups of throwing techniques (Table 3).

The statistically significant difference between the sub-groups of throws identified by cluster analysis was determined by discriminant analysis (Table 4 and Table 5).

Table 2. Group of throws divided into cluster A

SUB-GROUP A1		SUB-GROUP A2
C1 ASHI GURUMA	C17 YAMA ARASHI	C7 OBI OTOSHI
C5 HIZA GURUMA	C16 UKI WAZA	C21 YOKO WAKARE
C14 UKI GOSHI	C18 YOKO GAKE	C11 SUMI OTOSHI
C6 KOSHI GURUMA	C4 HIKIKOMI GAESHI	C15 UKI OTOSHI
C28 O GOSHI	C13 TSURIKOMI GOSHI	
C2 HANE GOSHI	C19 YOKO GURUMA	
C8 O GURUMA	C36 NIDAN KOSOTO GAKE	
C3 HARAI TSURIKOMI ASHI	C20 YOKO OTOSHI	
C12 TAWARA GAESHI	C39 OKURI ASHI HARAI	

Table 3. Group of throws divided into cluster B

SUB-GROUP B1	SUB-GROUP B2	SUB-GROUP B3
C9 SOTO MAKIKOMI	C22 TOMOE NAGE	C32 OUCHI GARI
C26 SASAE TSURIKOMI ASHI	C23 SODE TSURIKOMI GOSHI	C34 UCHIMATA
C31 HARAI GOSHI	C24 MOROTE SEOINAGE	C35 KOUCHI GARI
C37 TANI OTOSHI	C25 IPPON SEOINAGE	
C33 OSOTO GARI		
C10 SUMI GAESHI		
C40 DEASHI HARAI		
C27 TSURI GOSHI		
C38 KOSOTO GARI		
C29 URANAGE		
C30 TAI OTOSHI		

Table 4. Discriminant analysis of sub-groups A1 and A2

Eigenvalue	Canonicl - R	Wilks' Lambda	Chi-Sqr.	df	p-value
3.025602	.866943	.248410	22,97913	7	**.001719**

Table 5. Discriminant analysis of sub-groups B1, B2 and B3

Discriminant function	Eigen value	Canonicl - R	Wilks' Lambda	Chi-Sqr.	Df	p-value
0	3.831364	.890516	.049792	35,99874	14	**.001044**
1	3.156886	.871456	.240565	17,09719	6	**.008933**

Discussion and conclusions

Unlike in some other classifications, according to the criterion of performance importance of certain throwing techniques to various weight categories a smaller number of groups was formed. The throwing techniques classified into a certain group are similar as regards their application, thus such a distribution is logical and interpretable from the aspect of performance in a judo match.

Group B mainly contains the most used (the highest importance) techniques of throws (Marek, Smaruj, & Tyszkowski 2011; Marek, Laskowski, Tabakov, & Smaruj, 2013), while group A contains less used throws.

Within group B, sub-group B2 comprises throws that are commonly used by judokas of light and medium weight categories. According to the execution structure, the throws are performed in a way to affect the opponent's centre of gravity by a judokas' rapid descend below its level. These throwing techniques require a high level of speed and this motor ability characterizes judokas in these weight categories (Almansba, et al., 2008). If one analyses judo matches of judokas in these weight categories, it can be seen that intensity of a bout and frequency of throwing techniques application are very high (Boguszewski & Boguszewska, 2006; Sterkowicz, Lech, & Almansba, 2007). These techniques of throws are characterized by judokas' capability of quick "entering" into a throw, but also with a quick "exit" or "escape" out from throwing if he/she has estimated that the application of the final phase of a throw (kake) will not be possible.

Throws in sub-group B1 are commonly used in heavier weight categories. Due to their anthropological characteristics, judokas in higher weight categories rely on their strength and body mass and not on speed, as is the case in the lighter weight categories. More suitable throws for them are those that can be performed without a deep descend below the opponent's centre of gravity, and those in which the body does not do a large range of motion.

Sub-group B3 contains throws that are equally important in all analysed weight categories (Franchnini & Sterkowicz, 2000). Also, from the aspect of judo training, the throws from group B must be a basis in training process in order to enable judokas to be more effective in matches.

Group A comprises throwing techniques that are used less frequently in judo matches and that are, according to their importance and applicability, "secondary" in modern judo. Throws from sub-group A2 fulfil this criterion in particular. These throws are hardly ever used in a modern judo match and can be found in "Judo Nage no Kata" (a form that includes throwing techniques that are performed by a predefined order). In the sub-group A1 are throws occasionally used in a judo match, but they do not belong to the group of the most important throws. It is interesting to note that most of the throws from this subgroup were presented in the first classification of throwing techniques in 1885 (three years after judo was first mentioned). It can be assumed that these throws had a greater importance and a more frequent application in the ancient judo and that they lost their importance due to the development of judo sport.

A large number of throwing techniques exist in judo, therefore it is not realistic to expect that every judoka will master all throws equally. However, every throw has at least a minimum applicability and relevance to performance in a match since it enables judokas to select throwing techniques according to their own individual characteristics. Judokas, according to their anthropological characteristics, will modify basic throwing techniques and will use them in a specific way, thus creating their own "special techniques" (tokui waza) and their own fighting style. The relationship of judoka's motor abilities and morphological characteristics affects the selection and use of throwing techniques in a judo match (Franchini, Takito, & Bertuzzi 2005; Jagiello, Kalina, & Korobrelnikow, 2007). For that reason the classification of judo throwing techniques according to the criterion of importance to performance of judokas of different weight categories in a match is important and can help to improve technical and tactical aspects of training process. The results of this research can serve experts in the selection of the most rational contents of the technical and tactical preparation and in the establishment of new, modern teaching procedures and approaches to judo training. Thus, the results of this study can be used for rational planning, programming and organization of judo training and that is a practical contribution of this paper.

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KLASIFIKACIJA TEHNIKA BACANJA PREMA NJIHOVOJ VAŽNOSTI U JUDO BORBI

Analiza tehnika bacanja, kao najvažnijih tehnika u judo borbi, može pomoći trenerima u unapređenju trenažnog procesa. Cilj ovog rada je analizirati i klasificirati tehnike bacanja s aspekta njihove važnosti u samoj borbi. Osam eksperata iz područja judo sporta ocijenilo je tehnike bacanja prema njihovoj važnosti u borbi u sedam službenih težinskih kategorija za seniore. Uzorak entiteta činilo je 40 bacanja, a skup varijabli 7 težinskih kategorija. Tehnike bacanja su grupirane u homogene skupine pomoću klaster analize pri čemu je korištena metoda euklidskih distanci i Wardova metoda udruživanja klastera. Razlike između skupina bacanja, utvrđenih klaster analizom, testirane su na multivarijatnoj razini diskriminacijskom analizom. Nakon obrade rezultata utvrđen je manji broj skupina bacanja u odnosu na neke druge klasifikacije. Identificirane su dvije glavne skupine bacanja (A i B), od kojih skupina B sadrži najvažnije (najprimjenjivije) tehnike bacanja u judo borbi, a grupa A manje važne tehnike. Daljnjom analizom utvrđene su tri podgrupe unutar skupine B te dvije podgrupe bacanja unutar skupine A. Dobivena klasifikacija jasno razlikuje bacanja prema njihovoj važnosti i primjenjivosti te daje jasniji uvid u strukturu tehnika bacanja u judu. Rezultati ovog istraživanja mogu koristiti trenerima u odabiru najracionalnijih metoda za tehničku i taktičku pripremu judaša te za kreiranje novog, modernog, pristupa treningu juda.

Ključne riječi: *težinske kategorije, klaster analiza, primjenjivost tehnika bacanja, judo trening*