

# Performance analysis of the finalists of the K-1 Grand Prix Tournaments 1993-2004

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## Abstract

The aim of the research is to discover parameter values that indicate the actual situational positioning of competitors who attained the grand-prix tournament in Tokyo in the period from 1993-2004, and then to identify the development through that period. The study was conducted on 12 final K-1 GP Final tournaments in which 8 fighters took part, which made up the sample of the 96 fighters who were eventually described with 96 parameters on a universal scale. The article affirms specific methodology characterized by two innovations. The first is the situational aspect of the initial collection of data through DVD footage of all fights that took place in Japan Grand Prix K-1 tournaments from 1993 to 2004. All fighters were initially described with a total of 102 variables, which brought very interesting information about the situational aspects of K-1 events. The second innovation consists in determining the development of K-1 sport on a universal scale of data that accurately determines the position of any entity in the study, and hence all the contestants together that took part in a specific year. A relational model has been used in this research that describes the actions, offering multivariate criterion values and locating objects within the investigated sectors within hyper ellipsoids described by selected variables. Under the clear assumption that all objects are in the same universe, it is not difficult to conclude that they must have some sort of mutual relations. These relations can be described in binary-bifurcated way, but also in any other way. If a set of variables describing these objects are representative, as is the case in this research, then relations between the objects will surely lead to a structured set of relations, which in this model is simply called: actions. The study results showed that in 12 years (from 1993 to 2004) K-1 evolved toward higher and higher levels and range, which is an outstanding indicator of the global dynamics of this extremely demanding martial sport.

Key words: K-1, skills, top athletes, super heavyweight, situational efficiency, universal scale.

## Introduction

History of K-1 starts a revolutionary vision of Japanese karate master Kazuyoshi Ishii. K-1 is a sport designed by clearly defined rules so that all fighters of standing martial disciplines are allowed to fight in a ring to choose a champion. K-1 in the name comes from the first letters of the different styles of martial arts that make the K-1: karate, kickboxing, kung fu, kakutougi, Kemp, etc., while 1 stands for one weight class. Although it originates from Seido Karate, K-1 is designed to determine the most effective martial art during the fight (Kapo and Cikatić, 2010).

Understanding development of the sport at the present time is inevitably directed toward mathematical models of identification of situational parameters of which positioning the best athletes in the world competitions depends. Based on these data, it is possible to reveal important features that greatly assist us in understanding the changes occurring in sport. In martial arts, especially in the K-1, it is also inevitable. Martial arts, however, are particularly complex (Valera 1973, Nagamine, 1976; Hassel 1984, Murphy 1995, Shim 2003, Liao & Lui 2003). Out of these reasons, the analyzes were primarily directed at identifying the parameters of success of fighters and then, if the set of such informa-

tion is valid, at monitoring development of the sport, in this case the K-1. Therefore, this article focuses on the detection of the values of parameters indicating the actual situational positioning of competitors who have reached the Grand Prix tournament in Tokyo from 1993 to 2004, and then on identification of development through that period.

Specifically, if the exact individual position of the best of the best is located for each year, then the simple summing up of data per year gives a developmental function. In addition, the final K-1 World Grand Prix in Japan is attended only by the best athletes that have already passed the lower level qualifications. They are truly the best of the best, kings of the ring, and only one of them per year becomes the king of kings. In such conditions, it is difficult to find better selection criteria for definition of success.

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## Research Methodology

### The sample of examinees

The sample for this study consisted of top super heavy-weight athletes (21 to 39 years old) of the final K-1 tournament in Japan from 1993 to 2004. In this study, the analysis of 96 (total of 34 fighters, of which some have repeatedly attained the final tournament of K-1 GP) top K-1 male fighters in 84 match and 205 rounds was carried out. During the year, a series of regional qualification tournaments is held in ten countries on five continents in which eight best K-1 fighters qualify to fight in the final K-1 Grand Prix tournament in Tokyo in December, fighting for the prestigious crown of the king of kings. Thus a strictly selected sample was formed, which is taken for this study. It is expected, due to the activities of K-1 fighters, that they are very highly positively selected, especially in relation to all variables important for evaluation of hypothetical personality dimensions and tactical education compared to the normal population. In another sense, medically, morphologically and psychologically, there were no visible aberrations.

### The sample of variables

In this exploratory study, based on consultation with methodologists, coaches, competitors and other eminent experts, variables were selected that were able to be parameterized within the issue in which the author was interested. 102 out of total 108 variables were selected, covering the areas of morphological characteristics, situational-motor skills, evaluation of tactical education, age and estimates of hypothetical personality traits that might be expected to affect the success in the K-1 (Kapo, 2006). Five variables in this study had a zero value, therefore they were not applied in data processing, as well as one variable that concerned the original sport fighters.

### Data Collection

Data were collected through an extremely precise methodology which included meticulous inspection of DVD records. 102 types of situational events in all matches in the final tournament from 1993 to 2004 were registered. So each of the contestants who made it to the final of the annual tournament is described with each of the thus obtained 102 situational variables. It is obvious that such a character of the competition put accompanied fighters into a situation to show maximum achievement in extremely complex conditions, where it is a question of carrying out specific activities on the border of individual abilities of the widest range. In this way, the followed activity fully approaches situational conditions of performance. It is possible to state that because of purity of initial data this project approached almost strict laboratory conditions.

### Methods of data processing

Data were analyzed with a special algorithm (Bonacin, 2006) which recalibrated initial data on a universal range from 1 to 5, which brought all entities in all variables into

the same space and the data could be compared and processed even at the level of manifest variables. For each competitor all the data were summed up and thus obtained continuous circuit that explicitly position each individual. Due to the fact that 8 competitors fought in 12 tournaments, 96 of those fighters are ultimately described with 96 parameters on a universal scale. The matrix of the original gross data is viewed as a left vector in case of entities or as a right vector in case of variables.

## Results and Discussion

According to the data in Table 1 it is easy to conclude that the applied methodology revealed the fact that the best athletes really have the best values at the global universal scale. Out of 96 possible positions, the highest 7 positions were occupied by 7 winners. Also, all 12 winners are in the final 19 positions, and it is evident that only one among them was not a winner (Musashi who was defeated in the finals of 2004). Only two fighters (Hug and Hoost), which, however, were the winners in some other year of the competition were on the 6 other positions. So we can say that the top of the scale belongs only to winners, especially because the scale reveals other details. For example, only one defeated finalist is even among the lowest 60 positions (out of 96 in total). Also, among the lowest 36 positions is only one semi-finalist (Abidi), but no finalists.

Finally, as can be seen in figure 1, the total development of the data on a time distribution of the universal scale of all fighters, shows us that the highest level at the K-1 Grand Prix final tournaments has been reached in the period from 2001 to 2004, while the lowest was in the very beginning, i.e. from 1993 to 1994.

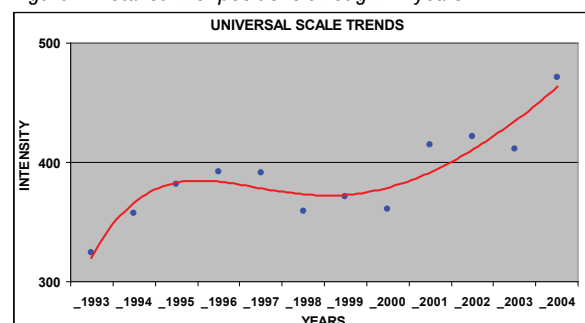
Fifth degree polynomial reveals that after an initial upward trend, a stagnation was present during the period from 1995 to 2000, but we can also see that the year 2004 was by far the year of the highest performance level. Generally it can be said that through the 12 years (1993-2004), K-1 evolved toward higher and higher levels and range, which is an outstanding indicator of the global dynamics of this extremely demanding martial sport. Instead of setting a hypothetical model, the subject of research in this paper is the actual status of fighters which could be registered in the part that directly relies on situational characteristics. Out of that, by appropriate procedure transformation and condensation information, a body of knowledge was created that clearly addresses the issue of modeling in a way that leaves no doubt.

By analyzing situational efficiency in kickboxing disciplines full contact and low kick, Krupalija and others (2010) found fourteen latent dimensions. Due to the fact that the K-1 sport is a sublimation of martial arts, the mentioned research has shown us the importance of latent dimensions and separated factors. Kuleš (1985) on a sample of 55 karate competitors in the category absolute classical

Table 1. Competitors from Tokyo 1993-2004 and their positions on a universal scale (individual contestants are marked by ordinal numbers, red labeled are tournament winners, blue labeled are defeated finalists, green labeled are defeated semifinalists, white labeled are defeated in the first round):

3	T. Hays	1993.	1.81	58	S. Leko	2000.	2.66
11	A. Hug	1994.	1.98	70	S. Leko	2001.	2.68
35	S. Greko	1997.	1.99	74	B. Sapp	2002.	2.69
20	T. Atokawa	1995.	2.00	59	P. Aerts	2000.	2.70
4	C. Kiatsongrit	1993.	2.09	55	M. Filipovic	1999.	2.70
1	T. Atokawa	1993.	2.17	46	S. Greko	1998.	2.72
89	M. Mo	2004.	2.17	51	A. Hug	1999.	2.74
60	A. Musashi	2000.	2.18	69	A. Ignjasov	2001.	2.76
66	N. Peetas	2001.	2.19	61	F. Filho	2000.	2.76
26	D. V.m.merwe	1996.	2.19	90	R. Sefo	2004.	2.76
33	M. Satake	1997.	2.21	73	P. Aerts	2002.	2.77
91	P. Aerts	2004.	2.25	84	A ignjasov	2003.	2.77
62	C. Abidi	2000.	2.27	31	M. Bernardo	1996.	2.78
85	C. Abidi	2003.	2.27	93	K. Kaoklai	2004.	2.80
50	A. Musashi	1999.	2.27	79	J. Lebaner	2002.	2.80
25	M. Filipovic	1996.	2.28	23	J. Lebaner	1995.	2.81
42	M. Satake	1998.	2.32	63	R. Sefo	2000.	2.82
76	A. Musashi	2002.	2.33	71	F. Filho	2001.	2.82
36	J. Lebaner	1997.	2.35	30	A. Musashi	1996.	2.82
10	M. Thompson	1994.	2.36	94	F. Botha	2004.	2.83
82	P. Graham	2003.	2.36	86	P. Aerts	2003.	2.84
41	F. Filho	1998.	2.36	2	P. Aerts	1993.	2.84
44	R. Sefo	1998.	2.38	87	A. Musashi	2003.	2.85
68	J. Lebaner	2001.	2.38	15	M. Satake	1994.	2.85
27	S. Greko	1996.	2.38	13	B. Cikatic	1994.	2.85
19	J. Klein	1995.	2.39	7	E. Hoost	1993.	2.86
12	R. V. Esdonk	1994.	2.40	78	M. Hunt	2002.	2.86
65	P. Aerts	2001.	2.40	37	P. Aerts	1997.	2.86
52	P. Aerts	1999.	2.42	38	F. Filho	1997.	2.87
28	P. Aerts	1996.	2.43	80	E. Hoost	2002.	2.88
17	S. Longinidis	1995.	2.47	47	A. Hug	1998.	2.90
34	M. Bernardo	1997.	2.47	92	E. Hoost	2004.	2.98
9	A. Mannart	1994.	2.48	39	A. Hug	1997.	2.99
49	R. Sefo	1999.	2.49	64	E. Hoost	2000.	2.99
57	M. Filipovic	2000.	2.51	22	E. Hoost	1995.	3.00
43	E. Hoost	1998.	2.52	48	P. Aerts	1998.	3.02
14	P. Smith	1994.	2.52	8	B. Cikatic	1993.	3.02
75	S. Leko	2002.	2.53	24	P. Aerts	1995.	3.04
81	F. Botha	2003.	2.54	67	E. Hoost	2001.	3.07
77	R. Sefo	2002.	2.55	95	A. Musashi	2004.	3.07
5	M. Smith	1993.	2.55	29	E. Hoost	1996.	3.13
6	M. Satake	1993.	2.55	56	E. Hoost	1999.	3.13
18	M. Satake	1995.	2.58	88	R. Bonjaski	2003.	3.13
45	M. Bernardo	1998.	2.59	40	E. Hoost	1997.	3.15
21	M. Bernardo	1995.	2.62	16	P. Aerts	1994.	3.15
83	R. Sefo	2003.	2.63	32	A. Hug	1996.	3.16
53	S. Greko	1999.	2.64	72	M. Hant	2001.	3.19
54	J. Lebaner	1999.	2.64	96	R. Bonjaski	2004.	3.20

Figure 1. Total sum of positions through 12 years



karate, found a high correlation between thirteen anthropometric measures and success in the sport. Karate is a sport that participates in the K-1 with technical and tactical elements, thus the analyzed anthropometric variables that indicate a correlation with success in the sport of karate suggest a possible link between the temporal distribution of the universal scale of all the fighters of the scale and the ability to influence through the training process to a higher range of the K-1 fighters in the future (Kapo, 2010).

Kačić and others (2004) reported that the preparation of athletes in general can be sorted out in four main areas of sports training - technical, tactical, physical and psychological preparation that are interdependent and interrelated. They also point to the fact that in the sport, absence of one of the parts of the preparation cannot be compensated by intensifying the second half; for example, lack of physical preparation cannot be replaced by psychological preparation and vice versa. Actually the upper limit of quality performance of an athlete is determined by the weakest link in the chain of his preparation. In other words, the player loses at the point where he is the weakest. The above research and analysis of the K-1 sport as well as sports that participate in the K-1 indicate that the application of scientific knowledge provides the opportunity for development in the direction of higher levels and range.

## Conclusion

Based on the above and the obtained results, it is obvious that this approach can accurately identify the most successful fighters in the analyzed period, as well as their underlying global combat characteristics. Finally, particularly illustrated indicators per individual years for all fighters together, provided a global development trend of K-1 sport in general. It is suggested to use the applied methodology in all situations where it is possible to analyze the situational aspects of sporting activities, especially martial arts, in order to obtain valuable information in terms of the development of scientific knowledge.

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