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# MULTIVARIATE SITUATIONAL DETERMINATION OF TOP-LEVEL K-1 FIGHTERS

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## *Summary*

We analyze all matches in final Grand-prix K-1 tournament 1993-2004, and register body height, body mass and age of each fighter. With detailed inspection of DVD recordings of all 96 matches we follow all arm and leg offense and defense techniques, blocks, activity types, ways of match finishing, injuries, match lasting, forbidden acting, tactical means, tactical fighting types and estimated personality dimensions, or totally 102 parameters. With specific technology procedures, we apply innovation approach to fights analyses that identify most successive fighters from 1993 to 2004, as well as their global fight characteristics. Finally, we have recognized all best parameters for top seven fighters in that period and for R.Bonjacki as “best of best”.

**Key words: fighters, situation, determination.**

## *Introduction*

Positioning of best fighters in World tournaments is easy and very hard task in the same time, because it depends of specific fighter parameters determination. It is easy because there is a simple way to find out which one is most efficient. It is undisputable fact that winner is best of best. Martial arts, as part of total sport specific human movement articulation are special phenomenon with enormous number of elements from different anthropological sphere (Valera, 1973; Shim, 2003; Hassel 1984, Liao & Lui 2003, Murphy 1995, Nagamine 1976). Its understanding demands a lot of good will, criticism and wishes about new material learning with breaking bounds or limitations (Kapo, 2005). It is necessary to go forward if new comprehensions and situations claim to overcome insecure methodological stereotypes (Bonacin, 2004). So, complexity of efficiency parameters identification is not evaluated as final rank on tournaments. We rather try to understand reasons that explain why someone is best and someone is not. That logic especially stands for estimations based on concrete situational analyses. This article is directed toward identification of parameters that explain real situational positioning of all fighters that come to Grand-prix tournaments in Tokio 1993-2004.

## ***Methods***

Several competent judges, with extra precise methodology that includes detailed and repeated overview of DVD recorded matches, register 102 types of situation aspects of all matches on final tournaments 1993-2004. Each fighter that came to Tokyo was described with each of 102 definitions, which become variables. Data were analyzed with special algorithm (Bonacin 2006.), that allows initial data rescaling to universal bounds (1 – 5). That procedure ensures all necessary conditions that all fighters in all variables were integrated in the “same space”. For each entity data were summarized. Vector of sums represents continual complex that explicitly positions every single fighter. We register 8 fights on each of 12 tournaments and get 96 entities described with 96 individual parameters derived from 102 variables. Of course, some of fighters participate on several tournaments (e.g. E.Hoost 10 times). Each entity was marked with specific **X** number (1-96) for numeric or graphical position determination. E.g., fighters that lose fights in first round of tournament in 1993 were marked as 1, 2, 3 and 4. Fighters that loose fights in semi-final 1993 were marked as 5 and 6. Fighter that lost final match 1993 was marked as 7 and winner in 1993 as 8. Furthermore, fighters that lose fights in first round of tournament in 1994 were marked as 9, 10, 11 and 12. Fighters that loose fights in semi-final 1994 were marked as 13 and 14. Fighter that lost final match 1993 was marked as 15 and winner in 1994 as 16, and so on. In that way, it is easy to calculate level (**L**) of entity on specific tournament with formula  $L = X - INT ((X-0.5) / 8) * 8$ . Calculated **L** represents position like in 1993. Year of Grand-prix tournament was easy calculated as  $Y = 1993 + INT ((X-0.5) / 8)$ .

## ***Results***

According to data in Table 1 we can conclude that applied methodology with 102 variables discover that really best fighters poses highest values on universal scale generated from 102 variables. Among 96 positions, top 7 positions belong to winners. All 12 winners are among top 19 positions too, with only one fighter that is not a winner (Musashi from final fight 2004.). On other 6 positions of first 19, we register only two fighters (Hug and Hoost) that are, however, winners in some other years of tournament.

X	YEAR	FIGHTER	POS	X	YEAR	FOGHTER	POS
3	1993.	T. HAYS	1.81	58	2000.	S. LEKO	2.66
11	1994.	A. HUG	1.98	70	2001.	S. LEKO	2.68
35	1997.	S. GREKO	1.99	74	2002.	B. SAPP	2.69
20	1995.	T. ATOKAWA	2.00	59	2000.	P. AERTS	2.70
4	1993.	C. KIATSONGRIT	2.09	55	1999.	M. FILIPOVIC	2.70
1	1993.	T. ATOKAWA	2.17	46	1998.	S. GREKO	2.72
89	2004.	M. MO	2.17	51	1999.	A. HUG	2.74
60	2000.	A. MUSASHI	2.18	69	2001.	A. IGNJASOV	2.76
66	2001.	N. PEETAS	2.19	61	2000.	F. FILHO	2.76
26	1996.	D. V.M.MERWE	2.19	90	2004.	R. SEFO	2.76
33	1997.	M. SATAKE	2.21	73	2002.	P. AERTS	2.77
91	2004.	P. AERTS	2.25	84	2003.	A IGNJASOV	2.77
62	2000.	C. ABIDI	2.27	31	1996.	M. BERNARDO	2.78
85	2003.	C. ABIDI	2.27	93	2004.	K. KAOKLAI	2.80
50	1999.	A. MUSASHI	2.27	79	2002.	J. LEBANER	2.80
25	1996.	M. FILIPOVIC	2.28	23	1995.	J. LEBANER	2.81
42	1998.	M. SATAKE	2.32	63	2000.	R. SEFO	2.82
76	2002.	A. MUSASHI	2.33	71	2001.	F. FILHO	2.82
36	1997.	J. LEBANER	2.35	30	1996.	A. MUSASHI	2.82
10	1994.	M. THOMPSON	2.36	94	2004.	F. BOTHA	2.83
82	2003.	P. GRAHAM	2.36	86	2003.	P. AERTS	2.84
41	1998.	F. FILHO	2.36	2	1993.	P. AERTS	2.84
44	1998.	R. SEFO	2.38	87	2003.	A. MUSASHI	2.85
68	2001.	J. LEBANER	2.38	15	1994.	M. SATAKE	2.85
27	1996.	S. GREKO	2.38	13	1994.	B. CIKATIC	2.85
19	1995.	J. KLEIN	2.39	7	1993.	E. HOOST	2.86
12	1994.	R. V. ESDONK	2.40	78	2002.	M. HUNT	2.86
65	2001.	P. AERTS	2.40	37	1997.	P. AERTS	2.86
52	1999.	P. AERTS	2.42	38	1997.	F. FILHO	2.87
28	1996.	P. AERTS	2.43	80	2002.	E. HOOST	2.88
17	1995.	S. LONGINIDIS	2.47	47	1998.	A. HUG	2.90
34	1997.	M. BERNARDO	2.47	92	2004.	E. HOOST	2.98
9	1994.	A. MANNART	2.48	39	1997.	A. HUG	2.99
49	1999.	R. SEFO	2.49	64	2000.	E. HOOST	2.99
57	2000.	M. FILIPOVIC	2.51	22	1995.	E. HOOST	3.00
43	1998.	E. HOOST	2.52	48	1998.	P. AERTS	3.02
14	1994.	P. SMITH	2.52	8	1993.	B. CIKATIC	3.02
75	2002.	S. LEKO	2.53	24	1995.	P. AERTS	3.04
81	2003.	F. BOTHA	2.54	67	2001.	E. HOOST	3.07
77	2002.	R. SEFO	2.55	95	2004.	A. MUSASHI	3.07
5	1993.	M. SMITH	2.55	29	1996.	E. HOOST	3.13
6	1993.	M. SATAKE	2.55	56	1999.	E. HOOST	3.13
18	1995.	M. SATAKE	2.58	88	2003.	R. BONJASKI	3.13
45	1998.	M. BERNARDO	2.59	40	1997.	E. HOOST	3.15
21	1995.	M. BERNARDO	2.62	16	1994.	P. AERTS	3.15
83	2003.	R. SEFO	2.63	32	1996.	A. HUG	3.16
53	1999.	S. GREKO	2.64	72	2001.	M. HANT	3.19
54	1999.	J. LEBANER	2.64	96	2004.	R. BONJASKI	3.20

Table 1. Fighters from Tokio 1993-2004 and their universal scale positions (red area represents winners, blue area finalists, green area semi-finalists)

We can reasonably conclude that top of universal scale belongs to winners, especially because this scale discover other details. E.g. between 60 lowest positions (of 96 totally) there is only one finalist (1999), and between 36 lowest positions there is only one semi-finalist Abidi) without presence of any finalist.

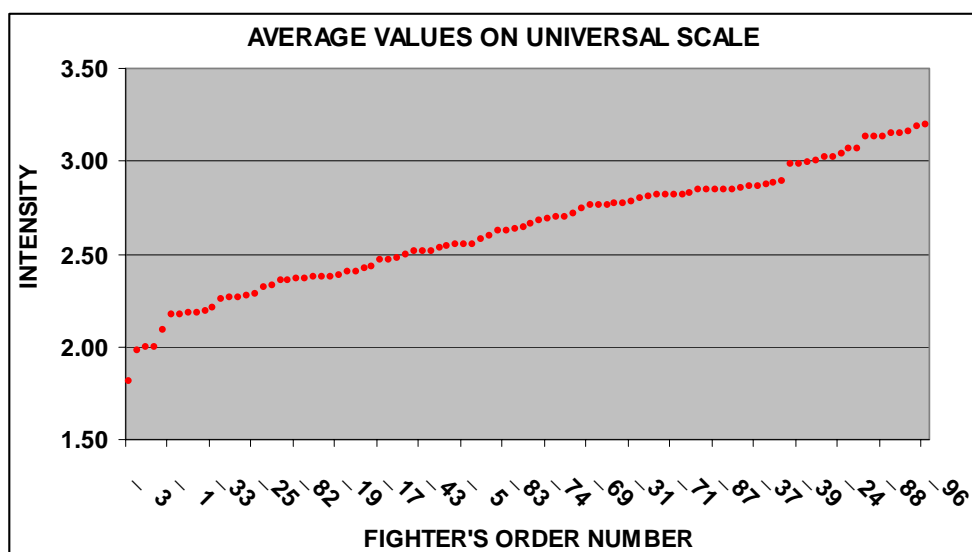


Figure 1. Average position values on universal scale

According to figure 1 it is obvious that top position belongs to winner from 2004 (Bonjatsky, X=96). Looking forward included parameters it seems that just that fighter is most capable and with best efficiency in K-1 fights of all final Grand-prix tournaments 1993-2004 (projection of 3.20). Very closely stands A.Hant from 2001 (3.19, X = 95). Worst fighter on that scale is T.Hays from 1993, then A.Hug from 1994 and S.Greko from 1997, all with projections less then 2.00 (Table 1.). We espy that only 14 fighters (10 years winners) show projections above 3.00. Because of specificity of best 7 fighter positions and R.Bonjatsky from 2004 it is of most interest to observe their real parameters after data rescaling to universal metric. Table 2 consist some variable that show maximal results trend.

### ***Conclusion***

This article affirms special methodology with two extraordinary characteristics. First one is situational aspect of initial data collecting with DVD recordings of all fights in Japan Grand-prix tournament 1993-2004 and all fighters described with 102 variables that generate extremely interesting information about situation aspects of K-1 sport. The other innovation is funding universal scale of data that precisely determine positions of any object in investigation. Results show that such approach identifies precise position of most successful fighters in analyzed period, as well as their fighting characteristics through time.

<b>ACTION</b>	<b>TOTAL</b>	<b>AVG 7</b>	<b>R.B.</b>
Right direct to head	2.09	2.58	3.21
Left chroshe to head	2.21	3.45	4.79
Left chroshe to stomach	1.15	1.10	1.22
Right uppercut to head	1.60	2.11	1.82
Right high circle kick	1.84	2.26	3.95
Left arm block from arm kick	1.87	2.62	5.00
Right arm block from arm kick	1.93	2.55	4.52
Offensive tactic	2.18	3.48	3.67
Knock-out win	1.74	3.48	5.00
Guard breaking	3.00	4.22	3.81
Distance	3.44	4.92	4.87
Chalanging of opponent	2.99	4.23	3.62
Avoiding	3.27	4.39	4.25
Analyzing	3.47	4.60	4.18
Manoeuvring	3.47	4.64	4.89
Simulations	3.96	4.62	5.00
Combinations	3.46	4.81	4.87
Tempo regulation	3.26	4.76	4.64
Opponents errors using	3.38	4.70	4.67
Ring surface using	3.44	4.62	4.47
Kretanje	3.27	4.47	4.35
Pause	3.27	4.27	4.39
Tricks	3.31	4.79	4.47
Timing	3.37	4.69	4.39
Safe defense	3.27	4.76	5.00
Balance	3.21	4.57	4.67
Attacking	3.41	4.83	4.52
Defense	3.29	4.73	4.76
Counter-attack	3.26	4.60	4.53
Concentration	3.47	4.92	4.56
Selfcontrole	3.25	4.87	4.41
Anxiety	3.88	4.92	4.41
Aggression	4.07	4.86	4.05
Motivation	3.47	4.83	4.26
Persistency	3.42	4.83	4.41
Coldness	3.25	4.81	4.11
Discipline	3.23	4.75	4.26
Morality	3.08	4.70	3.67
Positive attitude to strong opponent	3.87	4.75	4.44
Positive attitude to weak opponent	3.53	4.67	4.62
Tactical cunning	3.06	4.92	4.56

Table 2 Presentation of variables with maximum benefit for first 7 fighters  
(Total = average of all fighters, Avg = average of 7 best, R.B: = Bonjatsky 2004)

Finally, it is possible to examine comparative characteristics of all fighters, best 7 and “best of best” (winner 2004). We suggest use of such applied methodology in all situations when it is possible to analyze situation aspects of sport activities, especially martial arts, for precious information derivation based on scientific comprehensions. For better programming of transformation processes in martial arts too, because results undoubtedly show unique and persuasive conclusions.

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