THE INFLUENCE OF THE MORPHOLOGICAL CHARACTERISTICS ON THE EFFICIENCY OF THE TECHNICAL ELEMENTS PERFORMANCE IN KICKBOXING DISCIPLINES FULL CONTACT AND LOW KICK IN REAL FIGHTS

Edin Krupalija¹, Stipe Blažević² and Aldvin Torlaković³

¹ Euro-football marketing, Wien, Austria
² Faculty of economics, University of Rijeka, Croatia
³ Faculty of sport and physical education, Sarajevo, Bosnia & Herzegovina

Abstract
Research is made on sample of 78 examinees, participants on the Balkan’s championship in kickboxing from Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Macedonia, Montenegro and Serbia, aged from 18 to 33 years, that took place in Tešanj (B&H) in 2007. On the championship, in each category participated one competitor who is the winner of the national championship at the country he represents coming from different weight categories. For this research we applied the system with the 42 variables, from which 37 are technical elements variables, 4 are morphological characteristic variables and 2 are independent variables that signify the age of the examinees and their victories on the championship. This research was carried out with the goal of establishing the influence of the morphological characteristics on the efficiency of the technical elements performance in kickboxing disciplines Full Contact and Low Kick. Morphological characteristics had the status of the logical predictors while recorded actions had the status of the logical criterions. Given variables were estimated by the three competent assessors with the special protocol. All fights were recorded with two digital cameras covering from two angles. With multiple regressive analyses the relations between morphological characteristics and technical elements were established.

Key words: kickboxing, morphology, technical elements

Introduction
Kickboxing is relatively young sport that originated from the karate and which structure contains the elements of the boxing, karate, tae kwon do sport, and which also includes various sports’ branches-disciplines: Semi Contact, Light Contact, Full Contact, Low Kick, Thai Kickboxing, Musical Forms and Aero Kickboxing (WAKO). Kickboxing that we meet and watch today requests bigger technical-tactical, psychological and conditional forms from the competitors (Kapo 1999). Segments with which the fighter applies his good sport form in kickboxing disciplines- Full Contact and Low Kick are definitely the technical elements and morphological characteristics (Kapo 1999) in accordance with his age i.e. level of experience he possesses. Trainers help the fighters by guiding and tutoring them how to use their strong sides and how to hide the weak sides on the competition (Kapo 1999). Trainer of the kickboxing disciplines Full Contact and Low Kick have to possess a great amount of theoretical and practical knowledge in order to refine the techniques of his fighters. Even better knowledge of the basic and specific structure of the training process is needed for extreme work quality and top results achievement, and based on that, trainers could educate and refine the technical elements of the fighters that could have influence, both positively and negatively, on the realization of the complex motoric structures in the kickboxing disciplines Full Contact and Low Kick. This should be done in order to overcome the current practice in which the trainer prior to the fight advises the competitor to engage in the melee if he fights the taller opponent, or to keep the distance with directs if he fights the shorter opponent. As the kickboxing is relatively a young sport, there are a small number of researches related to the situational efficiency in Full Contact and Low Kick disciplines at the moment, so we must say that this work is almost pioneering. However I will mention the authors, who have done researches related to the situational efficiency in Full Contact and Low Kick disciplines at the country he represents coming from different weight categories. For this research we applied the system with the 42 variables, from which 37 are technical elements variables, 4 are morphological characteristic variables and 2 are independent variables that signify the age of the examinees and their victories on the championship. This research was carried out with the goal of establishing the influence of the morphological characteristics on the efficiency of the technical elements performance in kickboxing disciplines Full Contact and Low Kick. Morphological characteristics had the status of the logical predictors while recorded actions had the status of the logical criterions. Given variables were estimated by the three competent assessors with the special protocol. All fights were recorded with two digital cameras covering from two angles. With multiple regressive analyses the relations between morphological characteristics and technical elements were established.

Methods

Data processing methods
The establishment of the relations between morphological characteristics and technical elements is executed by the regressive analysis. Regressive analysis is used for the determination of the relations between two sets of variables, but in cases with more predictors and just one criterion.
That is the way to estimate the influence of the predictors on that criterion. In accordance with the goal of work, morphological measures were placed into predictor's position, and every recorded action was defined individually as a criterion. This way could be established which recorded action is significantly influenced by the morphological dimensionality (Bonacin et al., 2005).

**Examinee sample**

Examinee sample for this research consists of 78 top competitors in kickboxing disciplines - Full Contact and Low Kick, and only semifinalists and finalists are taken into account, 17 in Full Contact and 15 in Low Kick, all of them males from all weight categories from XIII Amateur Balkan’s Championship in Kickboxing that took place in Teşanj (B&H) on 1st and 2nd of September in 2007. This competition is enlisted in the official championship calendar of World Kickboxing Federation-WAKO (World Association of Kickboxing Organizations).

**Variables**

**Variables for the morphological characteristics registration**

1. MORVISIN Height  
2. MORFTEZI Weight  
3. MORFDRK Arm length  
4. MORFDRG Leg length

**Variables - Punches application during competition activity**

5. LUDIRGL Left direct to the head  
6. LDURST Left direct to the abdomen  
7. DESDIRGL Right direct to the head  
8. DESDIRST Right direct to the abdomen  
9. LUKROGL Left cross to the head  
10. LUKROST Left cross to the abdomen  
11. DESKROGL Right cross to the head  
12. DESKROST Right cross to the abdomen  
13. LJAPAGL Left uppercut to the head  
14. LJAPAGST Left uppercut to the abdomen  
15. DESAPEGL Right uppercut to the head  
16. DESAPEST Right uppercut to the abdomen  
17. DESFRIKOK Right punch from turn

**Variables - Kicks application during competition activity**

18. LUNNAPR Left kick forward  
19. DESNINPR Right kick forward  
20. LBNIPR Left side kick forward  
21. DESBNAPR Right side kick forward  
22. LUKKAT Left kakato geri  
23. DESKAKAT Right kakato geri  
24. LNKRUJL Left low rotary kick  
25. DESNKRUD Right low rotary kick  
26. LJUNDGOTJ Left kick to the body  
27. DESUDNOGJT Right kick to the body  
28. LUKVRJL Left high rotary kick  
29. DESVKRD Right high rotary kick  
30. LUSGER Left kick backward uishiro geri  
31. DESUSIRG Right kick backward uishiro geri  
32. DESUSMAY Right uishiro mawashi geri

**Variables - Defense techniques application during activity**

33. LUBLRJU Left hand block from punches  
34. DESBLNNU Right hand block from punches  
35. LUBLRNJ Left hand block from kicks  
36. DESBLRNJ Right hand block from kicks  
37. LUBLNNU Left foot block from kicks  
38. DESBLNNU Right foot block from kicks  
39. EKivaZed Evasion to the left  
40. EKivaZAT Evasion to the right  
41. IZMIKANJ Dodging

**Independent variable**

42. STDOB Age

**Results**

This means that the contribution to the criterion explanation is significant. Correlation coefficient of the set of predictors and criterions is 0.4018, significance is around 96.3%, and important one from the individual predictors is that whose beta is negative -0.37. Results of this research show that competitors with a bigger weight have lower frequency of the left directs to the head (LIDIRGL).

**Methods for the situational-motor variables assessment**

Real (situational) qualities of expressed motor and sports techniques-tactics are the most objective in the authentic conditions of performance during the competitions or by applying the situational and motoric tasks. Therefore, the observation technique is used for this research.

In the observation technique, for the registration of the basic data about examinees and their activities, we used appropriate mensural instruments that needed a special protocol (observation list), whose shape and structure formulation were based on the problems, subjects and goals of research. Observation for this research has been executed with the help of the technical aids (DVD snapshots and DVD players) for the sake of higher objectivity in the process of gathering data by competent persons.

**Table 1 - Regression Summary for VARO1**

<table>
<thead>
<tr>
<th>Intercept</th>
<th>BETA</th>
<th>Beta Err.</th>
<th>B</th>
<th>Err.</th>
<th>t(59)</th>
<th>p-level</th>
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<tr>
<td>VAR39</td>
<td>0.24</td>
<td>0.18</td>
<td>0.24</td>
<td>0.18</td>
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</tr>
<tr>
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<td>0.16</td>
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<tr>
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<tr>
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<td>0.31</td>
<td>0.29</td>
<td>1.07</td>
<td>0.29</td>
</tr>
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</table>

(R² = .40181703 R = .6145692 Adjusted R = .10460655 F(4,59)=4.8400 p<.03196 Std.Error of estimate: .82096)

This means that the contribution to the criterion explanation is significant. Correlation coefficient of the set of predictors and criterions is 0.4018, significance is around 96.3%, and important one from the individual predictors is that whose beta is negative -0.37. Results of this research show that competitors with a bigger weight have lower frequency of the left directs to the head (LIDIRGL).

**Table 2 - Regression Summary for VAR12**

<table>
<thead>
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<th>Intercept</th>
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<th>Beta Err.</th>
<th>B</th>
<th>Err.</th>
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<td>-0.43</td>
<td>0.25</td>
<td>-1.71</td>
<td>0.09</td>
</tr>
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</table>

(R² = .46613875 R² = .21728534 Adjusted R² = .16421994 F(4,59)=4.0947 p<.00538 Std.Error of estimate: .70624)

The significance of the whole variable is 99.5, and individual significance is asserted by the arm length with the beta coefficient 0.53, significance 0.00. (DESAPEST) Right uppercut to the abdomen will be placed often by those with the bigger arm length.
Variable 24 (LIJVKRUD) is significant together with all predictor variables, but it does not contain especially isolated individual criterion variables.

Table 4 - Regression Summary for VAR43

<table>
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<tr>
<th></th>
<th>BETA</th>
<th>BETA Err.</th>
<th>B</th>
<th>Err.</th>
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<tr>
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<td>0,24</td>
<td>0,20</td>
<td>1,19</td>
<td>0,24</td>
</tr>
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</table>

(R=.69357523 R²=.48104659 Adjusted R²=.4456331 F(4,59)=13.673 p=.00000 Std.Error of estimate: .56704)

The connection between the set of morphological measures and age (STDOB) is significant and maximum. Variable VAR40 (WEIGHT) with the beta coefficient -0.73 stands out from the individual variables, which shows that among top quality fighters occurs the reduction of the weight while the age increases. The result clearly points out to the organism adaption to the long-term techniques training, motoric stereotype and tactics acquirement. Techniques and skills refinement are improved through the experience, but the consequence is the loss of the muscle mass, or precisely, reduced need for the muscle mass.

Table 5 - Regression Summary for VAR08

<table>
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<th></th>
<th>BETA</th>
<th>BETA Err.</th>
<th>B</th>
<th>Err.</th>
<th>t(59)</th>
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<td>0,16</td>
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<td>0,14</td>
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<tr>
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<td>0,21</td>
<td>-0,32</td>
<td>0,25</td>
<td>-1,27</td>
<td>0,21</td>
</tr>
</tbody>
</table>

(R=.37543346 R²=.14095028 Adjusted R²=.08270962 F(4,59)=2.4201 p=.05835 Std.Error of estimate: .71610)

Variable 08 (DESKROST) is very near significance, but individual variable VAR40 (WEIGHT) is especially significant. It says that if the weight is bigger, the frequency variable of the right kick forward to the abdomen is lower. Variable 15 (DESNAPR) is very near significance, but individual variable VAR40 (WEIGHT) is especially significant. It says that if the weight is bigger, the frequency variable of the right kick forward is lower.

Variable 09 (DESKROST) is very near significance, but individual variable VAR40 (WEIGHT) is especially significant. It says that if the weight is bigger, the frequency variable of the right kick forward to the abdomen is lower. Variable 15 (DESNAPR) is very near significance, but individual variable VAR40 (WEIGHT) is especially significant. It says that if the weight is bigger, the frequency variable of the right kick forward is lower.
Sažetak
Istraživanje je izvršeno na uzorku od 78 ispitanika, sudionika Balkanskog prvenstva u kickboksingu iz Albanije, Bosne i Hercegovine, Bugarske, Hrvatske, Makedonije, crne Gore i Srbije, uzrasta 18 do 33 godine, što se održalo u Tešnju (BiH) 2007.g. Na prvenstvu, u svakoj je kategoriji nastupio po jedan natjecatelj koji je bio pobjednik nacionalnog prvenstva u zemlji koju predstavlja. Za ovo istraživanje primijenjen je skup od 42 varijable, od čega 37 varijabli tehničkih elemenata, 4 morfološke značajke i 2 nezavisne varijable koje označavaju uzast po pobjede na prvenstvu. Istraživanje je provedeno s ciljem utvrđivanja utjecaja morfoloških značajki na učinkovitost izvođenja tehničkih elemenata kickboksing disciplina Full Contact i Low Kick. Morfološke značajke su imale status logičkih prediktora dok su snimljene akcije imale status logičkih kriterija. Zadane varijable tehničke su utvrđene procjenom tri kompetentna procjenitelja po posebnom protokolu. Sve su borbe bile snimljene digitalnim kamerama koje su pokrivala borilište iz dva ugla. Multiplom regresijskom analizom utvrđene su relacije morfoloških značajki i tehničkih elemenata.

Ključne riječi: kickboksing, morfologija, tehnički elementi

Received: August 15, 2010
Accepted: June 02. 2011
Correspondence to:
Edin Krupalija, MSc.
Euro-football marketing, Wien, Austria
Phone:
E-mail: edinkrupalija@hotmail.com