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## Point-fight kickboxing match analysis

**Luboslav Šiška and Jaroslav Broďáni**

### Abstract

The present paper discusses the differences between the groups of winners and losers in point-fight kickboxing matches in terms of the points earned, techniques used and situations encountered during the match. We analyzed 28 matches from the 2015 World Cup. We compared the points earned and the individual techniques, which consisted of 8 parameters divided into 4 groups - hand, leg; lead, rear; offense, defense; body, head. The differences between the criteria were analyzed by standard tests of statistical and material significance. In terms of statistics, the winners have earned significantly more points than the losers in all rounds. The use of the individual techniques differs, however, there are no statistically significant differences in the acquisition of points through offensive and defensive techniques. The winners achieve statistically significantly more points in situations where no adequate counter-technique exists to the scoring technique. The most commonly occurring technique in the match is the confrontation of hand rear offense head against the lead leg defense body, where the offensive technique is more successful. However, the defensive punches are more successful in the lead leg offense body attack against the hand defensive techniques. In the most common situations, the winners earned significantly more points for the defensive techniques than the losers, they had significantly better efficiency ratios in the individual techniques, however, no differences have been observed in the total number of attempts in the individual techniques. The training process should focus on practicing the situations that occur most frequently in the match, and emphasis should be put on the speed and effectiveness of the hand rear offense head technique. The main difference between the winners and losers is the leg lead offense body technique, or an adequate response by a defensive punch either by the lead or rear hand. In terms of further research, we propose to perform a factor analysis of the most frequent situations.

**Keywords:** point, technique, situation, offense, defense, efficiency ratio

### 1. Introduction

Combat sports are highly popular these days. Knowledge of the structure of sports performance contributes to the effective management of training, which has a positive effect on performance. Since combat sports have a multifactorial character, the analysis can be approached from multiple angles. The time characteristics were addressed in karate<sup>[11]</sup> or kickboxing<sup>[8]</sup>. The number of punches was addressed in taekwondo<sup>[2]</sup>, boxing<sup>[3, 9]</sup> and kickboxing<sup>[7]</sup>. The effectiveness of techniques was addressed<sup>[1]</sup>. Kickboxing uses quick punches and kicks and it is a combat sport in which the athlete assumes a standing position. It is divided into 6 match divisions, one of the most popular of which is point-fighting. Pointfighting is a noncontinuous martial art, based on a "point-stop" scoring system, in which only the first regular technique scores<sup>[6]</sup>. It is a discipline with emphasis on the leg and hand technique in athletic terms. One point is awarded for each valid technique with the exception of a head kick, which is for two points, and a turning kick in the body and head for two or three points<sup>[12]</sup>. In his studies<sup>[4, 5]</sup> summed up the knowledge of basic attitudes, movements and techniques and analyzed the 2011 World Cup matches in terms of the efficiency ratio of attacking and counterattacking actions, efficiency ratio of combat operations, and general and individual indicators of attacking and counterattacking combat operations. He states that the winners achieved better values in the selected indicators except for one case, which was caused by a kick in the head for two points in the tightest victory for one point. Knowing the differences between the winners and losers is essential for improving the sport, and it is a prerequisite for a deeper analysis.

## 2. Materials and methods

We evaluated 28 matches at the 2015 World Championship in kickboxing, i.e. 14 quarter-final and 14 semi-final matches. We compared the points earned and techniques used in the

group of winners and losers. These consisted of 8 parameters divided into 4 groups: hand, leg; lead, rear; offense, defense; body, head; which resulted in 14 techniques (Tab. 1).

Table 1

7 offensive techniques:	7 defensive techniques:
HLOH – hand lead offense head	HLDH – hand lead defense head
HLOB – hand lead offense body	HLDB – hand lead defense body
HROH – hand rear offense head	HRDH – hand rear defense head
HROB – hand rear offense body	HRDB – hand rear defense body
LLOB – leg lead offense body	LLDH – leg lead defense head – 2 pt.
LLOH – leg lead offense head – 2 pt.	LLDB – leg lead defense body
LROB – leg rear offense body	LRDB J – leg rear defense body jump – 2 pt.

The points earned (w1, w2, w3, L2, L1, L3) in the group of winners and losers were compared statistically (t-test) and factually (Cohen's "d"). The distribution of the points earned between the offensive and defensive techniques is shown graphically and in percentage. The differences were confirmed statistically chi – square ( $\chi^2$ ) and factually (Cohen's - w). The situations (combinations of techniques) were divided into three groups: Clash - a situation where both techniques were rated by 1 point. No response - a situation where no counter-technique was used against the winning technique, or the counter-technique was not clearly identified, or only a hint of the technique was used. Classic a situation with a confrontation of the offensive and defensive techniques where one was successful and the other was not. We used a graphic distribution of the points between the winners and losers in the most commonly occurring classic situations: on the left side there are points earned with the offensive techniques and on the right side there are points earned with the defensive techniques. The differences between the offensive and defensive techniques were evaluated with the ANOVA test.

The ultimate effectiveness of the individual techniques in both groups was determined as the ratio of successful and unsuccessful attempts and compared with the Man-Whitney U test and ES coefficient (Fritz's - r). To verify the null hypothesis we chose the 5% and 1% level of significance in all cases.

## 3. Results

The differences between the winners and losers in each round were confirmed statistically ( $p < 0.01$ ) and factually with a great effect ( $p > 0.6$ ):

**w1-L1**  $t(27) = 5.44, p < .001, d = 1.37$ ;

**w2-L2**  $t(27) = 4.09, p < .001, d = 1.23$ ;

**w3-L3**  $t(27) = 3.46, p < .001, d = 0.66$

No statistically significant differences were found between the points earned by the winners and losers in the individual rounds:

**w1-w2**  $t(27) = 0.09, p > .005, d = 0.02$ ;

**w1-w3**  $t(27) = 0.23, p > .005, d = 0.07$ ;

**w2-w3**  $t(27) = 0.22, p > .005, d = 0.07$

**L1-L2**  $t(27) = -0.92, p > .005, d = 0.24$ ;

**L1-L3**  $t(27) = -1.55, p > .005, d = 0.42$ ;

**L2-L3**  $t(27) = -0.87, p > .005, d = 0.19$

The percentage of individual techniques in the points earned is different between the winners and losers. The most salient

difference is in the hand defense body technique, which is significantly higher in terms of the percentage in the losers group, and the hand rear defense technique amounting to 24% (38 points) and hand lead defense technique totaling 11% (17). The most used and most scored technique in the winners group is the hand rear offense head technique with 21% (64 points); which comes second in the losers group with 17% (27). This is followed by the hand lead defense head technique with 14% (45) in the winners group and 10% (16) in the losers group, where it represents the fourth most scored technique. An important disproportion was identified in the head kicks, which is a 2-point technique: the difference in the offense kick is 9% (32), while in the losers group, it was represented only at 2% (4). The losers did not use the defensive kick in the head, whereby this technique is represented in the winners group at 2% (8). The losers did not use the leg rear defense body jump (2-point technique) and the winners did not use the leg rear offense body technique (Fig. 2).

In terms of the representation of offensive and defensive techniques, we can conclude that the winners earn more points with the offensive techniques unlike the losers who mainly score by the defensive techniques (Fig. 3). However, in the calculation of the percentage of points earned by the offensive and defensive techniques, no statistically significant differences were determined through the chi-square test:

$\chi^2(1, N = 200) = 2.79, p = .10, w = 0.24$

There were altogether 37 clashes, in which the techniques used by both athletes were scored. The number of points earned was 11.94% among the winners and 23.42% among the losers. The most commonly used technique by the losers was the leg rear defense body jump, but it also reached a high number with the winners group. A more homogeneous proportional distribution is seen in the winners group where not a single technique gained significantly excessive values over the others, as was the case in the losers group (Fig. 4).

In situations where no counter-technique was used against the winning technique, or only a hint of a technique was used, the superiority in points is in the winners group (tab. 2), as confirmed by the ANOVA test:  $F(1, 4) = 39.36, p = .00$ ,

We identified 30 different classic situations in the observed matches. Their total number was 319, which accounted for 73.67% of the total number of situations, whereby in 18 cases the 2-point technique was used. 7 of the situations occurred 20 times or more, which accounted for a total of 206 situations, i.e. 64.5% of the total number of classic situations (Fig. 5). No statistically significant differences in the success of the offensive and defensive techniques in the most common situations were identified

ANOVA:  $F(1, 6) = 4.06, p = .09$ ,

Neither was it the case in situations with the hand rear offense head technique (HROH)

ANOVA:  $F(1, 2) = 0.04, p = .85$ ,

The statistically significant differences were confirmed in the lead leg offense body (LLOB) technique with the defensive techniques carried out with hands

ANOVA:  $F(1, 3) = 78.81, p = .00$ ,

No statistically significant differences were discovered in the distribution of points between the winners and losers in the most common situations (Fig. 6) when comparing the points achieved by the winners through offensive techniques and losers through defensive techniques

ANOVA:  $F(1, 6) = 0.09, p = .76$ ,

However, when comparing the defensive points achieved by the winners and offensive points achieved by the losers, the winners achieved statistically more points

ANOVA:  $F(1, 6) = 23.59, p = .00$ ,

In terms of the effectiveness of individual techniques, which is calculated as the ratio of successful and failed attempts, we can observe a clear superiority of the winners, which is confirmed by the Man-Whitney U test:  $U(7) = 3.00, p = .00, r = 1.08$

However, no statistically significant differences in the total number of attempts in the individual techniques were proven with Man-Whitney:  $U(7) = 24.00, p = .40, r = 0.29$

### 3.1 Tables and Figures

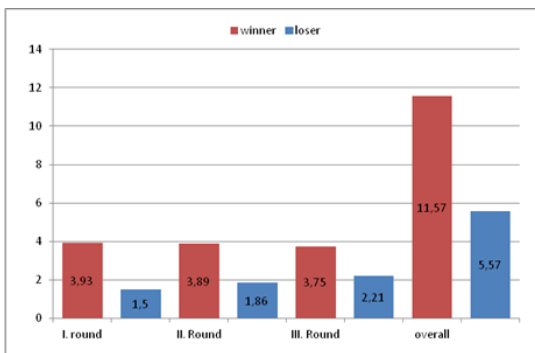


Fig 1: Average number of points in each round

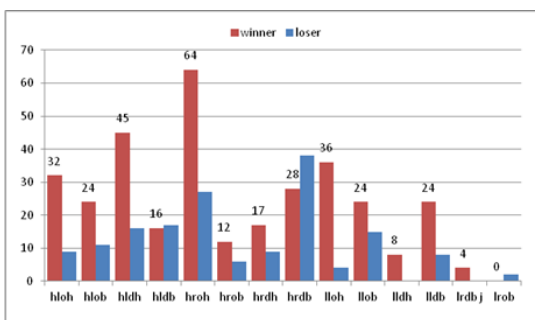


Fig 2: Individual techniques in the points earned

Tab 3: Efficiency ratio and the total number of attempts in the individual techniques

		hroh	hldh	lldb	hrdb	hldb	hloh	hlob	llob
Efficiency	winner	4,14	4,00	2,36	1,69	3,00	3,50	2,00	0,81
ratio	loser	0,57	1,08	0,40	0,68	1,33	0,70	1,60	0,23
total	winner	78	56	35	41	21	40	33	50
attempts	loser	69	28	28	64	26	19	16	77

### 4. Discussion

In our work we analyzed the point-fight kickboxing matches from several angles. The presented results show that the winners dominated from the beginning of the match. They

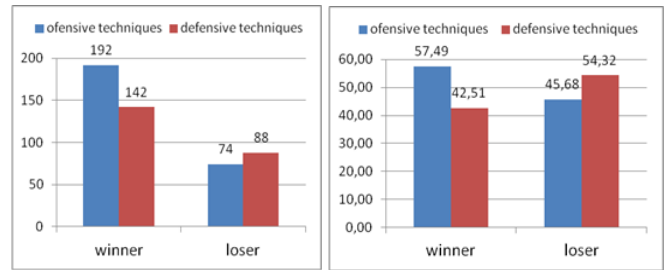


Fig 3: Totals and percentage of offensive and defensive techniques

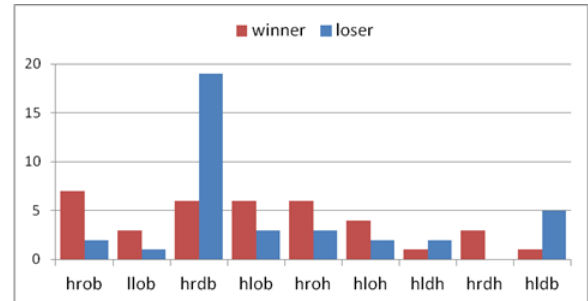


Fig 4: Number of points earned by each of the techniques in a clash

Table 2: Points achieved with the techniques without adequate reaction of the opponent

	hroh	llob	lloh	hloh	hlob
winner	18	12	14	15	6
loser	6	3	2	3	2

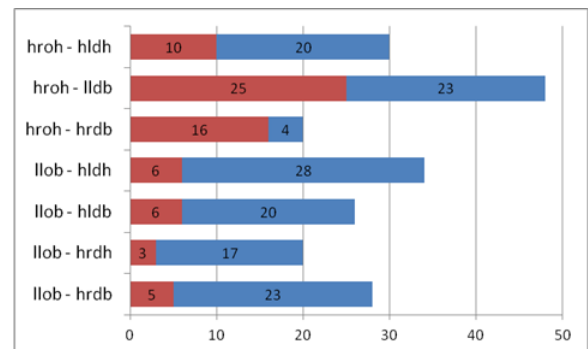


Fig 5: Most commonly occurring situations in a match

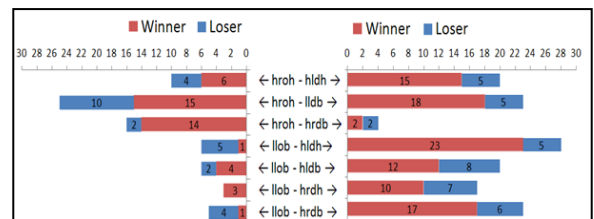


Fig 6: Division of points between the winners and losers earned through the individual techniques in the most common situations

difference between the winners and losers. It is interesting to note the use of the two-point lead leg offense head technique with a 32 point difference – when adding the leg lead defense head technique, which is also a two-point technique with 8 points, which was not used in the losers group, we have a difference of 40 points. In the individual assessment we can say that the importance of the two-point head kick technique was reflected mainly in balanced matches where it often decided the victory. The winners also have a significant superiority in the points earned where the opponent did not respond adequately. The highest number of points was scored with the hand rear offense head technique, which also demonstrated the highest difference of points, making us conclude that the winners have mastered this technique significantly better, and it is one of the preconditions of winning the match. The winners also dominated through the defensive techniques in the most common situations, i.e. mainly through the confrontations of defensive reactions to the lead leg attack, which according to [6] is one of the most used techniques, however, our research shows its negative success and failure rate. This also results in a significantly better ratio of success of the individual techniques in the winners group, as evidenced by [4, 5]. From a subjective perspective, the speed of the overall movement seems to be a very important factor, and attention should be paid to this skill as well. There has been little research so far in this area, and we hope that our findings will contribute to a better understanding of the issue.

## 5. Conclusions

In our work we identified the most important differences between the winners and losers. The effectiveness of the offensive techniques, mastery of the defensive techniques, especially when confronted with the lead leg kick, and the ability to implement the two-point kick in the head technique, can be viewed as predictors of victory in a close match. The most commonly occurring technique in the match is the confrontation of the hand rear offense head technique and leg lead defense body technique. These findings should be taken into account when managing the training process. We recommend developing a factor analysis of the most common situations, focusing on the speed of the overall movement and presenting a methodology for their diagnosis.

## 6. Acknowledgments

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