ORIGINAL RESEARCH PAPER

THE ANALYSIS OF SUCCESSFULLY APPLIED TECHNIQUES IN PART 1 IN JU-JITSU FIGHTING

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Abstract

Empirical data of technical and tactical performance in ju-jitsu fighting (JJF) competitions are rare, making it hard to derive validated recommendations for JJF training. Therefore, the current study investigated successfully applied punching and kicking techniques, which were performed in JJF competition at a world-class level. For this purpose 399 techniques, which were applied at the 2010 World Championships and were awarded with points by the referees, were systematically analyzed. Results revealed that punches are more likely to score "ippon" than kicks. Furthermore, the straight punch with the backhand could be identified as the most successfully applied technique, which is most likely to score "ippon" as a single counter technique. Practical implications of the results for training and recommendations for tactics in competition are drawn. Therefore, it is suggested to focus on punches in order to score "ippon". Furthermore, a more defensive fighting style increases the likelihood to be awarded "ippon" for a straight punch with the back hand, being the most dominant technique in part 1. Together with the existing literature it is suggested to behave tactically flexible and not to behave too defensive in ju-jitsu fighting fights. Further studies have to incorporate more techniques of different competitions at a world-class level.

Key words: *ju-jitsu fighting, straight punch with backhand, performance, training.*

Introduction

Ju-jitsu fighting (JJF) can be described as a high-intensity martial art and modern competition sport, in which the aim is to defeat the opponent using punches, kicks, takedowns, throws and ground techniques. JJF is one of three official competition systems of the Ju-Jitsu International Federation, and as such an official competitive sport at the World Games, which is

organized and governed by the IWGA, under the patronage of the International Olympic Committee (Ju-Jitsu International Federation, 2011). JJF is the most comprehensive discipline in ju-jitsu (Staller, 2008), since the competitors have to engage in distance combat (Part 1), in throwing and takedowns (Part 2), and in ground-fighting (Part 3). The system is divided into several categories according to sex and weight. A fight consists of one 3-minute round and has to be fought in every part. Three referees reward successfully applied techniques with "ippon" (2 or 3 points) or "waza-ari" (1 point). In order to win, an athlete has to have more points than his opponent after the regular fighting time. Another option to win is by "full ippon", which means to have an "ippon" in every part. Penalties are divided into "light forbidden acts" ("shido": 1 penalty point) and "forbidden acts" ("chui": 2 penalty points). The addition of two forbidden acts results in loosing the fight by "hansoku-make" (Ju-Jitsu International Federation, 2011).

Despite the growing professionalization, there is a lack of empirical studies focusing on JJF. Recommendations for practice are based on hypothetical considerations (Heckele, 2002) or are given on an abstract level (Renninghof & Witte, 1998), resulting in non-empirical validated curricula for JJF athletes. Since optimal performance at competition requires the integration of physiological, psychological, technical and tactical elements (Smith, 2003), the question arouses regarding the technical and tactical elements to practice to which extent. Systematic video analysis of technical and tactical components of competitions provides a possibility to gain information about the technical skills used successfully in a competition setting. This gap has been first addressed by a systematic video analysis of 58 world-class ju-jitsu fights of the World Championships 2010 (Staller, under review), which aims at the technical performance of elite athletes. Table 1 shows the number of successfully applied techniques for each part.

Table 1

Successfully Applied Techniques and Their Awarded Points for Each Part

	Frequency	2-Point „Ippon“	3-Point „Ippon“	„Waza-ari“	Points	Ratio [%]
Part 1	399	225		174	624	78,69
Part 2	70	32		38	102	12,86
Part 3	30	17	10	3	67	8,45
All	499	274	10	215	793	100,00

Regarding part 1, results of the study revealed, that this part is the most dominant one in regards to awarded points. Nevertheless, it is unknown which techniques out of which tactical situations are the most promising ones to be awarded with "ippon". The current study investigated successfully applied techniques in part 1 and their context in order to give recommendations for training and tactics in competition.

Material and Methods

Sample. 399 techniques in part 1 which were successfully applied in 58 JJF fights at the World Championships 2010 in Saint Petersburg, Russia, were analyzed.

Procedure. All analyzed fights were filmed during the World Championships 2010. The video clips were analyzed manually using the software "MPEG Streamclip 1.9.3b7". Successfully applied punching and kicking techniques were categorized in regards to the awarded score ("waza-ari" or "ippon"), the kind of technique (single technique or combination) and the tactical context in which the technique occurred (defensive or offensive).

Statistical Analysis. Frequency tables were analyzed using χ^2-test and log-linear analysis. The interpretation of a 2x2 crosstab table model was done using the odds ratio. A significance level of $p < .05$ was set for all tests and data was analyzed using SPSS version 20.0.

Results

Analysis of all successfully applied techniques in part 1 showed, that there were more successfully applied punches than kicks (Tab. 2). Furthermore results revealed that there were more "ippons" awarded than "waza-aris".

Table 2

Frequency of Successfully Applied Punches and Kicks in Part

	„Ippon“		„Waza-ari“		All	
	Frequency	Ratio [%]	Frequency	Ratio [%]	Frequency	Ratio [%]
Punches	186	63.92	105	36.08	291	72.93
Kicks	39	36.11	69	63.89	108	27.07
All	225	56.39	174	43.61	399	100.00

The relationship between the applied technique (punch or kick) and the awarded score ("ippon" or "wara-ari") was analyzed using χ^2-test. The results showed that there is a significant relation between the applied technique and the awarded score, χ^2 (1) = 24.77, $p < .001$. Based on the

odds ratio the likelihood to score "ippon" with punches is 3.13 higher than it is with kicks.

Out of all techniques in part 1, the straight punch with the backhand was the most successfully applied technique (39.35%), followed by the punch with the front backhand (12.53%) and sidekick with the front leg (9.21%).

Following-up the dominance of straight punches with the backhand, the awarded points, the kind of technique and the tactical situation in which it was applied was analyzed. The results are displayed in table 3.

Table 3

Frequency of the Straight Punch with the Backhand Regarding the Tactical Situation and the Awarded Points

	„Ippon"		„Waza-ari"		All	
	Frequency	Ratio [%]	Frequency	Ratio [%]	Frequency	Ratio [%]
Single Technique	64	40.76	29	18.47	93	59.24
Offensive	22	14.01	9	5.73	31	19.75
Defensive	42	26.75	20	12.74	62	39.49
Combination	35	22.29	29	18.47	64	40.76
Offensive	28	17.83	25	15.92	53	33.76
Defensive	7	4.46	4	2.55	11	7.01
All techniques	99	63.06	58	36.94	157	100.00

The relationship between the kind of technique, the tactical context and the awarded score, was analyzed using log-linear analysis. The results revealed that there is no significant relationship between the kind of technique, the tactical context and the awarded score, χ^2 (3) = 3.769, p = .287. A partial effect was discovered regarding the kind of technique and the awarded score, χ^2 (1) = 38.796, p < .001. Based on the odds ratio the likelihood of a successfully applied single technique in a defensive situation is 9.64 times higher than a single technique in an offensive situation.

Discussion

The current study points out that punches were more likely to be awarded with "ippon" than kicks and that the straight punch with the backhand is the most successfully applied technique in part 1. Furthermore results indicate that the straight punch with the backhand is successfully applied as a single technique out of defensive situations.

In a study of Lattke (2005), who analyzed successfully applied techniques on a national level in Germany, the straight punch with the

backhand was as well the technique, which scored the most in part 1. The author did not perform further analysis regarding this technique. Further analyses of straight punches of the backhand in a ju-jitsu fighting competition setting are not known until now.

Similar studies have been conducted for other martial arts, like judo (Heinisch, 2003, 2008), which proved themselves useful for practice and training. In this context, Müller-Deck (2002) points out that continuous analysis of the technical and tactical performance of high class athletes have to be conducted in order to be able to compete at a world class level. Furthermore, he puts emphasis on the fact that such analysis have to be conducted on a regular basis to be able to adapt to the changes which take place in competition performance. Therefore it is suggested to analyze the technical performance in JJF regularly.

Implications for practice. The current results have implications for practice concerning JJF.

First, in order to score "ippon" it is recommended to punch rather than to kick. Especially the straight punch with the backhand should be explicitly trained and used in a competition setting.

Second, in order to be awarded "ippon" for a straight punch with the backhand it is recommended to fight more defensive in part 1. This could be an option if the "ippon" in part 1 is still needed to win by "full ippon". Nevertheless, this tactical concept may not prove successful when the athlete is in need of points. In that case, it is suggested to attack with combinations in an offensive way.

Third, if the likelihood of "ippon" in a defensive situation is much higher, it seems to be better for the athlete if he or she has not necessarily to attack the opponent. Therefore, it is suggested to take the lead by points even in the beginning. With more points than the opponent, it is easier to switch to defensive tactics and to score further points, than being behind with points and having to attack, which makes it easier for the opponent to increase the lead.

Fourth, the athlete has to be careful not to behave too passively, when trying to score out of a defensive strategy. Results from Staller (under review) showed, that most penalties are given due to passive behavior.

Limitations. Some limitations of the study have to be acknowledged.

First, in the study there were only analyzed techniques, which were performed at one competition. It is suggested for further studies that the techniques of more competitions are included in the analysis. Like Müller-Deck (2002) proposed longitudinal studies have to be conducted in order to get a grasp of the development of tactical behavior of world-class athletes

and to be able to change strategies and tactics in training as early as possible, if it is needed.

Second, it has not been analyzed if the athlete switched to a defensive behavior because of being ahead of points. It is possible that this situation occurred as often because the pressure for the athlete was increased and therefore he or she made more mistakes when attacking. Therefore, it is suggested to enlarge the view of tactical context in which successful punches with the backhand are applied.

Conclusions

The current study showed that the straight punch with the backhand is best performed as a single technique out of a defensive situation in order to score "ippon". Therefore, it is recommended in competition to take lead by points as early as possible in order to switch to defensive tactics in part 1 afterwards. Like this it seems to be easier to increase the lead by using straight punches with the backhand as single counter techniques when the opponent attacks.

Furthermore, systematic video analyses of world-class fights, which provide detailed information of technical and tactical performance, are needed. Such analysis can provide validated technical aims for training. Proper practice of technical and tactical skills, which have to be learned for elite competitions, can increase performance in competitions.

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