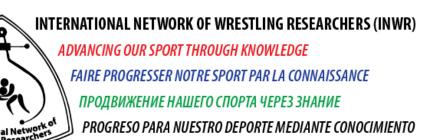**Original Research**
TECHNICAL-TACTICAL ANALYSIS OF MEN'S WRESTLING: A CASE STUDY OF THE 72ND NATIONAL ATHLETIC MEET OF 2017 IN JAPAN

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Published online:June 2019.

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TECHNICAL-TACTICAL ANALYSIS OF MEN'S WRESTLING: A CASE STUDY OF THE 72ND NATIONAL ATHLETIC MEET OF 2017 IN JAPAN

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ABSTRACT
The purpose of this research was to reveal the techniques that winners and losers attempted to use in wrestling matches, as well as the number of times these techniques were successful. We filmed and categorized the techniques used in 19 freestyle and 10 Greco-Roman matches in the 72nd National Athletic Meet of 2017 in Japan. When the winner scored points, standing position accounted for a high proportion of the positions in both freestyle and Greco-Roman, at 71.1% and 66.7% respectively. The loser scored all the points in the standing position. These results indicate that wrestling matches play out with a focus on standing positions. In freestyle, single-leg attacks were the most common point-scoring techniques for winners and the second most common for losers. The success rate for single-leg attack by winners was 73.1% but was significantly lower for losers at 25.0%. Therefore, it can be considered that practice on improving the success rate of single-leg attacks should be prioritized for securing victory in freestyle. The technique that scored the most points for winners in Greco-Roman was the gut wrench. Conversely, the gut wrench was not present and therefore failed to score points for the losers. These findings can be helpful to plan effective training for wrestlers.
Keywords: wrestling; scoring analysis; performance analysis; technique

INTRODUCTION
In the analysis of wrestling matches, the systematic categorization of techniques has previously been carried out (Ichiguchi et al. 1981; Fujiyama, 2007). Based on the categorized offensive and defensive techniques, a previous study reported that the double-hand single-leg tackle and double-leg attack were frequently executed offensive techniques, and the back step and leg pull back as defensive techniques (Fujiyama, 2008). It also investigated whether any structure-related differences in offensive and defensive techniques could be observed depending on weight classes, and found that in the heavyweight class, there were significantly fewer double-leg attacks than in the lightweight class and that the defensive technique of holding ground was highly related to the offensive techniques of gut-wrench and double-leg attack. (Fujiyama, 2010).

These conventional wrestling analysis methods are ways to gather information, focusing on techniques that score points, but have overlooked analysis of techniques that did not result in the scoring of points. In a wrestling match, offense and defense often involve a complex combination of techniques before any points are scored, so there are cases where techniques do not result in any points. Cipriano (1993) also investigated the success rate of techniques, and from this, it can be considered that as well as techniques that result in the scoring of points, elements of victory and defeat are hidden in chances that do not lead to the scoring of points. As such, this research does not use conventional analysis methods that focus only on techniques that score points. It also aimed to take into consideration and to carefully assess a multitude of techniques that do not necessarily lead to the scoring of points.

METHODS
Participants The tournament that formed the subject for this research was the 72nd National Athletic Meet held in Ehime Prefecture on the 7th and 8th of October 2017. It was a tournament in which representatives were selected through qualifiers held in each prefecture throughout Japan. The participants in this tournament included high ranking finalists at the 31st Olympic Games (Rio De Janeiro, Brazil), the 2017 World Championships (Paris, France), and the Japan National Championships, making it one of Japan's most prominent tournaments.

A total of 19 matches in seven weight classes were selected for the research in the men's freestyle event (Table 1). A total of 10 matches in seven weight classes were selected in the Greco-Roman. The matches analyzed centered on Japanese international level wrestlers with their previous statistics. Some of the winners appeared in several matches that were analyzed. As it was in a tournament format, the losers were different each time (Table 1), and as a result, a technical-tactical analysis was implemented for 19 winners and 29 losers.

Table 1. Matches used in analysis and results

FS	57 kg				61 kg				65 kg				74 kg			
	ID	Score	ID	Time	ID	Score	ID	Time	ID	Score	ID	Time	ID	Score	ID	Time
	W1	10 - 0	L1	1'11	W 2	10 - 0	L3	1'42	W3	12 - 2	L6	5'42	W4	10 - 0	L7	2'02
Results	W1	10 - 0	L2	2'37	W 2	10 - 0	L4	5'09					W4	10 - 0	L8	2'09
					W 2	10 - 0	L5	5'12					W4	10 - 0	L9	1'42
													W5	4 - 0	L10	6'00

FS	86 kg				97 kg				125 kg			
	ID	Score	ID	Time	ID	Score	ID	Time	ID	Score	ID	Time
	W6	4 - 2	L11	6'00	W9	6 - 4	L15	6'00	W10	10 - 0	L17	4'45
Results	W7	5 - 4	L12	6'00	W9	7 - 1	L16	6'00	W10	3 - 2	L18	6'00
	W8	4 - 1	L13	6'00					W10	10 - 0	L19	1'40
	W8	3 - 3	L14	6'00								

GR	59 kg				66 kg				71 kg				75 kg			
	ID	Score	ID	Time	ID	Score	ID	Time	ID	Score	ID	Time	ID	Score	ID	Time
	W11	12 - 2	L20	4'45	W12	4 - 3	L22	6'00	W13	4 - 2	L23	6'00	W15	9 - 0	L25	4'30
Results	W11	9 - 1	L21	2'58					W14	2 - 1	L24	6'00	W16	3 - 2	L26	

GR	85 kg				98 kg				130 kg			
	ID	Score	ID	Time	ID	Score	ID	Time	ID	Score	ID	Time
	W17	9 - 0	L27	1'50	W18	8 - 0	L28	2'33	W19	13 - 4	L29	4'55
Results												

*W: Winner, L: Loser

DATA ANALYSIS

The matches were recorded, with a digital video camera, from second-floor seats. The recorded data were analyzed using video motion analysis software (Dartfish 8 ProSuite; Dartfish, Fribourg, Switzerland). We categorized the techniques using the categories created by Fujiyama et al. (2007), categorizing them by success (when the winner/loser scored points), failure (when they did not), position type (standing or parterre) and the number of points. We also included penalties resulting from referees' decisions.

Table 2. Tags used for analysis and order of tagging

Attempt	Success (winner)	Failure (winner)	Success (loser)	Failure (loser)
Position	Standing		Parterre	
Points	0 1 2 3 4 5			
Techniques (Standing)	Single-leg attack	Double-leg attack	High crotch	Bear hug
	Front suplex	Ankle pick	Leg hold	Arm throw
	Snap down	Side lift	Lift	Fireman's carry
	Pushout	Front headlock	Front headlock throw	Neck throw
	Defence	Counteroffensive block	Others	
Techniques (Parterre)	Counteroffensive block	Gut wrench	Cross ankle	Others
Penalties	Challenge lost	Passive	1pt caution	2pt caution

RESULTS

In freestyle matches, winners executed techniques 84 times and led to the scoring of points in a total of 69 cases (success rate of 82.1%) (Table 2). Points scored by winners from a standing position made up 73.6% of the total. For parterre, they succeeded all 16 times they executed a technique. The winners mostly executed single-leg attacks (19 times, 38 points) and gut wrenches (14 times, 28 points), and the points scored using these two techniques made up 43.2% of the total. On the other hand, single-leg attacks failed seven times, which was the highest (success rate of 73.1%).

In 8 cases, losers executed techniques 25 times that resulted in the scoring of points (success rate of 32.0%) (Table 3). The primary source of points was single-leg attacks (4 times), followed by penalties (1pt caution, 5 times). There were no situations where techniques were attempted in the parterre. In the same way as winners, losers also mainly used single-leg attacks, but the success rate was 25.0%.

In Greco-Roman matches, winners executed techniques 37 times and scored points in a total of 30 cases (success rate of 81.1%) (Table 4). The technique that winners used in many cases was the gut wrench (9 times, 18 points), followed by push outs (4 times, 4 points). There were a total of 7 failures, and as with freestyle, these were all from standing positions. Many points were also scored from opponent passives (7 times, 7 points).

Losers executed techniques 6 times, and in a total of 3 cases this was successful (success rate of 50.0%) (Table 5). There were no situations where techniques were attempted in the parterre. The most points were scored from penalties (8 points).

Table 3. Freestyle winners' points breakdown and success rate

Winner (Freestyle, 19 games)		No. of attempts	No. of completion	Success rate	1pt	2pt	4pt	5pt	Toral points
Standing									
	Single-leg attack	26	19	73.1%		19			38
	Front headlock	10	7	70.0%		7			14
	Double-leg attack	6	6	100.0%	1	2	2	1	18
	Cross ankle	5	5	100.0%		5			10
	Others (standing)	7	3	42.9%	1	2			5
	Leg hold	3	3	100.0%		3			6
	Pushout	3	3	100.0%	2	1			4
	Counteroffensive block	3	2	66.7%		2			4
	Snap down	2	2	100.0%		2			4
	Ankle pick	1	1	100.0%		1			2
	High crotch	1	1	100.0%		1			2
	Defence	1	1	100.0%		1			2
	Total	68	53	77.9%	4	46	2	1	109
Parterre									
	Gut wrench	14	14	100.0%		14			28
	Others	2	2	100.0%		2			4
	Total	16	16	100.0%	0	16	0	0	32
Penalties									
	1pt caution		6		6				6
	Challenge lost		1		1				1
	Total		7		7				7

Table 4 **Freestyle losers' points breakdown and success rate**

Loser (Freestyle, 19 games)	No. of attempts	No. of completion	Success rate	1pt	2pt	4pt	5pt	Toral points
Standing								
Single-leg attack	16	4	25.0%		4			8
Front headlock	4	0	0.0%					0
Double-leg attack	3	2	66.7%		2			4
Others	1	1	100.0%	1				1
Pushout	1	1	100.0%	1				1
Total	25	8	32.0%	2	6	0	0	14
Penalties								
1pt caution	5	5	100.0%	5				5
Total		5		5				5

Table 5.Greco-Roman winners' points breakdown and success rate

Loser (Greco-Roman, 10 games)	No. of attempts	No. of completion	Success rate	1pt	2pt	4pt	5pt	Toral points
Standing								
Arm throw	3	1	33.3%			1		4
Bear hug	1	1	100.0%		1			2
Firemans carry	1	1	100.0%	1				1
Neck throw	1	0	0.0%					0
Total	6	3	50.0%	1	1	1	0	7
Penalties								
Passive	4	4	100.0%	4				4
2pt caution	2	2	100.0%		2			4
Total		6		4				8

Table 6.Greco-Roman losers' points breakdown and success rate

Loser (Greco-Roman, 10 games)	No. of attempts	No. of completion	Success rate	1pt	2pt	4pt	5pt	Toral points
Standing								
Arm throw	3	1	33.3%			1		4
Bear hug	1	1	100.0%		1			2
Firemans carry	1	1	100.0%	1				1
Neck throw	1	0	0.0%					0
Total	6	3	50.0%	1	1	1	0	7
Penalties								
Passive	4	4	100.0%	4				4
2pt caution	2	2	100.0%		2			4
Total		6		4				8

The majority of points scored, by the winners, were in standing positions in both freestyle and Greco-Roman, at 77.9% and 74.1 % respectively. The losers scored points 8 times in freestyle matches and 3 times in Greco-Roman matches both in the standing position. As with previously conducted research (Cipriano), it can be argued that wrestling matches are played mostly in standing positions. From the perspective of a previous study (Fujiyama et al., 2011), this is a valid result as many points were scored using techniques from standing positions.

Both winners and losers often used single-leg attacks in freestyle. Cipriano (1993) also reported that single-leg attacks were the most common of all the techniques that scored points, and the success rate for single-leg attacks by winners was 73.1% but was significantly lower for losers at 25.0%. Given this, it can be considered

that most attention should be paid to exercises that increase the success rate of single leg attacks or defenses against them.

On the other hand, gut wrenches from the parterre position constituted a large number of points in both freestyle and Greco-Roman matches. This is considered to be because opponents were taken down with a technique in the standing position and additional points were obtained through a gut wrench in the parterre position. This can also mean that losers were not able to execute any techniques from the parterre position. This fact can provide valuable knowledge indicating the effectiveness of practicing methods to score points with a string of techniques from standing to parterre positions.

Furthermore, 1pt cautions were the most frequently observed ways freestyle losers obtained points (5 times, 5points). The result is possible because the freestyle rule "When the referee evaluates one wrestler as the passive wrestler, then a 30-second mandatory-score period (an "activity period") has begun. If neither wrestler scores, the opponent of the designated passive-wrestler is awarded a technical point." (UNITED WORLD WRESTLING INTERNATIONAL WRESTLING RULES). It especially states that "If no wrestler has scored after 2 minutes in the first period, then the referee must obligatorily designate one wrestler as passive and an 'activity period' begins," so it was inferred that in the first half of the match, the loser scored a 1pt caution. Given this, it can be considered that one factor is that the wrestlers both tried to maneuver and take the lead in the first half, and so were unable to make any proactive attacks. Conversely, it could be considered to be a method where the winner intentionally does not make proactive attacks but instead waits to see how the opponent acts while keeping the opponent's score to the minimum possible points.

The technique that scored the most points for winners in Greco-Roman matches was the gut wrench (9 times, 18 points) with a 100% success rate. Conversely, the successful gut wrench was not present for losers, and they only obtained a total of three chances to get into parterre positions. It can be considered that to win, it is essential to score as many points as possible with gut wrenches and to ensure a solid defense against gut wrenches. Furthermore, the winner gained 12 chances in total to take a parterre position. Therefore, it can be proposed that how techniques in standing positions are used and taken into the parterre position in order to execute a gut wrench is also essential.

Given these results, in Greco-Roman practice, expending much effort to learn standing position techniques to perform gut wrenches in the parterre position can be considered essential. It was also made clear that gut wrenches are an essential technique for determining victory and defeat in Greco-Roman wrestling.

Passives were the second most common technique for winners to score points, and the most common one for losers to score points. It can be presumed that in the Greco-Roman rule "the active wrestler receives one point when the opponent is determined as passive for the second time" (UNITED WORLD WRESTLING INTERNATIONAL WRESTLING RULES) had an impact. As with the 1pt caution, this may be because wrestlers both tried to maneuver and take the lead in the first half and so were unable to make any proactive attacks, or were trying to see how the opponent acts while keeping the opponent's score to the minimum possible points. Furthermore, as previously reported by Lopez et al. (2013), the winners had many types of tricks in comparison with the losers. This illustrates how the winners had a series of additional skills and techniques compared to the losers.

CONCLUSIONS
We recorded 19 freestyle matches and 10 Greco-Roman matches at the 72nd National Athletic Meet and analyzed the techniques used in the matches. As a result, we gained the following knowledge.
1)   In both freestyle and Greco-Roman matches, there were a total of 115 instances of winners scoring points, while there were a total of 22 instances of losers scoring points. The position of the winner when scoring points in both styles was a standing position around 70% of the time. This suggests that wrestling matches play out with a focus on standing positions.
2)   In freestyle, there was a total of 76 instances where the winner scored points, and standing positions accounted for more than 70% of the overall frequency. There was a total of 13 instances where the loser scored points, and this was from a standing position in all cases. There was also a total of 15 instances where the winner had yet to score points, and all 15 instances were a standing position with a single-leg attack being the most common technique (7 times) with a success rate of 73.1%. All 20 instances where the loser had yet to score points were a standing position with a single-leg attack being the most common technique (12 times) with a success rate of 25.0%. In light of this, it can be considered that working on improving the success rate of single-leg attacks should be prioritized over everything else as a factor for securing victory in freestyle.
3)   The technique that scored the most points for winners in Greco-Roman wrestling was the gut wrench, doing so on nine occasions. Conversely, the gut wrench was not included in the techniques that scored points for losers. As such, it was considered that to win in Greco-Roman wrestling it is essential to score as many points as possible with gut wrenches, and conversely to ensure a solid defense against gut wrenches.

4) Gut wrenches from the parterre position constituted a large number of points in both freestyle and Greco-Roman. This is thought to be because opponents were taken down with a technique in the standing position and additional points were obtained through a gut wrench in the parterre position. Such information can serve as an indication of the effectiveness of practicing methods to score points with a string of techniques from standing positions to parterre positions.

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