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David Eduardo López González

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DETERMINANT FACTORS FOR THE FREQUENCY OF SUCCESSFUL TECHNICAL-TACTICAL COMBINATIONS IN THE STANDING POSITION FROM THE 2009 WOMENS' SENIOR WORLD WRESTLING CHAMPIONSHIPS

David Eduardo López González
Nuevo León State Wrestling Association, México
e-mail: luchamx@gmail.com

ABSTRACT

Objective. To classify the performance of world-class women wrestlers in the frequency and characteristics of their effective Technical-Tactical Combinations (TTC) from the standing position at the highest level of international competition in 2009. *Methods.* All effective TTC were characterized from a sample of 70 wrestlers, the top 10 place-winners in each of the 7 weight categories. Five descriptive variables were used: effectiveness, technical group, and characteristics of its 3 phases. Variables were obtained determining the effectiveness, measured the "success rate" achieved per wrestler, all through factor analysis. Later wrestlers were classified by cluster analysis by Ward's method. *Results.* The most important factor related to winning a medal was the execution of leg attacks, with several possible endings, with almost non-contact set-up, followed by low-risk attacks launched from a close distance. Outstanding wrestlers opted mostly for low risk counterattacks. Most competitors who had good results using throws chose variants with several alternative endings. *Conclusions.* The Characterization Model used and the factors of effective TTC in the standing position provided detailed explanations of the performance characteristics of the best female wrestlers in the Senior World Championships 2009. The design of this research can be applied year after year in both men's and women's freestyle competition.

KEY WORDS: Technical - Tactical Combinations, Rules, Female Wrestling, Factor Analysis, Technique

INTRODUCTION

The International Federation of Associated Wrestling Styles (FILA) has organized World Championships for women's freestyle wrestling since 1987. The growing popularity of women's wrestling, especially in countries where wrestling was already established, led to its inclusion in the official program of the Olympic Games in Athens. This has led many National Federations to promote this modality, and to study talent identification, develop programs and methods for fitness and to assess the adequacy of training and technical-tactical training systems specific to the characteristics of women, all under the requirements of the International Wrestling Rules.

Modifications to the international rules of Olympic wrestling in 2004 had an impact on strategy, technique and tactics of the world's top wrestlers. Several national teams are still trying to adapt, with modest results. In the specialized literature, there are many investigations of factors related to the wrestlers sporting success: technical analysis, as developed by Schultz (1992) and Cipriano (1990), and studies of the relationship between success and physiological and psychological variables (Highload and Bennett, 1979; Roemmlch and Frappier, 1993; Chamakov, 1999, Martínez-Abellán et al, 2010). Much of this research assessed success on a two-level, nominal scales (e.g. "successful" and "unsuccessful") and it did not investigate the causes of technical/tactical success.

MATERIALS AND METHODS

Using the five variables considered in the characterization of technical-tactical combinations by López González (5), all 193 videos of the matches in the Women's World Wrestling Championship 2009 senior age category recorded by FILA were analyzed. The purpose was to observe each action which received technical points in the standing position from the top ten ranked wrestlers in each weight division. The "Technical-Tactical Combination" concept and their variables and classification criteria are defined as follows.

Technical-Tactical Combination. A wrestling specific literature review showed that technical-tactical actions used by wrestlers to earn points are called by several names. In Russian the term is Приемы, transliterated: priemy (Tumanyan, 1998), Spanish translation: "key." In most English-language documents it is "hold", defined by Shakhmuradov as "the set of actions that achieves the intended result from the attacking, counter-attacking or defensive action" (2008). In Spanish, words were as diverse as "hold", "key", "action" and "technique" (González, S. and Cañedo, I., (1996). For this work, we chose the more contemporary term "Technical-Tactical Combination" (TTC), prepared as part of the theoretical framework of the "FILA's Master Degrees" program: "The combined




technical / tactical is an invariable sequence of three phases: a starting phase, a preparation phase, and a technical phase" (4). Table 1 contains an example of these phases of a TTC.

Variables. The five variables used together characterize all TTC phases and their relationships.

Effectiveness - Success Rate. Effectiveness is defined as obtaining certain technical points for making a technical-tactical combination. Effectiveness characterizes the final phase. To characterize the activity of a wrestler during a match or tournament, the corresponding variable is the success rate, ie, total TTC with which the wrestler received technical points.


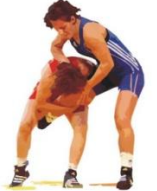


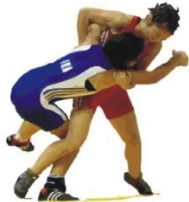



Table 1

**TECHNICAL-TACTICAL COMBINATIONS CHARACTERIZATION MODEL
FREESTYLE WRESTLING, STANDING POSITION (López, 2010)**

PHASES	1. SETUP Phase (PREPARATION)	2. TECHNICAL Phase (also called "Execution")	3. FINAL Phase
TTC			
VARIABLES (Technical-Tactical Features)	c) SETUP Type (Preparation) Set of maneuvers to achieve distance and position to attack the opponent, breaking their stability and leading to oversights in their defense.	b) TECHNICAL GROUP CTT classification according to the fundamental movements (body Movements) that the wrestler performs to score from a control (grips) determined.	a) Effectivity Getting technical points under the rules implementing the refereeing body
		d) Tactical Risk Adverse consequences (i.e. points to the opponent, the opponent in top position) facing the wrestler to make an unsuccessful CTT	e) Completion Alternatives (Technical-Tactical Complex) Number of different movements with which the wrestler can continue and complete a TTC to face his first defense of fundamental movement. This feature is not obtained through observation of the sequence, but by the historical record of the different endings achieved in attempts same type of CTT in the same or in other tournaments..





Technical Group. Each TTC was classified into one of eight groups according to the mechanical properties of the fundamental movement ("body movement ", according to Lafon, (4) that are performed by the wrestler for attaining the desired effect on the opponent's body, based the criteria in Table 2. The push outs of the red zone and purely counter-offensive actions were recorded for particular groups.

Table 2. Technical Groups used in the investigation and its Features

 <p>1. Takedowns</p> <p>The opponent is taken to the mat by means of a push or pull applied to his upper body, keeping at least one foot in contact with ground as the axis of rotation. Are commonly associated with a go behind..</p>	 <p>2. Single Leg</p> <p>The attacker controls one of the opponent's legs with at least one of his hands. Is a group with a variety of terminations and can be combined with other body movement.</p>	 <p>3. Double Leg</p> <p>The attacker applies some kind of shift while controlling both legs of the opponent. The completion requires more continuity than in the group of attacks on one leg.</p>	 <p>4. Throws</p> <p>The opponent is lifted off the floor and launched into the air, passing over an rotational axis that is located somewhere in the opponent's torso or hips.</p>
 <p>5. Leg-on-leg</p> <p>Are mechanically similar to the takedowns, but the attacker secures a rotational axis using one leg to limit movement of one leg of his opponent. Are takedowns that end in danger position.</p>	 <p>6. Counterattacks</p> <p>We considered separately the TTC facing an opponent's attack and take advantage of conditions created by the defense. We included only those actions that can only be applied in such circumstances.</p>	 <p>7. Blocks</p> <p>Defensive actions, contrary to the attack and without application of technical phase, where the attacker is at a disadvantage as the defensive wrestler score points against him.</p>	 <p>8. Push-outs</p> <p>Category for situations where one of the wrestlers step into the protection zone during the standing position, meriting a technical point for the opponent. Only were considered in that category actions without technical phase.</p>


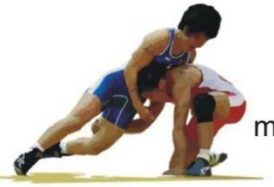


Set-up Type. The maneuvers used in the preparation phase to break the stability of the opponent and cause lapses in its defense were considered within a four group nominal scale with the technical criteria "distance", "position" and "tie-up", as detailed in the table 3. The actions from the clinch position were considered as a particular group because the attacker does not apply any tactical procedure for attaining the grip on the opponent's leg.

Table 3. Four set-up types of the TTC in the standing position and criteria of each.

<p>Set-up Type</p>	 <p>1. Non Contact Set-up</p>	 <p>2. Fast Set-up</p>	 <p>3. Power Set-up</p>	 <p>4. Without Set-up</p>
<p>Distance</p>	<p>Open</p>	<p>Medium</p>	<p>Close</p>	<p>Close</p>
<p>Tie-ups & Contact</p>	<p>Non tie-ups</p>	<p>Secondary Áreas (wrists, elbow, forearm, neck)</p>	<p>Primary Áreas (arms, shoulders, head, torso)</p>	<p>Inside Single leg grab</p>
<p>Level of Stance</p>	<p>All;major times low, medium</p>	<p>Low, medium</p>	<p>Medium, high</p>	<p>Ordered Clinch</p>

Tactical risk. It is defined as the disadvantage to make a TTC ineffective, the tactical risk characterized the technical phase and fundamental body movement itself. It was rated on a four-level scale, from least to greatest known risk, and is illustrated in table 4. Even if they are effective, TTC's could be classified according to the risk associated with implementation.

Table 4. The four types of tactical risk, characteristics, and the consequences for the red wrestler.

	<p>Low Risk Offensive wrestler is over her/his opponent, or lose contact, so it is not at a disadvantage.</p>
	<p>Medium Risk The fighter is under the rival, in front of it. The opponent must make a technical phase to take this disadvantage and score points.</p>
	<p>High Risk The wrestler give his/her back at the opponent, so the rival wins one technical point and define its role clearly offensive..</p>
	<p>Very High Risk The wrestler falls in danger position, so the opponent scores two or more technical points and have a big chance for seek win by pin.</p>

Completion alternatives. This concept was uses the number of different execution moves that can effectively end the same type of TTC against defense, and characterizes the technical phase from the point of view of the possibility to overcome the defensive behavior. Earlier, it was found that there was a strong positive correlation ($r = 0.828$) between the amount of completion alternatives of a TTC and the amount of actual successful attempts (Lopez, 2010). It is the only variable that was not classified by direct observation, but accounting for the end of data collection, the amount of different endings (so-called "variants") observed throughout the complete tournament for the same TTC. According to the number of variants alternative found, the TTC was classified on a 4-level categorical scale ranging from only one ending to more than 7 possible endings (Table 5).

Table 5. Categories of Completion Alternatives variable

Category	a)	b)	c)	d)
Criteria	Only one ending	2 to 3 endings	4 to 6 endings	7 and more endings

Statistical analysis and software. Using the video analysis program Longomatch version 0.15.7, each TTC was observed and categorized. Subsequently a database of wrestlers from the sample was generated (Table 6), listing all of the frequencies of each technical-tactical criteria. The data were processed by factor analysis to group

the variables according to their importance in the overall success rate of each wrestler. The wrestlers were classified by cluster analysis by Ward's method with Varimax Kaiser rotation components, reducing the variables of each factor considering two criteria: value of more than three frequencies, and higher correlations with the frequency of success. All data and statistical procedures were performed in software SPSS 17.0. Finally, the averages of the frequencies of each variable used in cluster analysis were converted to percentiles to compare the performance of each cluster.

Table 6. Example of the database frequency of each feature of TTC's of wrestlers studied

General and Behaviour Wrestler data					Setup type				Technical Groups							Tactical Risk				Completion alternatives				
Wrestler	Country	Weight class	Rank	Success rate	Without setup (Clinch)	Non contact setup	Fast setup	Power setup	Double leg	Single leg	Takedowns	Leg-on-leg	Throws	Counterattacks	Push-outs	Blocks	Low risk	Medium risk	High Risk	Very high risk	Single ending	2-3 endings	4-6 endings	7 and more endings
Stadnyk, M.	AZE	48	1o	13	0	4	3	6	5	5	1	1	0	0	0	1	2	11	0	0	2	3	2	6
Ratkevich, J.	AZE	59	1o	11	1	0	5	5	3	3	0	0	5	0	0	0	1	5	4	1	4	3	1	3
Dugrenier, M.	CAN	67	1o	12	0	10	1	1	5	7	0	0	0	0	0	0	0	12	0	0	0	0	6	6
Qin, X.	CHN	72	1o	11	0	1	6	4	1	6	1	0	0	1	0	2	3	7	1	0	1	0	1	9
Yoshida, S.	JPN	55	1o	22	0	9	11	2	10	10	1	0	0	0	1	0	2	20	0	0	1	5	0	16
Nishimaki, M.	JPN	63	1o	11	0	1	1	9	0	4	4	0	0	0	3	0	7	4	0	0	0	7	0	4
Mattsson, S.	SWE	51	1o	15	0	3	5	7	6	5	0	0	2	0	1	1	2	11	2	0	0	3	5	7

RESULTS

Factor analysis yielded seven components (Table 7), the latter being ruled out to contain a single variable, whose highest value was less than 1 frequency. The remainder account for 75.76% of the total variance.

Table 7. Rotated component matrix.

	Components						
	1	2	3	4	5	6	7
Medium Risk Freq	.965						
7 and more endings Freq	.883						
Single leg attacks Freq	.813						
Double leg attacks Freq	.798						
Non contact setup Freq	.787						
Fast setups Freq	.767						
2-3 endings Freq		.868					
Push outs Freq		.811					
Power setups Freq		.702					
Low Risk Freq		.655					
Takedowns Freq		.611					
Throws Freq			.867				
4-6 endings Freq			.708				
Leg-on-leg attacks Freq				.840			
Blocks Freq				.837			
Counterattacks Freq					.925		
High risk Freq					.668		
Only one ending Freq						.867	
Very high risk Freq							.741
Variance percent	25.598	14.780	11.099	9.645	8.061	7.715	6.271

The component 1 in order of importance was composed of 6 variables: Medium risk, 7 or more completions, Single leg attacks, Double leg attacks, Non-contact setups and Rapid (poor contact) setups, all these features are related to conditions for leg attacks with short time setup and several ending alternatives to address the defense.

Component 2 is characterized by a predominance of characteristics of low-risk attacks with close distance setup, whose variables were 5: 2 to 3 completions, Push outs of the combat area, Power setups, Low risk, and Takedowns.

The third component consisted of two variables: Throws, and 4 to 6 possible endings.

Leg on leg attacks and blockages, which reached low frequencies, are the two variables that were grouped into component 4.

The component 5 links the high risk to the conduct of counterattacks.

The sixth component consists of a variable, TTC's with only one possible ending.

The cluster analysis was performed with nine variables, those that by their correlation with others of the same component had the highest predictive value of the success frequency, resulting as follows: "Medium Tactical Risk", "Power setups", "High Tactical Risk", frequencies "Blocks "and "Counter-attacks" and the 4 levels of "Completion Alternatives". This program determined the solution of 8 groups as appropriate to classify the wrestlers and describe the characteristics of their effective TTC's (Table 8).

Table 8. Top 10 wrestlers in each division at the Senior World 2009 and its classification in 8 groups by cluster analysis. The frequency in each factor is shown in percentiles.

CLUSTER	WRESTLERS	% EFFECTIVE IN DISPUTE MEDAL	Medal contenders	RANK				FACTOR 1 Leg attacks with short time setups and several alternative endings		FACTOR 2 Low risk attacks with close distance setup.		FACTOR 3 TTCs with medium amount of alternative endings	FACTOR 4 Pin (fall) like only one ending	FACTOR 5 Inevitable High Risk (counterattack)		FACTOR 6 TTC's distinctive of specific wrestlers
				Gold	Silver	Bronze	5°	Medium Risk	7 and more endings	Power setups	2 or 3 endings			Blocks	High Risk	
I	1	100.00%	1	1	0	0	0	100.00%	100.00%	30.01%	98.35%	23.49%	30.31%	21.98%	32.66%	65.55%
II	4	100.00%	4	3	0	1	0	98.93%	89.72%	77.96%	72.47%	94.80%	57.98%	49.14%	45.72%	56.31%
III	8	100.00%	8	1	1	3	3	70.22%	93.09%	39.96%	17.38%	39.32%	80.85%	41.71%	71.78%	37.28%
IV	3	100.00%	3	1	0	2	0	55.47%	66.55%	99.59%	99.84%	40.48%	96.39%	59.06%	32.66%	40.37%
V	11	54.55%	6	1	1	3	1	38.20%	38.71%	86.10%	65.59%	62.87%	44.55%	92.12%	51.91%	77.39%
VI	12	50.00%	6	0	1	2	3	38.03%	48.62%	30.01%	39.22%	27.35%	43.31%	46.65%	67.81%	31.37%
VII	6	50.00%	3	0	0	1	2	70.22%	62.25%	57.74%	37.27%	76.51%	38.81%	44.17%	59.27%	65.55%
VIII	25	44.00%	11	0	4	2	5	27.38%	20.07%	27.08%	42.00%	44.25%	38.46%	31.83%	34.66%	45.93%
SUMA	70	SUMA		7	7	14	14									

DISCUSSION - CONCLUSIONS

Tünnemann has described the growing use of leg attacks and a decrease in the throws by the senior class female wrestlers in the last two Olympic cycles. Podlivayev and Shakhmouradov discuss the case of freestyle wrestlers at the international level, that "throws demanding a great deal of time for preparation and are connected with a higher level of risk" (2010, p.168).

However, the characterization model and its variables grouped in this study as determinants of effectivity in standing position provided more detailed explanations of the performance characteristics of the best female wrestlers in the case of the Senior World Championships 2009. The most important factor of effectiveness in this position is closely related to the attainment of medals, characterizing the TTC of six of the seven champions was the execution of single and double leg attacks with several possible endings with setup almost without contact with their opponents, followed by the use of attacks with a close distance setup but low risk, mainly the technical group takedowns. The high tactical risk hardly distinguishes the frequency of actions of these wrestlers, opting mainly for defense and counterattacks of low risk. The wrestlers who were successful using throws chose variants with between 4 and 6 alternative endings.

PRACTICAL IMPLICATIONS / ADVICE FOR ATHLETES AND COACHES

Considering that the sample comprises the elite of women's wrestling under the current rules, the technical and tactical characteristics found are useful for the management of the preparation of aspiring wrestlers to achieve high results at the international level. According to our data, several female wrestling national teams- Cuba, France, Germany and Spain, were distinguished by the preferred use of throws prepared in close distance and high risk, with poor results in comparison with teams like Japan, China, Azerbaijan and Sweden.

The design of this research can be applied year after year in both freestyle and female wrestling, and its implementation at other levels (continental, national) may provide relevant data on the performance of wrestlers from other countries and less effective teams compared with outstanding world class wrestlers.

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