

Praxeological characteristics of the game model in risky situations for football players as a determinant of rational training

Henryk Duda¹, Ewa Sobilo-Rydzik^{2*}

¹ Institute of Sports Sciences – Department of Sports and Recreational Games, University of Physical Education in Krakow, Poland

² Independent Researcher, 35-326 Rzeszów, Poland

*Correspondence: ewa.sobilo@onet.pl

Abstract

Background: The article is of an implementation (application) nature, addressing problems related to the modelling of individual play in risky situations. Assuming that individual actions constitute the basis of team play, the work carried out a praxeological assessment of individual play in risky situations. These activities, due to the specificity of the sports game (group pressing), high difficulty in execution (activity in discomfort), constitute a significant element that in the modern game becomes a necessity for organized training. **Methods:** The assessment of actions in difficult situations was made on the example of the game of football (soccer) players from group H (Colombia, Japan, Senegal, Poland), participating in the World Cup tournament - Russia 2018 (observation of 150 players). The research used the method of noted observation, which consisted of direct recorded observation – secondary (DVD material), with the possibility of repeated replay of the events being the subject of research. The data obtained were recorded on a praxeological observation sheet. **Results:** Data analysis allowed to determine the level of individual actions in risky situations, which, for application purposes, determines not only the assessment of these actions against the background of dominant football teams in the world but, above all, determines the direction of game modelling in organized training of football players in Poland. **Conclusion:** Individual game activities are activities that are significant to the effectiveness of the game. Teams achieving better values for the above activities in the analysed tournament had higher values of praxeological indices of the game than teams losing their matches.

Key words: efficiency of the actions, individual game, game modelling, a risky situation

Introduction

Individual actions are the basis of team play, because each group action is taken in the context of the player's individual decision and constitutes a sequence of events in achieving the game goals (1). These activities are very typical of modern football, which is characterized by a large variety of movement activities and high variability of game situations, which places special demands on players, especially in terms of making quick decisions that surprise the opponent.

When characterizing the game of football, it can be concluded that individual actions become particularly important in situations of playing one against a group (1>G), where the player must perform the task in great organizational and motor discomfort (2).

Such action requires not only perfect technique but, above all, its structure is characterized by high conceptuality, as it requires knowledge (what to do in the game and how to do it) – (2,3) and highly developed volitional features – courage and tenacity in action (4). Therefore, it seems that 1>G activities are of exceptional value for the effectiveness of the game and set significant directions in the organization of modern football (5,6).

The process of rational organization of training also requires precise observation of the game, which can provide significant information on the conduct of activities in natural conditions of sports competition and, above all, allows determining the performance of individual players (7,8).

To assess an athlete's performance, it is necessary to introduce praxeological assessments belonging to the category of utilitarian assessments (9,10). According to Panfil (11), the introduction of praxeological assessments for sports activities will allow for understanding the mechanisms of success and failure in sports and, consequently, will enable organizing and rationalizing the optimal direction of training.

The use of utilitarian assessments is particularly important in the case of sports games in which the impact of players' partial actions on the team result is varied. Hence, assessing the contribution of individual players to the obtained result will allow for objective control.

Assessment of performance efficiency requires taking into account praxeological indicators (11,12), which, based on their quantitative and qualitative characteristics – especially among players

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with high competences – can not only objectify the observed actions but also set norms and trends in the development of the game (4,13).

So far, praxeological research in team sports games has mainly concerned the research problem of individual game activities occurring in a game situation 1 > 1 (one against one) (12,14). Therefore, the extensive analysis of these game activities in one-against-a-group situations in this study is not only a research novelty on this problem (lack of precise data in the literature on the subject) but also a broader recognition of activities in individual play.

The aim of the research is to develop patterns of performance of players of highly qualified sports teams in the game of football and to assess the effectiveness of actions performed in offensive play in risky situations (1>G), which are significant situations for the modern game of football (4).

The study poses research questions and hypotheses:

1. Do winning teams have a higher level of praxeological indicators in one-versus-group action?
2. What are the differences in the level of praxeological indicators of a game played by one person against a group of players who have different levels of sportsmanship in the game?

Research hypotheses:

1. Individual game activities in 1>G situations are significant for the game, and "winning" teams have higher values of praxeological indicators than teams losing their matches.

Material and Methods

The assessment of the efficiency of the teams' activities 1 > G as an example of praxeological assessment of teams in terms of diversified sports value, also confirmed by the level of the world ranking, was made in the World Championships – Russia 2018 tournament in "group H"; this group included the teams: Senegal, Colombia, Poland and Japan (Table 1).

Table 1. List of matches and sports results of "Group H" teams in the 2018 World Cup

No.	Competition	Match	Result	Analysed team	Competition stage
1.	WC-2018	Poland – Senegal	1:2	Poland, Senegal	eliminations
2.	WC-2018	Poland – Colombia	0:3	Poland, Colombia	eliminations
3.	WC-2018	Poland – Japan	1:0	Poland, Japan	eliminations
4.	WC-2018	Colombia – Japan	1:2	Colombia, Japan	eliminations
5.	WC-2018	Senegal - Japan	2:2	Senegal, Japan	eliminations
6.	WC-2018	Colombia – Senegal	1:0	Colombia, Senegal	eliminations

The data obtained during game observation were used to assess performance indicators in 1>G situations, and the final classification in the elimination phase, in which the leaders were Colombia and Japan (advancement to further competitions), is presented in Table 2.

Table 2. Sports ranking of Group H teams in the 2018 World Cup tournament

No.	Team	Number of matches	Points	Goals
1.	Columbia	3	6	5 : 2
2.	Japan	3	4	4 : 4
3.	Senegal	3	4	4 : 4
4.	Poland	3	3	2 : 5

In praxeological research, 12 teams were independently observed, with the participation of 152 players taking part in direct sports competition.

The research used the method of recorded observation, which consisted of secondary observation, with the possibility of repeated reconstruction of the events being the subject of the research. The research analysis was conducted on the basis of film material recorded on a DVD, using the so-called (freeze frames). Replayed film material was used to obtain detailed information about the game, and the obtained data was recorded on observation sheets specially prepared for this purpose (15) (Table 3).

In the praxeological evaluation of the game for 1>G activities, the following indicators were calculated: effectiveness, ineffectiveness, activity and reliability (12,14).

Table 3. Observation sheet template and data recording in game activities 1>G (match example: Poland – Colombia)

World Championships – 2018 – Polish group									
Teams Indicator		Polish National Team offensive actions				Colombian national team offensive actions			
Examinated player Formation		Indicator of effectiveness	Indicator of ineffectiveness	Indicator of activity	Indicator of reliability	Indicator of effectiveness	Indicator of ineffectiveness	Indicator of activity	Indicator of reliability
1	O1	0	0	0	0	0	1	1	0
2	O2	0	0	0	0	0	0	0	0
3	O3	0	0	0	0	0	1	1	0
4	O4*	1	1	2	0.5	1	1	2	0.5
5	P1	0	0	0	0	1	0	1	1
6	P2	0	0	0	0	2	1	3	0.66
7	P3	0	0	0	0	2	1	3	0.66
8	P4	1	1	2	0.5	3	1	4	0.75
9	N1	1	1	2	0.5	2	1	3	0.66
10	N2	2	1	3	0.66	2	1	3	0.66
Total	average of activities	0.50	0.40	0.90	0.22	1.40	0.80	2.10	0.49

O1 – right defender, O2 – central right defender, O3 – central left defender, O4 – left defender (O4* – in the Polish team he was a defensive midfielder), P1 – right midfielder, P2 – central midfielder, P3 central midfielder, P4 – left midfielder, N1 – right striker, N2 – left striker,

A – activity S – effectiveness Ns – ineffectiveness Nz – reliability

Play 1>G was made based on the fact that a player took such an action in a situation 1 against at least 2 players of the opposing team. The praxeological assessment was made based on the following indicators: effectiveness (winning the duel and keeping the ball in action), ineffectiveness, activity (taking action 1>G regardless of its effect), reliability (ratio of effective actions to all actions in the game 1>G)

To assess the accuracy and reliability of the observation sheet (validation), the method of competent expert judges was used (15,16). In the obtained statistical values, the reliability of the data collection method in correlation indicators in the parallel test was: 0.90. The reliability of the data collection method in retest correlation indices (after a 2-week repetition) was 0.92.

Basic statistical methods were used to prepare the research results. In order to determine the significance of differences in the level of performance indicators, basic statistical calculations were used: arithmetic mean, standard deviation, and the significance level of differences was determined using the Student's t-test (16).

Results

Assessment of differences in the values of fitness indicators in the tested individual game activities 1 > G in the aspect of the obtained sports result

The obtained data on praxeological indicators, which will be presented in this section, should indicate that teams with greater sports value (teams winning their matches in the championship tournament) had a higher level of efficiency indicators in individual game activities 1 > G (17). Confirming this relationship may be interesting for tasks in the application activities of training in sports games and for further research direction for the purposes of this study. Taking this into account, the research analysis in this subchapter will aim to determine the degree of differentiation of praxeological values in the examined individual game activity in terms of the sports result obtained (matches won - matches lost).

The analysis of the data included in Table 4 shows that almost all performance indicators in game 1 > G show higher values for teams that achieved a better sports result in "group H" (won their matches). The variation in these values was highest for the indicators: effectiveness and reliability ($p < 0.05$).

Table 4. Assessment of the differentiation of performance indicators in the game 1 > G in terms of the sports results obtained by the players of "group H" in the World Championships tournament – Russia 2018

Group examined Statistical parameters	Group H – World Championships – 2018							
	S p*	S w*	N p*	N w*	A p*	A *w	Nz p*	Nz w*
Arithmetic average	1.10	1.66	1.22	1.13	2.21	2.86	0.37	0.56
Standard deviation	0.56	0.47	0.65	0.30	1.09	0.85	0.13	0.07
Coefficient of variation	49.73	26.92	51.35	26.78	49.26	30.37	30.77	8.30
Significance of differences between groups	0.050*		0.393		0.228		0.019*	

*p** - indicator for the losing team, *w** - indicator for the winning team, * $p < 0.05$
(*S* - effectiveness, *N* - ineffectiveness, *A* - activity, *Nz* - reliability)

These facts mean that these indicators have a high information value in terms of their impact on sports results. These results are consistent with the results of Duda and Brzyski (4,18) – in their studies concerning the 2006 World Championship tournament and the 2008 and 2016 European Championship tournaments, these authors showed similar differences in praxeological indicators in favour of teams with more advanced sports characteristics. Such trends are also confirmed by research by Castellano et al. (19) who demonstrated higher praxeological indicators for players with higher football skills. This fact also positively verifies the adopted method in the praxeological assessment of the examined footballers, where the players' skills correspond to the team's sports results (17).

Determining the efficiency indicators of the tested individual game activities of players with the lowest sports level (Polish team - group H) in World Cup matches 2018

Emphasizing the utilitarian importance of the measurable value of praxeological indicators in individual game activities - 1 > G, the further part of the research aimed at assessing the players who achieved the lowest sports value - the Polish national team (in the above activities) against the background of other national teams in the observed group (teams: Senegal, Colombia and Japan) with whom the Polish national team competed in the tournament. The activities of the remaining matches in the group were also analyzed in this aspect. The obtained research results will not only allow for the sports assessment of the players of the losing team (Poland's national team) in this tournament, but will also help determine the fitness model for the 1 > G game, thus indicating the direction of effective player preparation in organized training for an individual game in a risky situation.

Based on the analysis of game effectiveness indicators (effectiveness, ineffectiveness, activity, reliability) for action 1 > G, statistical calculations were made and the degree of differentiation of the obtained indicators was estimated for the following teams: Poland, Senegal, Colombia and Japan (Tables: 5 - 8).

An analysis of the data in Table 5 contains the characteristics of praxeological indicators of the differentiation of effective offensive actions in the game 1 > G. The data shows that the players of individual teams had similar values.

However, the Colombian team (leader of "Group H") in the World Cup - 2018, statistically significantly outperformed Polish players and other teams in the group competition in this parameter.

An analysis of the data in Table 6 contains the characteristics of the praxeological indicators of the differentiation of ineffective offensive actions in the game 1 > G. The data show that the players of the competing teams achieved variable values, but in terms of statistical differences they presented a similar level of activity, so it can be assumed that this parameter did not determine the result in the sports competition.

An analysis of the data in Table 7 contains the characteristics of the praxeological indicators of the differentiation of active offensive actions in the game 1 > G. The data shows that the players of individual teams had similar values. However, the winning teams, and especially the leader in the group – the Colombian team, had the highest indicators of this parameter. A significant difference in this indicator was noted especially in the match against the weakest team in group H, the Polish team – significance level $p < 0.05$.

Table 5. Assessment of differences in the values of fitness indicators effective actions in the game 1 > G, of the players of "group H" teams in the World Cup tournament – 2018

Studied group	World Cup – 2018		World Cup – 2018		World Cup – 2018		World Cup – 2018		World Cup – 2018		World Cup – 2018	
	Poland	Senegal	Poland	Columbia	Poland	Japan	Columbia	Japan	Senegal	Japan	Columbia	Senegal
Statistical Parameters												
Arithmetic average	0.28	0.58	0.50	1.40	0.37	0.54	0.68	1.32	0.59	0.98	0.92	0.42
Standard Deviation	0.45	0.66	0.71	1.06	0.42	0.65	0.73	0.83	0.69	0.92	0.89	0.69
Coefficient of variation	160.00	113.49	141.42	81.49	198.74	112.33	140.38	78.31	138.11	93.25	93.17	18321
Significance of differences between groups	0.140		0.0483 *		0.2917		0.0497*		0.0873		0.0498*	

* $p < 0,05$

Table 6. Assessment of differences in the values of fitness indicators actions that were ineffective in the game 1 > G of players of "group H" teams in the 2018 World Cup tournament

Studied group	World Cup – 2018		World Cup – 2018		World Cup – 2018		World Cup – 2018		World Cup – 2018		World Cup – 2018	
	Poland	Senegal	Poland	Columbia	Poland	Japan	Columbia	Japan	Senegal	Japan	Columbia	Senegal
Statistical Parameters												
Arithmetic average	0.65	0.43	0.79	0.45	0.5	0.55	0.63	0.54	0.52	0.63	0.54	0.72
Standard Deviation	0.48	0.65	1.01	0.85	0.46	0.89	0.66	0.59	0.73	0.70	0.65	0.61
Coefficient of variation	101.22	165.75	169.22	126.41	162.06	133.42	97.35	99.24	121.13	115.43	92.39	79.22
Significance of differences between groups	0.3628		0.4153		0.1268		0.2361		0.2366		0.3672	

Table 7. Assessment of differences in the values of fitness indicators active actions in the game 1 > G of players of "group H" teams in the World Cup tournament – 2018

Studied group	World Cup – 2018		World Cup – 2018		World Cup – 2018		World Cup – 2018		World Cup – 2018		World Cup – 2018	
	Poland	Senegal	Poland	Columbia	Poland	Japan	Columbia	Japan	Senegal	Japan	Columbia	Senegal
Statistical Parameters												
Arithmetic average	0.78	1.21	0.90	2.10	1.32	0.98	1.02	1.55	1.58	1.62	1.98	1.39
Standard Deviation	0.72	0.98	1.31	1.36	0.79	1.03	1.31	1.43	1.12	1.32	1.51	0.98
Coefficient of variation	101.04	83.21	142.71	102.73	125.42	78.57	109.34	88.14	125.03	93.13	88.72	78.64
Significance of differences between groups	0.3186		0.0391*		0.5333		0.4342		0.2260		0.4091	

* $p < 0,05$

The analysis of the data in Table 8 contains the characteristics of the praxeological indicators of the differentiation of reliable offensive actions in the game 1 > G. The data shows that the players of the Polish team performed worse compared to other teams. Variation (at the level of statistical

significance - $p < 0.05$) in this indicator was noted in the Poland-Senegal, Poland-Colombia, and Colombia-Japan matches. Data analysis shows that this rate was higher for winning teams. Therefore, it can be assumed that it could have had an impact on the sports results of the competing football teams.

Table 8. Assessment of differences in the values of fitness indicators reliable actions in the game 1 > G of players of "group H" teams in the World Cup tournament - 2018

Studied group	World Cup - 2018		World Cup - 2018		World Cup - 2018		World Cup - 2018		World Cup - 2018		World Cup - 2018	
	Poland	Senegal	Poland	Colombia	Poland	Japan	Colombia	Japan	Senegal	Japan	Colombia	Senegal
Statistical Parameters												
Arithmetic average	0.14	0.58	0.13	0.63	0.33	0.38	0.31	0.57	0.28	0.36	0.42	0.36
Standard deviation	0.31	0.43	0.29	0.37	0.31	0.46	0.22	0.40	0.35	0.32	0.35	0.28
Coefficient of variation	171.81	101.02	210.12	102.14	121.64	81.12	134.73	96.65	131.73	91.01	90.17	142.12
Significance of differences between groups	0.0312*		0.0289*		0.3389		0.0499*		0.2517		0.2413	

* $p < 0,05$

Based on the above data, it can be noted that the degree of differentiation of praxeological indicators of actions in the game 1 > G for the competing teams was characterised by different levels of values, and the Polish team compared to the competing teams, especially the group leader (Colombia), had worse parameters in effective, active and reliable operation. This fact means that these activities could determine the sports value of the competing teams in the qualifying group. However, in order to confirm this thesis, an attempt was made to characterize the degree of differentiation of praxeological indicators of game effectiveness in activities 1 > G, assessing these indicators in a global dimension (summed indicator values from all matches played are given in Tables 9 – 12).

Table 9 presents a summary assessment of the diversity of effective actions in the game 1 > G of the players of the "group H" teams. The table shows that the players of the Polish team had the worst parameters of this action in effective values. This fact largely corresponds to the sports result, where the Polish team took last place in the group in the analysed matches (Table 2).

Table 9. Summary assessment of the diversity of effective actions in the game 1 > G of players of "group H" teams in the 2018 World Cup

Participants	Poland (P)	Senegal (S)	Colombia (K)	Japan (J)
Statistical parameters				
Arithmetic average	0.38	0.54	1.00	0.95
Standard deviation	0.11	0.10	0.37	0.39
Coefficient of variation	28.85	18.00	36.66	41.31
Degree of significance of differences	Poland – Senegal	0.0793		
	Poland – Colombia	0.0449*		
	Poland – Japan			0.0498*

* $p < 0,05$, ** $p < 0,01$

Table 10 presents a summary assessment of the diversity of ineffective actions in the game 1 > G of the players of the "Group H" teams. The table shows that the Polish team's rivals performed a similar number of actions in the observed matches, but slightly fewer. However, in the examined parameter, in the summary assessment of the diversity of ineffective actions in game 1 > G, no significant statistical differences were found.

Table 10. Summary assessment of the diversity of ineffective actions in the game 1 > G of players of the “Polish group” teams in the 2018 World Championships

Studied group Statistical parameters		Poland (P)	Senegal (S)	Colombia (K)	Japan (J)
Arithmetic average		0.65	0.56	0.54	0.57
Standard deviation		0.15	0.15	0.09	0.05
Coefficient of variation		22.43	26.67	16.67	8.60
Degree of significance of differences	Poland – Senegal	0.2742			
	Poland – Colombia			0.1755	
	Poland – Japan				0.2399

The analysed statistical parameters (Table 11) reveal that in the summary assessment of the diversity of activities in the game 1 > G, although no significant differences were recorded for the competing teams, Polish players achieved the worst values.

Table 11. Summary assessment of the diversity of activities in the game 1 > G of players of “group H” teams in the 2018 World Cup

Studied group Statistical parameters		Poland (P)	Senegal (S)	Colombia (K)	Japan (J)
Arithmetic average		1.00	1.42	1.70	1.38
Standard deviation		0.28	0.15	0.59	0.35
Coefficient of variation		28.35	10.71	34.82	25.38
Degree of significance of differences	Poland – Senegal	0.0544			
	Poland – Colombia			0.0830	
	Poland – Japan				0.1091

In the last parameter analysed (Table 12), the table presents a summary assessment of the diversity of reliability activities in the 1 > G game of the competing teams.

Table 12. Summary assessment of differences in reliability in game activities 1 > G of players of “group H” teams in the 2018 World Championships

Studied group Statistical parameters		Poland (P)	Senegal (S)	Colombia (K)	Japan (S)
Arithmetic average		0.20	0.41	0.45	0.44
Standard deviation		0.11	0.16	0.16	0.12
Coefficient of variation		56.35	38.20	35.86	26.54
Degree of significance of differences	Poland – Senegal	0.0712			
	Poland – Colombia			0.0496*	
	Poland – Japan				0.0322*

* $p < 0,05$

The data obtained shows that in the observed matches in the 2018 World Cup, the average values of the players from Senegal, Colombia and Japan were estimated at a similar level. However, in the observed matches, the players of the Polish national team recorded the lowest reliability indicators in game 1 > G. Also in the data analysis we see significant differences in the observed parameter of group leaders: Colombia and Senegal.

Discussion

The global dimension of praxeological indicators determined the tendencies of competing teams for 1>G game activities. Based on the analysis of the obtained research results, it can be noted that teams with the highest sports level (in group competition: Colombia and Japan) achieved the highest values for effectiveness, activity and reliability. The Polish team (the team lowest classified in the sports ranking of group H) had much lower values and significantly (statistically significantly) differed from the level of activities in game 1 > G from the leading teams (Colombia and Japan), which advanced to the next phase of the competition. This fact is also confirmed by the general statistics of observations in the reports of the World Cup - Russia 2018 (20).

The above statement was confirmed in various aspects of our research, where, based on the regularities of praxeology in sports games (11,12), 1>G activities were analysed in terms of effectiveness, activity and reliability. In all these indicators, higher parameters were obtained for the studied teams that obtained higher values in the sports ranking. Another aspect of our research, concerning the analysis in the scope of the summary assessment of the diversity of effective actions and the activity of these actions, as well as the reliability in the game 1 > G, largely objectifies the statements in the obtained research results.

Confirming the research facts, it can be stated that the assessment of offensive individual play in activity 1 > G clearly corresponds to the obtained sports result. Teams with higher sports classifications achieved better praxeological parameters in this activity (20). Therefore, taking into account the fact that similar dependencies (in the analysis of the game 1 > G) were obtained in other championship tournaments (World Championships – 2006 and European Championships – 2008, 2012, 2016) – (4,18), it can be concluded that these activities are significant for the effectiveness of game and may influence the team's sports results (19). Also, the obtained values of fitness indicators may constitute a praxeological determinant in sports game modelling (21-24). Such activities are utilitarian in nature, as they define a rational direction in the organized training of football players.

In summary, it should also be noted that in modern football, playing in discomfort – that is, playing against a larger number of players in a given activity is a significant factor in the effectiveness of the sports game. Learning about events in this aspect of activities allows not only to better understand the sports game but also to rationally select resources in sports training. Therefore, based on the main goal of the research aimed at determining fitness patterns in 1>G game situations, the aim was to confirm these activities for the effectiveness of the game. Research in this area is rare because such situations are difficult to describe due to the development of optimal defining criteria (4,5). Our research methodology attempted to deal with this problem by describing events in risky situations of a sports game, where the significant importance of highly qualified teams of various sports levels in the competition was confirmed (more favorable praxeological indicators for teams with a higher sports ranking). Based on the above statements, it can be concluded that this work is not only of research nature but also of implementation (application) nature, as it is a reflective contribution for football players at all stages of organized training.

Conclusions

1. Individual game actions (1 > G) are significant for the effectiveness of the game. Teams achieving better values for the above activities in the analysed tournament had higher values of praxeological indices of the game than teams losing their matches.
2. The assessment of game actions 1 > G differentiates players in terms of the level of performance indicators in offensive play, which, in turn, may determine the sports result.
3. Due to low sports competences (ranking in the 2018 World Cup tournament), the Polish national team had a lower value of praxeological indicators in the observed game activities 1 > G than the champion teams.
4. Introduction of new terms to describe an individual game (actions in game situations: 1 > G) can indicate directions and trends in rationalizing the organized process of training players and reveal the important mechanisms of achieving victories and defeats in the game of football.

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