EVALUATION OF A MODEL OF MONITORING INDIVIDUAL AND TEAM PERFORMANCE DURING ATTACK IN A COMPETITIVE SOCCER GAME

Zvonko Miljković[1], Stjepan Jerković[2] and Zlatko Šimenc[2]

[1] Faculty of Mechanical Engineering, Slavonski Brod, University of Osijek, Croatia
[2] Faculty of Kinesiology, University of Zagreb, Croatia

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Abstract:

The soccer game between Brazil and Scotland, played at the FIFA World Cup in France in 1998, was chosen to determine the applicability of a model intended for monitoring both the individual and the team performance in attack at a particular competition. The measurements were conducted on a set of variables that describe the events during attack in a soccer match. Contingency tables were used for data analysis where statistical significance of frequency distributions was determined by means of a chi-square test and the correlation by means of the contingency coefficient. The entities were attacks of the observed team and they were obtained by the summation of actions executed throughout the duration of attacks.

The analysis of all variables made it possible to determine the differences between these two teams according to their type of play and according to different playing characteristics. Brazil was characterized by a larger number of actions executed (58.7%), as compared to the Scottish team (41.3%). The results also showed that the Brazilian team played more aggressively than the Scottish team and executed more actions in the sub-areas in the middle of the field and in the sub-areas closer to the opposing team's goal. Dribbling the ball over medium-long and long distances was dominant in the play of the Brazilian team. The Brazilian team executed a larger number of actions pertaining to the middle and to the final phase of the attack (60.2% and 63.8%, respectively) than did the Scottish team (39.8% and 36.2%, respectively). In both teams outside defenders and goalkeepers were dominant in the phase of attack commencement. Midfield players dominated in the middle phase and outside forwards in the final phase of attack.

The applicability of the assessment tool was confirmed as regards the capacity to differentiate between the style of play of two soccer teams.

Key words: *soccer, attack, play analysis, game structure, difference*

DIE BEWERTUNG EINES MODELLS ZUR BETRACHUNG DER INDIVIDUELLEN UND MANNSCHAFTSLEISTUNG IN DER ANGRIFFSPHASE IM WETTKAMPFSFUßBALLSPIEL

Zusammenfassung:

Das Fußballspiel zwischen Brasilien und Schottland auf der 1998 Weltmeisterschaft in Frankreich wurde gewählt, um den Anwendungswert des Modells zur Betrachtung individueller sowie Mannschaftsleistung in der Angriffsphase in einem Wettkampf festzustellen. Es wurde eine Gruppe von Variablen gemessen, die die Ereignisse in der Angriffsphase eines Fußballspiels umfangreich beschreiben. Die Daten wurden mittels Kontingenztabellen verarbeitet, wobei statistische Bedeutung der Häufigkeitsverteilung mittels des Chi-Quadrat-Tests und die Korrelation mittels des Kontingenzkoeffizienten festgestellt wurden. Die Angriffe der betrachteten Mannschaft stellten die vorgegebene Menge dar, die als Summe der Ereignisse während eines Angriffs verstanden waren.

Die Analyse aller Variablen ermöglichte, sowohl die Unterschiede zwischen zwei Teams in der Art und Weise des Spielens sowie in den verschiedenen Spieleigenschaften, als auch die Unterschiede zwischen der Spielertypen beider Mannschaften festzustellen. Das Spiel des brasilianischen Teams wurde von einer höheren Anzahl von Ereignissen in der Angriffsphase (58,7%) im Vergleich zum schottischen Team (41,3%) gekennzeichnet. Die Ergebnisse zeigten, dass das brasilianische Team aggressiver und häufiger im Mittelfeld und näher dem gegnerischen Tor gespielt hat. Das Dribbeln des Balles über Mittel- und Langstrecken dominierte im Spiel des brasilianischen Teams. Brasilien führte mehrere Handlungen in der mittleren (60,2%) und in der Endphase (63,8%) des Angriffs aus als Scottland (39,8% bzw. 36,2%). In beiden Mannschaften, die Außenverteidiger und die Torwarte

dominierten in der Anfangsphase des Angriffs. Die Mittelfeldspieler dominierten in der mittleren Phase und die Außenstürmer in der Endphase des Angriffs.

Die Anwendungswert des Bewertungsmodells, d.h. sein Potential zwischen zwei Spielstils zu unterscheiden, wurde bestätigt.

Schlüsselwörter: *Fußball, Spiel, Angriff, Spielanalyse, Spielstruktur, Unterschied*

Introduction

Soccer, a part of our everyday life, is not only an issue of playing the game in the practical meaning of the word. It is also frequently discussed between members of different social classes and in almost every corner of the world. Frequently, many very important issues are considered only after having previously discussed a current soccer game or a soccer event. This is particularly the case with soccer coaches, other soccer experts and researchers who deal with soccer-related issues.

It is therefore not surprising that there is a certain degree of enthusiasm for data that are both of scientific and of practical interest among soccer circles. This especially holds true for top soccer games such as those that are played during a FIFA World Cup (Borić, Mavrek & Jerković, 2001; Mavrek & Jerković, 2001).

Appropriately constructed assessment tools are needed for the objective analysis of soccer games (Gabrijelić, 1977; Jerković, S., Mavrek & Jerković, M., 2001). Many prominent experts and researchers have dealt with the analysis of soccer games. They analysed different aspects of monitoring the events on the field for achieving different research goals. Dufour (1993), Gerish & Reichelt (1993), Jinshan, Xiaoke, Yamanaka & Matsumoto (1993), Bishovets, Gadijev & Godik (1993), Jerković & Barišić (1997) and many others contributed significantly to this issue in their research. In this sense some other research studies conducted by various authors both in soccer and in other sports (basketball, handball) about the analysis of play efficiency, may also contribute to the discussion (Reilly, Less & Davids, 1988; Pavičić, 1991; Swalgin, 1994; Trninić, Perica & Pavičić, 1994; Vuleta, 1997; Jerković, S., Miljković, Barišić, Verdenik & Jerković, M., 1999).

The first author of this paper has devised a model which could help to objectively quantify the events, that is, the sequence of events, during the game. This was an attempt to extract as many pieces of information as possible from the standardized videorecording of a game. The difficulties that the researchers are faced with when attempting to assess the performance in competitive conditions are under constant discussion (Dufour, 1993) and well known. The focus of the model is on individual and team performance of both teams when on the attack in a competitive soccer game. The play of a soccer team on attack is denoted by a set of actions of players in their attempts to score. Theoretically, it is the open set in terms of the types of actions and their total number. Therefore, the author of the model assumed that each action may be described by a set of variables that can be classified in the following groups: space, time, type of player, tactics, biomechanics of execution of game elements and a group of events that are the result of the referee's decision.

The need to construct an appropriate assessment tool is obvious, especially if we take into account the requirement that it be generally applicable to teams that have different styles of play and that even belong to different soccer schools. Thus, some authors distinguish between the European soccer school that makes it possible to differentiate further between the German soccer school, the style of play of the English, Scottish, Welsh and Irish teams, the South-European soccer school, the soccer school from the area of the former USSR, etc. (Gabrijelić, 1966; 1969). According to the diversity of styles of play, there is also the South-American soccer school, the African soccer school and the Asian soccer school of the Middle and Far East whose characteristic representatives are Japan and South Korea, the hosts and participants of the FIFA World Cup 2002.

The basic research goal of this study was to evaluate a model of systematic team and player performance monitoring during the phase of attack in a soccer game. More precisely, the aim of this research was to determine whether it is possible to recognize the differences between the chosen teams, which differ in their approach to play, par-

ticularly in a tactical sense, on the one hand, and on the other, to analyse the differences between the types of players for both observed teams according to individual variables.

On example of the soccer game between Brazil and Scotland, held at the 1998 FIFA World Cup in France, the following issues, in congruence with the basic goals, will be dealt with:

1) differences in play between the two soccer teams according to individual variables,
2) differences in play between the types of players of both teams according to individual variables, and
3) applicability evaluation of the model of monitoring individual and team performance during attack in a competitive soccer game as regards its capacity to differentiate between the style of play of two soccer teams.

Methods

Data collection

The collecting of data was accomplished by watching the video recording of the soccer game between Brazil and Scotland played at the 1998 FIFA World Cup in France. The collection of data was done by a qualified expert (Barišić, 1996) and the data were written down in a prepared pro forma. The pro forma enables unified records of actions executed during the game to be made where the conditions and the ways of recording the attacks were standardized as entities described by the listed attributes. All actions executed by a team when on the attack were recorded chronologically during the game.

Sample of entities

The sample of entities is represented by attacks executed by the teams monitored. Each attack was, as an entity, identified by the summation of actions executed during its duration from the moment at which a team gains possession of the ball until the moment at which the team loses possession of the ball. At least two contacts with the ball by players from the team now in possession of the ball are necessary for commencement of an attack. Attack implies an action or several actions that are characterized by different attributes monitored within the context of an attack. This means that the course of play during attack will be monitored up to the final outcome for the team in possession of the ball. If play of the team on attack is terminated for any reason, i.e. the team has lost the possession of the ball and two contacts with the ball are made by the opposing team, the monitoring procedure continues, however, this time the attack carried out by the opposing team is observed.

The sample of variables

The sample of variables was comprised of the modalities of attributes describing the actions contained in one attack. As said previously, to start monitoring the commencement of an attack of a team, at least two contacts with the ball are needed. If only one contact with the ball by the opposing player occurs, then the team‘s attack seems to be temporarily interrupted by an opponent. In this way, the attack of the team monitored continues, although, for example, the ball has been kicked out of bounds.

The variable ACTION was comprised of the following modalities: (DS) passing the ball to a team-mate; (PS) receiving the ball from a team-mate; (PP) receiving and passing the ball; (VL) dribbling the ball; (DR) outmaneouvring an opponent; (UG) kick directed towards the goal; (OG) defence by a goalkeeper; (GP) goalkeeper‘s handling/kicking the ball; (DP) gaining possession of the ball by interception; (DO) gaining possession of the ball by taking it away from the opponent; (PK) gaining possession of the ball due to an incorrect pass by an opponent; (PK, PP) gaining possession of the ball due to an incorrect passing of the ball by an opponent, receiving and passing the ball; (VL, DR) dribbling the ball, outmaneouvring an opponent and (DP, PP) gaining possession of the ball by interception, receiving and passing the ball.

The variable BODY is comprised of the following modalities: (NH) leg, foot, middle of the instep; (NU) leg, foot, inside of the foot; (NV) leg, foot, outside of the foot; (NP) leg, foot heel; (NS) leg, foot, sole of the foot; (NY) leg, foot, toes; (NT) leg, lower leg; (NN) leg, upper leg; (TR) trunk; (GL) head and (RU) hand (execution of a throw-in, goalkeeper catching the ball by hand, goalkeeper throwing the ball, goalkeeper handling the ball).

The variable SPACE is comprised of the following modalities: back field area (1 – back field-goal area-left, 2 - back field-goal area-centre, 3 – back field-goal area-right, 4 – back field-penalty kick line-left, 5 – back field-penalty kick line-centre, 6 – back field-penalty kick line-right), midfield area (7 – back field-centre-left, 8 – back field-centre-centre, 9 – back field-centre-right, 10 – front field-centre-left, 11 – front field-centre-centre, 12 – front field-centre-right) and front field area (13 – front field-penalty kick line-left, 14 –

front field-penalty kick line-centre, 15 – front field-penalty kick line-right, 16 – front field-goal area-left, 17 – front field-goal area-centre, 18 – front field-goal area-right); each area of the field has its left and right side and its middle/centre area relative to the direction of an attack.

The variable VBALL (dribbling the ball) was comprised of the following modalities: (K) a short 5-6 metre dribble; (S) a medium-long dribble up to 25 metres and (D) a long dribble - more than 25 metres.

The variable PLAYER was comprised of the following modalities: (GO) goalkeeper; (OS) inside defender; (OB) outside defender; (VE) midfield player; (NS) inside forward; (NB) outside forward. The players were clustered according to their role and action participation and not according to the number they have on their jerseys, that is, according to the role previously assigned to them by a coach.

The variable PHASE OF ATTACK was comprised of the following modalities: (FO) the phase of attack commencement, (FS) middle phase and (FZ) the final phase. The variable TYPE OF ATTACK was comprised of the following modalities: (TO) continuous attack, (TK) counter-attack and (TP) semi-counter-attack.

The variable SPACE according to the type of PLAYER provides data about the type of players, as regards their role, compared to the sub-areas of the field in which they played during the game.

The variable PHASE OF ATTACK according to the type of PLAYER provides data about the type of a player and the phase of attack in which a particular type of player participated the most.

TYPE OF ATTACK according to the type of PLAYER is the variable that provides the pieces of information about the type of player and the type of attack (continuous, counter-attack or semi-counter-attack) that a particular type of players participated in the most.

Data processing methods

The analyses applied to these variables are non-parametric statistics. Accordingly, contingency tables were used in which statistical significances of frequency distributions were determined by means of x^2 test, and the degree of association was determined by means of the contingency coefficient (C). The data were analysed by means of statistical package SPSS for MS WINDOWS Platform.

Results and discussion

For evaluating the model proposed for monitoring the team and individual performance during attack in a competitive soccer game, a comparison between Brazil and Scotland, competing at the 1998 FIFA World Cup in France, was chosen. On the basis of the detailed analysis of the applied variables and their modalities the following may be determined.

The comparison between the two teams revealed that the Brazilian team executed, on the whole, significantly more actions during the game (58.7%) than did the Scottish team (41.3%) (Table 1). Additionally, Brazil preferred to execute attacks comprised of a large number of actions, so that the duration of attacks was consequently longer. The x^2 was statistically significant (x^2 = 25.78; $p \leq 0.018$), and the contingency coefficient was not very high (C = 0 .108).

To execute the actions, the teams most frequently used the inside of the foot (NU) 53.5% (Table 2), then leg, foot, middle of the instep (NH) 16.9%, leg, foot, outside of the foot (NV) 9.3% and head (GL) 4.5%. Techniques executed with other parts of the body or combining other parts of the body were almost negligible. This may point to the conclusion that for the purpose of successful attack the previously mentioned parts of the body may be given priority in the process of training and coaching. When the two teams in question are compared, it is evident that the diversity of utilizing different parts of the body was greater for the Brazilian team (60% : 40%). In other words, the Brazilian team played more imaginatively and more visually attractively than the Scottish team. The x^2 was significant (x^2 = 39.35; $p \leq 0.001$) and C was relatively low (0.133), which means no correlation between the teams in the choices regarding the utilization of different parts of the body for the execution of actions.

The analysis of sub-areas (Table 3) makes it possible to conclude that the play mostly took place in the middle of the field since the actions carried out in the sub-areas that represent this particular part of the field comprised almost 60% of all actions. Consequently, it may be concluded that the midfield area is a dominant area for play generation. The x^2 was significant (x^2 = 121.43; $p \leq 0.001$) and the contingency coefficient between individual sub-areas of the field was 0.230, which means that they are not highly correlated. The results also show that the Brazilian team played more aggressively than the Scottish team because they executed more actions in the sub-areas in the middle of the field and in the sub-areas closer to the opposing team's goal.

The largest number of actions (57%) belonged to the middle phase of the attack (FS) (Table 6). Twenty-three percent of all actions related to the commencement (FO) of the attack, whereas 20% of all actions executed during the game related to the final phase (FZ), which is in accordance with the expected values. The comparison between the two teams revealed that the Brazilian team executed a larger number of actions pertaining to the middle (FS) and to the final phase (60.2% and 63.8%, respectively) than did the Scottish team (39.8% and 36.2%, respectively).

Table 5. Values for the variable PLAYER (type of player).

TEAM	Variable PLAYER	GO	VE	OS	OB	NB	NS	pct Variable for team
BRA	Frequency	46	577	56	157	338	100	
	row pct	3.6	45.3	4.4	12.3	26.5	7.8	1274
	col pct	41.1	62.2	49.1	58.1	56.8	65.4	58.7
	tot pct	2.1	26.6	2.6	7.2	15.6	4.6	
SCT	Frequency	66	350	58	113	257	53	
	row pct	7.4	39.0	6.5	12.6	28.7	5.9	897
	col pct	58.9	37.8	50.9	41.9	43.2	34.6	41.3
	tot pct	3.0	16.1	2.7	5.2	11.8	2.4	
	pct total modality	112 5.2	927 42.7	114 5.3	270 12.4	595 27.4	153 7.0	2171 100.0

x^2 = 27.18; p ≤ 0.001; df = 5; C = 0.111

these differences were in favour of Scotland, whereas with semi-counter-attack, they favoured Brazil. The data obtained may be integrated to reflect the existence of two different soccer schools, the South American soccer school on one hand, and the European school, on the other.

Table 6. Values of the variable PHASE OF ATTACK.

TEAM	Variable PHASE OF ATTACK	FO	FS	FZ	pct variable for team
BRA	Frequency	251	744	279	
	row pct	19.7	58.4	21.9	1274
	col pct	50.4	60.2	63.8	58.7
	tot pct	11.6	34.3	12.9	
SCT	Frequency	247	492	158	
	row pct	27.5	54.8	17.6	897
	col pct	49.6	39.8	36.2	41.3
	tot pct	11.4	22.7	7.3	
	pct total modality	498 22.9	1236 56.9	437 20.1	2171 100.0

x^2 =20.05; p ≤ 0.001; df =2; C= 0.095

Table 7. Values of the variable TYPE OF ATTACK.

TEAM	Variable TYPE OF ATTACK	TO	TK	TP	pct variable for team
BRA	Frequency	1122	31	121	
	row pct	88.1	2.4	9.5	1274
	col pct	59.1	37.3	64.0	58.7
	tot pct	51.7	1.4	5.6	
SCT	Frequency	777	52	68	
	row pct	86.6	5.8	7.6	897
	col pct	40.9	62.7	36.0	41.3
	tot pct	35.8	2.4	3.1	
	pct total modality	1899 87.5	83 3.8	189 8.7	2171 100.0

x^2= 17.93; p ≤ 0.001; df=2; C= 0.09

For the purpose of the interpretation of data the symbols and the abbreviations in the tables have the following meaning: BRA – Brazil, SCT – Scotland, frequency; row pct - percentage per row (team), col pct - percentage per column (modality); tot pct - total percentage; pct variable for team - total for one team; pct total modality - total percentage modality (for both teams); total percentage for the variable of one team; x^2 – chi square; p – significance of x^2; df – degrees of freedom; C – contingency coefficient.

Table 7 displays data that make it possible to conclude that regarding various types of attack it was the continuous attack (TO) that was dominant with both teams (87.5%), followed by the semi-counter-attack (TP) (8.7%), whereas counter-attack (TK) was most rarely applied (3.8%). There were hardly any differences as regards the application of a continuous attack; however, there were differences as regards counter-attack and

As for sub-areas (Table 8), midfield players covered 15 out of the total of 18 sub-areas (eighteen being the number of sub-areas comprising the soccer field). It is obvious that midfield players appeared in almost all parts of the field. On the basis of these data, it may be accurately determined what positional role a player has. Namely, when the type of player concerned is known, the sub-areas in which this player is expected to appear may be determined.

Table 8: Values of the variable SPACE according to the type of PLAYER.

Sub-area	Variable PLAYER with SPACE	GO	VE	OS	OB	NB	NS	pct Variable for team
1	Frequency				12			
	row pct				100.0			12
	col pct				4.4			6
	tot pct				.6			
2	Frequency	75		7	7			
	row pct	84.3		7.9	7.9			89
	col pct	67.0		6.1	2.6			4.1
	tot pct	3.5		.3	.3			
3	Frequency				9			
	row pct				100.0			9
	col pct				3.3			.4
	tot pct				.4			
4	Frequency		10	2	44			
	row pct		17.9	3.6	78.6			56
	col pct		1.1	1.8	16.3			2.6
	tot pct		.5	.1	2.0			
5	Frequency	34	64	90	22			
	row pct	16.2	30.5	42.9	10.5			210
	col pct	30.4	6.9	78.9	8.1			9.7
	tot pct	1.6	2.9	4.1	1.0			
6	Frequency		4	1	76	2		
	row pct		4.8	1.2	91.6	2.4		83
	col pct		.4	.9	28.1	.3		3.8
	tot pct		.2	.0	3.5	.1		
7	Frequency		33	2	41	77		
	row pct		21.6	1.3	26.8	50.3		153
	col pct		3.6	1.8	15.2	12.9		7.0
	tot pct		1.5	.1	1.9	3.5		
8	Frequency	2	282	9	8	3	4	
	row pct	.6	91.6	2.9	2.6	1.0	1.3	308
	col pct	1.8	30.4	7.9	3.0	.5	2.6	14.2
	tot pct	.1	13.0	.4	.4	.1	.2	
9	Frequency		55	3	42	79		
	row pct		30.7	1.7	23.5	44.1		179
	col pct		5.9	2.6	15.6	13.3		9.2
	tot pct		2.5	.1	1.9	3.6		
10	Frequency	1	57		8	128		
	row pct	.5	29.4		4.1	66.0		194
	col pct	.9	6.1		3.0	21.5		9.2
	tot pct	.0	2.6		.4	5.9		
11	Frequency		281			2	39	
	row pct		87.3			.6	12.1	322
	col pct		30.3			.3	25.5	14.8
	tot pct		12.9			.1	1.8	
12	Frequency		26		1	119		
	row pct		17.8		.7	81.5		146
	col pct		2.8		.4	20.0		6.7
	tot pct		1.2		.0	5.5		
13	Frequency		15			54		
	row pct		21.7			78.3		69
	col pct		1.6			9.1		3.2
	tot pct		.7			2.5		
14	Frequency		84			13	82	
	row pct		46.9			7.3	45.8	179
	col pct		9.1			2.2	53.6	8.2
	tot pct		3.9			.6	3.8	
15	Frequency		9			54		
	row pct		14.3			85.7		63
	col pct		1.0			9.1		2.9
	tot pct		.4			2.5		
16	Frequency		2			26		
	row pct		7.1			92.9		28
	col pct		.2			4.4		1.3
	tot pct		.1			1.2		
17	Frequency		4			10	26	
	row pct		10.0			25.0	65.0	40
	col pct		.4			1.7	17.0	2.9
	tot pct		.2			.5	1.2	
18	Frequency		1			28	2	
	row pct		3.2			90.3	6.5	31
	col pct		.1			4.7	1.3	1.4
	tot pct		.0			1.3	.1	
	pct total	112	927	114	270	595	153	2171
	modality	5.2	42.7	5.3	12.4	27.4	7.0	100.0

x^2= 4,844.90; p ≤ 0.001; df = 85; C= 0.831

Regarding the phase of the attack (Table 9), it is evident that different types of players differ with respect to play participation. In the phase of attack commencement (FO), the outside defenders (OB) (36.3%) and the goalkeepers (22.5%) were dominant. During the middle phase of the attack (FS), midfield players (VE) had the largest contribution (57.7%) followed by outside forwards (NB) (32%), whereas in the final phase (FZ) outside forwards (NB) had the most expressed role with 43.9% action participation followed by midfield players (VE) with 27.9% and inside forwards (NS) with 27.2% of action participation.

With respect to the contribution of various types of players to different types of attack (Table 10), it is evident that midfield players executed continuous attacks (43.7%), followed by outside forwards (26.5%) and by outside defenders (13.3%). Outside forwards (28.9%), inside forwards (27.7%) and midfield players (25.3%) were dominant in counterattack. Midfield players and outside forwards contributed most to the semi-counter-attack, the former with 40.7% and the latter with 36% of semi-counter-attack participation. Inside forwards participated in 13.8% of actions in this type of attack. The x^2 was significant (x^2 =109.46; p ≤ 0.001) and the correlation between these types of attack was relatively low (C = 0.219).

Table 9: Values of the variable PHASE OF ATTACK according to type of PLAYER.

PHASE OF ATTACK	Variable PHASE OF ATTACK with	GO	VE	OS	OB	NB	NS	pct variable for team
FO	Frequency	112	92	105	181	8		
	row pct	22.5	18.5	21.1	36.3	1.6		498
	col pct	100.0	9.9	92.1	67.0	1.3		22.9
	tot pct	5.2	4.2	4.8	8.3	.4		
FS	Frequency		713	8	86	395	34	
	row pct		57.7	.6	7.0	32.0	2.8	1236
	col pct		76.9	7.0	31.9	66.4	22.2	56.9
	tot pct		32.8	.4	4.0	18.2	1.6	
FZ	Frequency		122	1	3	192	119	
	row pct		27.9	.2	.7	43.9	27.2	437
	col pct		13.2	.9	1.1	32.3	77.8	20.1
	tot pct		5.6	.0	.1	8.8	5.5	
	pct total modality	112 5.2	927 42.7	114 5.3	270 12.4	595 27.4	153 7.0	2171 100.0

x^2 = 1,641.89; p ≤ 0.001; df=10; C= 0.656

For the purpose of the interpretation of data the symbols and the abbreviations in the tables have the following meaning: BRA – Brazil, SCT – Scotland, frequency; row pct - percentage per row (team), col pct - percentage per column (modality); tot pct - total percentage; pct variable for team - total for one team; pct total modality - total percentage modality (for both teams); total percentage for the variable of one team; x^2 – chi square; p – significance of x^2; df – degrees of freedom; C – contingency coefficient.

Table 10: Values of the variable TYPE OF ATTACK according to the type of PLAYER.

TYPE OF ATTACK	Variable PLAYER with TYPE OF ATTACK	GO	VE	OS	OB	NB	NS	pct variable for team
TO	Frequency	104	829	106	253	503	104	
	row pct	5.5	43.7	5.6	13.3	26.5	5.5	1899
	col pct	92.9	89.4	93.0	93.7	84.5	68.0	87.5
	tot pct	4.8	38.2	4.9	11.7	23.2	4.8	
TK	Frequency	7	21	6	2	24	23	
	row pct	8.4	25.3	7.2	2.4	28.9	27.7	83
	col pct	6.3	2.3	5.3	.7	4.0	15.0	3.8
	tot pct	.3	1.0	.3	.1	1.1	1.1	
TP	Frequency	1	77	2	15	68	26	
	row pct	.5	40.7	1.1	7.9	36.0	13.8	189
	col pct	.9	8.3	1.8	5.6	11.4	17.0	8.7
	tot pct	.0	3.5	.1	.7	3.1	1.2	
	pct total modality	112 5.2	927 42.7	114 5.3	270 12.4	595 27.4	153 7.0	2171 100.0

x^2 = 109.46; p ≤ 0.001; df = 10; C= 0.219

Conclusion

The soccer game between Brazil and Scotland, held at the FIFA World Cup in France in 1998, was chosen for the evaluation of the model proposed for monitoring team and individual play performance during attack in competitive soccer. The application of the variables ACTION, BODY, SPACE, VBALL (dribbling the ball), PLAYER, PHASE OF ATTACK, TYPE OF ATTACK, SPACE according to the type of PLAYER, PHASE OF ATTACK according to the type of PLAYER and TYPE OF ATTACK according to the type of PLAYER served to analyse the actions executed during attack in the game. The entities were attacks executed by the observed teams. They were obtained by the summation of actions executed during attack. The data, collected by analysing a video recording, were processed by the statistical package SPSS for MS WINDOWS Platform. On the basis of the detailed analysis of the variables and their modalities and as regards the research goals the following may be concluded.

1) There were differences between the two teams observed in the type of attacking play. Brazil was characterized by a larger number of actions executed (58.7%), as compared to the Scottish team (41.3%). The results also showed that the Brazilian team played more aggressively than the Scottish team and executed more actions in the sub-areas in the middle of the field and in the sub-areas closer to the opposing team's goal. Further, dribbling the ball over medium-long and long distances was dominant in the play of the Brazilian team. The comparison between the two teams revealed that the Brazilian team had executed a larger number of actions pertaining to the middle and to the final phase of attack (60.2% and 63.8%, respectively) than did the Scottish team (39.8% and 36.2%, respectively).

2) It is evident that the goalkeepers of both teams participated exclusively in the phase of commencement of attack, whereas they did not participate at all either in the middle or in the final phase of attack.

Outside defenders and the goalkeepers were dominant in the phase of attack commencement in both teams, midfield players in the middle phase of attack, and outside forwards in the final phase. In both teams, the burden of play-making was predominantly with midfield players.

It is also evident that midfield players are dominant in continuous attacks (43.7%), followed by outside forwards (26.5%) and outside defenders (13.3%). Outside forwards (28.9%), inside forwards (27.7%) and midfield players (25.3%) are dominant in counter-attack. Midfield players (40.7%) and outside forwards (36%) contributed most to the semi-counter-attack. Inside forwards participated in 13.8% of actions in this type of attack.

As for sub-areas, midfield players covered 15 out of the total of 18 sub-areas (eighteen being the number of sub-areas comprising the soccer field). It is obvious that midfield players appeared in almost all parts of the field. It was found that the assessment tool made it possible to determine the type of player in question on the basis of the frequency of appearance of a particular player on some parts of the field.

3) On the basis of the data obtained, it may be stated that the model applied in this study proved to have the capacity to differentiate between the styles of play of two soccer teams. These findings are encouraging for further research in which the proposed model will be investigated and verified on a larger sample of top-level soccer games.

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Correspondence to:
Zvonko Miljković
Kolodvorska 12
35000 Slavonski Brod, Croatia
Phone: +385 91 56 99 683
Fax: + 385 35 44 64 46

EVALUACIJA JEDNOG MODELA ZA PRAĆENJE IGRE IGRAČA I MOMČADI U NAPADU U UVJETIMA NOGOMETNE UTAKMICE

Sažetak

Kako bi se utvrdila upotrebna vrijednost jednog modela za praćenje nogometne igre momčadi i igrača u napadu u uvjetima natjecanja odabrana je utakmica Brazil – Škotska koja je odigrana na Svjetskom nogometnom prvenstvu u Francuskoj 1998. godine.

Mjerenjem varijabli AKCIJA, TIJELO, PROSTOR, VLOPTA (vođenje lopte), IGRAČ, FAZA NAPADA, TIP NAPADA, PROSTOR prema tipu IGRAČA, FAZA NAPADA prema tipu IGRAČA te TIP NAPADA prema tipu IGRAČA opisana su sva zbivanja tijekom napada za vrijeme nogometne utakmice.

Za analizu podataka korištene su kontingencijske tablice, gdje su statističke značajnosti raspodjele frekvencija utvrđene hi-kvadrat testom, a stupanj povezanosti koeficijentima kontingencije. Entitete su predstavljali napadi promatranih momčadi, koji su se dobili sumacijom akcija za vrijeme trajanja napada.

Napad je definiran trenutkom dolaska u posjed lopte, kao i svim akcijama koje ga obilježavaju do trenutka gubljenja posjeda lopte. Kriterij za početak mjerenja trajanja napada, kao i za njegovu registraciju, bila su najmanje dva dodira s loptom koje su iostvarili igrači jedne od momčadi. Podaci, prikupljeni metodom opservacije video zapisa, analizirani su statističkim paketom SPSS za MS WINDOWS platformu.

Ciljevi ovoga rada bili su:

1. utvrditi razlike u igri između dvije promatrane momčadi u pojedinim varijablama,
2. utvrditi razlike u igri među tipovima igrača u pojedinim varijablama,
3. ocijeniti model sustavnog praćenja nogometne igre igrača i momčadi u napadu u uvjetima natjecanja s obzirom na njegov kapacitet da razlikuje stil igre dviju momčadi.

Na temelju detaljne analize varijabli i njihovih modaliteta može se zaključiti da su ciljevi navedeni u ovome radu ostvareni.

1) Utvrđene su razlike između dvije momčadi uočene u načinu igranja u napadu. Igru brazilske momčadi obilježio je veći broj odigranih akcija (58.7%) u usporedbi sa škotskom momčadi (41.3%). Rezultati su također pokazali da su Brazilci igrali agresivnije te da su izveli više akcija u podprostorima na sredini terena i u podprostorima koji se nalaze bliže protivničkim vratima. Nadalje, vođenje lopte na srednje dugim i dugim udaljenostima dominiralo je igrom brazilske momčadi. Usporedbom dvije momčadi došlo se do zaključka da su Brazilci izveli veći broj akcija u središnjoj i završnoj fazi napada (60.2% i 63.8%) od Škota (39.8% i 36.2%).

2) Vidljivo je da su vratari obje momčadi sudjelovali isključivo u fazi otvaranja napada, dok se u središnjoj i završnoj fazi napada ne nalaze. Obrambeni bočni igrači i vratari obiju momčadi dominirali su u fazi otvaranja napada, vezni igrači u središnjoj fazi, a bočni napadači u završnoj fazi napada. Vezni su igrači u obje momčadi ponijeli najveći teret građenja igre.

Kontinuirani napad osmišljavaju i sudjeluju u najvećem broju akcija u takovom tipu napada vezni igrači (43.7%), zatim bočni napadači (26.5%) te obrambeni bočni sa 13,3%. U kontranapadu najviše sudjeluju bočni napadači sa 28.9% akcija, zatim srednji napadači sa 27.7% te vezni igrači sa 25.3% udjela. Polukontranapad obilježavaju vezni igrači u kojemu sudjeluju sa 40.7% akcija, zatim bočni napadači sa 36% te srednji napadači sa 13.8% akcija.

S obzirom na podprostore igrališta, vezni su igrači pokrili 15 od ukupno 18 podprostora koji čine nogometno igralište. Vidljivo je da su se vezni igrači pojavljivaili na gotovo svim dijelovima terena. Utvrđeno je da je mjerni instrument omogućio određivanje tipa igrača na temelju učestalosti njegova pojavljivanja na pojedinim dijelovima terena.

3) Na temelju dobivenih podataka moguće je zaključiti da se model praćenja nogometne igre u napadu, pokazao kao vrijedan doprinos analizi igre u fazi napada tijekom nogometne utakmice te da razlikuje stilove igre dviju momčadi.

Ključne riječi: *nogomet, model praćenja igre, napad, struktura igre, razlike*