AA Polozov
Doctor of pedagogical sciences,
Associate Professor,
Institute of Physical Education,
Sport and Youth Policy
Ural Federal University
Ekaterinburg, Russia

Computer model of the Russian team matches at the FIFA world cup Russia 2018

AA Polozov

Abstract
There are many disparate studies of various game fragments of modern football without uniting by one model. This gives an advantage to the expert evaluation of the trainer. The basis of the PIRS model is the difference created by the player in the score which is added to the final score of the team. Since you have to play both with your superior opponents (Negative difference) and downstream ones (Positive difference), then a rating scale is created to display this difference. The rating stability allows you to simulate the upcoming match. The difference in the ratings in one action is converted into the difference of goals scored and conceded in a personal meeting and can be checked for compliance with the actual results obtained. Provided 50% of the recommendations are fulfilled, the team will receive 20 - 30% of the points collected additionally. An example of the work is shown at the match of Russia and Uruguay teams on the World Cup in 2018. The results of the study were provided to the RFU.

Keywords: football, players, rating, single combats, tactics

Introduction

Is there a maximum result which one team can win another? The answer is objectively positive. You can have no idea where it is, but intuitively we understand that it exists. If it exists, how far is it from the usual level of the game? How close are modern trainers to it? A person can live up to 120 years. There are examples of people who lived to 116-117 years. That is, the limit is achievable. We see this on individual examples. In Russia, however, men live up to 60-65 years. We are all used to the fact that 50% of the limit is the norm. On average, lifetime increases by 3 years every 10 years. We are slowly moving to the limit of our capabilities. And we'll be able to get it after 200 years. However, when the author shows the limit result to the team trainer, this usually causes distrust. Is it possible to calculate the expected score of the match for different arrangements and game scenarios? What will the score of the upcoming match be if you go to the game in three central defenders?

The problem

The work [9] considers the tactics of the game as an offer of the greatest number of options for continuing the game to the partner holding the ball.
The authors [10] examined the successes of the Indian team up to 17 years at the FIFA tournament. They came to the conclusion that it is necessary to have as many offensive strategies and tactics as possible.
The authors often deify IT capabilities [11] believing that they will solve all the problems. "Previously, performance analysis relied mainly on frequency distributions of certain game events. In contrast, the novel approaches allow calculating more complex metrics. This helps to measure and identify the performance of teams and individual players and especially how teams interact". The great possibilities of IT actually do not work. The authors offered only three criteria for the game: the amount of space controlled by the player, the number of defensive opponents cut off from the gate and the speed of the player's movement.
"We develop a dynamic model based on the Poisson difference (Skellam) distribution which simultaneously models the two different point scoring mechanisms in Australian Rules Football, the motivation for which comes from work on predicting outcomes in soccer matches. Our model is developed in a Bayesian framework and is fitted using the Stan

Correspondence
AA Polozov
Doctor of pedagogical sciences,
Associate Professor,
Institute of Physical Education,
Sport and Youth Policy
Ural Federal University
Ekaterinburg, Russia

modelling language. Model validation is performed on the Australian Football league (AFL) home and away season in 2015" [12].

"The application of continuous attack is dominant, beginning by cutting a pass and winning "the second ball" on the opponent's half, while the final pass is in most cases the centre and back lateral passing". However, the authors [13] hope to find more serious criteria for the game in the future.

The authors [14] try to analyze the geometric aspects of the game: the center of gravity of the game and the effective area of the game.

In connection with the poor in terms of content, the scientific base in football will be relevant to the analogy of basketball. There are a number of competing indicators of the player's utility in basketball and the corresponding correlation coefficient with the results of games: the coefficient of utility of the PBL (0.89), KPI (0.37), Euro KPI (0.37), KPI (0.9), NBA + \ - (056), Lithuania KPI (-0.17). The PIRS technology determines the cost of single combat from the game statistics. Therefore the correlation with the result of the game will be practically 1. In order to be correct when comparing with other technologies these indicators from previous matches were used. In this case, PIRS gave a 0.93 correlation with the results of the games [4]. The low KPI can explain to us why until now the expert coaching evaluation takes precedence over the analysts' assessment.

It was already in 1997 when Polozov AA. Published an article [2] which showed the fundamental possibility for the existence of a computer version of an upcoming match. Skorovich S.L., the current trainer of the Russian national futsal team, graduated from Institute of Physical Education, Sport and Youth Policy, URFU, in 2003. In that time we collaborated in the work on his diploma thesis. The Russian team has never won against the Spanish national team from 1998 to 2014. Our cooperation continued. The theme of the game modeling was in demand. Today, the national team of Russia has already won over the Spanish national team twice. And there is another leader in the world rating of teams in futsal. Later experience with the team was invested in other game sports.

Why is it difficult for a trainer to manage a game?

An information pool called handball is too large to be controlled by one trainer. If I ask you

"Who is the best and who is the worst player of your team?"- Then the answer is definite.

"Who are the 6th in the level of the game?"- Then the answer is most likely absent.

"Who is the fifth in coordination defeating?" - The answer is especially absent.

"Who is the fifth in the coordination defeating after 10 minutes of the game?" – You unlikely can answer. Etc.

We a priori ascribe to ourselves the ability to finely differentiate the ranking of players according to their game level, but in fact we cannot. Therefore, most of the game remains at the discretion of the players themselves. It's hard to believe that a trainer can, for example, say how a player's transfer from one position to another can change a match result, express in one number the tactical effect of the team in the last match. This is beyond the capabilities of the average person. In this situation, trainers-analysts help to a trainer (Instat, Basket-stats, ICEBERG, LONGO Match PRO, FUTSALSTAT, etc.). They calculate technical and tactical actions (TTA) that have no correlation with the results of games for similar teams. Instat, Basket-stats are not able to answer specific questions. What is the score for this plan of a game? How much less dribbling a player will win from C one at the beginning of the game and at the end? How many goals will players score from this point of the field from an uncomfortable position? Our conversation with opponents always ends here.

The purpose of this study is to determine the maximum value of the match result in football of the highest level on the basis of the created technology of result simulation. The latter is called Polozov Information Rating System, hereinafter referred to as PIRS.

Methodology. Let's consider some problems of game analytics.

1. The game consists of a single combat sequence allowing you to approach the gate and realize the created moment. To determine the actual value of the cost we should understand how to evaluate the implementation of scoring chances. Let's imagine that we are at some point in the field and want to get into the gate. The index of the field point is ratio of the multiplication of α and β vertical angles of the view of the gate to the distance to the gate (r): **(r):** $\varphi = \frac{\alpha * \beta}{r}$.
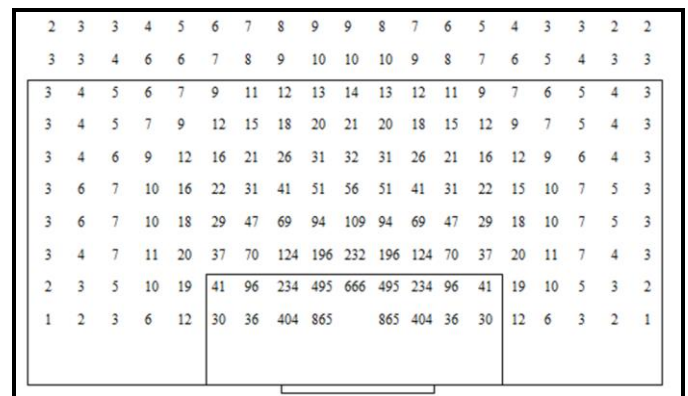

Fig 1: The distribution of the index on the football field [1]

There is a link between the probability to score from the given point of the field in this match: $p = 1 - (exp(-\varphi o/A))$ p, where A = 70-200 (for Russia). Any action on the field can now be estimated from the increase in this probability. Hereafter, this increase we call the single combat cost. On the other hand, we have to evaluate the player in the implementation of shots. The value of A is average for the players of this tournament. You can calculate the average probability of scoring for each shot of the player in the match. So by the end of the game we will get the expected number of points scored by the average rating and actually scored by the player. The difference between these two figures is the necessary evaluation.

2. Mixing of technical and tactical actions (TTA) and technical and tactical single combats (TTSC) should be considered as another problem of analysts. TTA can be set up even when the opponent on the field is not at all. Therefore they create data noise than help to evaluate. Correlation with the results of games is usually below 0.5. It is necessary to go from TTA estimates to TTSC. They are not less than 30. These are a pass for the back, dribbling (speed, coordination, and force), control of the ball in a situation when being knocked out, upper single combats, a pass tackling, barriers, etc. There is a forceful, coordinating and speedy dribbling. In addition to these well-known components, there are less actively used such as blocking a shot, restoring a position after a lost single combat, a barrier. TTSC are taken into

account only as a loss of the ball and are recorded as an independent component.

3 The necessity to display the results obtained on an abstract rating scale. If an A player has beaten a B player for 5 out of 10 single combats in one of the components of the game in a match with one team, what will this ratio be in the match with a C player who plays in the next team on the calendar? We cannot create a model without it. The key consideration is that the difference created by the team consists of the differences created by its players. Therefore, we need to arrange the teams on the scale of the rating at a distance corresponding to their score for a personal meeting. Then the players can be placed on it. A website www.ra-first.com was created, [12] where there was a section on football. The current results of all club and national teams were obtained from the relevant sites and then transformed into a rating on-line. To prove the consistency of the concept

the forecast for the next match was formed. The ratings of the teams set the average values of the ratings of its players.

4. Player's level is transferred into the rating and it is built for each component. The player's rating falls during the game from the number of single combats. But it happens with different speed. There are "light" single combats that are not associated with significant expenditure of energy. There are "heavy" ones. Finding the dynamics of decrease for each component of the game of each player is not a difficulty. The results obtained allow us to redistribute the match load among the players. The load is given to strong players until their level is equal to the level of the others. This mode is called equiparametric. This is the distribution of the number of single combats by players when the largest number of single combats in the match will be won. The player must be given such a distribution in comparison with his usual number of single combats.
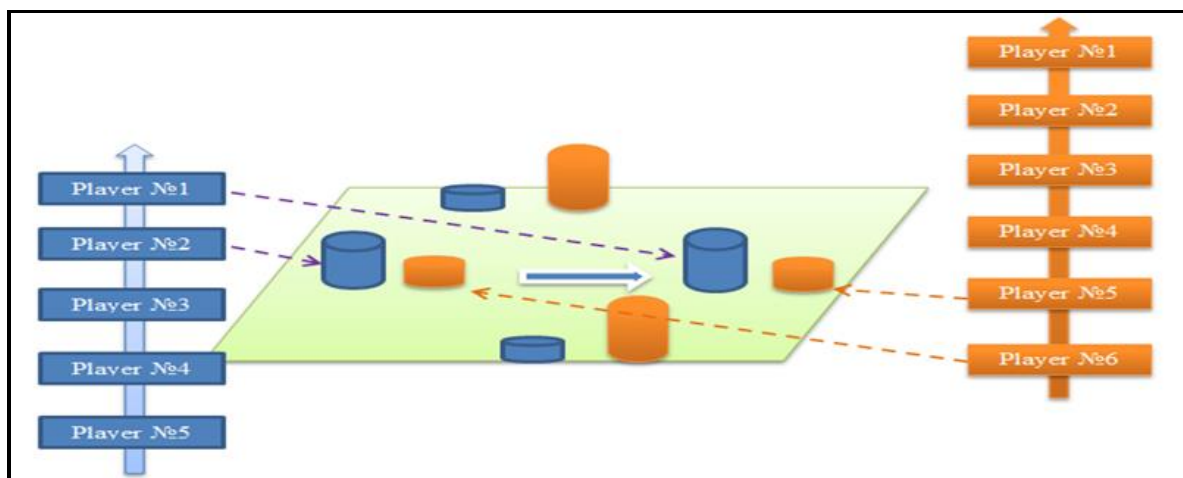

Fig 2: Player ratings and tactics

5. Tactical effect.
It often happens that a player should collect a number of single combats in defense, but they are not enough on his position. The algorithm moves the player to another position where he will get the necessary number of single combats in this component. As a result, the algorithm rearranges the players throughout the game that gives significantly more won single combats. Accordingly, one must write to the player - when he goes, against whom he plays in the attack and defense. To do this you must use the substitution and placement of the opposing team in the previous match. Then, as a result, a table is formed for each minute of the match with the alignment of the opponent and our team in the attack and defense.

6. Team combinations.
There are about 400 combinations that assume more than 90% of the overall effectiveness of the game. The combination consists of a sequence of single combats and a shot. The probability to score a goal is equal to the multiplication of the probabilities of winning their single combats, to score from a given point of the field. Probability is formed from a rating that decreases from the number of single combats. Hereafter, under advantageous replacement we mean player single combat with the greatest advantage in the corresponding rating (the greatest chances to win this single combat). The algorithm selects the most advantageous replacement and combines them in combination. The effect of combinations is

that the strongest your players do not play with the weakest opponents. This gives an additional increase in the result [5]. The aspects are discussed in more detail in [5, 12].

Experimental part
The study was conducted on the base of the Russian national football team participation at the World Cup in 2018. This research was done twice: in 2016/17 and 2017/18 seasons when the opponents in the group have been already known. We have published preliminary research data three months before the start of the World Cup 2018 [6]. However, we could not publish a series of assessments in that situation.
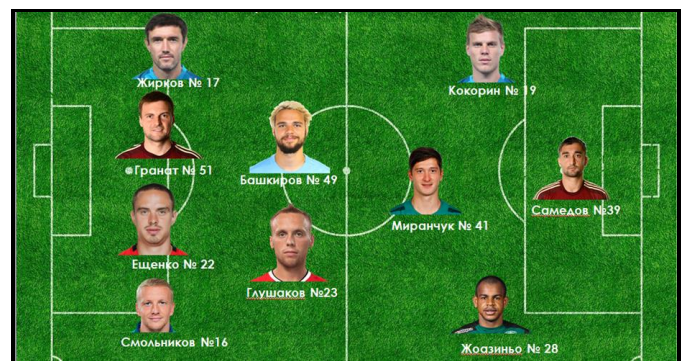

Fig 3: Line-up of the Russian national team at the World Cup in 2018 according to the investigation of 2016/1

In the season in 2017/18 we watched the game:

- Locomotive - CSKA   Date: November 5, 2017   Score: 2 - 2
- Krasnodar - Zenith   Date: September 24, 2017   Score: 0 - 2
- Rostov - Spartak   Date: October 28, 2017   Score: 2 - 2
- Ural - Tosno   Date: September 24, 2017   Score: 3 - 1
- Ufa - Rubin   Date: October 30, 2017   Score 2 - 1
- Akhmat - Arsenal   Date: August 21, 2017   Score 1 - 2
- Amkar -Dinamo   Date: November 24, 2017   Score 2 – 1

Data received on the game - 202 players, half of them (only 104 players) having a passport of the Russian Federation. As a result, the line-up of the Russian national team was formed.

The algorithm redistributes the load (the number of single combats) in favor of a strong player until he equals all the others. In this case, the total number of the player's single combats in all components becomes the criterion of the player's strength. This allows you to compare the calculated number of match single combats of one of the teams' player in the attack with the number of recommended match single combat in the defense of the opponent's players. You can outline advantageous exchanges and form combinations of them. This is a simplified view of the operation of the algorithm.

Table 5: The recommended number of single combats in the attack and defense of each of the selected players in comparison with their usual match load for the club.

Player	Recommended in attack	In fact	Recommended in defense	In fact
Ignatiev	30.9	27	45	34
Kombarov	22.3	28	22	25
An. Miranchuk	26.0	22	46	31
Dzyuba	26.7	9	36	34
Al. Miranchuk	32.4	34	38	33
Denisov	31.0	33	28	15
Fernandez	45.6	41	20	27
Zhirkov	24.7	16	41	29
Kutepov	29.3	30	18	12
Granat	16.1	21	6	6

Table 6: Recommended line-up of Russia and the expected line-up of Uruguay. Advantageous replacement. The numbers of the players and the number of single combats (sc) recommended are given.

		19 sc	42 sc	
		№2	№3	
		№81	№60	19 sc
		24,7	26,0	№22
	26 sc			№2
№20	№13			45,6
30,9 sc		13 sc	42 sc	
		№4	31 sc	№15
	№23	№6		26 sc
	22,3	№22		№9
	№23	26.7 sc		№59
	10 sc			32,4
		14 sc		
		№21		
	№18	№3		№27
	29.3 sc	16.1 sc		31.0 sc

Fig 5: The line-up of the Russian national team at the World Cup in 2018 according to investigation in 2017/18

Fig 6: The cost of won and lost single combat in the RFPL in 2016-18 for: 1 - central defenders, 2 - outside defenders, 3 – Pivot, 4 – half forwards, 5 - forwards.

Table 5: Comparison of the line-up of the team according to the study.

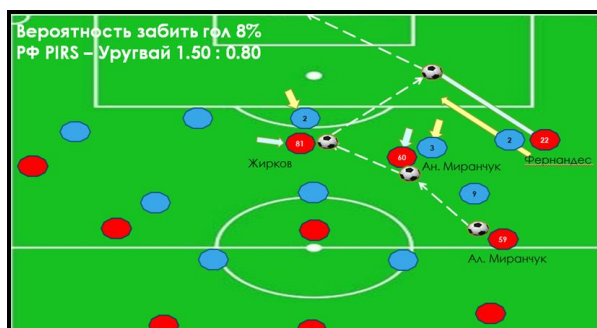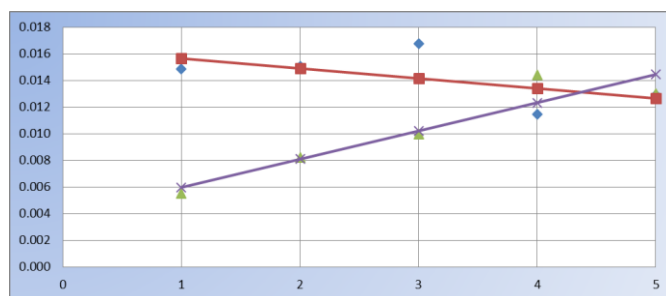| «PIRS» Team	Reting	Team of S.L. Cherchesov	Rating
Dzagoev	3784	Dzagoev	3784
Granat	3685	Granat	3684
Kombarov	3656	Gazinsky	2526
Vasin	3588	Erokhin	3064
Ignatiev	3575	Al. Miranchuk	2948
Jikia	3533	Fernandez	3317
Denisov	3409	Semenov	3362
Poloz	3232	Kudryashov	2987
Dzyuba	3209	Smolov	3059
An. Miranchuk	3209	An. Miranchuk	3209
Average Rating	3488	Average Rating	3194

Fig 4: The recommended combination for the Russian national team with a final probability to score a goal of 8% with an average effectiveness of its attack of 1%.

According to the Fig. 5 one can see the average cost of single combat players of different roles for the super league RFPL. If you win the attacking single combat at the position of the central defender, then it will give you 0.006 goals. But if you lose in the defense, then you get just 0.016 goals.

The difference in the rating is 294. Hence the expected result of the game: PIRS team: RFU team 1.94 : 1.06 = **+0.8**

Due to the choice of S.S. Cherchesov RFU team is weaker than the PIRS team by 0.8 goals for their personal meeting.
It was possible to experimentally establish a tactical effect when moving from 4 to 5 defenders, for example, at the

Russia vs. Uruguay match. Simulatìon of the Russia - Uruguay game in 4 and 5 defenders gave a very significant difference in the balance of goals scored and conceded.
- PIRS Russia (4 defenders) - Uruguay 1.38: 1.56
- PIRS Russia (5 defenders) - Uruguay 1.50: 0.80

During the study it was revealed that the increase in the result is 0.9 goals for the national team game with five defenders.

Table 3: Expected score of Russia vs. Uruguay match at the World Cup in 2018 in various simulations

Expected match score of Russia - Uruguay	Imposing conditions
1.50:0.80	PIRS technology with 5 defenders in a team
1.77:1.49	Line-up of the Russian Football Union with 5 defenders according to the PIRS technology
1.38:1.56	Line-up of the Russian Football Union with 4 defenders according to the PIRS technology
1.28:1.98	Line-up of the Russian Football Union with 5 defenders without PIRS technology
0.30:2.20	Team of the RFU for all games over the past year

Table 4: Estimated increase in the difference between Z and P goals for the game of the RF - Uruguay at the World Cup in 2018 from the impact of various factors

Increase	Causes
0.80	Losses resulting from the selection of the Russian national team line-up
0.88	The result increase when moving from 4 to 5 defenders.Resource of S.S. Cherchesova
0.98	The result increase when using PIRS technology
2.66	Total losses as a result of the match.
	The addition of 726 points on the rating gives the national team an opportunity to move from the 60th place to the 12th, pass to ¼ World Cup, 2018

Why is the maximum level practically unattainable?
- Players may not reproduce their level of play.
- Players may not remember too much information.
- Opponent can change his game.
- The dynamism of the game and the impossibility of its full determinism.
- Players are used to a certain model of their game in the team, etc.

To overcome all these difficulties it is necessary to create your game model for each next opponent and master it in training. Perhaps, after a while, football players will also wear an earpiece on the game through which the coach will tell them what to do next like the stars of TV-series.

Conclusions
1. Computers are better playing chess and other games than a person. Game sports are next. An information pool called football is too large to be effectively controlled by one coach. The resource of the game is used only by two thirds by the forces of coaches. This unclaimed tactical resource of the game is the limit of the coach possibilities. Now there is the time of information algorithm competition. The competition of coaches turns into a competition of analytical groups.
2. The information rating technology (PIRS) proposed by the authors
   - based on the priority for the game activity difference of goals scored and conceded goals
   - represents a simple universal linear solution of a complex problem
   - allows you to determine the maximum value of the game result with a given opponent based on his placement and distribution of single combats according to the positions of the players.
   - Forms answers in an understandable format of the advantages in the score.

There are a number of other competing indicators of the player's utility. But their correlation with the results of games is lower and they do not have such ability to create a

computer version of the upcoming match as PIRS. Technology is better at the national team level where it is more difficult to work for a coach because of the large number of options to create a team.
3. The maximum result is practically unattainable due to the information complexity in the use of a large group of people. It is necessary to create your game model for each next opponent and master it in training, rather than using one universal version of the game.

References
1. Polozov AA, The rating system in the game sports. USTU-UPI, Ekaterinburg, 1995, 206.
2. Polozov AA. The upcoming match. Computer version / Theory and practice. 1997, 3.
3. Polozov AA. Rating in sport: yesterday, today, tomorrow. - Moscow: Soviet sport, 2007, 316.
4. Polozov AA. Burov IV, Alternative statistical accompaniment of basketball matches / Journal of Scientific Problems of Humanitarian Studies No. 2011; 11:90. ISSN 2071-9175
5. Handbook of Ratings. Approaches to Ratings in the Economy, Sports, and Society / A. Karminsky. A. Polozov / International Publishing house "Springer", 2016, 360.
6. Data model of football on the example of participation of the Russian national team at the World Cup in 2018.
7. AA Polozov, ZF Gazimova, MV Kraev. Ural Federal University named after the first President of Russia B.N. Yeltsin, Ekaterinburg, Russia. Human. Sport. Medicine 2018; 18(1):138-148.
8. YouTube «CSKA Tottenham 0: 1. UEFA Cup. But CSKA can win this match». 2016.www.ra-first.com
9. Functional analysis of marker loss in football / Losquiño, Toni Díaz; Santesmases, Josep Solà /Apunts: Educació Física i Esports. Abr. 2018; 132:60-71
10. Analysis of the effectiveness of the Indian soccer team at the FIFA U-17 World Championships / Jamshad K. K. Muhammad, Dr. Pravene A. / Asian Journal of

Multidimensional Research (AJMR) d 2018; 7(2):667-67. ISSN: 2278-4853.

11. Match analysis, Big Data and tactics: current trends in elite soccer. / Memmert D, Rein R. Dtsch / Z Sportmed. 2018; 69:65-72.

12. Dynamic Bayesian prediction of the results of the AFL mapping using the Skellam distribution / A.A. Manderson, C. Murray B.A. Turlach / Australian and New Zealand Journal of statistics, №6. 2018; 60(2):174-187.

13. Tactics of attack of football teams in the champions league knockout phase in seasons of 2015/2016 and 2016/2017. /Leontijević, Bojan; Janković, Aleksandar; Tomić, Lazar/ Physical Culture / Fizicka Kultura. 2017; 71(2):137-144.

14. Measuring Tactical Behavior Using Technological Metrics: Case Study of a Football Game /Filipe M. Clemente, Micael S. Couceiro, Fernando M.L. Martins/ International Journal of Sports Science & Coachin. 2013, 8(4),