

Statistical characterisation of roller-hockey matches

Preliminary report

Introduction

A statistical research study has been done for traditional roller-hockey matches. For this, a database with scores of games, linked with the ranking points (RP) from the competing teams (calculated on a match by match basis) has been built.

The database includes matches from both men and women's competitions, as well as from official and friendly matches. Also, matches disputed in the home of one team, as well as matches played in neutral places were considered. For the moment, due to the limited number of matches included in the database (about 11.000), a complete statistical research is only done for men's competitions, and for games played at the home of one of the teams.

1. Men's competitions with games played at the home of one team

For this purpose it is considered all the matches played by teams of men, where one of the teams play at its home. A total of 8932 matches are included in the database for these conditions. The matches concern different competitions, in different countries, and different seasons or years. The distribution of the matches by year, as well as the % of games won, drawn or lost by home team, is as follows:

Year	Number of matches	%	% victory for home team	% of draws	% victory for away team	% points for home team
Before 1998	1536	17,20	52,80	11,33	35,87	58,47
1998	4347	48,67	52,75	11,16	36,09	58,33
1999	3049	34,14	51,70	10,95	37,34	57,18
All matches	8932	100	52.41	11.12	36.48	57,97

The distribution of matches by countries is the following:

Country	Number of matches	%	% victory for home team	% of draws	% victory for away team	% points for home team
Portugal	2491	27,89	54,80	10,08	35,13	59,84
France	2294	25,68	52,66	11,33	36,01	58,33
Spain	1157	12,95	49,56	14,52	35,96	56,82
Italy	868	9,72	49,77	13,59	36,64	56,57
Switzerland	567	6,35	53,62	9,88	36,51	58,56
Germany	445	4,98	49,44	6,97	43,60	52,93
Argentina	334	3,74	48,80	10,18	41,02	53,89
Benelux	195	2,18	53,55	4,92	41,53	56,01
Friendly matches	154	1,72	51,95	14,94	33,12	59,42
Europe	145	1,62	56,55	9,66	33,79	61,38
England	102	1,14	51,96	8,82	39,22	56,37
Chile	99	1,11	46,46	12,12	41,41	52,52
Other	81	0,91	61,73	8,64	29,63	66,05

Some conclusions may be extracted from these figures:

- for countries like Portugal, Spain, France, Italy, Switzerland, England and Benelux, the effect of playing at home represents a probability of victory for the home team around 57 %. It seems that the same effect is less clear for competitions held in Argentina, Chile and Germany;
- the % of draws is slightly higher in Spain and Italy (around 14%) than in the other countries. In Germany, Benelux and England, less than 10 % of the matches finish with a draw result.

The following table characterises, for each country and year, the structure of goals marked per match:

Group	Mean of goals for home team	Standard deviation	Mean of goals for away team	Standard deviation	Mean of total of goals	Standard deviation
Portugal	5,04	3,39	4,02	2,68	9,06	4,08
France	5,52	3,78	4,43	2,99	9,95	4,51
Spain	4,18	2,79	3,57	2,72	7,75	3,77
Italy	5,10	3,62	4,14	2,81	9,24	4,34
Switzerland	5,35	3,61	4,36	2,99	9,71	4,33
Germany	5,66	4,26	4,88	3,74	10,54	4,89
Argentina	5,55	3,46	5,06	3,48	10,62	4,87
Benelux	6,27	4,07	5,67	3,24	11,94	5,00
Friendly matches	4,09	2,44	3,37	2,34	7,46	3,42
Europe	6,16	7,31	3,59	3,45	9,74	6,97
England	5,03	3,04	4,79	3,75	9,82	4,13
Chile	5,10	3,13	4,80	3,20	9,90	4,40
1999	5,19	3,60	4,32	3,19	9,51	4,53
1998	5,09	3,54	4,13	2,81	9,22	4,29
before 1998	5,38	4,14	4,22	2,76	9,60	4,62
All matches	5,17	3,67	4,21	2,94	9,38	4,43

We can conclude that the structure of average of goals marked is different from country to country. So, in Spain the average total number of goals per match (7,75) is significantly lower than for other countries. By the other hand, in Germany, Benelux and Argentina, in average a greater number of goal are marked per match (more than 10).

The calculation of the various statistics for groups of matches according to the difference of points between the home and the away team leads to the following table:

Lower limit	Upper limit	Average points differ.	Number of matches	% victory home	% of draws	% victory away	% points home	Average of goals home	Average of goals away	Average of total of goals	Average of differ. of goals
580		689	75	97,33	1,33	1,33	98,00	14,81	2,21	17,02	12,60
480	580	530	100	97,00	1,00	2,00	97,50	11,16	2,14	13,30	9,02
380	480	426	244	95,49	2,05	2,46	96,52	9,00	2,50	11,50	6,50
295	380	338	458	93,68	3,05	3,27	95,21	8,13	2,64	10,77	5,49
235	295	265	440	86,59	7,73	5,68	90,46	7,38	3,03	10,41	4,35
190	235	215	450	86,47	5,10	8,43	89,02	7,04	2,88	9,92	4,16
150	190	171	434	77,65	8,99	13,36	82,15	6,44	3,33	9,77	3,11
120	150	137	409	77,02	11,98	11,00	83,01	5,89	3,15	9,04	2,74
85	120	105	456	69,96	11,40	18,64	75,66	5,77	3,54	9,31	2,23
55	85	73	457	66,74	15,10	18,16	74,29	5,33	3,41	8,74	1,92
25	55	42	473	60,38	12,08	27,54	66,42	5,00	3,70	8,70	1,30
-5	25	12	494	58,82	14,00	27,18	65,82	5,11	3,77	8,88	1,34
-30	-5	-15	401	50,37	16,96	32,67	58,85	4,52	3,95	8,47	0,57
-60	-30	-43	416	47,12	15,87	37,02	55,06	4,40	4,08	8,48	0,32
-90	-60	-73	487	42,30	16,22	41,48	50,41	4,44	4,34	8,78	0,10
-120	-90	-102	425	37,18	16,47	46,35	45,42	4,19	4,71	8,90	-0,52
-155	-120	-135	448	25,89	16,74	57,37	34,26	3,76	4,77	8,53	-1,01
-195	-155	-173	469	26,65	11,51	61,83	32,41	3,66	5,08	8,74	-1,42
-240	-195	-215	446	21,08	13,90	65,02	28,03	3,49	5,38	8,87	-1,89
-300	-240	-265	449	14,25	11,36	74,39	19,93	3,22	5,91	9,13	-2,69
-380	-300	-334	439	9,79	7,52	82,69	13,55	3,06	6,05	9,11	-2,99
-480	-380	-420	277	5,05	6,14	88,81	8,12	2,68	7,44	10,12	-4,76
-580	-480	-521	104	5,77	4,81	89,42	8,18	2,32	7,85	10,17	-5,53
	-580	-688	81	2,47	0,00	97,53	2,47	2,05	9,69	11,74	-7,64

Some graphical representations of these data are:

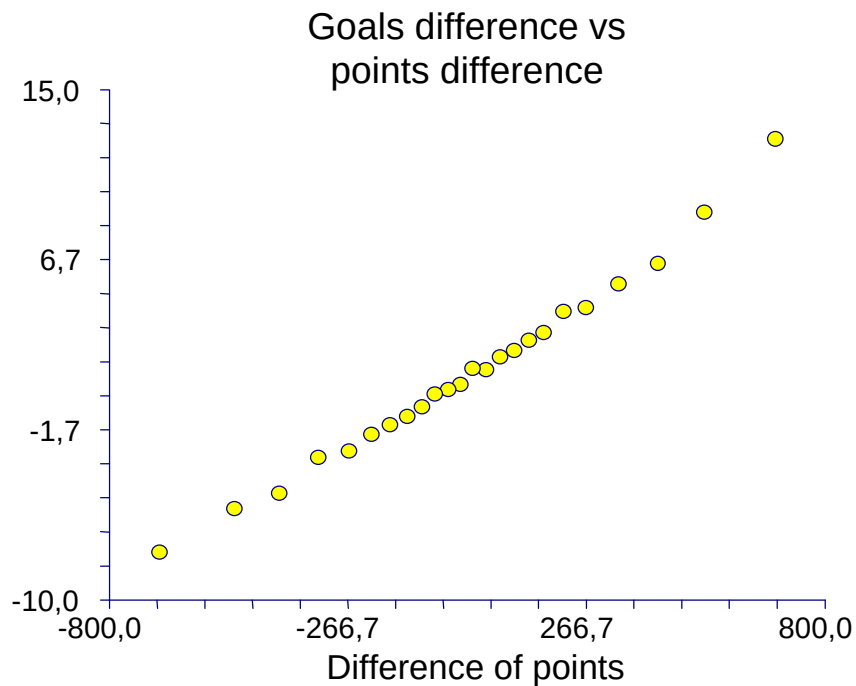


Figure 1 – Relationship between the difference of ranking points between home and away teams and the average difference of goal between those teams.

It is evident from Figure 1 that there is a very good correlation between the two variables. The linear regression analysis allows to the expression:

$$\text{Difference of goals} = 1,13 + 0,0139 \times (\text{Difference of ranking points})$$

with $r^2 = 0,986$.

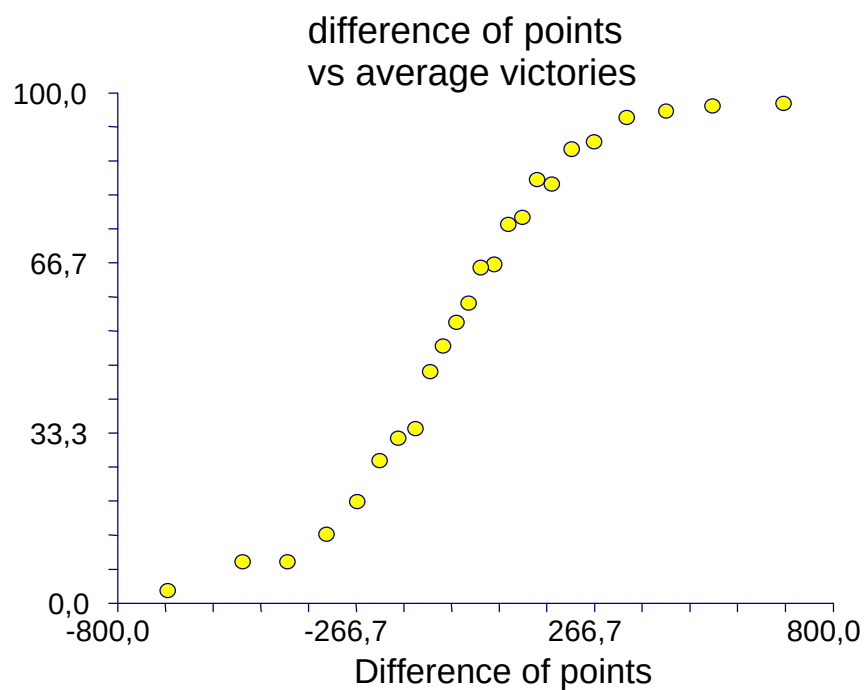


Figure 2 – Relationship between the mean of the points got by home teams and the difference of ranking points between home and away teams.

This curve is slightly different from the one employed in the ELO system, employed by FIDE (International Federation of Chess). Because of this, a modified table for the calculation of the ranking will be employed from now for traditional roller hockey competitions. It will be presented below.

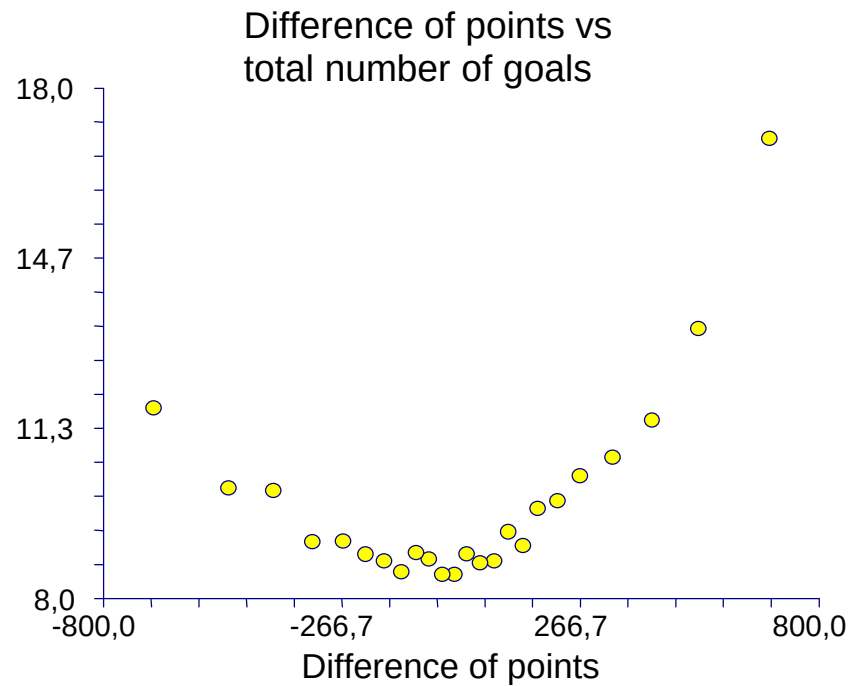
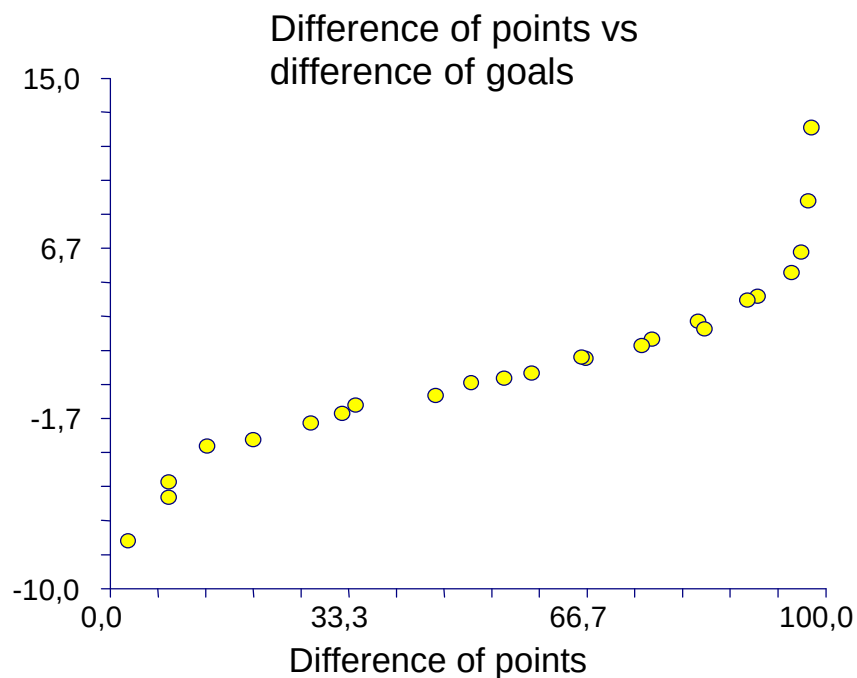


Figure 3 – Effect of the difference of ranking points between home and away teams and the average total number of goals per match.

This figure shows that the average number of goals per match is lower when the teams are of even force. When there is an important difference in the strength of the two teams, the number of goals increases accordingly. The minimum occurs for a difference of ranking points between -60 and 0 points. By the other hand, this effect is more evident when the strongest team is the one playing at home, what is also suggested by the following figure.

Figure 4 – Effect of the difference of ranking points between home and away teams on the average difference of goals marked by the two teams.



The obtained statistics allow to calculate a modified table for the calculation of points to be won or lost by the teams, from the difference of ranking points (RP) between the opposing teams.

RP home teams – RP away team	Home team wins	Draw	Home team loses
< - 620	+ 60	+ 30	0
≥ - 620 and < -355	+ 55	+ 25	- 5
≥ - 355 and < -270	+ 50	+ 20	- 10
≥ - 270 and < -195	+ 45	+ 15	- 15
≥ - 195 and < -135	+ 40	+ 10	- 20
≥ - 135 and < -85	+ 35	+ 5	- 25
≥ - 85 and < -45	+ 30	0	- 30
≥ - 45 and < +5	+ 25	-5	-35
≥ +5 and < +60	+ 20	- 10	- 40
≥ +60 and < +130	+ 15	- 15	- 45
≥ +130 and < +200	+ 10	- 20	- 50
≥ +200 and < +380	+ 5	- 25	- 55
≥ + 380	0	- 30	- 60

Change of points for home team, according to the result of the match and to the difference of ranking points (RP) between home and away team, for K = 60. The away team have a simetrical change.

This new table will be considered for the purpose of calculation of the ranking, in a match by match manner, after the 11 September 1999.

2. Women's competitions with games played at the home of one team

Due to the yet small number of matches included in the database, for these conditions, less than 1.000, an accurate statistical analysis is not yet possible. When the number of matches reaches the 2.000, a provisional study will be presented. Until then, the ranking calculation will follow the scheme adopted for men's competitions.

3. Competitions with games played at neutral places

Due to the yet small number of matches included in the database, for these conditions, less than 2.000, an accurate statistical analysis is not yet possible. When the number of matches reaches the 2.000, a provisional study will be presented. Until then, the normal ELO table will be employed to calculate the ranking for these kind of matches.

