

# Scoring Patterns in Rugby League

---

*John Croucher*

Department of Statistics, School of Economic & Financial Studies, Macquarie University, NSW Australia.

---

---

## ◆INTRODUCTION◆

---

IT IS well known that sporting data provide a rich source of information for lecturers and students for statistical analysis with virtually no limit to the amount of investigation that can be undertaken. Previous studies in this regard include Croucher (1981 and 1985) on tennis, Kimber (1993) on cricket, Mosteller (1970) on American football and Windle (1993) on horse-racing to name but a few.

One of the more popular international codes of football is rugby union where tournaments such as the five nations and World Cup in particular attract a great deal of interest. However, in 1908 a breakaway football code called rugby league was formed and has since developed into the main winter sport for many parts of Australia. It is also now a professional code which is played in a number of countries including New Zealand, Great Britain, South Africa, France, New Guinea and Fiji.

The 13 a-side game is played in two 40 minute halves and scoring is done by:

- (i) a try (worth 4 points)
- (ii) a goal (worth 2 points)
- (iii) a field goal (worth 1 point)

A goal may be kicked as a result of a try conversion or a penalty kick. Try conversion kicks may be taken in any position parallel to the sideline from where the try was scored. An odd scoreline can occur for a team only if they kick an odd number of field goals.

The Australian Sydney based competition consists of teams who do not necessarily play each other twice but, for the most part, play half of their matches at home and half away.

As well as being popular in its own right, rugby league is also a source of betting through the TAB (a Government betting Agency) where around \$A20 million (or £9 million) per season is wagered legally on the outcomes of these games. Gambling options include trying to predict the exact score for each team in a game and selecting the winning teams (with points start taken into consideration) for all eight matches in a round.

This paper considers some of the more interesting



scoring patterns of 88 matches played by the 16 teams over 11 rounds during the 1993 season. To achieve this the analysis involved the construction of a database which included 40 variables and over 3500 data points. While space does not permit a listing of all the actual data, an idea of the type of information recorded is given along with suggestions how this may be used for teaching purposes.

---

## ◆HOME VERSUS AWAY◆ PERFORMANCE

---

In most sports the 'home ground' advantage is well documented, an example being Stefani (1992). Reasons for the home advantage include familiarity with the ground, loud cheering by home fans (who are often in the vast majority) and perhaps the referee favouring the home team in the penalty count.

This home advantage is certainly true in rugby league where traditionally about two-thirds of home teams win their games (in general it is around 65%). However, in 1993 there has been a reversal of this trend with 43 of the 88 matches being won by the home team, 44 by the away team and one match was drawn.

Although this represented a significant departure from past trends (this can be tested as an exercise), the reasons for this anomaly were not clear. However, it possibly

related to some of the weaker teams who generally won at least a few home matches and did not do so but nevertheless managed to win a few games away. A consequence of this was that media football tipsters had a difficult time since in the past they used the rule of 'when in doubt go for the home team'. This strategy proved a disaster in 1993 where tipster success rates were quite low.

The points scored by home and away teams are shown in Table 1 in the form of a grouped frequency distribution. (Exercises include constructing histograms for each and comparing shapes. The mean and standard deviations can also be estimated and compared for significant differences. Is the result surprising in view of the fact that away teams won more matches?)

**Table 1.** Points scored by home and away teams.

Points scored	Home	Away
0-3	8	4
4-7	7	14
8-11	17	21
12- 15	15	14
16-19	14	11
20-23	10	12
24-27	5	7
28-31	4	3
32&over	8	2
<b>TOTAL</b>	<b>88</b>	<b>88</b>

In fact, there were 2654 points scored - 1433 by the home teams ( $\bar{x} = 16.3$  and  $s = 12.24$ ) and 1221 by the away teams ( $\bar{x} = 13.9$  and  $s = 9.41$ ).

In particular, winning home teams scored 1029-390 points (average 24.9) while winning away teams scored 821-394 points (average 19.9). Overall, winning teams are about five points better in attack at home but their defence is much the same home and away. (Is this significant? Is more information required?)

Winning home teams also scored 178-64 tries for-against while winning away teams have scored 136-61 tries for-against. Hence while the number of tries scored by winning teams is 30% larger at home, there is no difference between the number they conceded home and away. (This can be tested for significance.) The actual number of tries scored by home and away teams is shown in the frequency distributions in Table 2. (Exercises include constructing histograms for each and comparing shapes. The mean and standard deviations can be calculated exactly and compared for significant differences. Is this result surprising?)

**Table 2.** Number of tries scored by home and away teams.

Tries scored	Home	Away
0	10	8
1	16	24
2	27	20
3	9	18
4	10	11
5	7	4
6	4	2
7	2	1
8	0	0
9	2	0
10	1	0
<b>TOTAL</b>	<b>88</b>	<b>88</b>

### ◆TIME TO FIRST SCORE POINTS◆

A detailed analysis was undertaken of the time each team took to score their first points (either by try, goal or field goal). In 62 matches (70%) the team scoring the first points went on to win the match and in 25 matches (28%) the team scoring the first points lost. (Is this significant?) The remaining match was drawn. This result may explain the emphasis by some coaches on the importance of scoring first.

Only two home and three away teams did not score a point in a game. A summary of the time taken (in minutes) to score the first points (for those that scored at all) is shown in Table 3 for the 86 home teams and the 85 away teams.

**Table 3.** Summary of time taken (in minutes) to score the first points.

Statistic	Home	Away
Number ( $n$ )	86.00	85.00
Mean ( $\bar{x}$ )	15.33	21.42
Median ( $\tilde{x}$ )	11.00	16.00
Standard deviation ( $s$ )	15.30	17.12
Minimum	1.00	2.00
Maximum	78.00	67.00

A pooled t-test statistic for the difference between the means yielded a value of 2.46 resulting in a p-value of  $<0.02$ . Home teams do score first points significantly earlier than away teams but, as stated previously, won fewer matches.

From Table 3 it also seems that the home team scores its first points about five or six minutes, on average, before the away team. This is true whether we consider the mean or the median as an appropriate measure. This indicates that although home teams may be quicker

starters than their opponents, this does not guarantee success in the long run.

The grouped frequency and percentage cumulative distributions of the actual times taken by home and away teams to their first score is shown in Table 4.

**Table 4.** Distributions of time taken to score by home and away teams.

Time taken Home (mins)		Cum.%	Away	Cum.%
1- 5	24	28	15	18
6-10	18	49	10	29
11 - 15	17	69	15	47
16-20	6	76	13	62
21-25	6	79	7	71
26-30	4	87	5	76
over 30	11	100	20	100
<b>TOTAL</b>	<b>86</b>		<b>85</b>	

The data in Table 4 verify the trend of earlier scoring of points by home teams with about half of them scoring in the first 10 minutes compared with under 30% for away teams. (Is this significant?) To determine if differences occur between winning home and away teams, the data were split into these two categories in Table 5.

**Table 5.** Summary of time taken (in minutes) by the winning team to score the first points according to whether they were playing at home or away.

Statistic	Home	Away
Number ( $n$ )	43.00	44.00
Mean ( $\bar{x}$ )	10.58	15.50
Median ( $\tilde{x}$ )	9.00	13.00
Standard deviation ( $s$ )	8.05	12.66
Minimum	1.00	2.00
Maximum	33.00	54.00

Using Table 5 a pooled t-test statistic for the difference between the means yielded a value of 2.21 resulting in a pvalue of  $<0.05$ . Winning home teams do score first points significantly earlier than winning away teams by an average of about 4 or 5 minutes. An F-test on the differences between the variances yielded a non-significant test statistic value of 2.47 with a p-value of  $>0.05$ .

### ◆REMARKS◆

Like other sports, rugby league provides a wealth of statistical data for investigation and most rugby league coaches now have computer systems to record

at least basic information about their players and details on their performance. This is the case in many professional sports where there are many evenly matched teams and collection of information on both your own and opposition players is commonplace. There is also much of the basic data published in the press and magazines.

There are many other aspects that students could investigate including referee performance, modelling the goal kicking performance, the danger times in defence for teams, the importance of converting tries and winning scrums, the performance of teams playing at night and the importance of having a half time lead and of scoring just before half time.

Indeed, many of the aspects discussed here also apply to rugby union where a study of, say, World Cup matches or the five nations tournament would prove both instructive for demonstration of statistical principles and relevance of application.

### References

- Croucher, J.S. (1981) An analysis of the first 100 years of Wimbledon tennis finals. *Teaching Statistics*, **3(3)**, 72-74.
- Croucher, J.S. (1985) Changing the rules of tennis: who has the advantage? *Teaching Statistics*, **7(3)**, 82-84.
- Kimber, A. (1993) A graphical display for comparing bowlers in cricket. *Teaching Statistics*, **15(3)**, 84-86.
- Mosteller, F. (1970) Collegiate Football Scores. U.S.A., *Jrnl. of the American Stat. Assoc.*, **47(259)**, 355-380.
- Stefani, R.T. (1992) Prediction and home advantage for Australian Rules football. *J. of Applied Statistics* **19(2)**, 251-261.
- Windle, D. (1993) Multiple criteria decision making applied to horse racing. *Teaching Statistics*, **15(2)**, 34-37.

