

AUSTRALIAN RULES FOOTBALL DURING THE 1980's

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The decade of the 1980's has concluded in Australian Rules Football after 1386 home & away matches and 60 finals games leading up to the ten premierships. With the help of a computer, the results can be used to obtain conclusions about the best teams over the entire decade, the best of the single-season teams, scoring trends, the advantage of playing at home and the predictability of the matches. The conclusions obtained by relatively sophisticated methods can be compared with those obtained by the average football follower.

Both authors have long been interested in using a computer to predict football matches. Using least squares methodology to produce a team rating, Stefani (1977,1980,1987) has forecast the results of several thousand matches in the U.S.A and Europe. Using ratings that were exponentially smoothed depending on the margin of victory, Clarke (1981, 1988) provided computer tips for a Melbourne daily newspaper from 1981 to 1986. In 1987 collaboration began on Australian Rules Football - Stefani & Clarke (1990). It was found the results produced by the 2 algorithms are surprisingly similar. All the results detailed here have been obtained with the Stefani method.

Best club performances

A simple way to compare clubs over the decade is to construct an ordinary premiership table. This has been done in Table 1. Results for South Melbourne earned during the 1980 and 1981 seasons are combined with those for Sydney earned starting in 1982. The table includes games played, wins,

losses, points scored by each team during the games, points scored against each team, percentage, premiership points and a computer rating. Premiership points are earned at the rate of four points for each win and two points for a draw, and are used during a season to produce a ladder order. However, given the varying number of games played by teams (due to finals appearances, and the

recent introduction of interstate teams) the average follower might be expected to use percentage - 100 times the number of points for divided by points against. This is normally used only to order teams tied on premiership points.

Because the draw is not equally fair to all teams, here the teams are ranked based on the average computer rating over the decade. The computer rating uses a least-squares method to produce a weekly rating which is the average margin of victory corrected for home advantage plus the average opponent rating, a measure of strength of schedule. This rating provides much more information than percentage, which depends only on the margin of victory.

To interpret Table 1, it is important to realize that every team except Brisbane and West Coast played 220 home & away games. The latter teams joined the Victorian Football League in 1987, making it a more aptly-named Australian Football League. Those two teams each played 66 home-away games. All teams except Brisbane and St. Kilda participated in finals matches.

In the 1446 matches the teams scored a total of 297,203 points, or nearly 206 points per game. Hawthorn is the best team over the decade, with a clear gap to Carlton and Essendon. These three teams stand out as the most successful teams over the entire decade, playing in 24, 20, and 15 finals matches respectively. At the lower end, St Kilda and Brisbane are clearly the worst teams of the decade, well behind Melbourne and Footscray. The remaining teams are grouped together with both ratings and percentages about 100.

It is interesting that a simple analysis based on percentages would have reached the same major conclusions. The complicated computer rating produces results which differ only slightly from the much more simple method of percentage. Where the ordering due to percentage is different from that of the average computer rating, it is due to only minor differences in the ratings of the teams. Possibly the extra factors the computer method takes into account do even out over the decade, suggesting that if you have enough data, simple methods may be adequate.

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RANK	TEAM	G	W	L	D	FOR	AG	PCT	Prem pts	Average rating
1	Hawthorn	244	176	60	1	28927	22535	128.4	706	125.7.
2	Carlton	240	158	80	2	26002	21983	118.3	636	117.5
3	Essendon	235	152	82	1	25667	21654	118.5	610	116.3
4	Geelong	229	118	110	1	23697	22716	104.3	474	103.5
5	Collingwood	234	124	108	2	23542	22984	102.4	500	103.1
6	Nth. Melb.	226	114	108	4	24418	24417	100.0	464	100.0
7	Fitzroy	228	106	120	2	24101	24488	98.4	428	99.2
8	West Coast	67	31	36	0	6604	6714	98.4	124	98.0
9	Sydney	226	110	116	0	23507	23955	98.1	440	97.7
10	Richmond	225	103	122	0	23203	24480	94.8	412	94.5
11	Footscray	223	87	134	2	20112	23088	87.1	352	88.7
12	Melbourne	229	90	139	0	21956	25092	87.5	360	87.2
13	Brisbane	66	21	45	0	5711	7361	77.6	84	75.5
14	Sl. Kilda	<u>220</u>	48	171	1	<u>19756</u>	25736	76.8	194	74.2
		1446				297203				

Table 1 Recap for the Decade of the 1980's
Includes both home & away and finals matches.

Year	Highest Rating		Second Highest Rating	
1980	Richmond	135.0 (P)	Nth Melb.	119.5
1981	Carlton	124.2 (P)	Geelong	121.5
1982	careen	128.6 (P)	Hawthorn	127.3
1983	Hawthorn	130.0 (P)	Essendon	122.2 (R)
1984	Essendon	127.2 (P)	Hawthorn	124.7 (R)
1985	Essendon	135.6 (P)	Hawthorn	126.9 (R)
1986	Hawthorn	133.1 (P)	Carlton	131.2 (R)
1987	Carlton	137.0 (P)	Hawthorn	136.7 (R)
1988	Hawthorn	138.8 (P)	Carlton	114.5
1989	Geelong	136.2 (R)	Hawthorn	135.7 (P)

Table 2
Two Highest Rated Teams For Each Season
(p=Premiership, R=Runner-up)

Highest computer rated teams each year

We all know who won the grand finals, but some followers argue that in spite of not winning the flag their team was still the best that year. We might ask how efficient the league's system of home and away matches followed by a final series is in choosing the best team. In this section we compare the best teams as rated by the computer with the actual grand finalists. Table 2 contains the highest two computer-rated teams at the conclusion of the grand final. For nine of the ten years, the highest rated team won the premiership. The only exception was Geelong which lost one of the hardest-fought grand finals by one goal in 1989 while retaining the highest rating. In six of the ten years the two grand finalists also had the two highest ratings. It appears the league's system is quite efficient at selecting the best team.

Best 'single season' teams of the decade

Footy fans spend a lot of time discussing the relative merits of teams from different eras. We cannot physically play Hawthorn's 83 side with their 89 side, but we can use the computer rating to compare the great sides of the decade. Table 3 shows the ten highest ranking teams for the decade. If five of those teams could be rejuvenated into a finals competition, the elimination final would be a replay of the 1989 grand final while the qualifying final would pair the 1987 grand finalists. While the authors know of no other attempt to state the best teams of the decade, it is difficult to imagine simple methods (eg average winning margin in the finals) producing 2 beaten grand finalists among the best teams of the decade.

What would happen if the 1988 Hawthorn team that won its grand final by 102 points played against Carlton's 1987 premiership winner? Perhaps there is a project there for an operations researcher interested in simulation.

Rank	Team	Year	Rating
1	Hawthorn	1988	138.8
2	Carlton	1987	137.0
3	Hawthorn	1987	136.7
4	Geelong	1989	136.2
5	Hawthorn	1988	135.6
6	Essendon	1985	135.0
7	Richmond	1980	133.1
8	Hawthorn	1986	131.2
9	Carlton	1986	130.0
10	Hawthorn	1983	

Table 3 Ten Highest Rated Single-Season Teams For The 1980's

Scoring and home ground advantage

All football followers recognise the importance of a home ground advantage, but rarely is the actual advantage in points calculated. About 80% of the games involve a home team situation. The remaining 20% are played at VFL Park and are considered neutral games or the games are played by teams sharing the same ground, so that both teams are at home and no advantage is assumed for either team. For example, from 1979 until 1987 Carlton and Hawthorn shared Princes Park. These two were joined by Fitzroy in 1988. The MCG was shared by Richmond and Melbourne from 1979 until 1985. In 1986 they were joined by North Melbourne. During the 1985 and 1986 seasons Collingwood and Fitzroy shared Victoria Park, Collingwood.

Table 4 shows the number of home games played each season, the percentage of home team Wins, the total points scored per game (P), the excess number of points scored by the home team per game (H), and the ratio of P to H.

Over the entire decade the home team won 58% of its games by an average of 9.8 points per game, or 1 point in every 21.1 points scored. The fraction of home wins and pointwise home advantage was generally greater at the end of the decade. In 1989 the home team won 63.9% of the games, the highest for the decade. The total number of points scored was generally greater in the early part of the decade. During the 1982 season 226.2 points per home game were scored, the highest yearly output. The average was 206.5 points per game for the entire decade. Since the number of points

scored dropped at decade's end while the home advantage increased, the lowest ratio of total-to-home advantage was in 1989 in which the home advantage was one point in each 13.7.

Year	No. of home games	% of home wins	Total Pts P	Home Adv. H	Ratio P/H
1980	128	56.3	208.8	2.1	99.4
1981	104	54.8	198.5	10.1	19.7
1982	105	56.2	226.2	12.6	17.9
1983	106	55.7	214.7	8.9	24.1
1984	106	58.5	206.7	9.4	22.1
1985	101	51.5	213.1	5.7	37.2
1986	100	58.0	205.5	11.7	17.6
1987	120	62.5	212.0	14.2	14.9
1988	117	60.7	194.4	10.0	19.4
1989	112	58.0	188.2	9.8	21.1
Total	1109	58.0	206.5	9.8	21.1

Table 4 Scoring and Home Advantage For The 1980's

Scoring and Home advantage during the year.

Table 5 reorganizes the data in Table 4 by combining the ten years of data by week. The first and last five weeks are separately combined. When finals matches resulted in a home ground advantage, those matches are added to the data for the last five weeks. In the middle of the season, the data is combined four weeks at a time. In effect, Table 5 shows the monthly progression of scoring and the home advantage. Scoring is somewhat lower in the last three months of the season as the weather deteriorates. The pointwise home advantage and the fraction of games won by the home team appears to be somewhat higher toward the end of the season. Thus it may be an advantage for teams to play home matches against important opponents at the end of the season rather than at the beginning.

Wks	No. of home games	% of home wins	Total Pts P	Home Adv. H	Ratio P/H
1-5	257	55.3	217.2	5.7	38.0
6-9	201	56.2	206.8	9.4	22.1
10-13	198	60.1	201.1	12.0	16.8
14-17	200	58.0	199.6	8.5	23.4
18-22	253	60.5	205.2	13.6	15.0
1-22	1109	58.0	206.5	9.8	21.1

Table 5 Scoring and Home Advantage By Week

Individual team home ground advantages

Although the collective home ground advantage for the entire decade is 9.8 points per game, it is possible to assign individual home advantages to each team. In this case an analysis done by most followers is likely to mislead. Although all teams do better at home than away, most supporters fail to realise that this is also due to the collective home advantage of the opposition. In a proper analysis this has to be allowed for to obtain an individual team's home ground advantage. As mentioned above, about 80% of all games involve a home ground advantage. About 80% of that 80% involve a return match on a home ground, so that about 64% of all games can be paired. Individual home ground advantages may be found by combining seasonal results for home-away pairs and then using a computer to obtain the home advantage of each team. Those advantages were averaged for the decade and displayed in Table 6. That table shows each team, the average advantage and the number of home-away pairs in which the team participated.

West Coast has the highest home advantage for the decade. In fact, West Coast's home advantage increased during its three years in the league from 17.3 in 1987 to 29.2 in 1988 to 61.0 in 1989. For example, West Coast's participated in nine home-away pairs for 1989. West Coast won five of nine home games by an average of 19.7 points per game. The team lost eight of nine away games by an average of 48.6 ppg, thus the average home-away difference was 68.3 ppg. The average opponent had a home advantage of 7.3 ppg leaving West Coast with a net advantage of 61.0 ppg.

Most experts believe that a visiting team suffers a disadvantage caused by combinations of fatigue from travel, especially across time zones, crowd intimidation, and lack of familiarity with the playing conditions. It is logical that West Coast should benefit from the distances travelled by other teams. Table 6 indicates that some other teams have above average home advantages, specifically: Footscray, Carlton, Essendon and Sydney. While this is probably in line with most supporters perceptions, other parts of the table are not. Geelong is low on the table while Collingwood has only a slight positive advantage, substantially less than the league average. The supposed intimidate effect of the Collingwood supporters at Victoria Park does not appear to show up in the figures. In addition, not all teams benefit from playing at home. North Melbourne and Richmond have

not benefited from sharing the MCG (each has a negative home advantage).

Rank	Home Team	Paired Advantage	Games
1	West Coast	36.8	25
2	Footscray	19.9	73
3	Carlton	16.3	58
4	Essendon	13.7	72
5	Sydney	13.1	97
6	St. Kilda	12.5	74
7	Fitzroy	10.8	64
8	Melbourne	9.9	63
9	Brisbane	8.9	23
10	Geelong	5.5	77
11	Hawthorn	3.7	63
12	Collingwood	0.3	62
13	North Melb.	-1.0	66
14	Richmond	-1.6	64
	All teams	9.8	880

Table 6 Home Advantage By Team For the 1980's

Predictions

The rating system described above can also be used to predict the outcome of future matches. The rating difference is generally larger than the subsequent average margin of victory so that difference is multiplied by a shrinking factor of about 0.7 when predicting matches. The collective home advantage is added for purposes of prediction. A five year average for the shrinking factor and for the collective home advantage was used to predict the outcome of the 1446 games played during the 1980's. The same method has been applied to American college football, American professional football, American college basketball, and soccer football with 70% accuracy in predicting the winner over 10,000 matches.

Table 7 contains the results for Australian Rules Football. The table shows the fraction of correct predictions during the home & away schedule, during the finals and for all games combined. Draws are considered to be half right and half wrong. The average point error is also shown. Accuracy varies from a high of 73.2% in 1981 to a low of 64.1% in 1988. The first three years of the decade were more predictable than the last seven years, while predictability during the last seven years of the decade was rather consistent. For the entire decade 68.1% of the 1446 games were correctly predicted. However, accuracy for the 60 finals matches was only 56.7%. There is no intrinsic difference with finals matches. These matches are less predictable only because the

teams are more evenly matched. Games played during the home-away schedule among evenly matched teams have about the same predictability as the finals matches. The average point error varied from 27.5 points per game in 1981 to 36.5 ppg in 1987. The average for the 1446 games was 32.9 ppg.

The accuracy of these computer predictions should be compared to the accuracy of human predictors to put the results into proper perspective. For example, in 1980, commentators in the Age, Herald and Sun were 63% accurate during the home-away schedule compared to 70.8% for the computer. In 1981 the humans were 73% accurate compared to 74% for the computer. From 1976 through 1981 the humans were 47% accurate during the finals. The computer was 50% accurate during 1980 and 1981. It appears that the computer is a better-than-average predictor, about at the expert range for humans. Also, computer and human predictions tend to rise and fall together. Both have difficulty on finals matches, so those of you who similar trouble can be assured that you have a lot of company. It is interesting to speculate as to why so called experts, with their extra information and inside knowledge, do not perform better than computer predictions - perhaps much of the information thought important by the experts (injuries to key players, performance at training, weather conditions etc) is really not that important in determining the results of matches.

<u>Year</u>	<u>Gms.</u>	<u>% Home-Away Correct</u>	<u>% Finals Correct</u>	<u>% all games Correct</u>	<u>Av. margin of Error</u>
1980	138	70.8	50.0	70.0	29.8
1981	138	74.2	50.0	73.2	27.5
1982	138	73.2	16.7	70.0	32.9
1983	138	65.9	83.3	66.7	34.1
1984	138	65.9	83.3	66.7	32.4
1985	138	67.0	83.3	67.8	34.7
1986	138	68.9	50.0	68.1	35.6
1987	160	68.2	50.0	67.5	36.5
1988	160	64.6	50.0	64.1	32.9
<u>1989</u>	<u>160</u>	<u>68.5</u>	<u>50.0</u>	<u>67.8</u>	<u>aia</u>
	1446	68.6	56.7	68.1	32.9

Table 7 Australian Rules Football Predictions

Some conclusions

With the help of a computer, the 1446 matches played during the 1980's yielded some interesting results when analysed by both technical and less technical means. The best teams over the entire decade were Hawthorn, Carlton and Essendon. The best

single-season teams were Hawthorn's 1988 premiership winner and Carlton's 1987 winner. The top computer-rated team won nine of ten premierships, the exception being Geelong in 1989. The home advantage was worth 9.8 points per game and the home team won 58% of the games. The highest individual home advantages were by West Coast, Footscray and Carlton, but Richmond and North Melbourne actually had negative advantages while sharing the MCG. Computer predictions are better than the average human. The computer predicted 68.1% of the 1446 games correctly, but only 56.7% of the finals matches in which the teams are more closely matched.

As the decade of the 1990's continues, a few predictions can be safely made. New champions will be crowned. There will be more hard-fought finals and more surprises. Supporters will continue to argue the relative merits of their teams, and technology will probably be used to an increasing degree to resolve those arguments. Meanwhile, we can all wonder what would happen if Hawthorn's 1988 team played Carlton's 1987 team?

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