Girl and Boy characters with statistical bell curves on their guernseys standing left and right of  the words 'WORKING WITH STATISTICS'.


If you were asked who won a game of footy, but you don’t know the final score, then a clever answer would be:

**“The team that kicked the most goals won that game.”**

However, this isn’t always true.

In a real season of Australian Rules football where over 200 games were played, there were 13 matches where the team who kicked the most goals **did not win the game!** This is because there are more ways to score points than just kicking goals. The 6 points awarded for 1 goal could also be produced by 6 behinds, worth 1 point each. We can summarise the entire season’s wins, losses and draws based on the difference in goals kicked in the following table:

|  |  |  |
| --- | --- | --- |
| **Difference in Goals per Game** | Total Games | |
| Won | Lost/Draw |
| Teams that kicked more goals than their opposition | 194 | 13 |

However, by using statistics we can make predictions about match results without knowing the final score. For example, you could say:

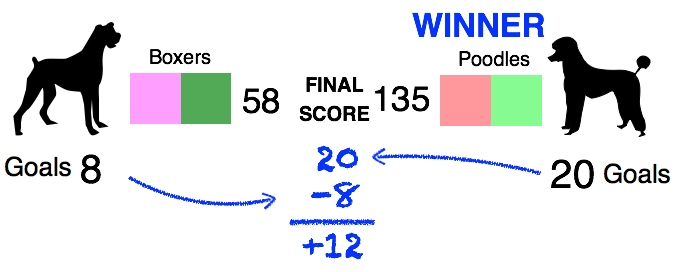
**“Any team that kicked 2 or more goals than their opposition always won that game.”**

Not every match will have a difference of 2 or more goals, but for the games that do, we will know who won it!

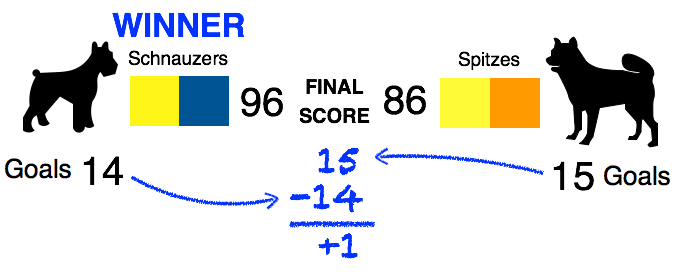
Girl and Boy characters with statistical bell curves on their guernseys standing left and right of  the words 'WORKING WITH STATISTICS'.


To see how this works, let’s look at two matches. We are interested in 3 questions:

1. **Which team kicked more goals?**
2. **How many more goals did they kick?**
3. **Did they win or lose?**

****

In a match between the Poodles and the Boxers, the Poodles kicked 12 more goals than the Boxers and won the game. This shows that the team that kicked 2 or more goals than their opposition won the game.

****

However, in a match between the Spitzes and the Schnauzers, the Spitzes lost the game despite having 1 more goal than the Boxers. Since the goal difference was less than 2 goals, we cannot say for sure which team won based on just goal difference. However, this still shows our rule: that a team who kicks 2 or more goals over their opposition always wins the game.

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These two matches were the first and last in Round 1 of the competition. We can look at other matches in this round and see which teams had a bigger goal difference and whether or not they won.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Round | Match | Team that kicked more goals | Goal Difference | Won, Lost or Drawn? |
| Round 1 | Pdl - Bxr | Poodles | +12 more | Won |
| Round 1 | Pgs - Dlm | Pugs | +1 more | Won |
| Round 1 | Ter - Spn | Terriers | +1 more | Won |
| Round 1 | Mst - StB | Mastiffs | +1 more | Won |
| Round 1 | Chi - Bgl | Chihuahuas | +9 more | Won |
| Round 1 | Shp - Dch | Sheepdogs | +4 more | Won |
| Round 1 | Hnd - Pnt | Hounds | +4 more | Won |
| Round 1 | Shp - Crg | Shepherds | +1 more | Won |
| Round 1 | Sch - Spz | Spitzes | +1 more | Lost |

We have used red to distinguish teams that lost despite kicking more goals and green for those that won. If we re-sort the games by goal-difference, then the distinction becomes clear: there was only one goal difference that linked to a losing team – the Spitzes with ‘+1 more’.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Round | Match | Team that kicked more goals | Goal Difference | Won, Lost or Drawn? |  |
| Groups matches according to how many goals up they are. There are 5 matches with 1 goal difference, 2 with 4 goal difference, 1 with 9 goal difference and 1 with 12 goal difference. | Round 1 | Pgs - Dlm | Pugs | +1 more | Won | Points to the round where a team was one goal up, but did not win |
| Round 1 | Ter - Spn | Terriers | +1 more | Won |
| Round 1 | Mst - StB | Mastiffs | +1 more | Won |
| Round 1 | Shp - Crg | Shepherds | +1 more | Won |
| Round 1 | Sch - Spz | Spitzes | +1 more | Lost |
| Round 1 | Shp - Dch | Sheepdogs | +4 more | Won |
| Round 1 | Hnd - Pnt | Hounds | +4 more | Won |
| Round 1 | Chi - Bgl | Chihuahuas | +9 more | Won |
| Round 1 | Pdl - Bxr | Poodles | +12 more | Won |

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In the left third of the sheet is a long table of data. There are over 200 rows in the table and the font size purposely too small to be read. The table is used to show how a statistic of interest can be viewed over a large number of instances. Most rows in the table are green with 13 red rows dispersed throughout the table. Left of each red row is an arrow pointed to it with words ‘DID NOT WIN’ alongside.

The top few rows of the table are expanded in window to the top right of the sheet. This is to show some of the contents of this table. They are same contents from previous tables in this document. They will be described following a description of the text on this sheet.

The text for this page are found below the expanded window and to the right of the long table of data.

Begin text: We now move from Round 1 to the entire season. We list every match - in the order played - and look at the same information as before: the team that kicked the most goals, the goal difference and whether they won or not.

Again, we have used red to distinguish teams that lost despite kicking more goals and green for those that won.

While the text is too small to read, the ‘Red’ matches/teams are clearly visible. Without having to look directly at each match we can see how few there were of these Red teams and how far they were spread throughout the entire season. End text.

Below the text is an arrow pointing to the very last row of the long data column with the words ‘The Grand Final is GREEN!’

We return to a description of the contents of the expanded window in the top right of the sheet.

A table of Round 1 matches showing the matches played, the team that kicked more goals, the goal difference and whether that team won, lost or was drawn with the opposing team.

The second column of the table shows the match that was played identified by dog codes. For example the Poodles versus the Boxers is shortened to PDL - BXR. These dog codes are largely irrelevant and are only included to provide a means of reference. The reason for the this table is solely to communicate the teams that kicked more goals, the goal difference and whether that team won, lost or was drawn with the opposing team.

Rows containing data are coloured either red or green.
Red is to distinguish teams that kicked more goals and lost or were drawn in their match.
Green is to distinguish teams that kicked more goals and won their match.

The Data Row 1 contents by column are now described from left to right:
The Round Column contains Round 1.
The Match Column has a dog code that signifies Match 1.
The 'Team that kicked more goals' Column contains Poodles
The Goal Difference Column contains +12 more
The Won, Lost or Draw? Column contains Won
The overall colour of this row is Green

Data Row 2 contents by column are now described from left to right:
The Round Column contains Round 1.
The Match Column has a dog code that signifies Match 2, 
The 'Team that kicked more goals' Column contains Pugs
The Goal Difference Column contains +1 more
The Won, Lost or Draw? Column contains Won
The overall colour of this row is Green

Data Row 3 contents by column are now described from left to right:
The Round Column contains Round 1.
The Match Column has a dog code that signifies Match 3, 
The 'Team that kicked more goals' Column contains Terriers
The Goal Difference Column contains +1 more
The Won, Lost or Draw? Column contains Won
The overall colour of this row is Green

Data Row 4 contents by column are now described from left to right:
The Round Column contains Round 1.
The Match Column has a dog code that signifies Match 4, 
The 'Team that kicked more goals' Column contains Mastiffs
The Goal Difference Column contains +1 more
The Won, Lost or Draw? Column contains Won
The overall colour of this row is Green

Data Row 5 contents by column are now described from left to right:
The Round Column contains Round 1.
The Match Column has a dog code that signifies Match 5, 
The 'Team that kicked more goals' Column contains Chihuahuas
The Goal Difference Column contains +9 more
The Won, Lost or Draw? Column contains Won
The overall colour of this row is Green

Data Row 6 contents by column are now described from left to right:
The Round Column contains Round 1. 
The Match Column has a dog code that signifies Match 6, 
The 'Team that kicked more goals' Column contains Sheepdogs
The Goal Difference Column contains +4 more
The Won, Lost or Draw? Column contains Won
The overall colour of this row is Green

Data Row 7 contents by column are now described from left to right:
The Round Column contains Round 1.
The Match Column has a dog code that signifies Match 7, 
The 'Team that kicked more goals' Column contains Hounds
The Goal Difference Column contains +4 more
The Won, Lost or Draw? Column contains Won
The overall colour of this row is Green

Data Row 8 contents by column are now described from left to right:
The Round Column contains Round 1.
The Match Column has a dog code that signifies Match 8, 
The 'Team that kicked more goals' Column contains Shepherds
The Goal Difference Column contains +1 more
The Won, Lost or Draw? Column contains Won
The overall colour of this row is Green

Data Row 9 contents by column are now described from left to right:
The Round Column contains Round 1.
The Match Column has a dog code that signifies Match 9, 
The 'Team that kicked more goals' Column contains Spitzes
The Goal Difference Column contains +1 more
The Won, Lost or Draw? Column contains Lost
The overall colour of this row is Red

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In the left third of the sheet is a long table of data. There are over 200 rows in the table and the font size purposely too small to be read. The table is used to show how a statistic of interest can be viewed over a large number of instances. Most rows in the table are green with 13 red rows grouped at the top of the table. Flanking the table on the left are brackets indicating groupings of matches by goal difference. There are 16 seperate brackets each with its own label. The labels tell you what the goal difference is for that bracket. The labels run consecutively from 1 to 16, starting with ‘+1 goal up’ and ending with ‘+16 goals up’.

The top few rows of the table are expanded in window to the top right of the sheet. This is to show some of the contents of this table. They are new contents but follow the logic from previous tables in this document. They will be described following a description of the text on this sheet.

The text for this page are found below the expanded window and to the right of the long table of data.

Begin text: When we re-order the entire season by goal difference from smallest to largest a definite pattern emerges.

In the close-up window above, the Sptizes are shown to have lost twice despite kicking more goals: one game we have already seen from Round 1 and in a different game from Round 5. Each time the Spitzes had a ‘+1 more’ goal difference. 

While there are lots of matches grouped by different goal differences, there is only one goal difference associated with losing - the ‘+1 more’ teams.

We can now summarise this information into a useful statistical rule about the entire season. End text.

We now return to a description of the contents of the expanded window in the top right of the sheet.

An section of the whole table containing matches from the entire season. Section of table shows the matches played, the team that kicked more goals, the goal difference and whether that team won, lost or was drawn with the opposing team.

The second column of the table shows the match that was played identified by dog codes. For example the Poodles versus the Boxers is shortened to PDL - BXR. These dog codes are largely irrelevant and will be skipped in this description as they have no impact on the understanding of this infographic. 

The rows have been sorted by Goal Difference from smallest to largest.

Rows containing data are coloured either red or green.
Red is to distinguish teams that kicked more goals and lost or were drawn in their match.
Green is to distinguish teams that kicked more goals and won their match.

Data Row 1 contents by column are now described from left to right:
The Round Column contains Round 1.
The 'Team that kicked more goals' Column contains Pugs
The Goal Difference Column contains +1 more
The Won, Lost or Draw? Column contains Won
The overall colour of this row is Green

Data Row 2 contents by column are now described from left to right:
The Round Column contains Round 1.
The 'Team that kicked more goals' Column contains Terriers
The Goal Difference Column contains +1 more
The Won, Lost or Draw? Column contains Won
The overall colour of this row is Green

Data Row 3 contents by column are now described from left to right:
The Round Column contains Round 1.
The 'Team that kicked more goals' Column contains Mastiffs
The Goal Difference Column contains +1 more
The Won, Lost or Draw? Column contains Won
The overall colour of this row is Green

Data Row 4 contents by column are now described from left to right:
The Round Column contains Round 1.
The 'Team that kicked more goals' Column contains Shepherds
The Goal Difference Column contains +1 more
The Won, Lost or Draw? Column contains Won
The overall colour of this row is Green

Data Row 5 contents by column are now described from left to right:
The Round Column contains Round 1. 
The 'Team that kicked more goals' Column contains Spitzes
The Goal Difference Column contains +1 more
The Won, Lost or Draw? Column contains Lost
The overall colour of this row is Red

Data Row 6 contents by column are now described from left to right:
The Round Column contains Round 2. 
The 'Team that kicked more goals' Column contains Corgis
The Goal Difference Column contains +1 more
The Won, Lost or Draw? Column contains Won
The overall colour of this row is Green

Data Row 7 contents by column are now described from left to right:
The Round Column contains Round 3.
The 'Team that kicked more goals' Column contains Spaniels
The Goal Difference Column contains +1 more
The Won, Lost or Draw? Column contains Won
The overall colour of this row is Green

Data Row 8 contents by column are now described from left to right:
The Round Column contains Round 5.
The 'Team that kicked more goals' Column contains Spitzes.
The Goal Difference Column contains +1 more
The Won, Lost or Draw? Column contains Lost
The overall colour of this row is Red

Data Row 9 contents by column are now described from left to right:
The Round Column contains Round 5.
The 'Team that kicked more goals' Column contains Chihuahuas.
The Goal Difference Column contains +1 more
The Won, Lost or Draw? Column contains Won
The overall colour of this row is Green

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To the right of the long table is a very long bracket. It is marking out all the grouped areas starting from +2 goals up and ending at the very bottom of the table where the +16 goals up is.

This long bracket has its label which says ‘+2 or more goals up’.

The text for this page are found directly to the right of the ‘+2 or more goals up’ bracket.  

There is a large title to the text which says 'GOALS RULE’ with the following text underneath:

In this season, any team that kicked 2 or more goals over their opposition always won that game.

Below that text is the following:

We will not be using the Goals Rule in this activity since it predicts the winner of a match too easily. Instead we have used this method to find other statistical rules that will allow you to work out 'Who Won It'.