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# Significance, Causality and Statistics

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This preview was researched by the analysts at [Football Form Labs](#).

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## Understanding Significance, Causality and How to Get the Best Out of Statistics

Statistics can be derided in some corners when it comes to betting, and when used wrong they are often selectively picked by users to make one argument when another seemingly equally relevant statistic can be produced to make the opposite argument. As the famous quote goes 'there are lies, damned lies, and statistics'. However, if your goal is to make consistent long-term profits statistics are invaluable.

So how do you go about establishing what is a relevant stat and what isn't? Well the first thing to do when analysing any football match (or any sporting event for that matter) is to get access to as much data as possible so that you can look at the different possible angles before deciding which stats are worth following. At Football Form Labs as we offer analytical software that allows users to run their own queries on a database covering 49 different leagues, including both pre-match and in-play and also player analysis.

Once you have your data the two key points to bear in mind are **significance** and **causality**, i.e. understanding the significance of sample sizes and the relative confidence margins of stats, and being able to explain the reasons and context behind the stats themselves.

Since the start of the 2013/14 season, 49.9% of Premier League matches (404 of 810) have had three or more goals. Now if we assume therefore that all Premier League games have a 50% chance of having either Under or Over 2.5 Goals and that a team's results are all independent then the probability of a side having at least three goals in five consecutive matches, as Chelsea have had at the start of this season, is just 3.1%. Does this mean that we can conclude that Chelsea's matches definitely have more than two goals more often than 50% of the time?

3.1% means it's an unlikely occurrence but you'd still expect one out of 31 teams who have a 50/50 chance of 'overs' in every game to be on such a streak, which means that on most weeks there is likely to be one Premier League on such a run. Now if this were to continue for 10 consecutive games then the chances of that happening are just 0.1%, while for nine of 10 it is just 1.0% and for eight is 4.4%. Therefore we could start to make bolder assertions that these teams do in fact have Over 2.5 Goals more than 50% of the time and that these numbers are becoming significant.

That is a very basic assessment of significance and the assumptions we made were obviously false; matches and results are not independent and can usually be reasonably explained. E.g. if a side normally has Over 2.5 Goals 55% of the time but they lose their key striker and the next five games all have 'unders'. Then those matches were dependent on an event – the injury to the striker – and with football matches there are usually many events that lead to explaining the match outcomes. So it is causality that we want to mostly focus on here. Some examples of causations might be a change of manager, team news, the quality and style of play of the opposition, transfer activity, or simply motivation or fatigue at the end of the season, and while some may be difficult to quantify others we can make a decent assessment of.

As an example, Crystal Palace's 58 games from the start of 2013/14 until Alan Pardew took over last season averaged just 2.26 goals per game (GPG) with 63.8% having fewer than three goals. Since Pardew took over there has been a marked increase in goals, as 61% of their 23 matches have had at least three goals, with an average of 2.69 GPG. If you had the stats then this wouldn't have been a surprise as in Pardew's 229 Premier League games in charge of West Ham, Charlton and Newcastle those matches averaged 2.73 GPG and backing Over 2.5 Goals would have been consistently profitable.

If we work through the Southampton v Man Utd game this weekend we can assess some stats based on their causality. The most obvious bet for this match is likely to be under-goals with the line currently at Under 2.25 Goals and Under 2.5 priced at 1.67, so we'll concentrate there.

Southampton have had fewer than three goals in 60% of matches since the start of last season, which is a good point to go from as it is when Ronald Koeman took over and gives us a decent number of games – going further back will increase the significance of our sample size but reduce the relevance of the matches being included. In these matches they've conceded just 0.88 GPG and while there was some concern that their defence had been significantly weakened with the long-term injury to Fraser Forster and the absence of Ryan Bertrand so far this season, plus the departures of Alderweireld, Clyne and Schneiderlin over the summer, the work they've done in training looks to have solidified the team as they've got kept clean sheets in each of their last three matches.

Home : Southampton												
											Seasons 14/15-15/16	
Summary <span>i</span>											All Matches	All Results
Played	-1.5	+1.5	-2.5	+2.5	-3.5	+3.5	BS	G1H	G2H	1H+	2H+	
43	16	27	26	17	36	7	14	28	31	13	17	
%	37	63	60	40	84	16	33	65	72	30	40	
Odds Conv	2.69	1.59	1.65	2.53	1.19	6.14	3.07	1.54	1.39	3.31	2.53	
<a href="#">Match Outcome</a> <a href="#">Match Goals</a> <a href="#">Team Goals</a> <a href="#">Half-time/Full-time</a> <a href="#">Asian Handicap</a> <a href="#">Corners</a> <a href="#">Bookings</a>												
Matches <span>i</span>												
Season	Match	H/A	Team	Pos	F/C Pos	Versus	Pos	F/C Pos	Res	Score	HT Res	HT Score
15/16	5	A	Southampton	10	11	WBA	15	14	D	0:0	D	0:0
15/16	4	H	Southampton	19	11	Norwich	10	9	W	3:0	W	1:0
15/16	3	A	Southampton	18	11	Watford	13	13	D	0:0	D	0:0
15/16	2	H	Southampton	11	11	Everton	9	7	L	0:3	L	0:2
15/16	1	A	Southampton	12	11	Newcastle	16	20	D	2:2	D	1:1
14/15	38	A	Southampton	7	7	Man City	2	2	L	0:2	L	0:1
14/15	37	H	Southampton	7	7	Aston Villa	14	17	W	6:1	W	5:1
14/15	36	A	Southampton	7	7	Leicester	16	14	L	0:2	L	0:2
14/15	35	A	Southampton	7	7	Sunderland	18	16	L	1:2	D	1:1
14/15	34	H	Southampton	7	7	Spurs	6	5	D	2:2	D	1:1
14/15	33	A	Southampton	6	7	Stoke	10	9	L	1:2	W	1:0
14/15	32	H	Southampton	7	7	Hull City	17	18	W	2:0	D	0:0
14/15	31	A	Southampton	6	7	Everton	13	11	L	0:1	L	0:1
14/15	30	H	Southampton	6	7	Burnley	18	19	W	2:0	W	1:0
14/15	29	A	Southampton	7	7	Chelsea	1	1	D	1:1	D	1:1
14/15	28	H	Southampton	6	7	C Palace	12	10	W	1:0	D	0:0
14/15	27	A	Southampton	5	7	WBA	14	13	L	0:1	L	0:1

The addition of Virgil van Dijk has helped the defensive rebuild and now that they are over their run of eight matches from the latter part of last season where they conceded 16 times, which can be explained to an extent by fatigue at the end of last term (plus the wider trend for matches to see more goals in this time of the season) and defensive reshuffling at the start of this, we can say that Southampton's true average for Under 2.5 Goals is more than likely greater than the 60% mark. This Sunday they are expected to field a very similar team to the past couple of weeks with no fresh injuries or suspensions to be aware of at the time of writing.

Looking more closely we have to take into account the quality of Saints opposition here and we see that last season 12 of their 18 matches against top-half teams had fewer than three goals with seven having fewer than two. Often there will be a significant split between a side's home and away form but here we see a 6-3 Under-Over split both home and away as their increase in goals scored/decrease in goals conceded when at home versus away roughly averages out.

Home : Southampton												
												Seasons14/15-15/16   v Finishing Top 6
Summary <i>i</i>											All Matches	All Results
Played	-1.5	+1.5	-2.5	+2.5	-3.5	+3.5	BS	G1H	G2H	1H+	2H+	
12	3	9	8	4	11	1	5	9	9	4	4	
%	25	75	67	33	92	08	42	75	75	33	33	
Odds Conv	4.00	1.33	1.50	3.00	1.09	12.00	2.40	1.33	1.33	3.00	3.00	
Match Outcome <b>Match Goals</b> Team Goals   Half-time/Full-time   Asian Handicap   Corners   Bookings												
Matches <i>i</i>												
Season	Match	H/A	Team	Pos	F/C Pos	Versus	Pos	F/C Pos	Res	Score	HT Res	HT Score
14/15	38	A	Southampton	7	7	Man City	2	2	L	0:2	L	0:1
14/15	34	H	Southampton	7	7	Spurs	6	5	D	2:2	D	1:1
14/15	29	A	Southampton	7	7	Chelsea	1	1	D	1:1	D	1:1
14/15	26	H	Southampton	5	7	Liverpool	7	6	L	0:2	L	0:1
14/15	21	A	Southampton	4	7	Man Utd	3	4	W	1:0	D	0:0
14/15	20	H	Southampton	4	7	Arsenal	5	3	W	2:0	W	1:0
14/15	19	H	Southampton	4	7	Chelsea	1	1	D	1:1	D	1:1
14/15	15	H	Southampton	4	7	Man Utd	5	4	L	1:2	D	1:1
14/15	14	A	Southampton	3	7	Arsenal	7	3	L	0:1	D	0:0
14/15	13	H	Southampton	2	7	Man City	3	2	L	0:3	D	0:0
14/15	7	A	Southampton	3	7	Spurs	11	5	L	0:1	L	0:1
14/15	1	A	Southampton	13	7	Liverpool	11	6	L	1:2	L	0:1

In fact, seven of their last nine against top-six finishers last term had fewer than three strikes so they are potentially getting even tighter against these teams. Overall we are fairly confident that there is value in the current 'Unders' price from Southampton's perspective.

Onto Man Utd and, like Koeman, Louis van Gaal has also had 43 games since the start of last season to shape his team. Interestingly, only 47% of United's matches in this time have had fewer than three goals but here we see a significant change in results on the road versus at home, with Under 2.5 happening in just 36% of Old Trafford games compared with 57% when playing away.

Furthermore, there appeared to be a shift in United's style last season as they went from an open style at the start of last season, when Angel di Maria looked briefly like he might back up his record transfer fee, before tightening things up and as a result of this tactical shift none of their last 17 away matches have had more than three goals.

United's squad changes and rotation under Van Gaal have filled a lot of column inches and need to be examined when understanding the nature of their results. Michael Carrick had injuries last season but despite the summer arrivals at Old Trafford he has started three of their five matches this term and United have won 15 of his 19 starts under Van Gaal, as they've conceded just 12 times with Man City the only side to score twice, compared to winning just eight of 24 without him. Schneiderlin is mostly likely to start alongside Carrick in midfield and in his last two seasons at Southampton they

conceded 18% fewer goal with him than without. In short this is currently a very solid defensive midfielder and a further lean towards that tactical shift we mentioned before.

**form lab black Player**

**Man Utd: Played - Carrick M**  
This season & last; Venue All; Opposition type All+Other League

**Summary** All Results ▾

P	W	Full-time			Half-time			PPG	GPGF	GPGA
		D	L		W	D	L			
19	15	3	1		9	9	1	2.53	1.95	0.63
%	79	18	5		47	47	5	-	-	-
P&L	8.9	-8.3	-14.4							

Match Outcome | Match Goals | Half-time/Full-time | Asian Handicap

**Matches**

Season	Match	H/A	Team	Pos	FPos	Versus	Pos	FPos	Full-time		Half-time	
									Res	Score	Res	Score
15/16	5	H	Man Utd	5	n/a	Liverpool	7	n/a	W	3:1	D	0:0
15/16	2	A	Man Utd	7	n/a	Aston Villa	5	n/a	W	1:0	W	1:0
15/16	1	H	Man Utd	4	n/a	Spurs	5	n/a	W	1:0	W	1:0
14/15	32	H	Man Utd	3	4	Man City	4	2	W	4:2	W	2:1
14/15	31	H	Man Utd	4	4	Aston Villa	18	17	W	3:1	W	1:0
14/15	30	A	Man Utd	4	4	Liverpool	5	6	W	2:1	W	1:0
14/15	29	H	Man Utd	4	4	Spurs	6	5	W	3:0	W	3:0
14/15	22	A	Man Utd	4	4	QPR	19	20	W	2:0	D	0:0
14/15	21	H	Man Utd	3	4	Southampton	4	7	L	0:1	D	0:0
14/15	20	A	Man Utd	3	4	Stoke	11	9	D	1:1	D	1:1
14/15	19	A	Man Utd	3	4	Spurs	7	5	D	0:0	D	0:0
14/15	18	H	Man Utd	3	4	Newcastle	9	15	W	3:1	W	2:0
14/15	17	A	Man Utd	3	4	Aston Villa	13	17	D	1:1	L	0:1
14/15	16	H	Man Utd	3	4	Liverpool	9	6	W	3:0	W	2:0

The attack has probably been their most talked about area though, and Wayne Rooney looks very likely to be absent again this weekend with a hamstring injury. With few alternatives that means Anthony Martial is likely to lead the line. At this stage of his career it is hard to quantify how this will impact United's goal threat or tactics but we can certainly say it reduces their options off the bench.

United played with a back three when these teams met first time last season and they won 2-1 as they scored from both shots on target while their second meeting was a 1-0 win for Southampton as the goal was the only shot on target from either side. Tactics, personnel, recent and longer term form and form against opposition types all suggests a low scoring affair and with enough reasons to back up the stats we can say with some confidence that the chances of fewer than three goals is greater than 60% and therefore value.