

The Numbers Game

Why Everything You Know About Soccer Is Wrong

Chris Anderson and David Sally



Preface: Soccer for Skeptics - The Counter(s)-Reformation

In sports, what is true is more powerful than what you believe, because what is true will give you an edge. - Bill James

- Rory Delap vs. Purists
 - Why are there some things that are just “not done?”
- Albert Einstein: “Not everything that counts can be counted, and not everything that can be counted counts.”
- Mike Forde (Chelsea - Director of Soccer Operations) has collected 32 million data points from 12,000-13,000 games.
- Roberto Martinez (Everton) is very much into analytics and can pull up (for example) all his teams corners, bad passes, etc. on his 60” pentouch t.v. at home.
- Opta Sports, ProZone, Amisco, . . . are major sport analytics companies.
- Sports Betting groups use analytics to set odds.
- Team owners get reports of player performance on their desks by Monday morning after games.
- Charles Reep (in the 1950s and 60s) annotated 2,200+ games with shorthand notes and drawings.
 - He labeled “Pressing” as such based on final 1/3 regaining of possession.
 - He highly supported “Route One” football.
- The average EPL team scores from a corner once every 10 games.

Before The Match: The Logic of Soccer Numbers

Riding Your Luck

Coincidence is logical. - Johan Cruyff

- Soccer is 50/50, . . . 1/2 skill, 1/2 luck.
- Many fans prefer to see their teams lose well than win poorly.
- Style vs Results
 - Grantland Rice (American Sportswriter): “When the One Great Scorer comes to mark beside your name / He marks - not that you won or lost - but how you played the game.”
 - Netherlands vs Spain in 2010 World Cup Final is a triumph for how the game should be played, but would have been a different story if Robben had finished his 82nd minute opportunity.
 - Reiner Calmund (Sporting Director at Bayer Leverkusen): “Soccer isn’t figure skating. There are no points for style.”
 - Chelsea’s 2012 Champions League Title came after “Parking the Bus” vs Barcelona and Bayern Munich.
 - Bayern outshot Chelsea 35-9 and took 20 Corners to Chelsea’s 1 (the one Chelsea scored from).
 - Richard Williams (of The Guardian): “Football is a contest of goals, not aesthetics. We love when the two elements are combined, but that is not the primary purpose of the exercise.”

Riding Your Luck (continued)

- “There are two routes to success in soccer, we have found. One is being good. The other is being lucky. You need both to win a championship. But you only need one to win a game.”
- The rare and uncertain in soccer is predictable.
- The more you do something, the more likely you are to see an unlikely outcome at least once.
- Team Sports: Soccer’s Underdog wins 45.2% of the time.
- Intransitive Triplet: If A beats B and B beats C, A will beat C.
- 44.4% of goals have an element of luck.
- Only 47% of teams who shoot more, win.
 - 50%-58% of teams who take more shots on goal, win.

The Goal: Soccer’s Rare Beauty

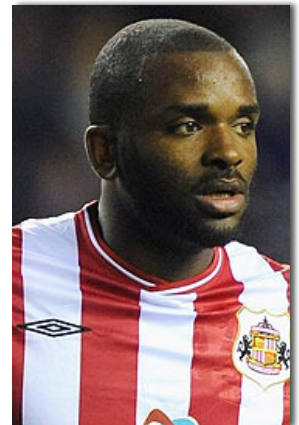
Everything that rises must converge. - Pierre Teilhard de Chardin

- Ballon d’Or and the largest transfer fees go to top Strikers.
- There are 1,421 game events / per goal
- Goals per Game
 - 1890 - 4.5
 - 1996 - 2.6
 - Influences on the decline:
 - Rules: Offside Law (1925), . . . 3 Pts. for a win (1981), . . . No Back Pass to GK (1992)
 - Style: Catenaccio vs Tiki-Taka
 - Formation: 7 Forwards to W-M to 4-2-4 to 4-4-2 to 1 Striker to False #9
 - Rise of Tactics
- Style of play compared to cultural background.
 - Cards are given more to players from countries in Civil War and at a rate higher for countries at war longer.
 - Passes (short and long), goals, corners, etc. are essentially the same in the top leagues of England, Germany, Italy and Spain.

They Should Have Bought Darren Bent

Sometimes in Football, you have to score goals. - Thierry Henry

- Changing the total to three points for a win did not translate into more goals. It put a higher emphasis on defending and increased the number of fouls committed on top Forwards.
- The most valuable goal is the 2nd.
 - Scoring a single goal gives a team an average chance of earning one point (only a one-in-four chance of winning).
 - Adding a second goal increase the point total on average by .99 (adding a 5th goal only increases the chance of winning by .1)
 - The 2nd goal tips the odds to over 50/50 that a team will win.
- Scoring a goal a game in England will ensure you do not get relegated (earning you 45M pounds in t.v. rights alone).



On The Pitch: Soccer "Intelligence" And Why Less Can Be More

Light and Dark

We play leftist Football. Everyone does everything. - Pep Guardiola

- Cesar Luis Menotti (Argentina National Team Coach 1978 - 1982)
 - "Scoring more is better than conceding less."
- Teams scoring the most goals in a season win 51% of championships.
 - Teams conceding the least goals in a season win 46% of championships.
 - 16/80 teams studied did both.
- 3 points come equally from 1-2-0 and 0-0-3 records.
- In regard to avoiding defeat, goals not conceded are 33% more valuable than goals scored.
- We're pre-disposed to look for evidence that supports what we already believe.
- We remember things that do happen (a goal scored) and forget things that do not (an opportunity missed).
- Alex Ferguson sold Jaap Stam using declining tackling numbers at age 29 as a sign of decline, but called it the biggest mistake of his career when he realized he tackled less because he was improving and was better positioned (no longer needing to tackle as often).
- Xavi Alonso was confused in England by the importance English Football put on tackling as he believed tackling to be what one does as a last resort, when proper defending had fallen apart.
- Paolo Maldini was considered one of the greatest Defenders of all time and was recognized for rarely going into a tackle.
- At the top level, a shutout is more valuable than scoring a single goal.
 - A Clean Sheet will produce (on average) 2.5 points. Compare that to the average of 1 point earned through a single goal.
 - Even after conceding a goal, a team averages 1.5 points per game.
- English Premier League Coaches: 0 former GKs and just 5 former Defenders.
- "The Italians can't beat you, but you can lose to them." - Johan Cruyff



Piggy In The Middle

Without the ball, you can't win. If we have the ball, they can't score. - Johan Cruyff

- Sepp Herberger (1954 West Germany Coach): "The ball is round, so that the game can change directions."
- 2010/2011
 - Arsenal (almost 30,000 touches, 60% possession on average)
 - Stoke (18,451 touches, 39% possession on average)
 - May, 2011 at the Britannia, Arsenal had more possession (73% to 27%) and completed 611 passes compared to Stoke's 223, . . . Final Score: Stoke 3 - 1 Arsenal
- 2012 Champions League
 - Barcelona had 79% and 82% possession over the two semi-final legs with Chelsea (and lost).
- 2012 La Liga
 - Real Madrid (under Mourinho) gave up possession at 72% to Barcelona, yet won.
- Each player in a single match will average 53.4 seconds with the ball.
- There are an average of 190 Turnovers (per team) in a single match.

Piggy In The Middle (continued)

- Good teams are not technically better at passing, they just find easier passing opportunities.
- Arsenal and Chelsea compared to Blackburn and Stoke (in EPL play) are at opposite ends of the spectrum.
- Teams keeping more possession are more likely to have more shots, more goals, less goals allowed and 7-11% more wins.
- Having fewer turnovers is statistically more effective than having more possession.
- Teams with more possession finish (on average) in 6th place in the EPL.
 - Team with less possession, . . . 13th.
 - Stoke is the outlier.

The Delation of The Long Ball

It's not about the long ball or the short ball; it's about the right ball. - Bob Paisley

- Tony Pulis at Stoke paid less in Transfer Fees per Point Earned than any other manager in the EPL.
- The ball is in play an average of 62.39 minutes per game in the EPL, . . . 60-65 in the four major leagues.
 - Manchester United (2010/11) = 66.58 vs Stoke = 58.52
- Stoke: 1/10 possessions includes more than 3 passes and only 4% involve 7 or more passes.
 - Arsenal completes 4 or more passes 38% of the time and 7 or more 18%.
- Brian Clough: "If God had meant for soccer to be played in the air, he would have put grass in the sky."
- Charles Reep found that with every additional pass, an attacking side became less and less likely to score.
 - The Numbers Game Authors found this to be simplistic in that frequency of goals is not the same as the odds of a goal being scored.
- Considering Penalties vs goals from open play:
 - (2009 - 2012) 65% of goals came from open play and only 8% from Penalties, but the odds of scoring a goal from open play is just 12% whereas from Penalties it is 77%. As a manager, do you promote frequency or opt for favorable odds?
- Hughes and Franks found that rates of scoring goals from passing movements are:
 - Shorter moves (4 or less passes) lead to a goal for every 9 attempts.
 - Longer passing movement (5 or more) lead to a goal for every 15 shots taken.



HOWEVER

- Hughes and Franks also contend that longer passing sequences produce more shots than shorter ones.

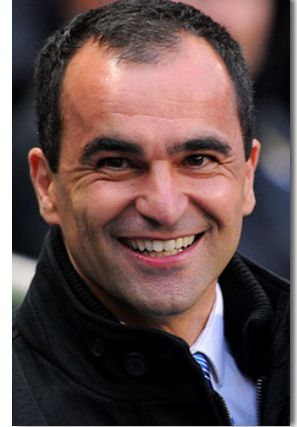
SO

- The Numbers Game argues that since a goal comes from every 9 shots (on average) and more shots come from longer passing movements than shorter ones, the difference of 6 fewer goals being scored from longer passing movements (compared to shorter passing moves) is made up for by taking more shots.
 - *The book does not however detail how many more shots come from longer passing movements than shorter ones, . . . the stat needed to prove it is more efficient.*
- As the possession game becomes more popular, the chances there will be a team playing Route One will increase.

Guerilla Soccer

So it is said that if you know your enemies and know yourself, you can win a hundred battles without a single loss. - Sun Tzu

- 92% of a teams standing in the EPL can be explained by it's relative wage bill.
- 2010/11 EPL Season:
 - 66% of Goals came from open play, . . . 2.8% came from Direct Free Kicks.
 - Wigan under Martinez scored twice as many goals on the counter as the average club and scored from Free Kicks four times more often.
 - Wigan shot (on average) from 26 yards out and scored (on average) from 18.5 yards out.
 - Why? To keep his team closer to getting into defensive shape quicker.
 - Wigan scored from just one corner that season.
 - Why? Because they didn't often risk getting out of position.
 - They typically played a 4-3-3 all season, but played the final 1/3 of the season in a 3-4-3.
 - Why? To throw off opponents down the stretch.
 - Managers like Martinez use the information available to them to craft a strategy that works for them in a particular moment.
 - Gianluca Vialli: "Deconstruct tactics, and you find that basically it's a way to minimize a team's weaknesses while maximizing it's strengths."
 - David vs Goliath
 - If underdogs choose not to play by Goliath's rules, they win.
 - The best way for David to survive is to be innovative and do the unexpected.
 - In the case of punting on 4th down:
 - Kevin Kelley coaches the Pulaski Academy (Prep School) Football team in Arkansas.
 - He consistently chooses to "go for it" on 4th down and although he was chastised at first, he has won two state championships and now coaches the 80th ranked team in the country.
 - Bill Belichick chose to go for it from his own 28 on 4th and 2 while up by 6 with just over 2 minutes to go in a regular season game against the Colts. This effort is successful 60% of the time and would have essentially ended the game had they been successful. The extra 38 yards (average) they would have netted would not have been worth keeping the ball from Peyton Manning with 2-minutes to go.
 - Belichick was ridiculed for not doing what was typical when it all went wrong, despite the fact he did the right thing.
 - Doing the conventional thing may help a coach keep his/her job.



In The Dugout: Building Teams, Managing Clubs

O! Why A Soccer Team Is Like The Space Shuttle

A team that commits errors in no more than 15 to 18 percent of it's actions is unbeatable. - Valeriy Lobanovskyi

A battalion is made up of individuals, the least important of whom may chance to delay things or somehow make them go wrong. - Carl von Clausewitz

- The Championship Division Playoff Game determines who is promoted and who remains in the Championship.
 - It is essentially a 90,000,000 - 120,000,000 pound match.
 - Reading lost to Swansea in 2011, in large part due to the mistakes of a single player.
 - He cost Reading 90M+ and on the flip side led to the promotion of Brendan Rodgers to Liverpool Manager, Joe Allen to LFC Central Mid instead of potential others, etc.
- If you want to build a team for success, you need to look less at your strongest links and more at your weakest ones.
- One mistake, one slip, by one individual, and the whole is affected.
- Clubs higher in the ranks have larger staffs, more amenities, more scouts, larger contract lengths, etc.
 - In the end, like players end up playing together.
 - The Zidane Clustering Theorem: Zidanes play with Zidanes.
- Perez' Galactico's Project at Real Madrid, brought the best players they could afford together (Zidane, Beckham, Roberto Carlos, Fifo, Raul, Ronaldo, . . .)
- Arrigo Saachi proved at AC Milan that 5 organized players could beat 10 disorganized players and proved it in training.
- Liverpool FC now rates players based on the average things they do. Players can be rated 1st to last.
- The Numbers Game Authors created a system for rating players and proved that replacing your top player by someone 10 "points" better can improve your goal differential by 10 goals, but improving your weakest player at the same rate will improve your differential by 13.
 - In turn, improving your weakest player can improve your league points by 13.7, your goal differential by 30% and can double your points per game.

How Do You Solve A Problem Like Megrelishvili?

The measure of success is not whether you have a tough problem to deal with, but whether it is the same problem you had last year. - John Foster Dulles

- Superstars are limited as to the level of impact they can make, in soccer more than in other sports.
- A Manager's job is to minimize the negative impact of the weakest player on the team.
- Five Ways:
 - 1) Hide Him: In a study of how Red Cards effect a team, it was proven that losing a player is very damaging. It reduces the potential for points by 33% (1.5 points to 1). It increases the percentage of losing from 24% to 38%. That is nearly equal to the amount attributed to trading Home Field Advantage for playing on the road.

How Do You Solve A Problem Like Megrelishvili? (continued)

- 2) Reinforce Him: Covering for players who don't recover or are more likely to make mistakes can be done in many ways, . . . one popular example is "Catenaccio."
 - The famous Italian style that essentially developed the Sweeper Center Back, created to protect a team's weakest link.
- 3) Substitute Him:
 - At some point the expected level of the substitute will exceed that of the tired teammate.
 - Is there an optimal time to substitute to reverse an unfavorable outcome?
 - . . . the times for a 1st, 2nd and 3rd sub if you want to recapture points.
 - Anchoring is a psychological term for holding on tightly to original thoughts. In soccer terms this means a coach will hold on to a starter until there is undeniable proof a sub is needed.
- 4) Try to Improve Him (Encouragement to Work Harder / Teach New Skills)
 - Kohler Effect is an action where a weaker link gains enthusiasm and improves effort in reaction to being a member of a team.
 - Jason Lezak in the 2008 Olympics shattered the World Record in a 100 Meter Relay to overtake the World Record Holder and win Gold for the US.
 - This is most effective when the top players are team-oriented.
 - Lionel Messi vs Allen Iverson
 - A professional player will spend 8 hours a day on soccer-related preparatory activities.
 - Factory Workers put on a team (vs working individually) have been found to increase productivity by 18%.
 - Strong links don't win matches, but weak links can lose them.
- 5) Sell Him: Some weak links cannot be improved or hidden.

The Young Prince

This is not a one-man show. Maybe you can call me the Group One. - Andre Villas-Boas

- Bad Managers fail, . . . good managers succeed.
- Arrigo Sacchi: "I never realized that in order to be a good jockey you have to have been a horse first."
- The Pros and Cons of hiring a top level player as a Manager:
 - Successful players are more likely to go back to the methods that made their careers successful, whereas less successful players are more likely to adapt and innovate as needed.
 - Andy Cole (Head of Player Development and Research - FA): ". . . this attitude in choosing managers has had disastrous effects. Just look at the number of sackings each year."
 - Sue Bridgewater / Larry Kahn / Amanda Goodall contend: 1) A manager who had played for his national side was generally more effective than someone who had never earned a cap. 2) Managers who had been skilled players themselves were particularly effective when they were in charge of teams of lower-paid and lesser talented players."
 - Many believe top players struggle as managers because they cannot teach what came instinctively to them.
 - Fabio Capello: "There are elements of technique, of timing, or coordination which I don't think you can understand if you never played the game at a certain level."
- Andrea Villas Boas had two years of managerial experience when he was hired at Chelsea (one at Academica de Coimbra and one at Porto). Mourinho had 9 before his first stint at Chelsea.

The Young Prince (continued)

- Based on the knowledge of the quality at Manchester United and Manchester City and the caliber of their Managers, coupled with the recognition of AVB's relative inexperience, Abramovich should have expected Chelsea to drop from 3rd to 5th or 6th (the place they were when AVB was let go).
- Talent is not innate.
 - *Talent is Overrated* by Geoff Colvin
 - Consider hours and hours of practice from Mozart and Tiger Woods
 - Psychologists findings that there is a strong correlation between practice and achievement.
 - *Outliers* by Malcolm Gladwell
 - 10,000 hours of practice are needed to master a skill.
- AVB started his career under Sir Bobby Robson's mentorship after posing a question to him one day when they bumped into each other (living in the same complex) about why Robson was not starting Domingos (Porto). Robson asked him to compile a report on why he should. The paper led to more research and inclusion in training at times.
- When hiring a new manager, it is important to keep all other factors stable / constant to see if the manager is effecting the change you want.
 - Sunderland let Steve Bruce go when the team was in 17th place (despite spending money on players at a level of 10th place). Nothing else was changed and Martin O'Neill brought the team back to 13th making it safe to assume the coaching change worked.
- Torres came in on a 50M pound transfer just before AVB was hired.
- Terry Venables on Torres: "He needs to start working harder in training but stop trying so hard in matches."
- Portability of Performance
 - *Chasing Stars: The Myth of Talent and the Portability of Performance* by Boris Groysberg studies whether or not successful financial analysts can take their talents elsewhere and be as successful.
 - His study showed among the top ranked Wall Street Analysts, those who stayed at their firms had an 89.4% chance of being ranked again the next year.
 - If they moved to a rival company, they had a 69.4% chance.
 - The top ranked analyst had a 10.6% chance of retaining the top spot if he stayed with his firm, but only a 5.6 % chance if he moved.
 - Groysberg also found:
 - Companies do their best when they hire from within.
 - Companies should hire with care, but integrate deliberately and fast.
- Regression to The Mean
 - In AVB's last 5 games at Chelsea, he averaged only a point a game, but DiMatteo earned 1.64 / game in the final 11 after AVB left, a clear improvement. However, AVB's average on the season was 1.7. DiMatteo didn't (by these numbers) improve anything, the change was simply regression to the mean.
 - Although the book also shares there is evidence that the dismissal of a failing manager can revive the spirits and performance of a club.
 - "An extraordinary period of poor performance is just that: extraordinary."
 - It will auto-correct when players return from injury, shots stop hitting the post, etc.



The Young Prince (continued)

- Treatment of Players (The Hairdryer Treatment or Praise)
 - If you're nice to players, praising them, patting them on the back, they grow complacent. Give them a kick up the backside and they perform much better.
 - This mindset is proof of "regression to the mean."
 - It is part of the human condition that we are statistically punished for rewarding others and rewarded for punishing them.
- *Abuse, Intimidation and Violence as Aspects of Managerial Control in Professional Soccer in Britain and Ireland* (paper) by Seamus Kelly and Ivan Waddington
 - Players who reported being yelled at "brought out the best in me" proved the regression to the mean theory in that it doesn't say the player improved, it shows he was underperforming, got yelled at, . . . and played better.
 - At halftime of a match between Manchester United and Tottenham Hotspur (2001), United was down 0-3 and it was assumed Ferguson would use his "hairdryer treatment" in the dressing room.
 - Instead he explained Hotspur's likely mindset of already counting the match as a win and the anxiety they'll feel if Man United were to score early. The final was 5-3 Man United.
 - The result regressed to the mean because Ferguson chose not to blow his top at that time.
- John Wooden (UCLA Men's Basketball) and Pat Summit (Tennessee Women's Basketball) were detailed planners and spent most of their time coaching through factual points.
 - This has proven to be the direction coaching is going today.
- Books like the Talent Code and Practice Perfect are detailing the importance of deliberate practice:
 - Accomplished Violinist Nathan Milstein: "I asked Professor Auer how many hours I should practice, and he said, 'It really doesn't matter how long. If you practice with your fingers, no amount is enough. If you practice with your head, two hours is plenty.'"
- The Numbers Game Authors on the Modern Manager:
 - "Managers must strive to be the bast they can. They must bite their tongues, resorting to anger only when absolutely necessary. They must monitor their own habits, share their wisdom and not be afraid to challenge convention. They have to do what they can with their resources. They must not fear going for it on fourth down. They must be aware that they owe a debt to the collective. If they do that, if they hold their nerve and stick to their beliefs, they can thrive."

After The Match is Before The Match

Life During the Reformation

Football is a game you play with your brain - Johan Cruyff

Sacred Cows make the best hamburger. - Mark Twain

- The Numbers Game Authors forecast 10 events to happen in the near future.

Life During the Reformation (continued)

- Forecast 1: The biggest analytical breakthroughs will not occur at Manchester United, Manchester City, Real Madrid, Barcelona or any of the twenty richest clubs listed in Deloitte's Football Money League.
 - The Oakland A's were at the absolute bottom when Billy Beane created the "Moneyball" system.
- Forecast 2: The Soccer analytics movement will not feature a singular "Bill James."
 - The multiple smaller insights by many will move the game forward.
- Forecast 3: The volume of Soccer data will increase by at least thirty-two times.
 - It's only a matter of time before players' kits and the ball itself will be fitted with GPS chips.
 - The technology exists and is already being used in the MLS with Adidas collecting data through chips in player's boots.
- Forecast 4: Geometry, space, vectors, triangles and dynamic lattices - will be the focus of many analytical advances.
 - Statistical attention will soon shift to players away from the ball, the clusters they form, the space they enclose, etc.
- Forecast 5: There will be about 1,000 goals scored in the Premiership in both 2013 and 2023.
 - The sport across the globe has settled into a competitive equilibrium.
- Forecast 6: The gap between the salaries and transfer fees of strikers and defenders and goalkeepers will shrink significantly.
 - Data shows Goalkeepers to be in the cheapest position, with prices rising in increments as you move further up the pitch.
- Forecast 7: The 4-4-2 will be replaced by the 150-4-4-2; organization will be the new tactics.
 - Tactics is, at the core, about organizing your whole team - on and off the pitch - to maximize effectiveness.
- Forecast 8: The current crop of absolutist managers are a dying breed. Once Sir Alex Ferguson retires, all large clubs will have a General Manager / Sporting Director - if not in name, then in function.
 - Managers will soon be put in there place and become more cooperative team players in the club.
- Forecast 9: Just because a club does not play the numbers game will not preclude it from enjoying success; analytics will help you win, but so will money.
- Forecast 10: The reformation of the counters will in turn be countered.
 - The numbers are overwhelming for some and not welcomed readily.
 - Many people know how to compile numbers, but don't know how to act on the findings.

