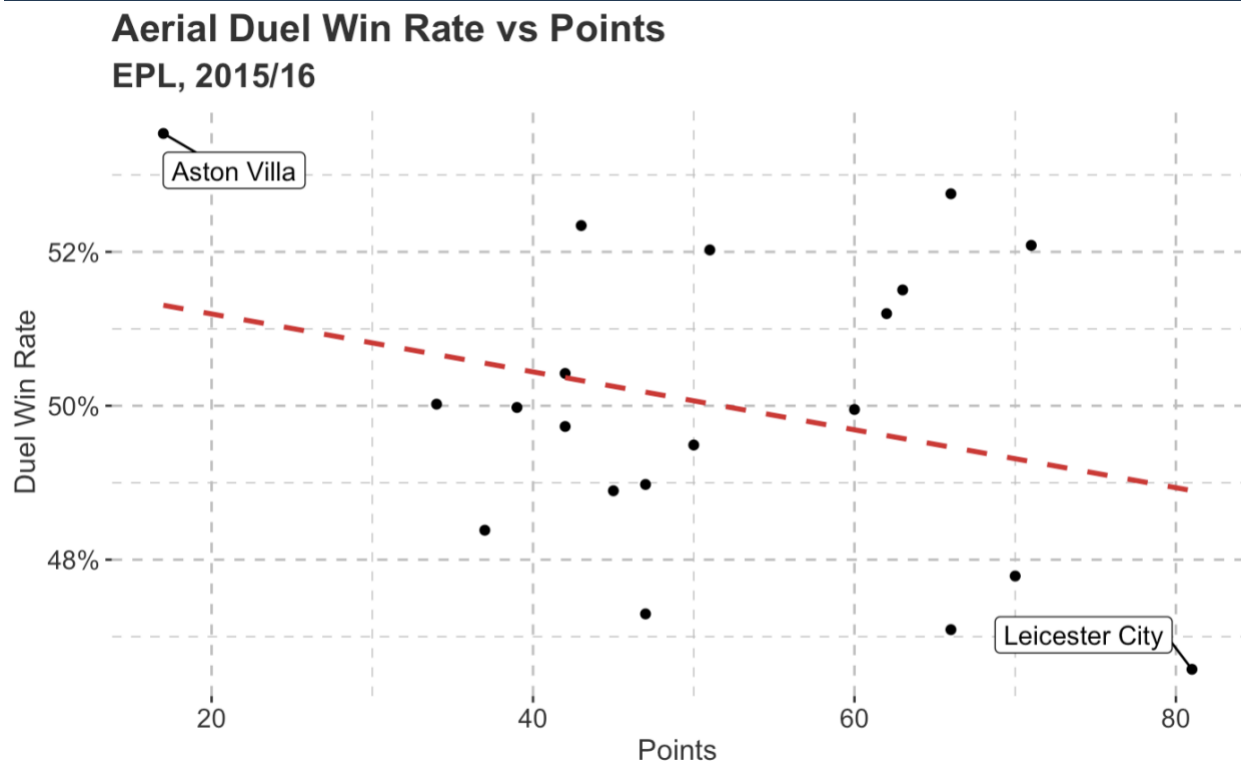


Evaluating Aerial Duels with Long-Term Duel Success Rate (LDSR)

Managers and pundits frequently tout the importance of winning 50/50 balls in a match, but how important are they, and does winning these contests translate to points? This analysis uses StatsBomb event data from the 2015-16 English Premier League (EPL) season to dissect aerial duels and propose a new strategy to evaluate aerial duel success: Long-Term Duel Success Rate (LDSR).

Aerial duels constitute 2.56% of recorded plays and have a binary outcome: a win or loss. Relative to events like passes and ball receipts, which comprise over 50% of the events combined, aerial duels make up a small portion of the game. Still, they allow teams to take advantage of an inherently symmetrical event. I expected that teams who won more duels in the 2015-16 season would have more points than teams who lost more duels, but the correlation between the percentage of aerial duels won for a team and the team's points in the table is surprisingly negative ($r=-0.291$). The plot below displays this confounding relationship, which can be primarily explained by Aston Villa, the league's worst side, excelling in aerial duel win percentage, and Leicester City, the league champion, posting the league's worst duel win percentage.

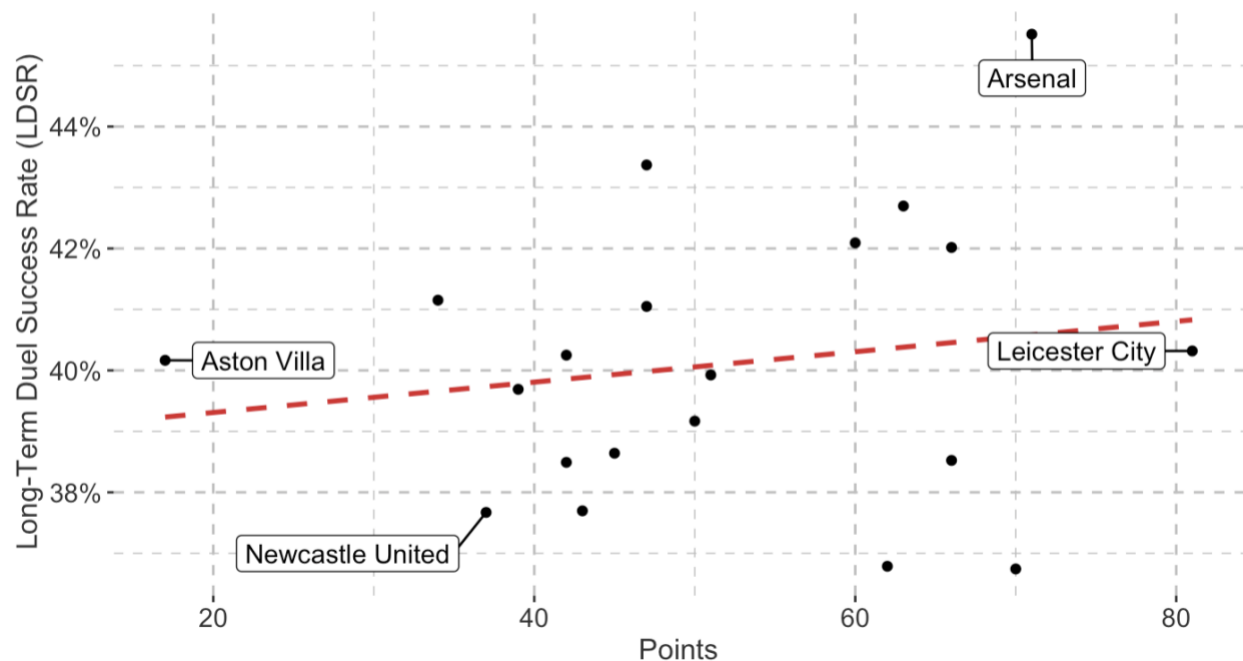


Perhaps pure win percentage is not indicative of overall game success, but how teams capitalize off aerial duels could be. To investigate this, I created long-term duel success rate (LDSR), which attempts to quantify the percentage of duels that a team wins and turns into "successful" possessions. I defined a successful possession as one that:

1. Generates a possession length above average (23.329 seconds)
2. Ends in a shot
3. Ends in a foul drawn

This creates a subset of aerial wins that ultimately result in something positive for the winning team: either a long possession that keeps the ball out of the opponent's possession, an attempt on goal, or a chance to retain further possession or deliver a dangerous set piece. This measure of duel success is more restrictive, meaning fewer duels are considered victories, but it has a positive relationship with points in the standings ($r=0.169$).

Long-Term Duel Success Rate vs Points EPL, 2015/16

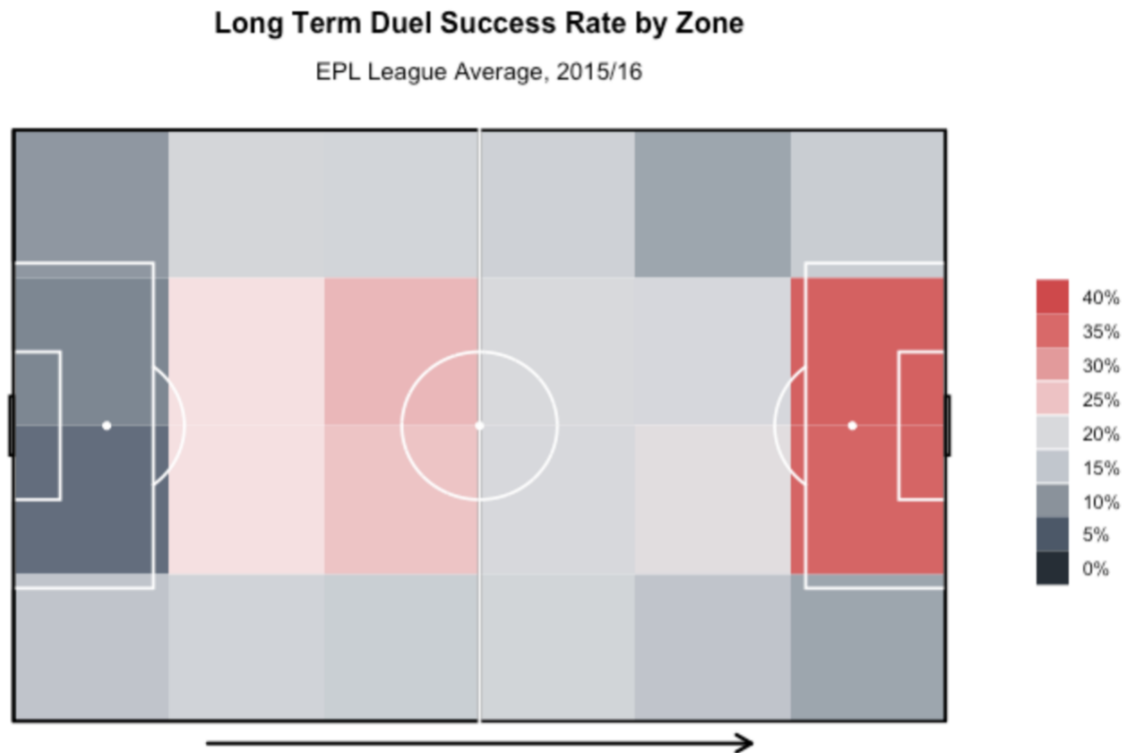


In the graph above, Leicester City and Aston Villa have comparable success rates (40.3% and 40.2%, respectively) despite Aston Villa winning 8.7% more duels on average. According to LDSR, Leicester City maximizes their duel victories more than Villa because they win fewer aerial balls but create as many successful possessions from all duels.

Arsenal, second in the standings, dominates LDSR, while Newcastle, the third-worst side, earned a matching third-worst LDSR. The correlation, though positive, is still weak due to the countless other factors that influence scoring and conceding goals and the low-scoring, fluid nature of soccer, which yields tremendous variability. However, LDSR could be a helpful scouting and evaluation metric that is more outcome-driven than the duel win rate alone.

To further understand this metric and compare teams, it is helpful to know where on the field "success" is happening most often, relative to the total number of duels. I created a heatmap of the league average percentage of successful duels in 24 equally sized square zones

to visualize this distribution. The left-hand side of the field corresponds to a team's defensive half, and the right-hand side is the attacking half.



A couple of key observations can be made about the league as a whole. First, aerial duels won in the center of the field, relative to the y-axis, are successful more often than duels won near the touchline. This makes sense, considering the importance of shots in this metric and that a header through the middle of the field poses a greater immediate threat on goal than one on the wing. Additionally, since a shot is one way to earn success and aerial duels in the box will more often end directly in shots than anywhere else, the percentage of successful duels is very high in the attacking box. This observation suggests that excelling in this area may be more critical than excelling elsewhere. With this in mind, we can view each team's LDSR relative to the league average on the same heatmap.

Long Term Duel Success Rate vs League Average

EPL, 2015/16



Once again, we notice that Arsenal is great at creating valuable chances from aerial duels in the attacking third, specifically in the right-hand side of the box, and only struggles on the left wing. Another insight from this chart is that Norwich City creates long-term success from duels in the defensive half—probably by developing long possessions after aerial victories—but struggles to capitalize on aerial challenges in the opponents' 18-yard box. This discrepancy could partially explain their relegation, despite their 9th-place finish in win rate and 6th-place finish in LDSR overall.

There are hundreds more insights to draw from these plots, but another potential application of this metric is scouting. In a matchup between Manchester City and Manchester United, for example, an analyst could identify that City capitalizes in the opponent's box (specifically on the left-hand side). At the same time, United struggles to win duels in their box and derive long-term control, a potential area of concern for United and one for City to exploit in the matchup.

Overall, LDSR combines a team's ability to win duels and produce from those wins, providing analysts with another way to identify strong aerial teams, scout opponents, and compare teams. Further analysis is necessary to determine how to improve LDSR, such as extending evaluation to other leagues and seasons. Analysts could alter the definition of success depending on their interpretations of successful possessions post-duel-win. Additionally, like any metric, LDSR has limitations. It is only weakly positively correlated with season-long success and may overweight the importance of winning duels as an attacking player. I will refine this metric in future analyses, with features like team, opponent, and location, to strengthen its association with team success.