How to Win an NFL Game?

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Background

The package also contains play by play data which will be analyzing to understand the relationship between different variables. The variables cover all relevant play information from yards gained and clock time, to win probabilities and players involved.

Reference

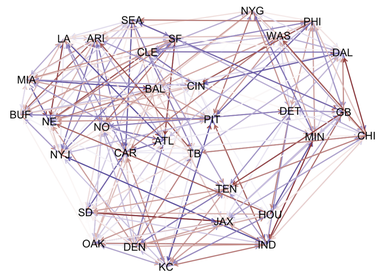
https://github.com/maksimhorowitz/nflscrapR, season 2016.

Research Objectives

- To investigate factors in helping a team win a game.
- To see how the effects of these factors change over time.

Win Probability and Description by Play

NFL Play Network

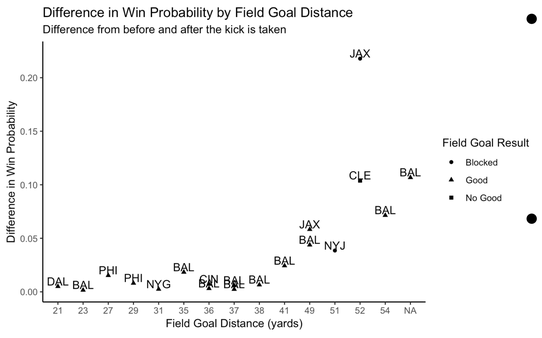


- There are 3 clustering in the play network: top left, top right, and the left bottom. Teams that cluster have more plays with one another. This roughly corresponds to the different divisions within the league.
- The edge indicates the win probability for the possession team, and the arrow is from the possession to the defensive team.

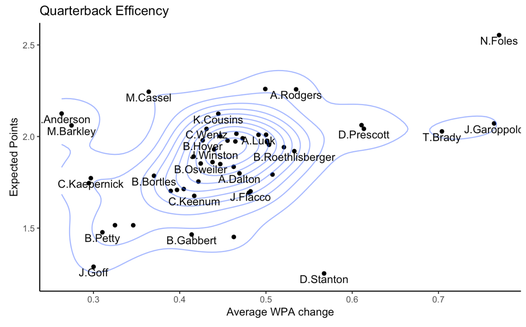
Text Cloud of the Description

- Shotgun plays tend to be incredibly popular in play calling.
- Timeout is larger than sack which implies it is more frequent, which is incredibly surprising given that the number of timeouts is limited.
- Enforced and deep are roughly the same size which says that deep plays happen at roughly the same frequency as penalties.

Field Goal and Quarterback



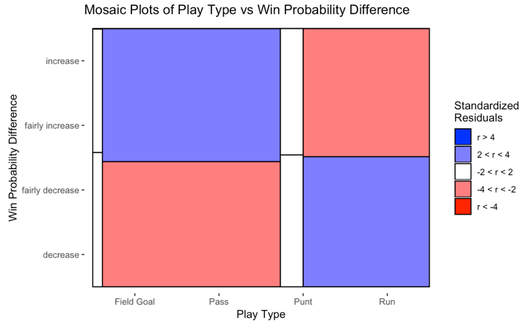
- The plots show the effects of late game field goals for the Baltimore Ravens season in 2016, with 22 total point differential on the season.
- Clear positive correlation between the distance and the overall change in win probability.
- It is more likely that a team who needs to win would have to take a kick from further away as time runs out. If the team was closer, they are more likely to attempt a touchdown.



- Clustering of quarterback performance. It is filtered by players that made > 50 pass attempts, so it effectively makes it players who started ≥ 2 games on the season.
- Nick Foles was the best player regarding the average expected points and overall win probability. Overall, the top four quarterbacks were Foles, Brady, Garoppolo, and Prescott.
- The worst quarterback was Jared Goff. This is not surprising given that the Rams went 4-12 on the season.

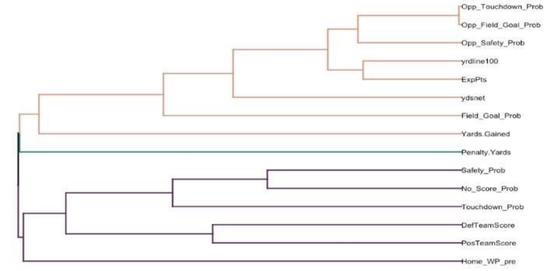
Multivariate Analysis

Mosaic Plots of Play Type vs Win Probability Difference



- The Win Probability Difference is the difference between win probability before and after the play.
- Field goal and punt are independent of the difference in win probability, but pass is associate with an increase in win probability, and run is associated with a decrease in the win probability.
- The p-value of the chi-square test is 0.001<0.05, so we conclude that the play type and the difference in win probability are not independent. Coupled with the results of the graph it is reasonable to assume that teams that pass more have a higher likelihood of winning.

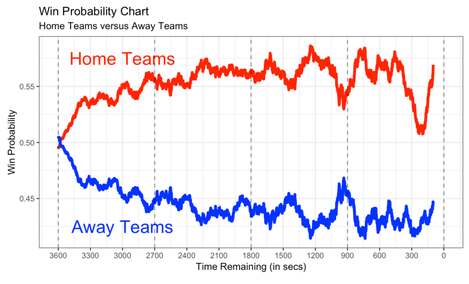
Dendrogram of Correlation of Continuous Variables



- The probability of safety, no score occurring within first half of the play, touchdown, the scores of the defensive team and the possession team are closely related to the win probability.

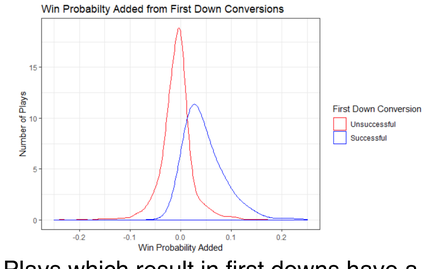
Home Advantage and First Down

Win Probability Chart
Home Teams versus Away Teams



- Home teams and away teams start with roughly equal win probability.
- Win probability of home teams gradually increases, and there is about 0.1 difference between the win probability of home teams and that of away teams.
- We conclude that there's a home advantage in NFL games overall.

Win Probabilty Added from First Down Conversions



- Plays which result in first downs have a larger mean and variance for their relationships with win probability added.
- On average a play in which a first down is achieved is more likely to have an effect on the outcome of the game.

Discussion

It is incredibly important to pass than run throughout the game. Furthermore, there is a slight advantage to being the home team (roughly .1), but it is still a statistically significant difference by the end of the game. It also matters how far field goals are kicked from in the fourth quarter; the further the kick, the more likely it is to significantly affect win probability.

Overall, it is crucial to have a quality quarterback and an accurate kicker in order to win games in the NFL.