

Sunday Morning Quarterbacking 4th Down Attempts (Part 1)

Everyone loves to Monday Morning Quarterback (literally) coaches' decisions to go for it (or not) on fourth down. The aim of my research was simple—to decide how much coaches should have known at the time (hence Sunday Morning Quarterback—corny, I know) based on the distance to the first down and location on the field. I was able to gain some fascinating insights, but was also unsuccessful in some of my queries due to a poor data set. I determined with relative certainty the value of field position, the average net results and probabilities of field goal attempts, punts, and 4th and 1 attempts. In Part 2 I hope to expand my analysis to including 4th and 2 through 4th and 10, the impact of play-calling, and the impact of team ability.

Methodology

I analyzed data from 2010 to 2014, using only plays and drives that started in the first, second, or third quarters. (Analyzing fourth down attempts in the fourth quarter would be biased because the majority of the attempts would be by losing teams.)

Field Position:

My strategy for determining the value of field position was very simple. The purpose of field positioning is to score points, so the value of field position can be determined by the average points scored (or allowed) at each region on the field. I found all of this in groups of five-yards.

Punts:

Once the value of field position was established determining the average number of points resulting from punts boiled down to adding up the values of the resulting field position from each punt. Safeties were worth two points and touchdowns were worth seven. If the punting team recovered the ball (via muff or fumble) the value was positive, otherwise it was negative.

Field Goals:

Average points from field goals was by far the easiest to determine. Each made field goal was three points while each missed field goal was equal to the value of field position from that region of the field for the opponent. That is if a field goal was missed from the opponent's 15-yard line (the kicker is terrible and) the value of field position from one's own 15-yard line was subtracted.

4th Down:

As with punts, determining the average points that resulted from 4th down plays was mostly a matter of valuing the resulting field position. I assumed the ball was on the middle yard line of the five-yard group. I then categorized all first downs based on how many yards were gained in connection to which field position value resulted. A gain of 1 or 2 yards resulted in same field position as start, gain of 3 to 7 yards resulted in the following field position, 8 to 12 the next, and so forth. This was based on the assumption that the ball was on the middle yard line of the five-yard group.

Grouping:

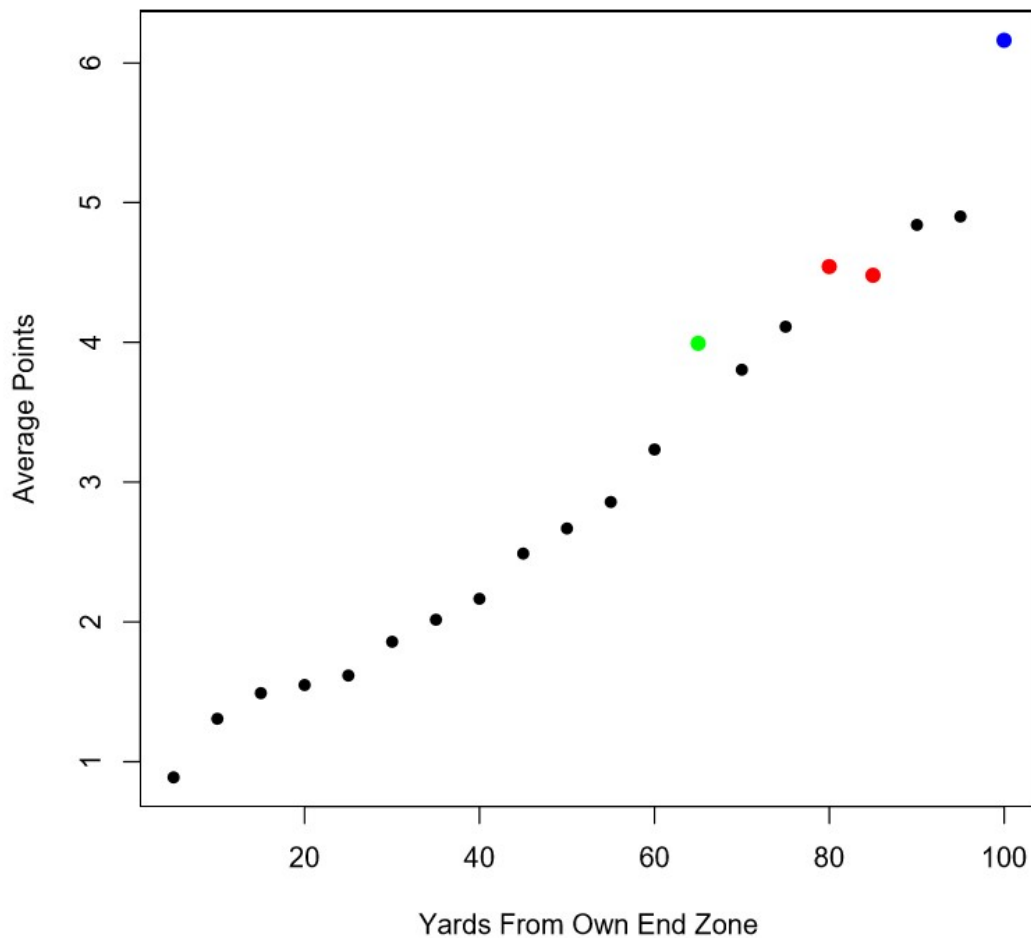
I ran into a sample size issue so I decided to bundle multiple five-yard groups to do the 4th down analysis. I don't believe this should have affected my results because most regions of the field don't alter how teams play defense—especially on 4th and 1. For example, whether a team is on their own 20 or their own 40 no defender will set up near the end zone, so they didn't need to alter their strategy. This is only more true on 4th and 1 because generally every defender or almost every defender is at the line of scrimmage. This could have conceivably created some unintended error but the positives far outweighed the negatives. The groupings were as follows: Own 11 to 50, Opponent's 50 to 36, Opponent's 35 to 21, Opponent's 20 to 11, and Opponent's 10 to 1. I purposely decreased the size of the group as the offense approached their opponent's end zone because it is in these scenarios that the field position could alter defensive strategy. The sample size was also greater as an offense approached their opponent's end zone.

Analysis

Field Position:

Figure 1.1

Field Position (Avg. Points by Yard Line)



A note on graphs: The x-axis for most graphs is the yards from a team's own end zone. There is no change once the yard line crosses into the opponent's territory, so 55 on the x-axis means opponent's 50 to 46, 60 means opponent's 45 to 41 etc.

The Field Position graph is generally linear with a few outlier points. The slope of the graph varies based on the position on the field and I would posit that this is meaningful. For example, a team between their own 6 and 10 yard lines average 0.42 more points than if they were between their own 1 and 5. However, they average only 0.18 fewer points between their own 6 and 10 than between their own 11 and 15. A team's play-calling is severely constrained when they are up against their own end zone at the risk of giving up a safety. This is reflected in the data as safeties, punts, and turnovers are all far more likely

between the 1 and the 5. Thus, there is a huge advantage to be between one's own 6 and 10 as compared to one's own 1 and 5. That same advantage simply doesn't exist going from the 6 to 10 to the 11 and 15.

There are three points that stand out. I have plotted them in different colors for simplicity. All three points are clearly a result of an increased touchdown rate (see figure 1.2 and table A1), but the cause of the increased touchdown rate is more complex.

The green point, which is the opponent's 40 to 36 seem to be an outlier because of the frequency with which drives reach the red zone. Drives starting on the previous five yards (opponent's 45 to 41) reached the red zone on 45.0% of drives. Drives starting in the yard lines in question reached the red zone on 59.5% of drives. Drives starting in the next five yards (opponent's 35 to 31) reached the red zone on 52.3% of drives. When teams reach the red zone from any of these starting positions their red zone efficiency is comparable (5.13 average points from Opp. 45 to 41, 5.13 from Opp. 40 to 36, 4.90 from Opp. 35 to 31).

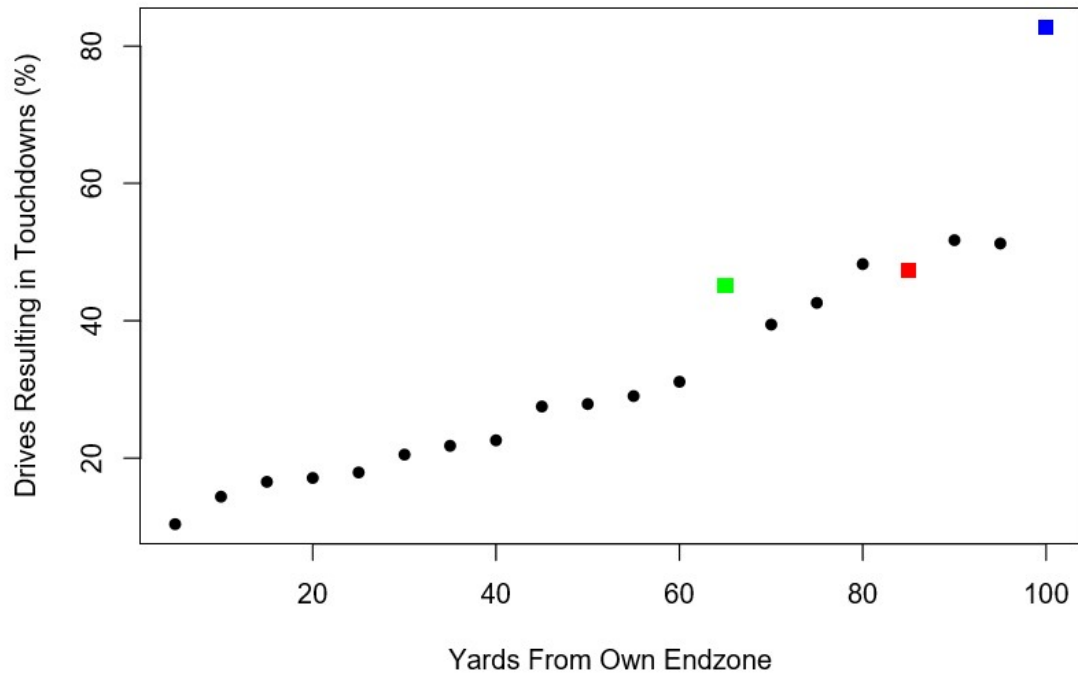
It is beyond me as to why it would be easier to reach the red zone starting further away from the end zone—as would appear to be the case. I'm still trying to come up with and test realistic possibilities, but as of right now I'm assuming the results are due to randomness.

It appears that the point previous to the red point accentuates its abnormalities. As is apparent in the touchdown rates graph, drives starting from the opponent's 25 to 21 have a slightly higher rate than is expected while drives starting from the opponent's 20 to 16 have a slightly lower rate than would have been expected

Finally, the blue point. Drives inside the opponent's 5-yard line. I found this data point particularly interesting because I think it might be a clear indication of the effect that coaching philosophies have on the game. To be clear I don't have data to back up this hypothesis, but I wonder if coaches are less likely to settle for a field goal in this area of the field—even relative to just five yards further from the end zone.

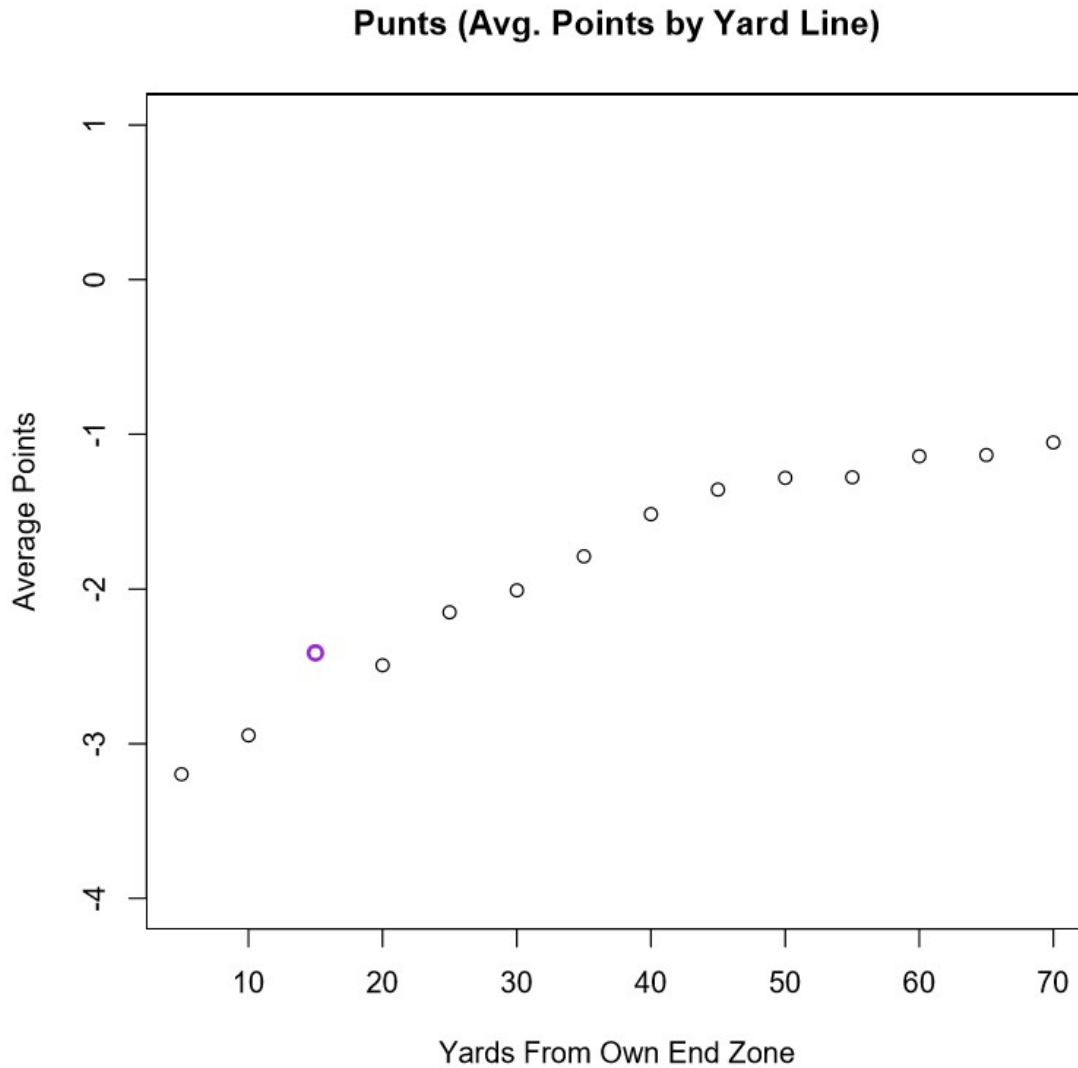
Figure 1.2

Touchdown Rates by Field Position



Punts:

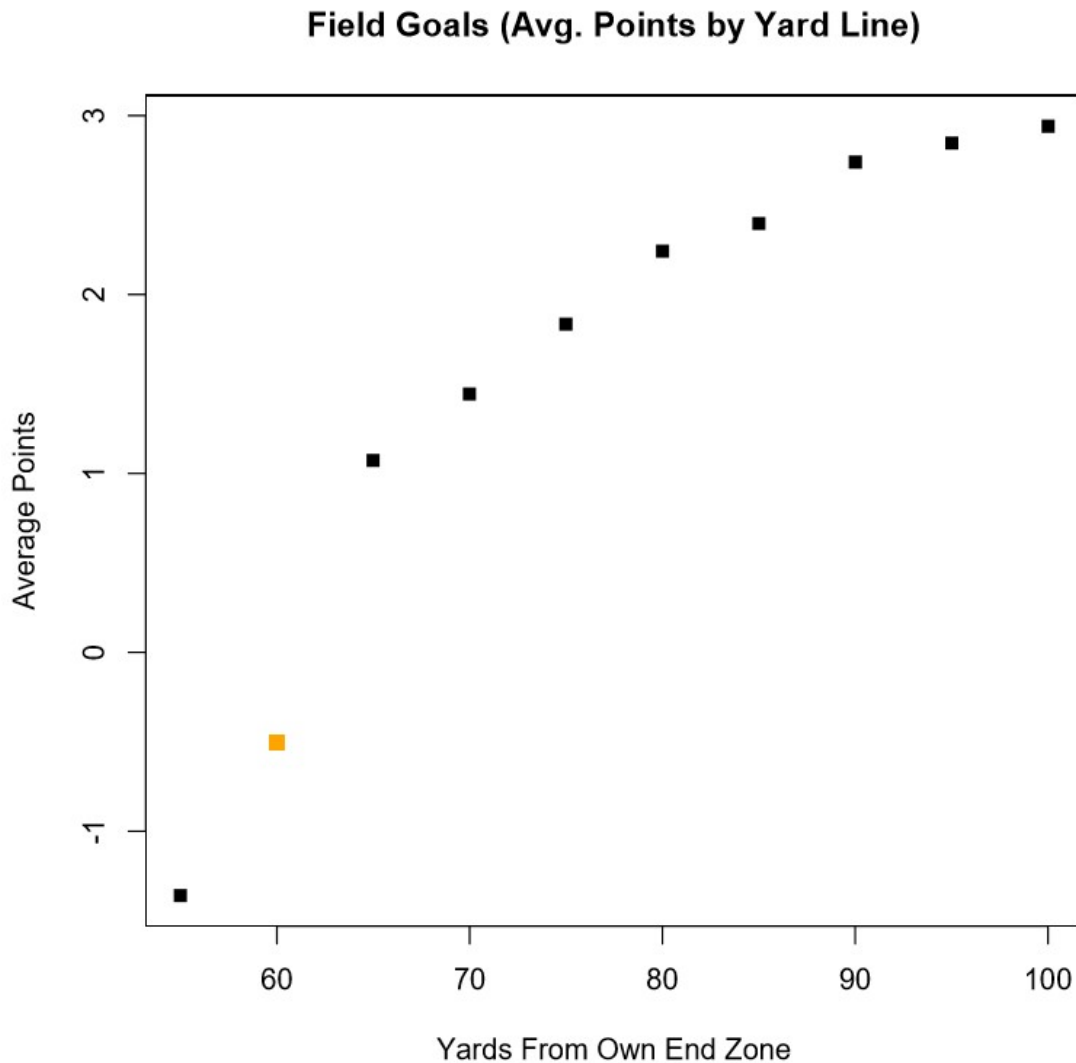
Figure 2.1



Not too much is surprising about the punts results. The average points scored is proportional to the line of scrimmage and the curve levels out indicating diminishing returns as one approach their opponent's end zone. The lone outlier point (in purple) is on punts between one's own 11 and 15-yard line (in purple). This particular position on the field had the highest rate of the punting team recovering the ball (via fumble or muff). For no apparent reason they recovered the ball on 2.1% of punts as compared to 0.3% for the preceding five yards (own 6 to 10) and 1.0% for the following five yards (own 16 to 20).

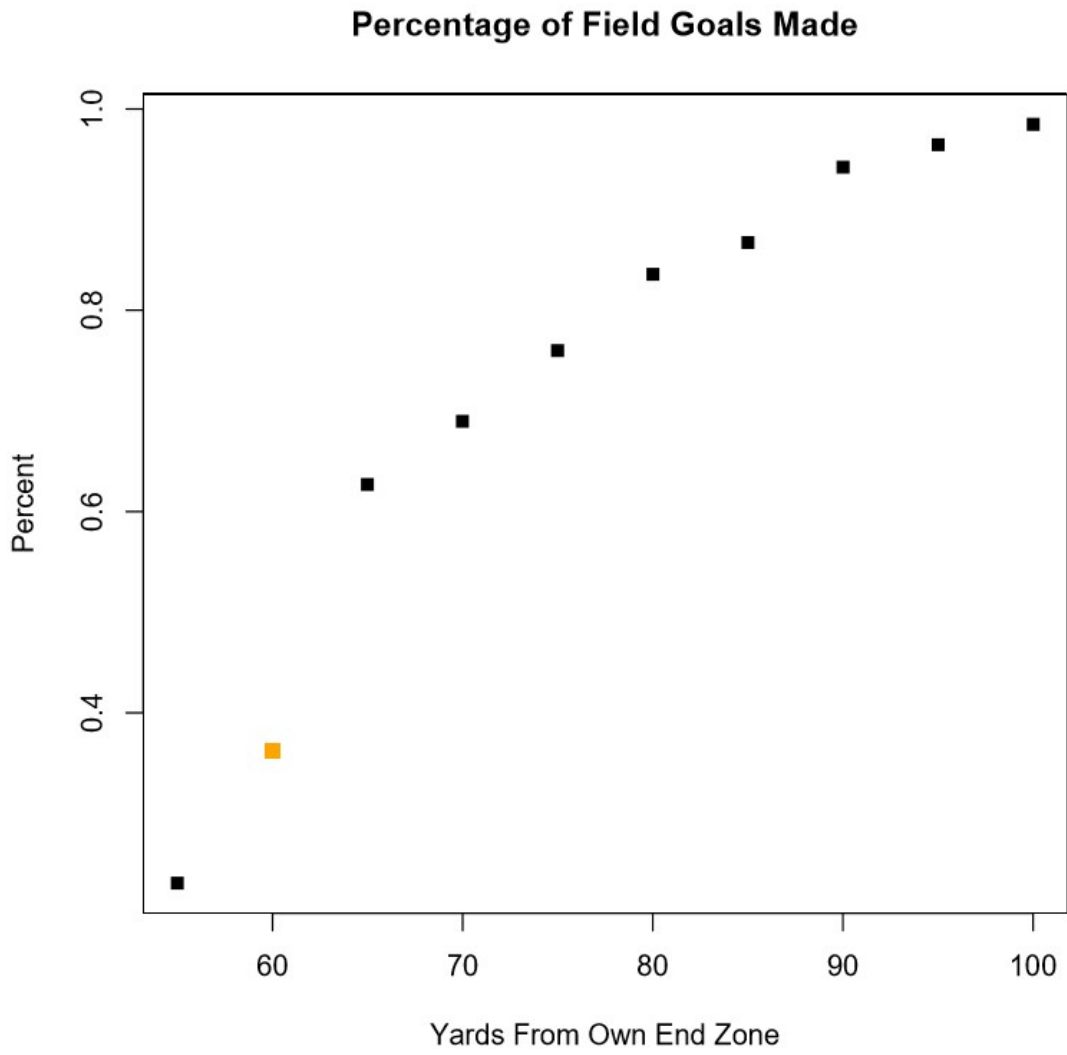
Field Goals:

Figure 3.1



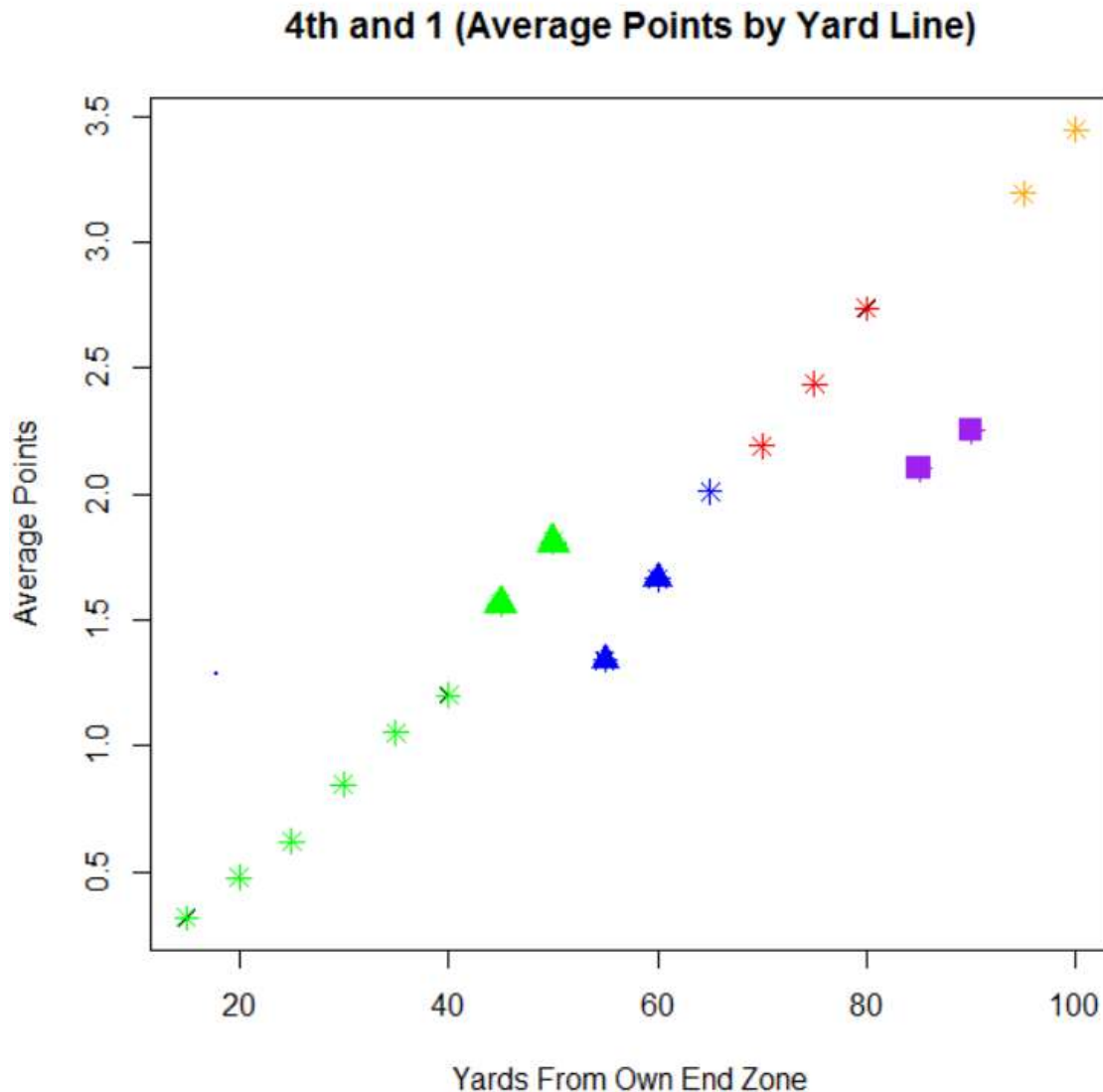
As with the punts, the graph indicates a solid trend that flattens off with one point that is doesn't completely conform. Field Goals between the opponent's 45 and 41 (in orange) result in slightly lower points than expected. This is a result of the field goal percentages not being linear either (see figure 3.2 and table A3), which I find very interesting. Based on this data, as one approaches the high percentage area of the field, field goals do not get progressively easier. Rather, until one reaches the 40-yard line it's less relevant exactly how close one is. While this wasn't what I expected, it's easily understood by realizing most long distances kicks don't just barely go through the uprights. If a kick is struck well it would often be good from significantly further out. If a kick is not struck well, it misses left or right more often or not—which doesn't depend on the distance.

Figure 3.2



4th and 1:

Figure 4.1



What immediately jumps out about this graph is the two sizeable gaps. The first is going from one's own 41 to 50 to the opponent's 50 to 41 (the triangles) and the second is from the opponent's 25 to 21 to the opponent's 20 to 16 (the squares). These both happened at the start of a new group of five-yard sets. For your reference, I color coded the graph by their group of five-yard sets.

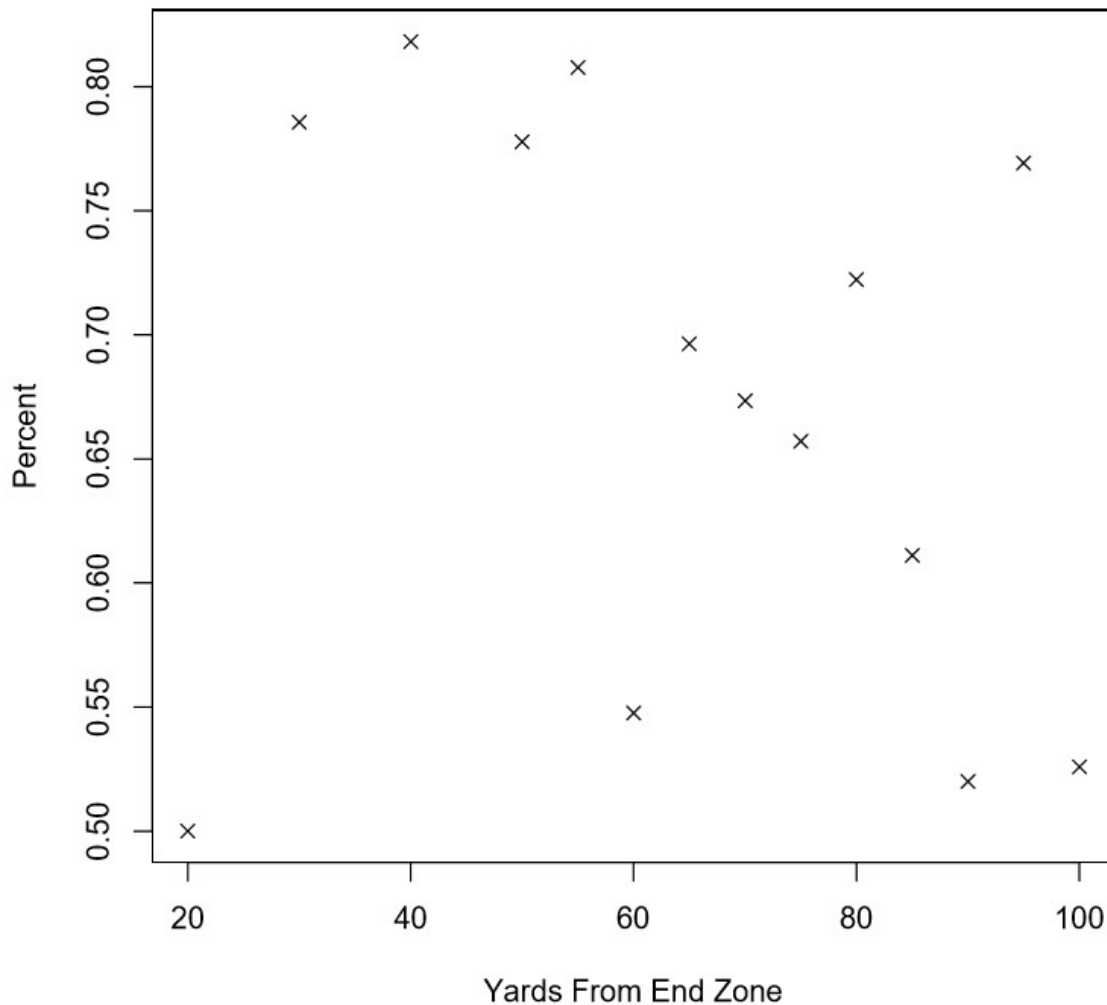
I tried to determine the cause of these anomalies—be it chance or a legitimate strategic point—in two ways: by comparing the data points in question to their neighbors as I have done in previous sections, and by comparing the 4th and 1 results with 3rd and 1 results from the same field position. The latter comparison would indicate if there is something about

the field position that made certain events more or less likely. I also hoped that the 3rd down results could give a baseline with which I could compare the 4th results. My theory was that 3rd down results would correlate better with field position because I had a better sample size (there were far more 3rd and 1 attempts than 4th and 1) and hopefully give some context to the 4th down results (eg. If both dipped at the same place on the field there is probably an explanation vs. if they were consistent save for one point then the 3rd down plot was probably more accurate).

First up is the four triangle points—from one's own 41 to the opponent's 41. This appears to be a failure of my grouping strategy. By-and-large it appears that combining multiple five yard groups for sample size purposes did as was intended to, that is, create a large sample size to minimize the effect of outliers. However, in this scenario—the 20 yards on the middle of the field—it appears as if the strategy simply was not sensitive enough. Figure 4.2 (below) shows the fourth down results grouped instead in groups of ten yards on a team's own side of the field and groups of five yards on their opponent's side. This data should be taken with a grain of salt because ungrouping decreases the sample size and leaves room for error, however the general trend is quite clear. Up until the opponent's 45 the conversion rate is in the high 70%. From there to the opponent's 20 conversion rates appear to be in the high 60%. The sample size is especially small for the remaining twenty yards, making that data tougher to read. The apparent outlier point at the opponent's 45 makes it difficult to determine if the change in conversion rate is abrupt or gradual. In any case, it would be fair to assume the data point at the opponent's 50 (the third purple asterisk from left to right) should have continued the upward trend of the previous points. When I used the data up to the opponent's 45-yard line rather than from the opponent's 50 to 36 I found the average points to be 2.1070 . It's tough to say for the fourth point. The apparent outlier point makes it difficult to tell how sharp the decline in conversion rate was. Furthermore, that point made the rate used for its two neighboring points as well as itself unnecessarily low. I hope to address this issue in part 2 of this study.

Figure 4.2

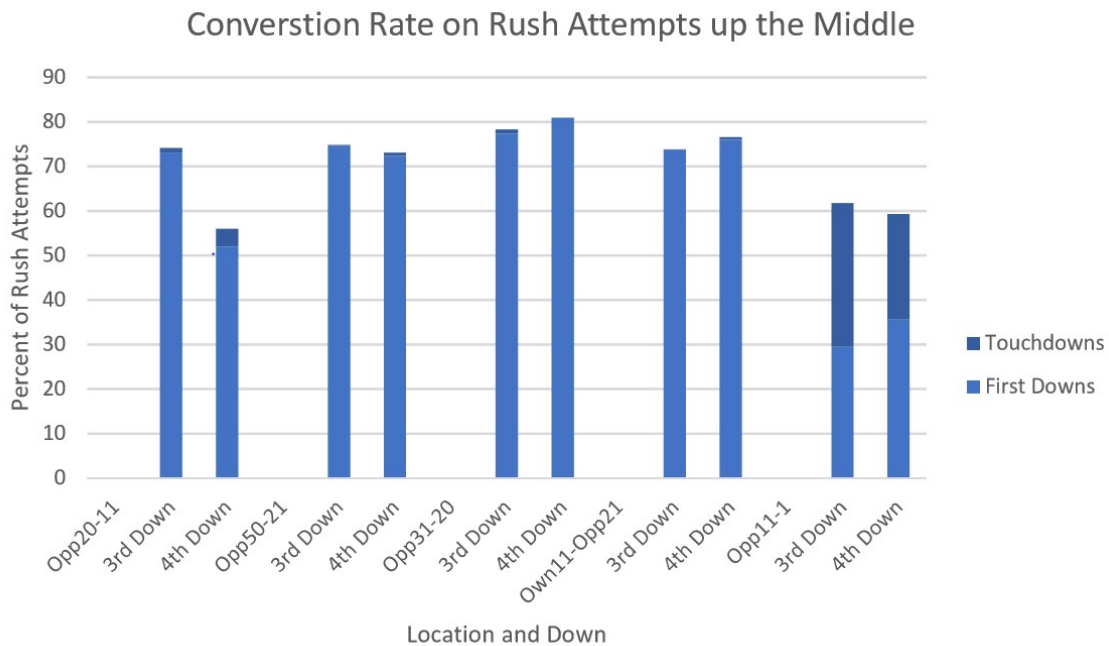
Percent of 4th Down Attempts Resulting in First Down



Note: The first plot point only had a sample size of 2

The explanation for the two square points is shockingly simple. The staple play for offenses to run on 3rd and 1 or 4th and 1 is a run up the middle. In this ten yard stretch the success rate of rushes was extremely low relative to, well honestly relative to any remotely comparable data set. (See figure 4.3 and table B2) I don't know of any logical explanation for this. My only idea was that as defenses get closer to their own end zone they don't have to devote as many defenders to the secondary because a deep pass is no longer a concern. This theory was debunked by rush attempts up the middle inside the opponent's 15-yard line—which continued to have a high success rate. When I replaced the low percentages with an average of the yard grouping up to the opponent's 20-yard line and the grouping from the opponent's 10-yard line to the goal line I came up with the following new average points: Opponent's 20 to 16: 2.3811/2.4397 Opponent's 15 to 11: 2.5468/2.5970 There are two numbers because I ended up needing to replace two turnovers on downs. With the first number I replaced them with gains of less than 3 yards, with the second I replaced one with a gain of less than three yards and one with touchdown.

Figure 4.3

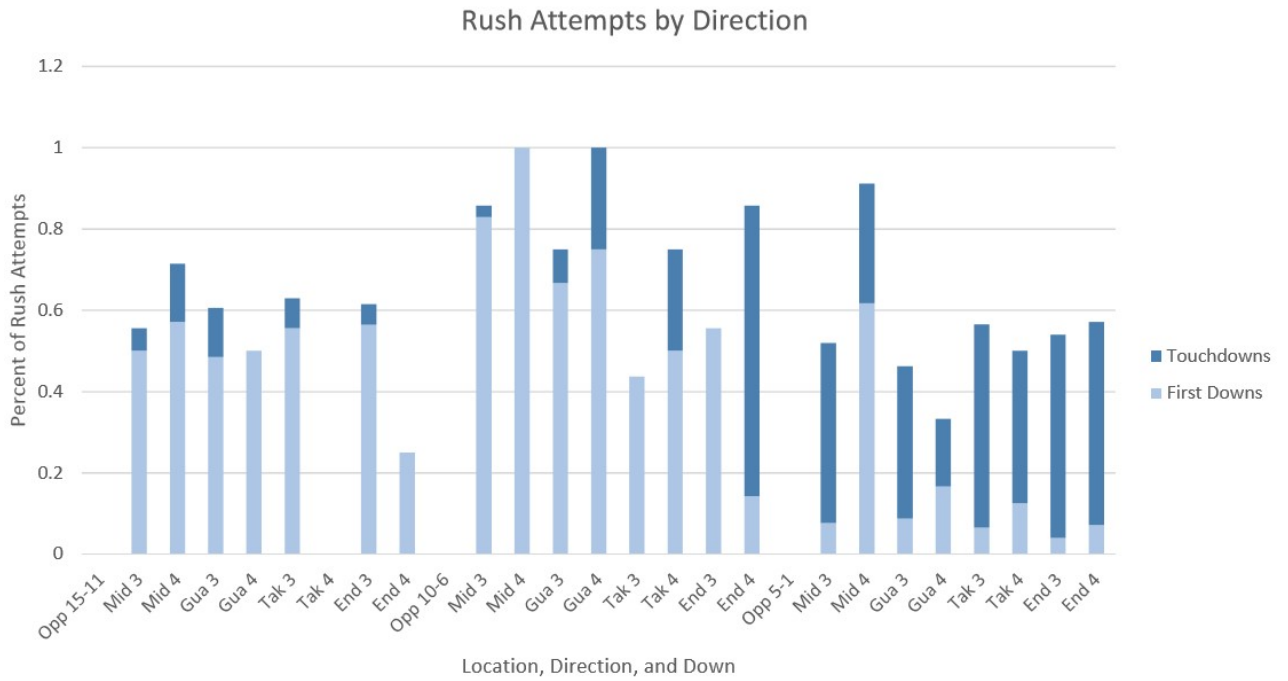


In each of the above bar graphs the left bar is 3rd down and the right bar is 4th down. The lighter shade of blue is first downs and the darker shade of blue is touchdowns.

The last point I want to make addresses something you wouldn't have noticed unless you meticulously poured over the tables. The average points from fourth down attempts and third down attempts begin to grow exponentially at different points. On third down average points increases sharply at the opponent's 5-yard line, while on fourth down the sharp increase begins at the opponent's 10-yard line (see tables A4 and A7). I think this may have something to do with the frequency with which teams attempt rush attempts to the end as opposed to up the middle (see table B for explanation on rush directions).

The comparison I would make here is a soccer player kicking a penalty kick down the middle. Just as the goalie focuses all of his/her efforts on defending a shot to the sides, (American) football defenses tend to focus all of their efforts on a rush attempt up the middle. This could explain the extremely high touchdown rate on fourth down rush attempts to the end on 4th down from the opponent's 10 to 6 yard line (see figure 4.4).

Figure 4.4

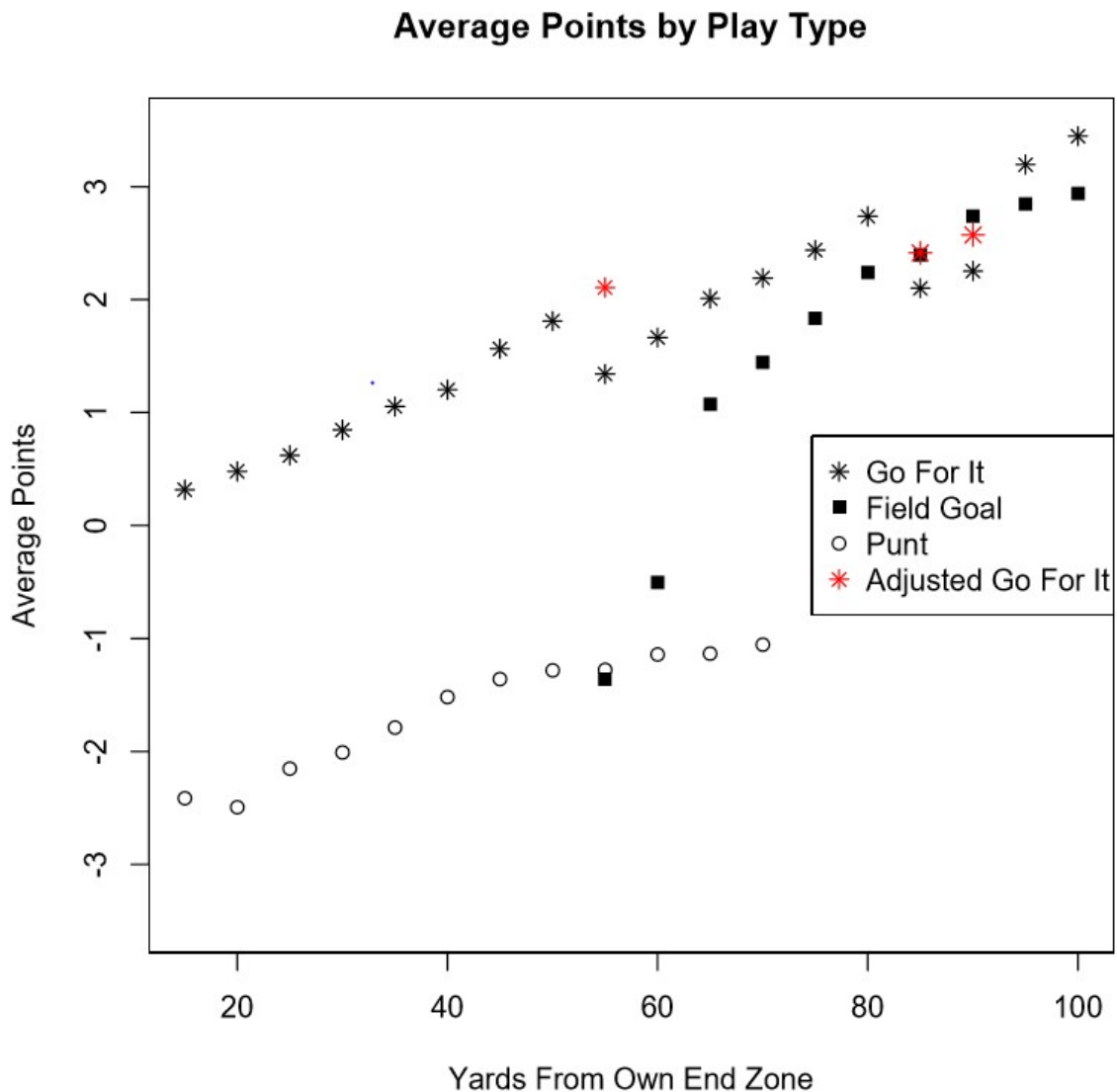


Note: There were no rush attempts from the opponent’s 15 to 11 yard lines on fourth down to the tackle.

Conclusion

No matter how you look at it going for it on fourth down is extremely advantageous. There were just two five yard regions where it appeared kicking a field goal was more advantageous. These appear to be outlier points that resulted from low success rates on rush attempts up the middle. Excluding those two points, the range of advantages to going for it on 4th down instead of punting is 2.6183 to 3.2447 and instead of kicking a field goal is 0.4960 to 2.7015. Going for it is still advantageous when a team is very close to their own end zone—a region of the field where coaches almost never go for it in the first three quarters. Moreover, the probability that a team gets the first down is *higher* in this region of the field—in the high 70%. The high conversion rates on all parts of the field also makes it much more likely that poor luck on attempts early in a game evens out by the end of a game.

Figure 5.1



Tables

Note: Each yard line refers to that yard line and the four lesser yard lines.

Eg. Own 5 = Own 1, 2, 3, 4, 5

Own 40 = Own 36, 37, 38, 39, 40

Opp 40 = Opp 36, 37, 38, 39, 40

Opp 5 = Opp 1, 2, 3, 4, 5

A. Drive/Play Results

A1. Field Position:

Note: Each result is the percentage of times that event occurred

In Own Territory

| Yard line | <i>Average Points</i> | Touchdown | Field Goal | Punt | Safety | Turnover | Downs | Missed/ Blocked FG or Punt |
|------------------|-----------------------|-----------|------------|------|--------|----------|-------|----------------------------------|
| Own 5 | 0.8875 | 10.4 | 8.1 | 59.7 | 4.2 | 15.4 | 1.0 | 1.2 |
| 10 | 1.3076 | 14.4 | 10.8 | 56.3 | 1.1 | 13.3 | 1.1 | 3.0 |
| 15 | 1.4910 | 16.5 | 11.3 | 53.5 | 0.3 | 14.3 | 1.7 | 2.4 |
| 20 | 1.5486 | 17.1 | 11.7 | 52.8 | 0.1 | 13.6 | 2.0 | 2.7 |
| 25 | 1.6163 | 17.9 | 12.2 | 51.7 | 0.1 | 13.5 | 1.6 | 3.0 |
| 30 | 1.8568 | 20.5 | 14.0 | 47.4 | 0 | 12.7 | 1.9 | 3.4 |
| 35 | 2.0154 | 21.8 | 16.3 | 44.7 | 0 | 11.5 | 2.5 | 3.3 |
| 40 | 2.1646 | 22.6 | 19.4 | 38.9 | 0 | 13.5 | 1.9 | 3.7 |
| 45 | 2.4878 | 27.5 | 18.7 | 36.2 | 0 | 10.7 | 3.4 | 3.4 |
| 50 | 2.6680 | 27.9 | 23.9 | 27.9 | 0 | 13.4 | 2.6 | 4.3 |

In Opponent's Territory

| Yard line | <i>Average Points</i> | Touchdown | Field Goal | Punt | Turnover (Int or fumble) | Turnover on Downs | Missed/Blocked FG or Punt |
|------------------|-----------------------|-----------|------------|------|--------------------------------|-------------------------|------------------------------|
| Opp 50 | 2.8586 | 29.0 | 27.5 | 25.5 | 10.4 | 3.8 | 3.8 |
| 45 | 3.2326 | 31.1 | 35.2 | 18.9 | 7.6 | 2.0 | 5.2 |
| 40 | 3.9929 | 45.0 | 28.0 | 10.3 | 8.5 | 1.4 | 6.7 |
| 35 | 3.8047 | 39.5 | 34.8 | 6.3 | 9.4 | 3.5 | 6.6 |
| 30 | 4.1121 | 42.6 | 37.7 | 4.0 | 5.4 | 0.9 | 9.4 |
| 25 | 4.5423 | 48.3 | 38.8 | 0.5 | 7.5 | 1.5 | 3.5 |
| 20 | 4.4790 | 47.3 | 38.9 | 0 | 7.8 | 1.8 | 4.2 |
| 15 | 4.8414 | 51.7 | 40.7 | 0 | 2.8 | 2.1 | 2.8 |
| 10 | 4.9000 | 51.3 | 43.8 | 0 | 3.8 | 0 | 1.3 |
| 5 | 6.1605 | 82.7 | 12.3 | 0 | 2.5 | 1.2 | 1.2 |

A2. Punts:

The frequencies of specific punt events gave few new insights. Punts resulted in points for the punting team less than two percent of the time* and the field position that the defense obtained was proportional to the line of scrimmage of the punt. Results regarding punt yards, return yards, return touchdowns, muffed punts, touchbacks, and average location that the defense receives is all available upon request.

*There was one exception which was addressed in Punt Analysis

In Own Territory

| Yard line | <i>Average Points</i> |
|------------------|-----------------------|
| Own 5 | -3.1978 |
| 10 | -2.9461 |
| 15 | -2.4140 |
| 20 | -2.4926 |
| 25 | -2.1502 |
| 30 | -2.0090 |
| 35 | -1.7891 |
| 40 | -1.5167 |
| 45 | -1.3575 |
| 50 | -1.2809 |

In Opponent's Territory

| Yard line | <i>Average Points</i> |
|------------------|-----------------------|
| Opp 50 | -1.2768 |
| 45 | -1.1411 |
| 40 | -1.1338 |
| 35 | -1.0530 |

A3. Field Goals:

| Yard line | <i>Average Points</i> | Made | Missed |
|------------------|-----------------------|------|--------|
| Opp 50 | -1.3600 | 23.1 | 76.9 |
| 45 | -0.5028 | 36.2 | 63.8 |
| 40 | 1.0724 | 62.7 | 37.3 |
| 35 | 1.4439 | 69.0 | 31.0 |
| 30 | 1.8335 | 76.0 | 24.0 |
| 25 | 2.2407 | 83.6 | 16.4 |
| 20 | 2.3963 | 86.7 | 13.3 |
| 15 | 2.7393 | 94.2 | 5.8 |
| 10 | 2.8460 | 96.4 | 3.6 |
| 5 | 2.9406 | 98.5 | 1.5 |

A4. 4th Down (1 Yard to Go):

I grouped my data into multiple collections of five-yard groups for sample size purposes. This accounts for repetitions in percentages—average points varies due to field position. See “Methodology” for justification.

In Own Territory

| Yard line | <i>Average Points</i> | Percent Points For | Percent Points Against | Average Points For | Average Points Against |
|------------------|-----------------------|--------------------|------------------------|--------------------|------------------------|
| 15 | <i>0.3171</i> | 78.3 | 21.7 | 1.75 | 4.84 |
| 20 | <i>0.4786</i> | 78.3 | 21.7 | 1.85 | 4.48 |
| 25 | <i>0.6212</i> | 78.3 | 21.7 | 2.05 | 4.54 |
| 30 | <i>0.8467</i> | 78.3 | 21.7 | 2.22 | 4.11 |
| 35 | <i>1.0538</i> | 78.3 | 21.7 | 2.40 | 3.80 |
| 40 | <i>1.2020</i> | 78.3 | 21.7 | 2.64 | 3.99 |
| 45 | <i>1.5640</i> | 78.3 | 21.7 | 2.89 | 3.23 |
| 50 | <i>1.8101</i> | 78.3 | 21.7 | 3.10 | 2.86 |

In Opponent's Territory

| Yard line | <i>Average Points</i> | Percent Points For | Percent Points Against | Average Points For | Average Points Against |
|------------------|-----------------------|--------------------|------------------------|--------------------|------------------------|
| Opp 50 | <i>1.3415</i> | 66.9 | 33.1 | 3.32 | 2.67 |
| 45 | <i>1.6645</i> | 66.9 | 33.1 | 3.72 | 2.49 |
| 40 | <i>2.0095</i> | 66.9 | 33.1 | 4.07 | 2.16 |
| 35 | <i>2.1917</i> | 68.3 | 31.7 | 4.14 | 2.02 |
| 30 | <i>2.4379</i> | 68.3 | 31.7 | 4.43 | 1.86 |
| 25 | <i>2.7367</i> | 68.3 | 31.7 | 4.75 | 1.61 |
| 20 | <i>2.1007</i> | 55.8 | 44.2 | 4.99 | 1.55 |
| 15 | <i>2.2523</i> | 55.8 | 44.2 | 5.23 | 1.49 |
| 10 | <i>3.1947</i> | 57.0 | 43.0 | 6.59 | 1.31 |
| 5 | <i>3.4462</i> | 57.0 | 43.0 | 6.71 | 0.88 |

A5. Third Down Rushing:

In Own Territory

| Yard line | <i>Average Points</i> | Percent Points For | Percent Points Against | Average Points For | Average Points Against |
|------------------|-----------------------|--------------------|------------------------|--------------------|------------------------|
| 15 | -0.1456 | 72.4 | 27.6 | 1.64 | 4.84 |
| 20 | 0.3376 | 76.7 | 23.3 | 1.80 | 4.48 |
| 25 | -0.2126 | 68.0 | 32.0 | 1.86 | 4.62 |
| 30 | 0.4441 | 74.3 | 25.7 | 2.02 | 4.11 |
| 35 | 0.3072 | 68.8 | 31.2 | 2.17 | 3.80 |
| 40 | 0.6627 | 72.6 | 27.4 | 2.42 | 3.99 |
| 45 | 1.0393 | 72.3 | 27.7 | 2.68 | 3.23 |
| 50 | 0.9927 | 66.2 | 33.8 | 2.96 | 2.86 |

In Opponent's Territory

| Yard line | <i>Average Points</i> | Percent Points For | Percent Points Against | Average Points For | Average Points Against |
|------------------|-----------------------|--------------------|------------------------|--------------------|------------------------|
| Opp 50 | 1.5615 | 71.8 | 28.2 | 3.22 | 2.67 |
| 45 | 1.7970 | 70.1 | 29.9 | 3.63 | 2.49 |
| 40 | 1.9977 | 68.0 | 32.0 | 3.96 | 2.16 |
| 35 | 2.1399 | 68.6 | 31.4 | 4.04 | 2.02 |
| 30 | 2.4734 | 67.6 | 32.4 | 4.55 | 1.86 |
| 25 | 3.0478 | 74.4 | 25.6 | 4.64 | 1.61 |
| 20 | 2.8727 | 69.9 | 30.1 | 4.78 | 1.55 |
| 15 | 3.3498 | 73.5 | 26.5 | 5.09 | 1.49 |
| 10 | 3.5339 | 70.6 | 29.4 | 5.55 | 1.31 |
| 5 | 3.5568 | 57.1 | 42.9 | 6.90 | 0.89 |

A6. Third Down Passing:

In Own Territory

| Yard line | <i>Average Points</i> | Percent Points For | Percent Points Against | Average Points For | Average Points Against |
|------------------|-----------------------|--------------------|------------------------|--------------------|------------------------|
| 15 | 1.8842 | 100 | 0 | 1.88 | 0 |
| 20 | -0.4865 | 63.2 | 36.8 | 1.84 | 4.48 |
| 25 | -0.7292 | 57.4 | 42.6 | 2.10 | 4.54 |
| 30 | -0.5105 | 55.1 | 44.9 | 2.47 | 4.16 |
| 35 | 0.6187 | 66.7 | 33.3 | 2.83 | 3.80 |
| 40 | -0.2896 | 54.7 | 45.3 | 2.78 | 3.99 |
| 45 | 1.1133 | 66.1 | 33.9 | 3.34 | 3.23 |
| 50 | 0.2883 | 50.9 | 49.1 | 3.47 | 3.01 |

In Opponent's Territory

| Yard line | <i>Average Points</i> | Percent Points For | Percent Points Against | Average Points For | Average Points Against |
|------------------|-----------------------|--------------------|------------------------|--------------------|------------------------|
| Opp 50 | 0.5517 | 51.2 | 48.8 | 3.63 | 2.67 |
| 45 | 1.4687 | 57.1 | 42.9 | 4.44 | 2.49 |
| 40 | 1.2898 | 52.9 | 47.1 | 4.36 | 2.16 |
| 35 | 0.6581 | 40.6 | 59.4 | 4.57 | 2.02 |
| 30 | 2.3284 | 65.0 | 35.0 | 4.58 | 1.86 |
| 25 | 1.9157 | 53.8 | 46.2 | 4.94 | 1.62 |
| 20 | 1.9167 | 47.4 | 52.6 | 5.77 | 1.55 |
| 15 | 3.1802 | 59.1 | 40.9 | 6.41 | 1.49 |
| 10 | 0.1860 | 20.0 | 80.0 | 6.16 | 1.31 |
| 5 | 3.1494 | 52.1 | 47.9 | 6.96 | 0.99 |

A7. Third Down Total:

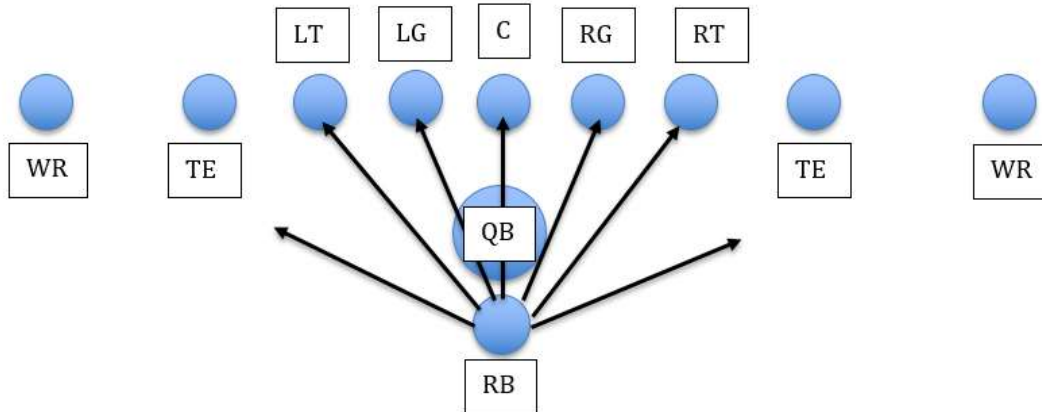
In Own Territory

| Yard line | <i>Average Points</i> | Percent Points For | Percent Points Against | Average Points For | Average Points Against |
|------------------|-----------------------|--------------------|------------------------|--------------------|------------------------|
| 15 | 0.1965 | 77.1 | 22.9 | 1.69 | 4.84 |
| 20 | 0.1551 | 73.9 | 26.1 | 1.79 | 4.48 |
| 25 | -0.3778 | 64.6 | 35.4 | 1.93 | 4.59 |
| 30 | 0.1319 | 68.0 | 32.0 | 2.14 | 4.13 |
| 35 | 0.4089 | 68.2 | 31.8 | 2.37 | 3.80 |
| 40 | 0.3461 | 66.5 | 33.5 | 2.53 | 3.99 |
| 45 | 1.0491 | 70.6 | 29.4 | 2.83 | 3.23 |
| 50 | 0.7886 | 61.9 | 38.1 | 3.07 | 2.91 |

In Opponent's Territory

| Yard line | <i>Average Points</i> | Percent Points For | Percent Points Against | Average Points For | Average Points Against |
|------------------|-----------------------|--------------------|------------------------|--------------------|------------------------|
| Opp 50 | 1.2894 | 66.0 | 34.0 | 3.33 | 2.67 |
| 45 | 1.7160 | 66.9 | 33.1 | 3.80 | 2.49 |
| 40 | 1.8181 | 64.2 | 35.8 | 4.04 | 2.16 |
| 35 | 1.7381 | 61.0 | 39.0 | 4.14 | 2.02 |
| 30 | 2.4560 | 67.0 | 33.0 | 4.58 | 1.86 |
| 25 | 2.7941 | 69.8 | 30.2 | 4.70 | 1.62 |
| 20 | 2.6753 | 65.2 | 34.8 | 4.93 | 1.55 |
| 15 | 3.3083 | 70.0 | 30.0 | 5.37 | 1.49 |
| 10 | 2.8962 | 61.0 | 39.0 | 5.59 | 1.31 |
| 5 | 3.4072 | 55.2 | 44.8 | 6.92 | 0.93 |

B. Specific Data for Analysis



I bring up the direction of rush attempts so I created the above diagram wanted to clarify the terminology. A rush attempt can be up the middle (the middle arrow), to the guard (the arrows on either side of the middle arrow), to the tackle (the next two outermost arrows), or to the end (the two outside arrows).

B1. Rush Attempts by Yard Line and Direction:

Third Down

Fourth Down

Opponent's Fifteen

| Direction | First Downs | TDs | Total Plays |
|-----------|-------------|-----|-------------|
| Middle | 27 | 3 | 54 |
| Guard | 16 | 4 | 33 |
| Tackle | 15 | 2 | 27 |
| End | 22 | 2 | 39 |

| Direction | First Downs | TDs | Total Plays |
|-----------|-------------|-----|-------------|
| Middle | 4 | 1 | 7 |
| Guard | 4 | 0 | 8 |
| Tackle | 0 | 0 | 0 |
| End | 1 | 0 | 4 |

Opponent's Ten

| Direction | First Downs | TDs | Total Plays |
|-----------|-------------|-----|-------------|
| Middle | 29 | 1 | 35 |
| Guard | 16 | 2 | 24 |
| Tackle | 7 | 0 | 16 |
| End | 5 | 0 | 9 |

| Direction | First Downs | TDs | Total Plays |
|-----------|-------------|-----|-------------|
| Middle | 4 | 0 | 4 |
| Guard | 3 | 1 | 4 |
| Tackle | 2 | 1 | 4 |
| End | 1 | 5 | 7 |

Opponent's Five

| Direction | First Downs | TDs | Total Plays |
|-----------|-------------|-----|-------------|
| Middle | 8 | 46 | 104 |
| Guard | 7 | 30 | 80 |
| Tackle | 5 | 38 | 76 |
| End | 2 | 25 | 50 |

| Direction | First Downs | TDs | Total Plays |
|-----------|-------------|-----|-------------|
| Middle | 21 | 10 | 34 |
| Guard | 3 | 3 | 18 |
| Tackle | 2 | 6 | 16 |
| End | 1 | 7 | 14 |

B2. Success on Rush Attempts up the Middle (includes to Guard):

Third Down

| Yard Lines | First Downs | TDs | Total Plays |
|---------------------------|-------------|-----|-------------|
| Opp 10-1 | 54 | 59 | 183 |
| Opp 20-11 | 68 | 1 | 93 |
| Opp 30-21 | 82 | 1 | 106 |
| Opp 50-21 | 267 | 1 | 358 |
| Own 11- Opp 21 | 720 | 1 | 977 |

Fourth Down

| Yard Lines | First Downs | TDs | Total Plays |
|---------------------------|-------------|-----|-------------|
| Opp 10-1 | 21 | 14 | 59 |
| Opp 20-11 | 13 | 1 | 25 |
| Opp 30-21 | 34 | 0 | 42 |
| Opp 50-21 | 97 | 1 | 134 |
| Own 11- Opp 21 | 133 | 1 | 175 |

B3. Non-Grouped 4th Down Conversion Rates

In Own Territory

| Yard line | First Downs | Total Plays |
|--------------|-------------|-------------|
| 11-20 | 1 | 2 |
| 21-30 | 11 | 14 |
| 31-40 | 18 | 22 |
| 41-50 | 35 | 45 |

In Opponent's Territory

| Yard line | First Downs | Total Plays |
|---------------|-------------|-------------|
| Opp 50 | 21 | 26 |
| 45 | 23 | 42 |
| 40 | 39 | 56 |
| 35 | 33 | 49 |
| 30 | 23 | 35 |
| 25 | 26 | 36 |
| 20 | 11 | 18 |
| 15 | 13 | 25 |
| 10 | 20 | 26 |
| 5 | 61 | 116 |

C. Comparison of Average Points by Play Type

C1. Unadjusted Average Points Comparison

In Own Territory

| Yard line | Punt Average Points | Go For It Average Points | Punt vs. Go For It |
|---------------|---------------------|--------------------------|--------------------|
| Own 15 | -2.414 | 0.317 | 2.731 |
| 20 | -2.493 | 0.479 | 2.971 |
| 25 | -2.150 | 0.621 | 2.771 |
| 30 | -2.009 | 0.847 | 2.856 |
| 35 | -1.789 | 1.054 | 2.843 |
| 40 | -1.517 | 1.202 | 2.719 |
| 45 | -1.358 | 1.564 | 2.922 |
| 50 | -1.281 | 1.810 | 3.091 |

In Opponent's Territory

| Yard line | Punt Average Points | Field Goal Average Points | Go For It Average Points | Punt vs. Go For It | Punts vs. Field Goal | Field Goal vs. Go For It |
|---------------|---------------------|---------------------------|--------------------------|--------------------|----------------------|--------------------------|
| Opp 50 | -1.277 | -1.360 | 1.342 | 2.618 | -0.083 | 2.702 |
| 45 | -1.141 | -0.503 | 1.665 | 2.806 | 0.638 | 2.167 |
| 40 | -1.134 | 1.072 | 2.010 | 3.143 | 2.206 | 0.937 |
| 35 | -1.053 | 1.444 | 2.192 | 3.245 | 2.497 | 0.748 |
| 30 | N/A | 1.834 | 2.438 | N/A | N/A | 0.604 |
| 25 | N/A | 2.241 | 2.737 | N/A | N/A | 0.496 |
| 20 | N/A | 2.396 | 2.1007 | N/A | N/A | -0.296 |
| 15 | N/A | 2.739 | 2.2523 | N/A | N/A | -0.487 |
| 10 | N/A | 2.846 | 3.195 | N/A | N/A | 0.349 |
| 5 | N/A | 2.941 | 3.446 | N/A | N/A | 0.506 |

C2. Adjusted Average Points Comparison

In Opponent's Territory

| Yard line | Punt Average Points | Field Goal Average Points | Go For It Average Points | Punt vs. Go For It | Punts vs. Field Goal | Field Goal vs. Go For It |
|---------------|---------------------|---------------------------|--------------------------|--------------------|----------------------|--------------------------|
| Opp 50 | -1.277 | -1.360 | 2.1070 | 3.384 | -0.083 | 3.467 |
| 20 | N/A | 2.396 | 2.3811/ 2.4397 | N/A | N/A | -0.015/ 0.043 |
| 15 | N/A | 2.739 | 2.5468/ 2.5970 | N/A | N/A | -0.193/ -0.142 |