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## **How to Draft Success in the NFL**

### **About the NFL Draft**

The National Football League Draft is an annual meeting of the 32 NFL teams to select eligible college players. The draft is the main way that players enter the NFL and the main way that NFL teams recruit talent. The current design of the NFL draft is that each team is positioned based on their record from the previous season, with the worst team selecting first. The draft consists of 7 rounds with each round concluding when each team has either selected a player or has traded their pick.

### **Overview and Motivation for Research**

Every spring NFL general managers(GMs) attempt to add value to their teams by selecting the best player they can in the draft based on their draft position. Frequently the general managers choose players who don't play up to their perceived ability and the team wastes time and money on a player that doesn't perform on the field. The goal of this project is to determine the combine metrics that lead to success in a player's first 5 years in the NFL. To define success we have used fantasy points and created a benchmark average of a successful NFL player in each position based on the average fantasy points per year for the top 300 wide receivers, 200 running backs, and 150 quarterbacks from the year 2006 to 2016. If a player achieved the benchmark they had a successful season, and we created a variable, Caliber, which counted the number of successful seasons a player had and classified them in the following way:

- 0 Successful seasons=Bust
- 1 Successful season=Back-up
- 2 Successful seasons=Starter
- 3 Successful seasons=Pro Bowl
- 4 Successful seasons=Super Star
- No players had all 5 seasons considered successful seasons.

We have selected a 5 year section of draft data, the draft years of 2006 to 2011, to evaluate, we selected this 5 year section of data so that every player would have at least 5 years of statistical data, and also to limit the amount of data that we would have to pull and clean to a 5 year section. We also made the decision to focus on offensive players for this analysis, only including the offensive skill positions of quarterback, running back, and wide receiver due to there being a large amount of statistical data for these position groups, and a lack of data for positions such as offensive linemen.

### **Related Work**

The NFL Draft is a popular topic for research and analysis as each pick represents a large financial risk for each team and individual researchers wish to determine metrics for determining the best player to draft. There are many studies that have been done on this topic and we found inspiration in a number of sources, a few are linked below:

- [CBS prospect Ranking](#)

- [Wonderlic, Race, and the NFL Draft](#)
- [Success or Bust?](#)
- [Most Likely to Succeed](#)

## Research Question

1. What combine metric(s) is the best determinant of success for each position group?
  1. Secondary Question: Which conference produces the most successful player in each position group.

For example is the 40 yard dash or the 3 cone drill a better indicator of NFL success for wide receivers, or is the broad jump or bench press a better indicator for running backs. By analyzing the players who had successful seasons and analyzing their combine data we hope to have definitive benchmarks for combine events that successful players achieve.

## Data Sources and Technical Processes

We pulled our data from pro-football-reference.com, pulling data from every NFL draft from 2006 to 2010, we also pulled season statistics for every year from 2006 to 2016 to create a benchmark fantasy point level for each position. [Pro-football-reference.com](#) contains statistical information for every NFL player that has been drafted, as well as the college they were drafted from and draft position. We also obtained combine performances of every player who participated in the NFL combine from 2006 to 2010 using the website, [nflcombineresults.com](#). We extracted the data by copying the data directly from pro-football-reference.com and pasting the data into an excel spreadsheet where we compiled a master list. In excel we calculated the fantasy points for each position using the following formulas:

- Quarterbacks:  $(\text{season passing yards}/25) + \text{season touchdowns} * 4 - \text{season interceptions} * 2$
- Running Back:  $(\text{season rushing yards}/10) + (\text{season rushing touchdowns} * 6) - (\text{season fumbles} * 2) + (\text{season receiving yards} * 6) + (\text{season receiving yards}/10)$
- Wide Receivers:  $(\text{season receiving yards} * 6) + (\text{season receiving yards}/10) - (\text{season fumbles} * 2)$

We then found the average fantasy points per season of the top 300 wide receivers, 200 running backs, and 150 quarterbacks over the 2006 to 2016 seasons to create a benchmark of the amount of fantasy points that an average NFL starter should get per season.

Once this benchmark was obtained, each season for the draft picks from 2006 to 2010 was given either a 1 or 0 based on if they obtained the benchmark fantasy points in each of their first 5 seasons or not(Figure 1).

**Figure 1**

	A	M	N	O	P	Q	R	S
1	Player Name	Year 1 Succ	Year 2 Succ	Year 3 Succ	Year 4 Succ	Year 5 Succ	Total Successes	Caliber
2	Demaryius Thomas	0	0	1	1	1	3	Pro Bowl
3	Dez Bryant	0	1	1	1	1	4	Super Star
4	Dexter McCluster	0	0	0	0	0	0	Bust
5	Arrelious Benn	0	0	0	0	0	0	Bust
6	Golden Tate	0	0	0	0	1	1	Backup
7	Damian Williams	0	0	0	0	0	0	Bust
8	Brandon LaFell	0	0	0	0	1	1	Backup
9	Emmanuel Sanders	0	0	0	0	1	1	Backup
10	Jordan Shipley	0	0	0	0	0	0	Bust
11	Eric Decker	0	0	1	1	1	3	Pro Bowl
12	Andre Roberts	0	0	0	0	0	0	Bust
13	Armanti Edwards	0	0	0	0	0	0	Bust
14	Taylor Price	0	0	0	0	0	0	Bust
15	Mardy Gilyard	0	0	0	0	0	0	Bust
16	Mike Williams	1	0	1	0	0	2	Starter
17	Marcus Easley	0	0	0	0	0	0	Bust
18	Jacoby Ford	0	0	0	0	0	0	Bust
19	David Reed	0	0	0	0	0	0	Bust

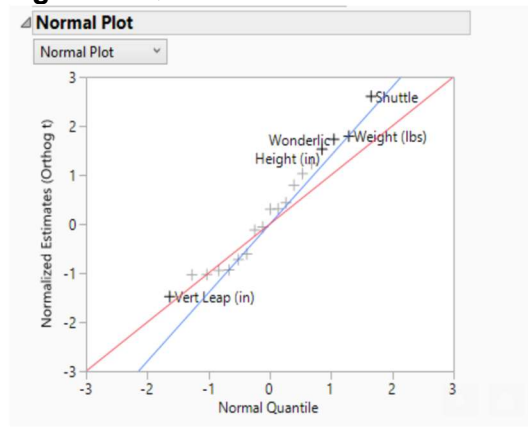
A column

labeled total success was then created to sum the number of success and the number of success in each of the first seasons was used to put a player in one of 4 categories in the caliber column(These categories can be seen in the Overview and Motivation for Research section). After this step we exported the data into JMP and performed our exploratory data analysis, which will be described in the next section, before ultimately exporting the data into Tableau to create the dashboard and story.

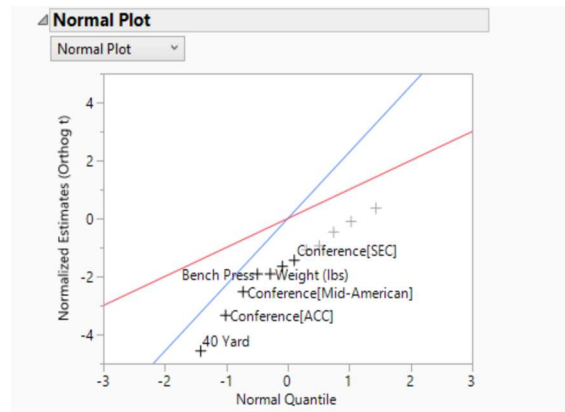
## Exploratory Data Analysis

To identify combine metrics that may lead to success in the NFL we exported the data from excel into JMP and performed a linear regression for each position with average fantasy points as the response variable and including all of the combine metrics from the excel document in the model, including weight and height, as well as creating interaction terms between variables that we felt might be related. The output of the JMP model helped us to identify important variables through using the p-values and the normal plot to identify variables that we should look further into, below are the normal plots for each position.

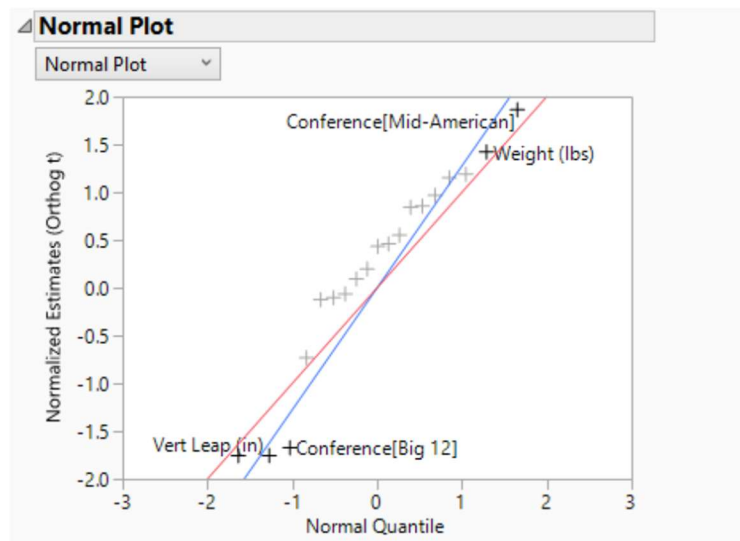
**Figure 2: QB Normal Plot**



**Figure 3: RB Normal Plot**



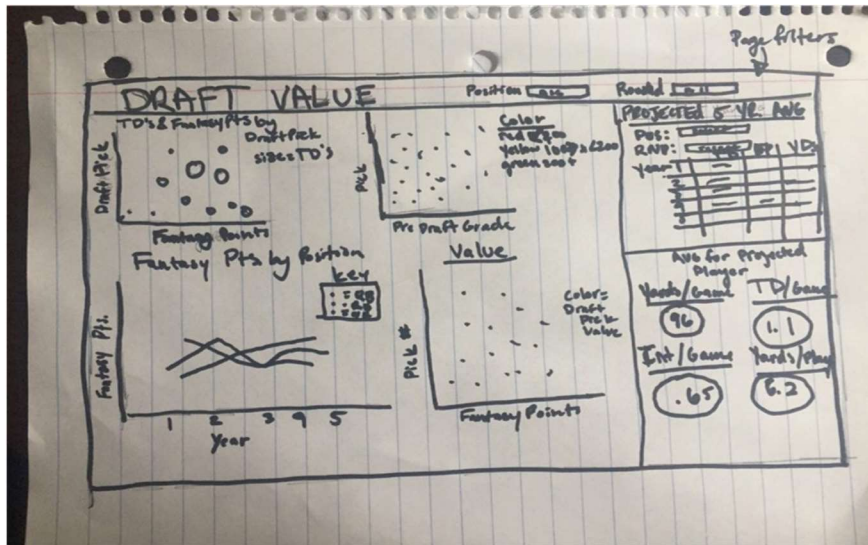
**Figure 4: WR Normal Plot**



## Design Evolution

The scope of this project changed several times while we were exploring the combine data that we had downloaded, this is clear from an early draft seen below where we were displaying charts attempting to display draft value of players.

Figure 5



This approach led us to a dead-end where we had trouble in making reliable conclusions in a draft value of a player, so we decided to change course and analyze the NFL combine, since the combine carries a good deal of weight with NFL scouts and how they evaluate talent. Once we made this decision we carried out the processes stated in the previous 2 sections to identify players that were successful, and combine metrics that could be predictors of NFL success for draft prospects. We used a variety of metrics to analyze the NFL draft a few of the charts/graphs we have in our story are shown in figure 6 and 7.

Figure 6

Conference							
ACC	Big 12	Big Ten	Division I FBS Independents	Mid-American	Pac-12	SEC	The American
0.476	0.333	0.333	0.250	1.167	0.150	0.567	0.500

Conference							
ACC	Big 12	Big Ten	Division I FBS Independents	Mid-American	Pac-12	SEC	The American
0.1905	0.1333	0.2083	0.2500	0.5000	0.1000	0.3000	0.2500

**Figure 7**

### Vertical Leap by 40

40 Yard (bin)	Vert Leap (in) (bin)								
	26	28	30	32	34	36	38	40	42
4.30		0.00	0.00	29.00	17.02	15.22	11.14	27.32	
4.35				7.62	0.96	26.16	54.76		
4.40		13.24		4.97	25.97	38.45	49.48	28.66	
4.45	48.68	0.16	4.32	75.86	0.16	21.63	10.02		
4.50	0.00		36.01	60.04	41.04	73.64	53.60		8.76
4.55		0.00	0.00	44.17	23.98	35.40			
4.60					0.00		1.16		
4.65	0.00			9.64	1.36				

### Implementation

Once we had identified the variables that we had identified as important we created charts in tableau that included the variables that we had identified. Since we were analyzing 3 different offensive skill positions we created 3 dashboards with various charts that display trends for each position group, as well as a dashboard that displayed the how many of each caliber of player were taken in each round of the draft, an example of which is shown below in figure 8. We also added the ability to filter on draft pick, conference, and individual player for each dashboard so that a user can drill down the charts to analyze a specific conference, player or draft round.

**Figure 8**

### Wide Receiver

Rnd	Backup	Starter	Pro Bowl	Super Star	Grand Total
1	3	3	2	2	10
2	4	1		1	6
3	4		2		6
4	1	1	1		3
5	1				1
6	1	1			2
7	1		1	1	3

## Evaluation

Since we evaluated three different positions we will provide a conclusion for each and then an overall conclusion of our analysis.

For wide receivers it appears that conference is significant in determining how likely a player is to be successful in the NFL, with the most wide receivers coming from the SEC and the most successful wide receivers on average also coming from the SEC. The MAC average number of successful seasons is inflated due to the 2 NFL superstars of Antonio Brown and Greg Jennings, however there are only 4 wide receivers from the MAC in our analysis, so we can conclude from our analysis that the most successful wide receivers on average from the SEC, but there is talent in smaller conferences so proper scouting should be performed, so these players aren't overlooked. There is also a height to weight ratio that successful wide receivers appear to have that is between 2.6 to 2.85 pounds per every inch of height. This range could be the optimal range to allow wide receivers to be quick while also being able to withstand the vicious hits of the NFL. We also were able to determine that for a wide receiver to be successful on average they have to run at least a 4.55 40 yard dash and have a vertical leap of 32, these metrics are probably the most important combine metrics for wide receivers since the position revolves around speed and athleticism. So in conclusion on average for our 5 year section of NFL statistics, successful wide receivers were more likely to come from the SEC, have a height to weight ratio between 2.6 to 2.85 pounds per inch, and run a 40 yard dash time of at least 4.55 seconds, while having a vertical of at least 32 inches. The conference information isn't as important, but it is something that could be considered when comparing draft picks, the benchmarks for the height to weight ratio, 40 yard dash time, and vertical are more important as they reflect if a player is athletically gifted enough to transition to the NFL.

Conference is also important for running backs, as the non-power 5 conferences of the American and Conference USA have done remarkably well at producing NFL quality running back, they don't provide as many as the other conferences but the ones they do are quality players. This could be potentially because GMs do more in the way of scouting to be sure players from smaller conferences are a sure thing where as they may give running backs from large conferences the benefit of the doubt because they are playing against better competition. The weight distribution for successful running backs is spread out, however the successful running backs are fast, with the successful ones clocking a 40 time of at least 4.55 seconds. Another metric that is extremely important for running backs is the 3-cone drill as running backs must be able to make explosive cuts to evade tacklers. Our analysis found that running backs must clock a 3 cone drill of at least 7.25 to be able to translate to the NFL. In conclusion the benchmarks our analysis found for running backs were running at least a 4.55 40 time, which we found surprising as it is the same 40 time benchmark, as wide receivers, which are perceived to be faster. The weight distribution of running backs varies as different sized running backs work better in different systems, so weight isn't as crucial a factor as we initially thought, however explosiveness is and that is represented in the 3 cone drill, which a successful running back will run in at least 7.25 seconds.

Our combine analysis for quarterbacks is less conclusive than the other positions as a quarterback doesn't necessarily have to be very athletic, but must possess a high football intelligence and intuition when on the field. The metrics that we analyzed as being important for quarterbacks at the combine were the Wonderlic test, which all our

successful quarterbacks scored a 25 or higher on, and the 3 cone drill, which the successful quarterbacks ran in at least 7 seconds, faster than some running backs. This drill may elude to a quarterbacks ability to move around in the pocket and evade defenders, and is the best combine metric out of the ones we analyzed for evaluating a quarterback. This fast time for the 3 cone drill is telling because it is faster than the less explosive of the successful running back group, meaning quarterbacks must be able to make cuts with the same explosiveness as running backs when in the pocket. The NFL combine metrics are less important for quarterbacks, as the passing drills and a player's ability to read defenses, etc, are harder to quantify at the combine.

Overall we feel that GMs are doing a good job currently at identifying talent in the first round, as 24 of the 54 successes in our analysis were taken in the first round. With this being said there is talent later in the draft, especially for the wide receivers, where 3 successes were taken in the 7<sup>th</sup> round, the last round of the draft. Running backs and quarterbacks are less spread out through the draft and GMs should be cautious with picking these positions later in the draft. Quarterbacks are harder to analyze at the NFL combine with current metrics, than the other 2 positions as the only metric that seemed to have a correlation with NFL success was the 3-cone drill, which could determine their ability to move in the pocket. If GMs use our cutoffs for the running back and wide receiver positions they can more accurately identify talent in the draft, and select players who will be successful for their teams.

## **Video**

Giving presentation.