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Systematic Evaluation of NFL Draft Prospects

Exploratory Research in Player Analysis

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Introduction

As the use of advanced metrics in sports grows, so too does the desire to measure a given player's performance using a single metric. In baseball, there is Wins Above Replacement (WAR) and in basketball there is Player Efficiency Rating (PER). In football, however, there is still no clear statistic capable of accomplishing such a monumental feat.

The ultimate "holy grail" question is this: can we create a statistic that truly measures a given player's contribution to his team? This question is much too grand in scope; there are simply too many moving parts in a football game to answer this question accurately. However, if we tweak this question, we can make the prospect of answering it much more feasible. With that being said, let's change the question to this: how can we systematically and objectively evaluate the running backs in the 2017 NFL draft class?

Player Selection and Data Gathering

This new question, now much smaller in scope, still requires a lot of information. First, data must be gathered on all the running backs in the draft. To save time and data, I will focus only on a select group of running backs. This group is as follows:

Player	School
Alvin Kamara	Tennessee
Brian Hill	Wyoming
Christian McCaffrey	Stanford
Curtis Samuel	Ohio State
Dalvin Cook	Florida State
De'Veon Smith	Michigan
D'Onta Foreman	Texas
Jamaal Williams	BYU
Jeremy McNichols	Boise State
Joe Mixon	Oklahoma
Leonard Fournette	LSU
Matt Dayes	NC State
Samaje Perine	Oklahoma
Wayne Gallman	Clemson

This group of 14 players is a relatively strong representation of what most analysts consider to be the top running backs in the draft.

In terms of data, I will use play-by-play data provided by Pro Football Focus (PFF) for the 2015 and 2016 NCAA football seasons. This data set includes all regular season games as well as all championships and bowl games. While some players in the above list played collegiately before those two years, the PFF data has some intricacies that limit its usefulness pre-2015. For that reason, I have limited my data gathering to those two years.

Performance Criteria

Once the sample of players has been determined and the data gathered, the next step is to determine how exactly to evaluate these players. In general, modern running backs need to be able to do two things: run the ball and catch the ball. This is an assumption that must be made in order to continue the evaluation process.

To evaluate abilities in the running game, I used five metrics. These metrics spanned from simply yards per carry to more proprietary measures that I will keep private for the time being. Using the PFF data, I calculated these metrics for each player over the last two years.

The exact same process was used to evaluate each player's receiving talents. However, only four metrics were used instead of the five for running. Again, some typical metrics such as yards per catch were used as well as other proprietary metrics.

Through this process, I ended with nine factors that provided an overall summary of how productive a given player had been in his collegiate career. The nine factors are as follows*:

Running Criteria (RC)	Receiving Criteria (PC)
YP carry	YP catch
RC2	PC2
RC3	PC3
RC4	PC4
RC5	

*I've decided to keep the actual criteria hidden to protect proprietary information.

Relative Player Value

The goal of this research was to create a single measure that could be used to compare draft prospects. Using the performance criteria described above, it is possible to create such a measure.

Each metric is measured on a different scale. While this initially presents a problem, Feature Scaling can be used to correct for it. To do that, each player's value for a given statistic will be recalculated using the following formula:

$$x' = (x - \min(x)) / (\max(x) - \min(x))$$

x’ = normalized valve>
x = original team stat value
min = minimum value of data set
max = maximum value of data set

This normalizes the players score in each category and puts it on a scale from 0 to 100. Below is an example showing how each player’s YPC was transformed using this process.

Player	Yards per Carry	Feature Scaled Value
Dalvin Cook	7.20	50%
Leonard Fournette	7.11	48%
Christian McCaffrey	6.78	42%
D'Onta Foreman	6.57	38%
Curtis Samuel	**9.81**	100%
Jamaal Williams	5.98	26%
Jeremy McNichols	6.20	31%
Samaje Perine	5.86	24%
Alvin Kamara	6.96	45%
Joe Mixon	8.15	68%
Brian Hill	5.39	15%
Wayne Gallman	5.47	17%
Matt Dayes	5.69	21%
De'Veon Smith	**4.60**	0%

Finally, to complete the process, all that is needed is to simply calculate a weighted average of the players Feature Scaled Values across all nine categories. The formula for this is extremely straight forward:

Relative Player Value = (sum Feature Scaled values) / 9

Something of note here is that each metric does not have to be weighted equally. Teams can adjust the weights of certain metrics to better represent their needs. This functionality of Relative Player Value (RPV) is a major strength as front offices can more accurately analyze players in terms of how they fit into any given system.

With this process completed, RPV is calculated and it encapsulates a player’s overall performance relative to his peers. Each players RPV can then be compared with other players in the sample.

Results

Below is a table detailing the RPV of every player in the sample.

Player	Relative Player Value
Joe Mixon	77%
Dalvin Cook	73%
D'Onta Foreman	69%
Leonard Fournette	68%
Alvin Kamara	61%
Christian McCaffrey	61%
Samaje Perine	60%
Jeremy McNichols	57%
Jamaal Williams	57%
Wayne Gallman	56%
Curtis Samuel	54%
Matt Dayes	45%
De'Veon Smith	44%
Brian Hill	38%

Interpretation

Simply put, the higher a player's RPV, the more consistently he scored at the top of the nine metrics relative to the others in the sample. If a player were to have an RPV of 100%, it would mean that he had the best overall statistics in each metric.

If players have relatively similar RPV, they had similar levels of production. Knowing this, one can see which players on the draft board are comparable and which ones are not. This is most useful when dividing the above results into tiers. Players can then be grouped with other players of similar abilities.

Limitations

First and foremost, this is a *comparative* method of evaluating players. A players RPV is partly a function of the other players in the sample. Therefore, individual RPVs can only be compared between players within the same sample.

Additionally, the RPV does not account for the different levels of competition that certain players face. A player who produces less against strong competition will grade out lower than a player who produces significantly against weaker competition.

Final Thoughts

RPV represents a fully objective, systematic approach to player evaluation. While it by no means encapsulates the entirety of a player's performance, it is a great first step in analyzing a large subset of players. It can be used as a screen to filter and create subgroups of players who can then be further analyzed using film studies and other traditional methods.