Racially Differentiated Language in NFL Scouting Reports

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ABSTRACT

Do NFL scouts describe white quarterback prospects and minority quarterback prospects differently? Does racially differentiated discussion of prospects affect their draft stock? In this paper, we identify systematic differences in how scouts describe white and minority quarterback prospects. Reports on white quarterbacks emphasize positive intangibles such as leadership skills and intelligence, while reports on minority quarterbacks focus more on physical attributes and negative intangibles. Supplementary analyses indicate that these differences are driven by the race of prospects and that minority quarterbacks are undervalued in the draft. We also show that discussion of intangible character qualities associated with reports on white prospects is predictive of improved draft position. Our findings suggest that racially framed perceptions, as reflected in the differentiated language of scouting reports, continue to influence the draft stock of NFL quarterback prospects.

Keywords

Text Analytics; Opinion Mining; Sport Analytics; Race

1. INTRODUCTION

The annual NFL draft is an extremely important event for NFL franchises and prospects. The draft provides franchises with an opportunity to select players that can strengthen their teams. The draft provides prospects with an opportunity to join the professional ranks. Scouts that evaluate the suitability of prospects for the NFL play a central role in the draft process. A scouting report which overestimates the ability of a prospect can be financially costly for a franchise, while a scouting report which underestimates the ability of a prospect can be financially costly for the prospect. The media coverage of the draft process is often dominated by the discussion of quarterback prospects, with franchises often hoping to draft a quarterback who can lead their team to better fortunes.

In this paper we extend our understanding of the role that scouts and race have on quarterbacks' draft stock by examining whether NFL scouts describe white and minority quarterbacks differently and how the language associated with the reports on white and minority quarterbacks influence the draft outcomes of prospects. Using a statistical model of the text of official NFL scouting reports, we find that reports on white quarterbacks focus on intangibles such as leadership skills, while reports on minority quarterbacks emphasize the physical attributes of these prospects. We support this result with additional analyses which suggest that race is the source of these differences and minority quarterbacks are systematically undervalued in the draft. With the text data from these scouting reports, we also find that the nature of the language used in scouting reports improves the predictive power of draft position models and language associated with reports on white prospects is predictive of improved draft position. Overall, our findings indicate that racially differentiated language in scout reports has a substantive influence on the draft stock of quarterback prospects.

2. DATA

We parsed the text of scout reports hosted on the NFL's website for all quarterbacks that participated in the combine between 2008 and 2016.[1] In total we collected reports on 175 quarterbacks. There are 43 minority prospects and 132 white prospects in our sample. Over the entire timespan, nearly 11,000 words are used in the minority prospects' reports, while roughly 27,500 are used in reports on white prospects. For these 175 prospects, and for 125 quarterbacks that both attended the combine and were drafted between 1992 and 2007, we also collected data on draft position, combine statistics, college passing statistics, and NFL value.[2]

3. ANALYSIS

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[1]For example, the scout report on former Oregon quarterback Dennis Dixon can be obtained from http://www.nfl.com/combine/profiles/dennis-dixon?id=748.

[2]Draft, combine, and NFL performance data was obtained from http://www.pro-football-reference.com/. College performance data was obtained from http://www.sports-reference.com/cfb/.

3.1 Are minority QBs described differently?

To identify racially differentiated language in this text, we employ a statistical technique formally called the "log-odds-informative-Dirichlet-prior" model, informally the "Fightin' Words" algorithm. This model enables us to determine the words which best distinguish scouting reports about minority prospects from reports about white players. This method was originally employed to capture partisan differences in Congressional speeches [6]. The technique has since come into use by computational linguists for tasks such as comparing cheap and expensive restaurant menus and for sentiment analysis [4, 5]. The model requires that differences in the usage of any particular word are very strong before we can be confident that we are capturing a systematic difference in scouts' descriptions of white and minority quarterback prospects. This approach is superior to simply examining the difference in counts or normalized counts of certain words, as done in previous work, as we are unlikely to know which words are the best to compare [3, 2].

More formally, the model captures the difference of the count of word w between corpus i and corpus j using the log odds ratio of w, δ_w^{i-j} [6, 5]. We estimate δ_w^{i-j} as follows:

$$\delta_w^{i-j} = \log\Big(\frac{y_w^i + \alpha_w}{n^i + \alpha_0 - y_w^i - \alpha_w}\Big) - \log\Big(\frac{y_w^j + \alpha_w}{n^j + \alpha_0 - y_w^j - \alpha_w}\Big)$$

where n^i and n^j represent the respective size of corpora i and j, y_w^i and y_w^j represent the count of the word w in corpora i and j respectively, α_w represents the prior of w,[3] and α_0 is the sum of the priors of each word in the background corpus, $\sum_w^W a_w$. The variance of these estimates, $\sigma^2(\delta_w^{i-j})$, can be calculated as:

$$\sigma^2(\delta_w^{i-j}) \approx \frac{1}{y_w^i + \alpha_w} + \frac{1}{y_w^j + \alpha_w}$$

Combining these we can calculate the z-score, ζ_w^{i-j}, of the log odds ratio which is the statistic used for evaluating words and accounts for the fact that estimates of words used less frequently have higher variance than frequently used words:

$$\zeta_w^{i-j} = \frac{\delta_w^{i-j}}{\sqrt{\sigma^2(\delta_w^{i-j})}}$$

Figure 1 presents the result of estimating the model discussed above on the text of quarterback scout reports. The x-axis represents how many times a term occurs in the scouting reports. On the y-axis we plot the value of ζ_w^{i-j} for each word in the dataset. This represents the extent to which a term is associated with minority prospects (positive scores) or white prospects (negative scores). For clarity, words that are less clearly differentiated are plotted as gray dots. This figure highlights a clear racial disparity in the language used to describe quarterback prospects.

3.2 Are the differences stereotypical?

The sociology literature on this subject suggests that we are likely to see white quarterbacks viewed as having positive character and intellectual traits, and their successes attributed to their own efforts; conversely we might expect to see minority quarterbacks viewed as having negative character and intellectual traits, discussed in terms of physical and 'natural' traits, and their successes and failures attributed to external forces [7]. We see all of these patterns here.

[3]This is typically calculated as $\alpha_w = \mathbf{y}\frac{\alpha}{n}$, where $\mathbf{y}$ is the frequency of w in the background corpus, n is the total number of words in the background corpus, and α is prior weight.

White	Examples
Smart	*smart, intelli(gent), understand*
Leader	*leader, command*
Consistent	*solid, consist(ent), pois(ed), calm*
Prototype	*prototyp(ical), proper, fit, appear*
Good	*good, outstand(ing)*
Minority	Examples
Physical	*big, weight, lean, frame, hand, step*
Bad	*issu(e), mess, defici(t)*
Unsteady	*hesit(ant), prematur(e), bolt, rather*
External	*ask(ed), coordin(ator), blitz, opportun(ity)*

Table 1: Most words that are used differentially by QB race reflect longstanding stereotypes.

It is apparent that a number of words pertaining to physical attributes, such as *big*, *lean*, *step*, and *frame* are strongly associated with reports on minority quarterback prospects. The term *danger* is used both in reference to a minority prospect as a *dangerous runner* and a maker of *dangerous throws*. Conversely, in reports on white prospects, we can see that terms related to a prospect's positive intangibles, such as *intellig*, *leader*, *command*, and *smart*, and terms related to a prospect's readiness for the professional ranks, such as *system* and *prototyp*, are strongly associated with these reports. It is also striking that white quarterbacks are frequently *good* or *outstanding*, while minority quarterbacks are *capable* or even have *issues*. We provide further examples of these stereotypical differentiations in Table 1.

3.3 Does this reflect objective differences?

While physical words like *big* and *weight* are strongly associated with minority prospects' reports, one might object that this observed difference in language usage might be driven by actual physical differences between minority and white prospects. We demonstrate, however, that race is a significant predictor of the use of these words in scouting reports even when accounting for the physical attributes of prospects.

Using combine data covering the same time period, we estimate a logistic regression model assessing the relationship between the mention of *weight*, and the prospect's actual weight. Since the word is descriptive of an objective measure that is recorded at the combine, we may not expect race to be a significant predictor of its use. This is, however, not the case. Figure 2 shows, for a player weighing 223 pounds, the median weight of players in our sample, the probability that the word *weight* is used in a prospect's report is just 6% if that player is white, but is 27% if they are a minority. The association between a player's weight and the use of the word *weight* in his report, with or without accounting for the player's race, is not statistically significant.

3.4 Does this matter in the NFL draft?

One might object that these are just words. As socially problematic as this might be, and as unambiguous as the historic record of undervaluing minority quarterbacks is [1], we might think that there's too much money now at stake

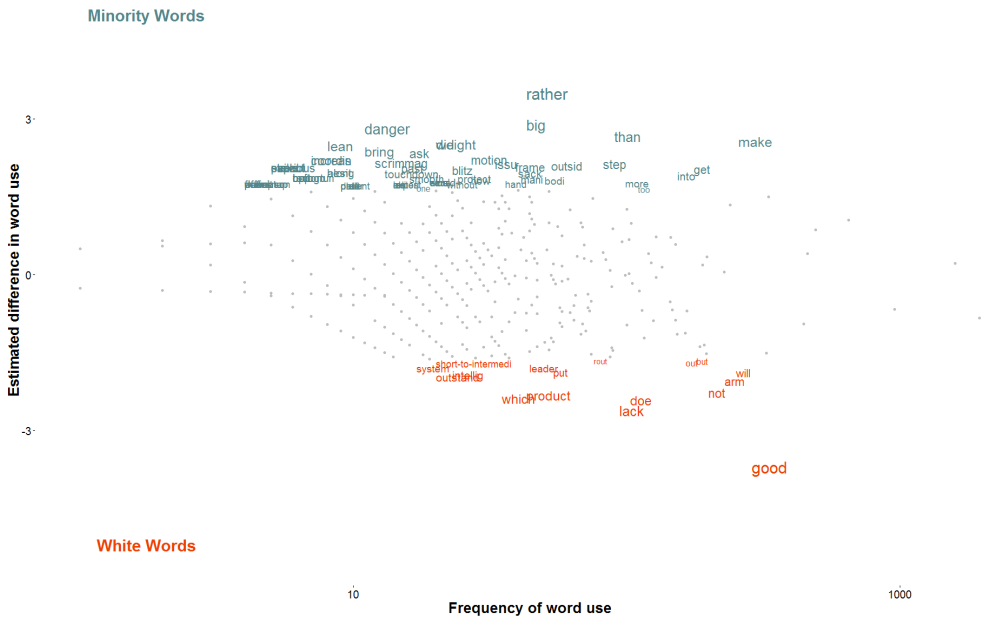

Figure 1: Frequency of word usage and estimated difference in word usage

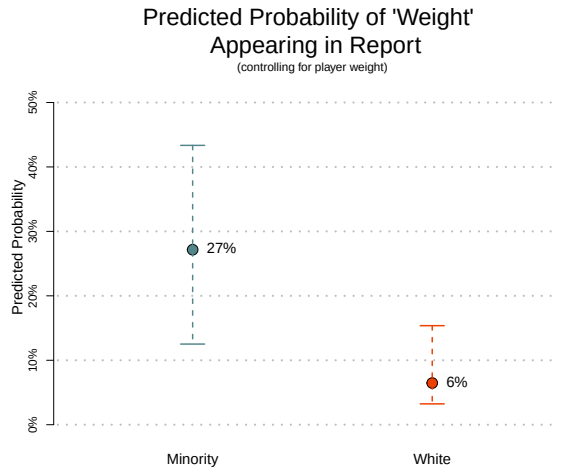

Figure 2: Logistic regression prediction for prospect of median weight (223lbs).

for this to impact the labor market for NFL quarterbacks. However, this market inefficiency appears to persist.

To determine whether quarterbacks are undervalued, we estimate the relationship between Careeer Approximate Value (CAV), which measures the value of a player over their entire career, and draft position, and SAAV (Season Average Approximate Value), which measures the average season value of a player, and draft position. We used data on quarterbacks between 1992 and 2007 and estimate a monotonic B-splines model to estimate the relationship between these performance measures and draft position. This provides us with the expected CAV and SAAV for a QB picked in any given draft position, which we then use as a baseline expectation for the quarterbacks drafted since 2008. Positive deviations from this expectation indicate excess value, that a pick overperformed his draft position; negative deviations indicate the opposite.

We model these value deviations as a function of race, finding that minority quarterbacks outperform white quarterbacks by 1.22 units of excess SAAV and 10.22 units of excess CAV relative to their draft position. This is roughly equivalent in both cases to the difference between a typical backup quarterback and a complete bust. That is, minority quarterbacks continue to be undervalued in the draft process.

It follows that racially differentiated language in scouting reports might have some value in a predictive model of draft position, to the extent that the reports reflect general conversations about and (mis)perceptions of a prospect.

To predict the draft position of prospects, we use linear regression and Elastic Net generalized linear models. The Elastic Net model is a shrinkage and variable selection method that combines the L_1 penalty of the LASSO model, which produces sparse models, and the L_2 penalty of ridge regression model, which penalizes correlated predictors [8].

We model the draft position of prospects as a function of height, college passing efficiency (the first principal component of completion percentage and touchdown percentage), combine-measured athleticism (the first principal component of broad jump and 40-yard dash speed), and logged counts of the words in the stereotyped groupings identified above (Table 1 identifies a subset of the words used.) For ease of comparison, all predictor variables are standardized. For interpretation, we present estimates of linear regressions, estimated on the whole sample, as well as on the subsamples of white and minority prospects respectively. For predictive validation, we estimate the GLMnet model on all prospects, using Leave-One-Out-Cross-Validation.

We present the coefficients from these models in Figure 3. Discussion of characteristics strongly associated with white prospects, particularly intangible character qualities such as leadership and consistency, are predictive of improved drafted position, while discussion of characteristics associated with minority prospects, specifically negative intangible character qualities, is predictive of degraded draft position. We can also see that the coefficients are largest when language is used in contradiction to stereotype. For instance, the magnitude of the coefficients for leadership words and consistency words is much larger in the model including only minority quarterbacks. Note that the confidence intervals are also much larger, indicating that it is relatively rare for minority quarterbacks to be discussed with words in the Smart or Leader groupings. The cross-validated GLMnet results are similar to those of the in-sample OLS model, with some shrinkage of coefficients.

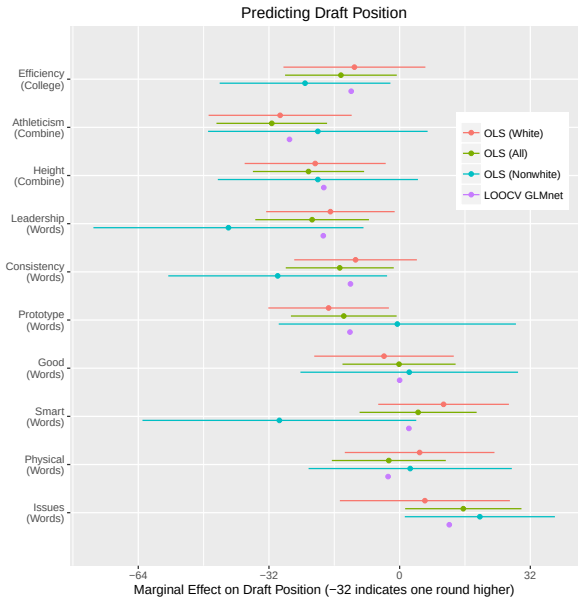

Figure 3: Linear regression and cross-validated GLMnet models of draft position.

We also present model fit statistics in Table 2. It is clear that predicting the draft position of quarterbacks is extremely difficult, with the null RMSE for the full sample equaling 93.9. However, it is also apparent that the language used in scouting reports improves the prediction of draft position over and above the predictive power of college and combine performance statistics.

4. CONCLUSION

Our analyses indicate there is a systematic difference in the language used to describe minority and white quarterback prospects in these reports and these differences substantively influence the the draft outcomes of prospects. Discussion of positive intangible characteristics strongly associated with white prospects is predictive of early draft selection, while discussion of negative intangible characteristics associated minority quarterbacks is predictive of late draft selection. However, our examination of the relationship between players' performance in the NFL and draft position indicate that minority quarterbacks provide more value than expected, while white quarterbacks provide less than expected. This suggests that potential biases in the draft process may lead to a market inefficiency that can adversely impact both franchises and prospects.

	All Prospects	**White**	**Minority**
Model	RMSE	RMSE (R2 / Adj. R2)	RMSE
OLS:			
Stats	87.17 (0.15 / 0.14)	85.87 (0.12 / 0.10)	92.95 (0.27 / 0.21)
Words	89.46 (0.13/0.09)	87.55 (0.11/0.06)	77.69 (0.55/0.45)
Stats & Words	81.81 (0.29 / 0.24)	83.38 (0.22 / 0.15)	68.14 (0.69 / 0.58)
GLMnet:			
Stats	88.30	87.33	99.02
Words	91.17	89.11	86.30
Stats & Words	84.44	86.92	76.29
Null	93.91	90.28	104.68
N	159	120	39

Table 2: Goodness-of-Fit statistics by sample, model type, and covariates.

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