

Have coaches changed how they select which players to give more minutes to?

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Abstract

Since the NBA adopted the three point line in 1979 the league has had several key rule changes (eg hand checking rules, allowing zone defense) that have altered the value of different skill-sets players may have. With the creation of the three point shot, a shot made from behind the arc was worth more, which made long distance shooting more valuable. We explore which stats better explain the minutes per game played in every season, to see if coaches have adapted to these rules, all analyses were made by position (Guards, Forwards and Centers). Mostly we see that assists per 100 possessions and points per 100 possessions are the two stats that have the most explanation for minutes per game played. We notice that since 2009, rebounding per 100 possessions stopped being an important variable selected by coaches

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Methods

The basketball reference player season finder was used to extract the per 100 team possessions stats, single season, during the three point era (since season 1979-80), during the regular season ("Player Season Finder Basketball-Reference.com" 2017), and that information was coupled with the minutes per game played by each player, again extracted from the basketball reference player season finder but now in the per game stats. We divided that data-set into 37 data-sets, one for each season from the 1979-80 season to the 2016-17 season.

Queries

- For single seasons, played in the NBA/BAA, in the regular season, from 1979-80 to 2016-17, played G or G-F, qualified for Minutes Per Game Leaderboard, sorted by descending Win Shares
- For single seasons, played in the NBA/BAA, in the regular season, from 1979-80 to 2016-17, played F or F-G or F-C, qualified for Minutes Per Game Leaderboard, sorted by descending Win Shares
- For single seasons, played in the NBA/BAA, in the regular season, from 1979-80 to 2016-17, played C or C-F, qualified for Minutes Per Game Leaderboard, sorted by descending Win Shares

For each season, the per 100 team possession stats was used to fit a global glm model (Nelder and Baker 1972) that explains the minutes per game of each player based on the following variables: Two point shot attempts per 100 possessions, two point shot percentage, three point shots attempts per 100 possessions, three point shot percentage, free throw attempts per 100 possessions, free throw percentage, total rebounds per 100 possessions, assists per 100 possessions, steals per 100 possessions, blocks per 100 possessions, turnovers per 100 possessions, points per 100 possessions and effective field goal percentage.

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In order to be able to compare the strength of relationship of every variable on the same scale, all of them were scaled and centered (Bro and Smilde 2003) using the caret package (Kuhn and Johnson 2013).

For each season, we tested variables for collinearity. Then we fitted every possible first order model not allowing models to coexist if they had a Pearson correlation coefficient equal or higher than 0.7 (Dormann et al. 2013). Then the models were ranked based on Akaike's Information Criteria for small sample sizes (AICc) (Cavanaugh 1997) using the MuMin Package (Bartoń 2013; Burnham and Anderson 2002). We didn't use model averaging since even though collinear variables were prohibited to coexist in the same model, these might coexist in the average model (Cade 2015), thus we selected the best possible model for each season selecting by AICc (Burnham and Anderson 2002). All of the analyses using R statistical Software (Team 2016),

Results

Centers

As we can see in figure 2, the TRB per hundred possessions is the variable that appears in most seasons being selected in 38 of 38 seasons, followed by TwoPA per hundred possessions and AST per hundred possessions being selected in 19 and 12 seasons respectively.

This doesn't hold true for every decade (Figure 1). Specifically, two point attempts per hundred possessions (TwoPA), were selected in most seasons (second overall), in the 80s, 90s and 2000s, but in the 2010s, they go down to the 6th position on times it was selected, with Points per hundred possessions (pts) taking its place as the second variable being selected in most seasons only behind Total rebounds per hundred possessions. Also notably in three of the last four seasons, Three point attempts per hundred possessions, was important in determining the minutes per game a center plays. Even when a variable is selected, that does not mean is the variable that has the most strength in a given year, as an example, if we look at figures 2 and 3, even when Total rebound per hundred possessions has been selected for every season in the NBA, the strength of the relationship of rebounds with minutes per games is weaker by the year, the same goes for assists. On the other hand, two point attempts per hundred possessions was selected less times this decade than any other decade. But when its selected is very strongly selected.

Forwards

As we can see in figure 5, the TRB per hundred possessions is the variable that appears in most seasons being selected in 38 of 38 seasons, followed by STL per hundred possessions and TwoPA per hundred possessions being selected in 28 and 22 seasons respectively.

In this case most notably the change for decades is mostly the Three point attempts per hundred possessions were chosen in 7 of the last 8 seasons (Figures 4 and 5).

Just as in centers, the total rebounds per hundred possessions have been less and less important for Forwards to gain minutes per game.

Guards

As we can see in figure 8, the TRB per hundred possessions is the variable that appears in most seasons being selected in 37 of 38 seasons, followed by AST per hundred possessions and FTA per hundred possessions being selected in 34 and 33 seasons respectively.

The most striking interdecadal change, is that Assists per hundred possessions, were the most selected variable through out the 80s and 90s, which fell to 4th most selected in the 2000s and 5th in the 2010s figure 7. Also, the importance of the variable has greatly decreased

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Here are two sample references: Bartoń (2013; Cade 2015).

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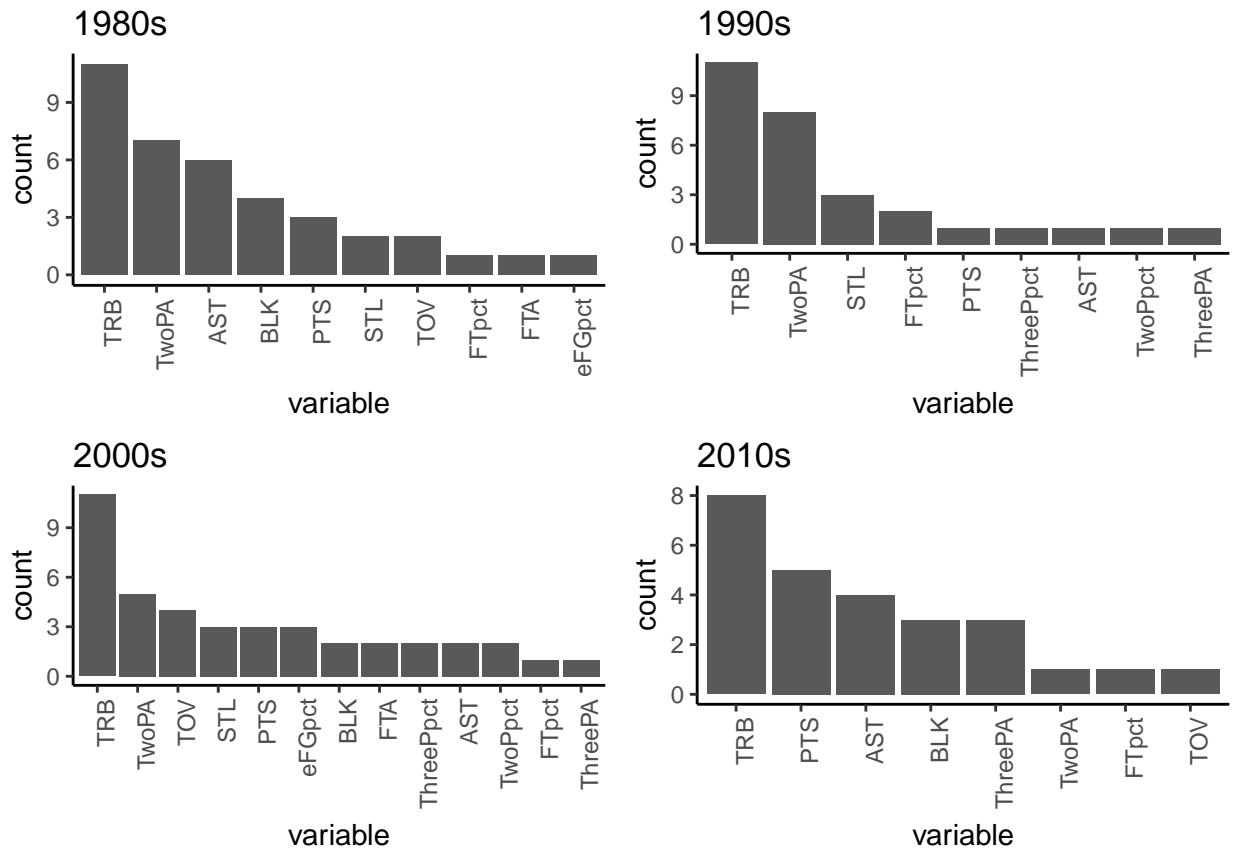


Figure 1: Times a variable was selected by decade for Centers

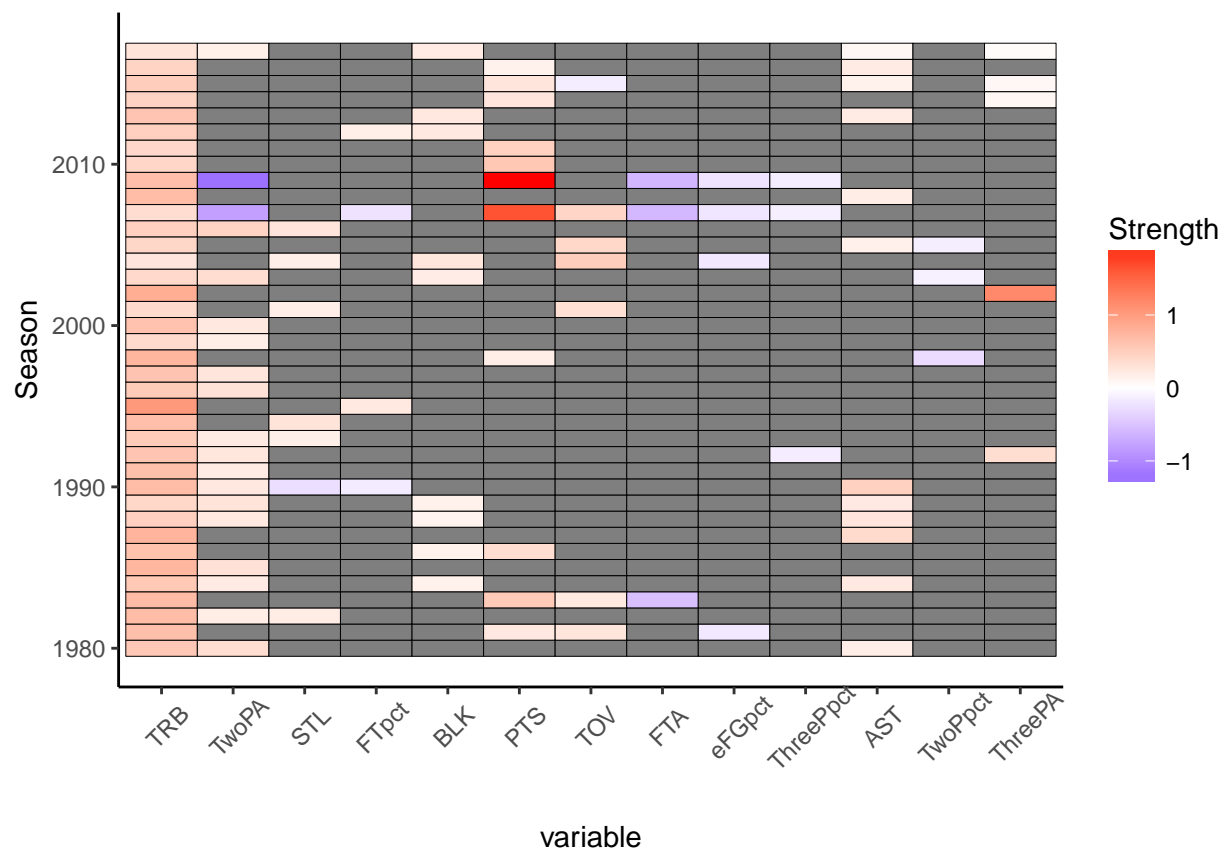


Figure 2: Strength of relationship by season for Centers

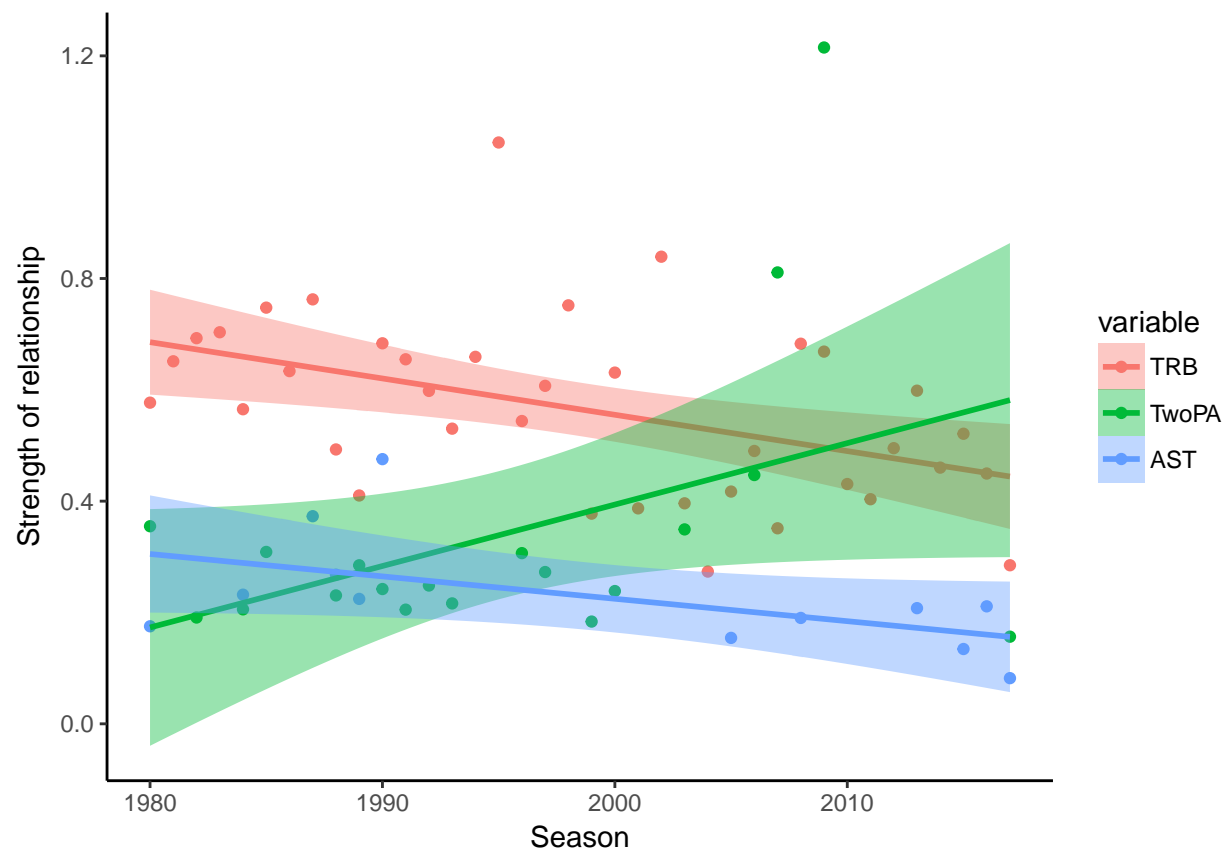


Figure 3: Strength of relationship by season for assists, Rebounds and two point attempts per hundred possessions for centers

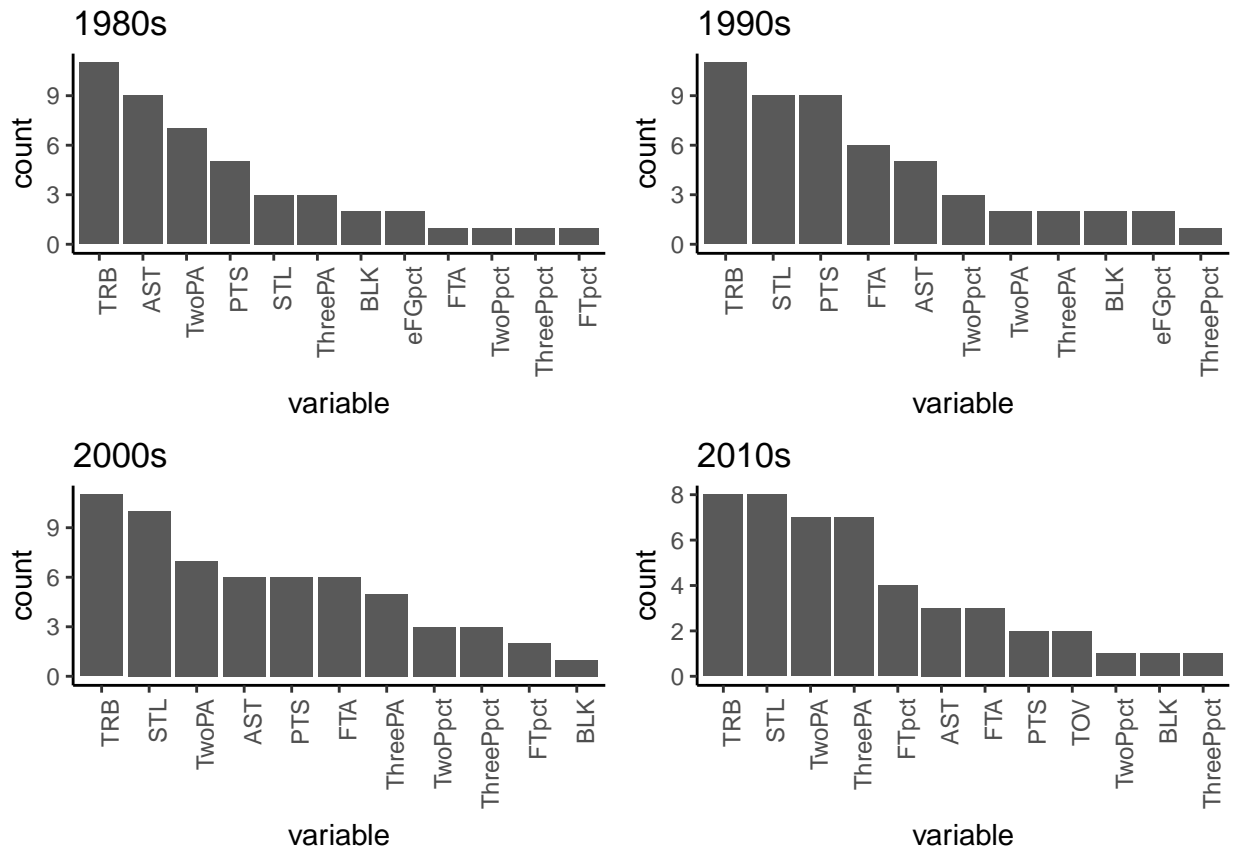


Figure 4: Times a variable was selected by decade for Forwards

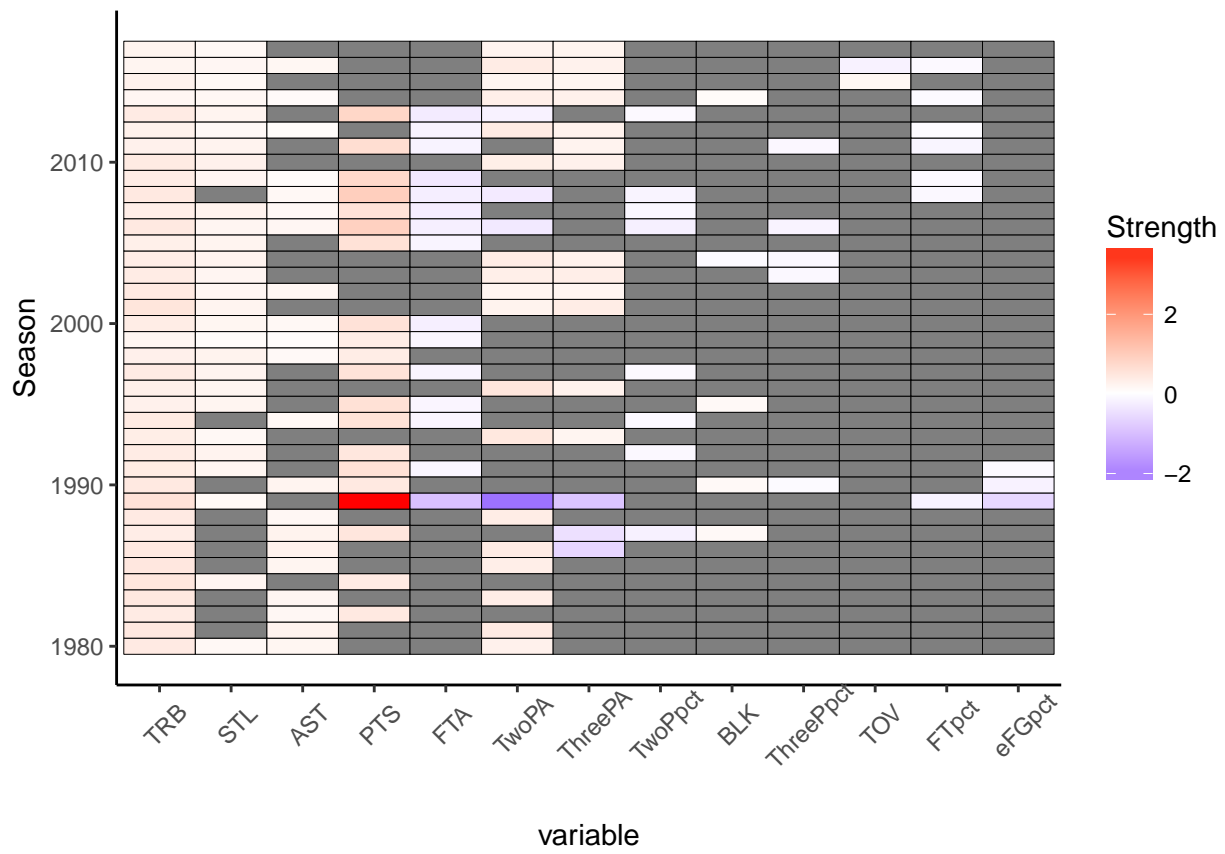


Figure 5: Strength of relationship by season for Forwards

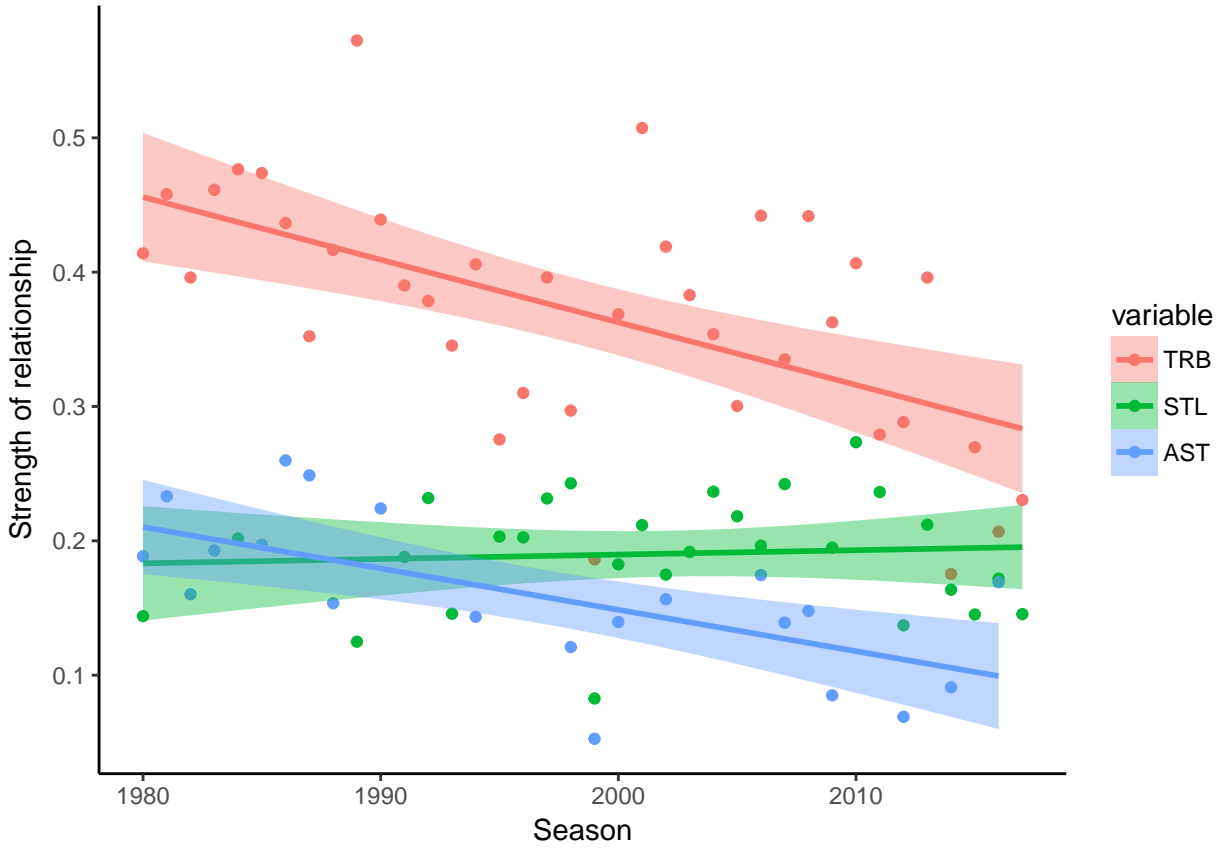


Figure 6: Strength of relationship by season for assists, Rebounds and points for Frowards

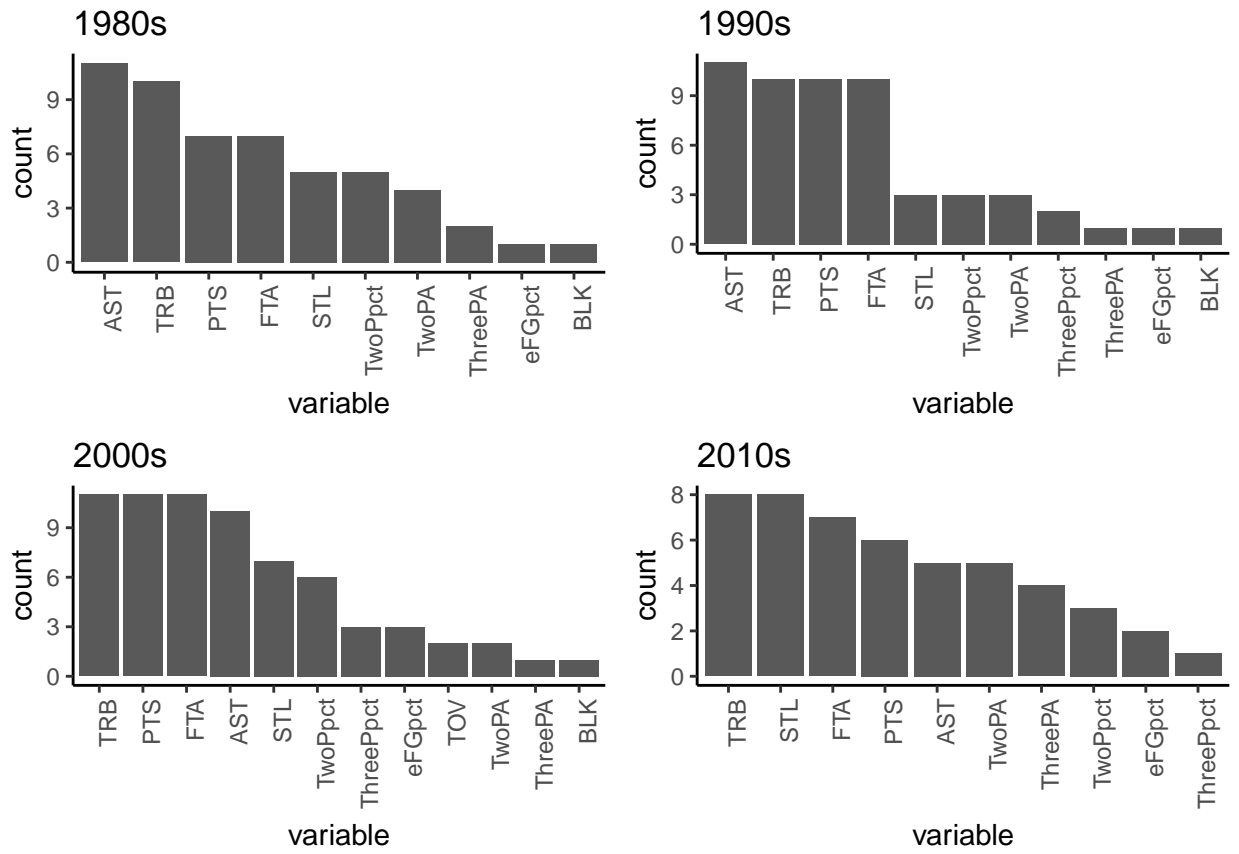


Figure 7: Times a variable was selected by decade for Guards

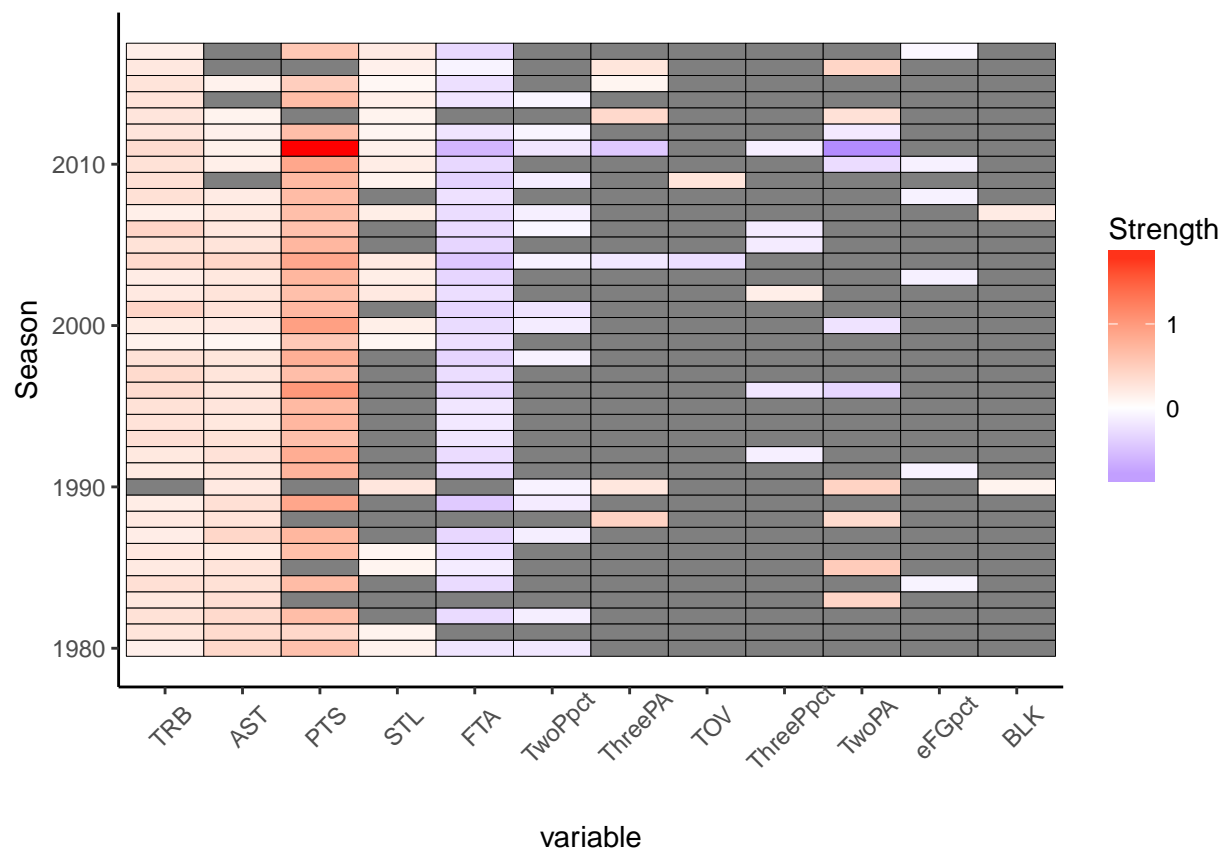


Figure 8: Strength of relationship by season for Guards

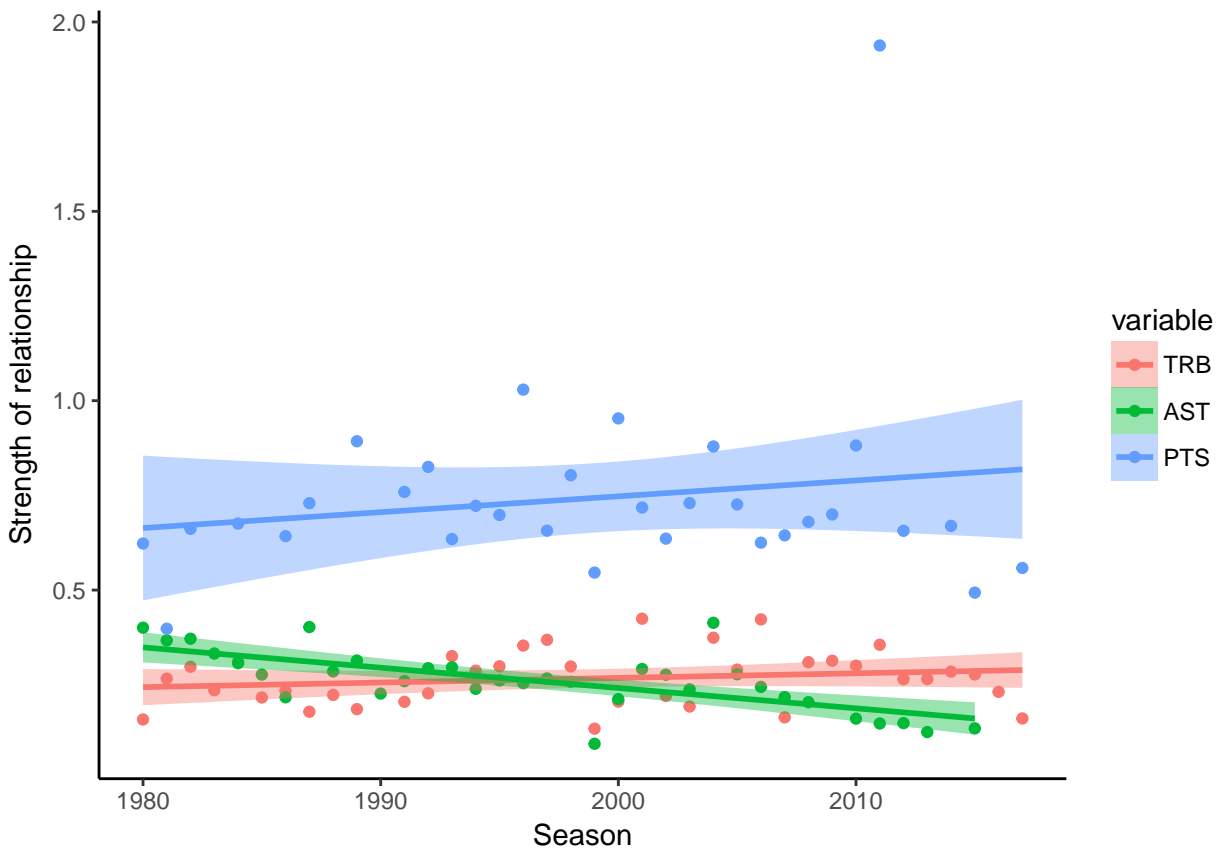


Figure 9: Strength of relationship by season for assists, Rebounds and points