Atlanta Hawks – Round 2 Programming Assessment

Part 1: Data Comprehension

A1. Which NBA team(s) has drafted the most players who went to Duke & drafted in/before 2000?

Data Preparation: To account for the time span covered in this analysis, historical team names have been updated to align with current NBA team designations. Changes affect the cities Charlotte, Brooklyn, New Orleans, Oklahoma City, Memphis, and Washington.

The Dallas Mavericks, Minnesota Timberwolves, and Phoenix Suns each have had **2 players** drafted.

A2. Which NBA team(s) has drafted the most players who have first name starting with "D" and drafted in an even year?

The Oklahoma City Thunder lead NBA teams with **8 players** falling under these requirements.

B. Relationship between a team's 1st round pick vs 1st round pick in subsequent year

Assumptions & Clarifications:

- "Higher" picks are considered to closer to the 1st pick, while "lower" picks are closer to 30th overall.
- In years where teams have more than one 1st-round pick, only the highest pick for the team is used.

In general, the relationship between consecutive year draft picks follows a predictable pattern: **teams picking early in the first year can expect a lower pick in the following year, and this trend continues until the end of the lottery, where teams picking later can expect a higher pick in the subsequent year.**

For example, a team selecting 1st in year one can expect their next year's pick to fall 7.8 spots, placing them around the 9th pick. Whereas a team picking out of the lottery at 23rd in year one can expect their next year's pick to rise 6.8 spots, having them picking around 16th.

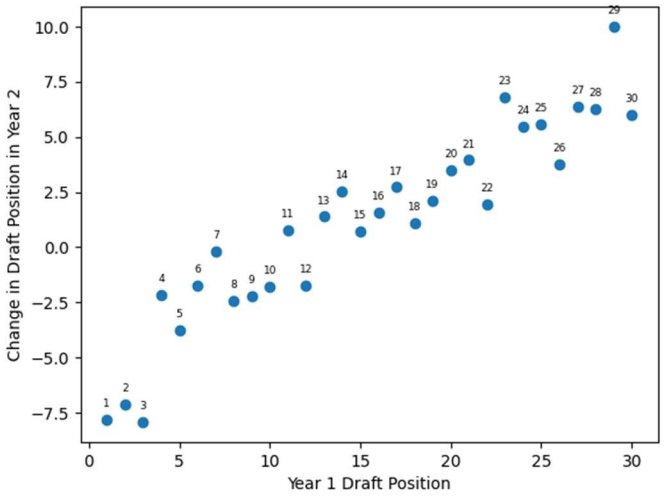

Figure 1. Year 1 Draft Positions vs Change in Year 2 Position

Part 2: Analytical Acumen

A1. Draft Position Value Methodology

Data Preparation & Assumptions:

- Drafted players without any playing time are kept, but their statistics are filled with 0's.
- The team designation of each player remains tied to the team that he was originally drafted to; this applies to any draft day trades or team affiliations the player may have had during his NBA career.
- The methodology is based off the historical performance of players drafted in their respective draft positions.

Typically, players selected earlier in the draft are anticipated to outperform players chosen later in the draft. This trend is illustrated in Figure 2 which shows the relationship between a player's draft position and the average points per game for players drafted in that specific position. When analyzing this relationship with other statistical categories, the consistency of the pattern remains.

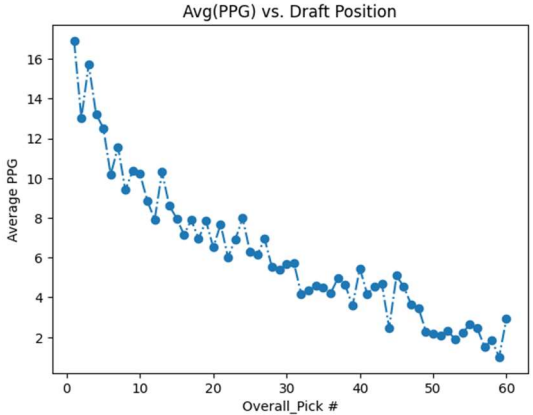

Figure 2. Average PPG per Draft Position

With the provided data, the method to value draft position follows the formula:

$$Metric = \frac{points}{game} + \frac{rebounds}{game} + \frac{assists}{game} + \frac{win\ shares}{game}$$

Although the formula is admittedly straightforward, the aim is to overview of a player's career averages given draft position, while also incorporating win shares per game as a part of the formula to consider the player's influence on team success. Under this metric, players drafted 1st overall on average have a score of 27.3, while players drafted 30th have a score of 10.02.

To obtain a value for each pick, we first compare the metric value of each pick to the sum of all metric values, which allows us to assess the significance of each pick's metric. Then, those values are normalized on a scale from 0 – 100. Figure 3 shows the relationship between the 3 variables.

overall_pick	metric	metric_weighted	pick_values
1	27.30	4.43	100.00
2	21.46	3.48	78.63
3	24.76	4.02	90.72
4	21.39	3.47	78.36
5	20.22	3.28	74.06
6	16.74	2.72	61.32
7	18.70	3.04	68.50
8	14.98	2.43	54.89
9	17.16	2.79	62.88
10	16.45	2.67	60.27

Figure 3. Metric Chart

A2. Team Draft Pick Player Performance

To evaluate NBA Team draft pick performance, we compare a player's stats to the corresponding metric for a draft pick. For example, LeBron James has a metric # of 42.18 compared to the average 1st pick's metric of 27.3. As a result, he achieved 14.88 metric points (2.51 standard deviations) above 1st pick expectations.

Extending the analysis to NBA teams, the **top 3 NBA teams** where their drafted player's have performed above expectations are:

- **Milwaukee Bucks:** 81.01 metric points (1.83 std dev)
- **Los Angeles Lakers:** 79.43 metric points (1.79 std dev)
- **San Antonio Spurs:** 69.99 metric points (1.58 std dev)

The **bottom 3 NBA teams** with their drafted player's underperforming are:

- **Los Angeles Clippers:** -111.94 metric points (-2.53 std dev)
- **Atlanta Hawks:** -63.01 metric points (-1.42 std dev)
- **Dallas Mavericks:** -57.93 metric points (-1.31 std dev)

This relationship between an NBA team's average draft pick spot and their metric value is shown to the right. Teams like San Antonio and the Lakers typically pick later in the draft but find players with great value while teams such as the Clippers and Orlando, even though have had early draft picks, have had players not play up to expectations.

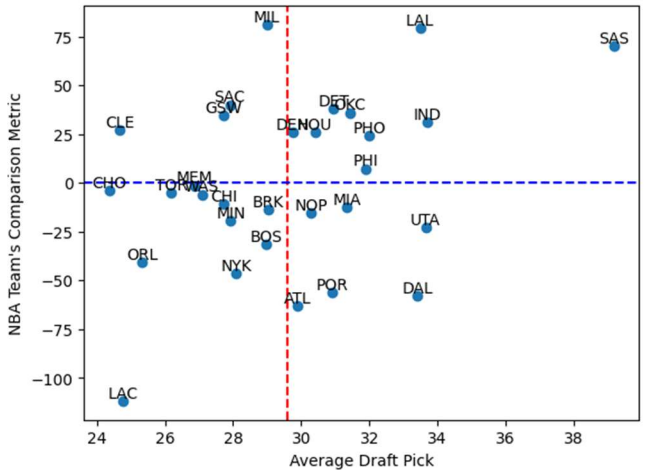

Figure 4. NBA Team's Metric Comparison to Draft Position

When analyzing player performance respective to their college team, players out of **Kentucky** (202.11 metric points), **UCLA** (72.26 metric points), and **Villanova** (60.01 metric points) have outperformed expectations. While players drafted from **Syracuse** (-52.63 metric points), **UNLV** (-43.66 metric points), and **Kansas** (-42.50 metric points) have underperformed draft expectations.

A3. Future Research Areas

Additional areas I would investigate and may be beneficial in the study would be:

- **Pick Trades:** Pick trades involving future draft picks or teams moving down in the draft introduces an interesting dynamic to pick valuation. Unlike picks in the same year, future picks should hold a varying level of value depending on a team's performance trajectory. It would be interesting to explore how teams performed when trading up/down, and to see what the outcomes of multi-year pick trades are.

- **Including Advanced Metrics:** The current iteration of the metric score has a reliance on offense (points, win shares), but incorporating metrics such as advanced efficiency metrics (True shooting %, usage %) and defensive metrics (defensive rating, blocks, steals) would give a more comprehensive assessment of player value and corresponding draft pick value.

- **Considering Contract:** Recently drafted players follow the NBA rookie pay scale, and when constructing a competitive roster, it is advantageous to have high production players relative to their contract value. It would be interesting to analyze the impact of a competitive team trading up in the draft to select high value rookies.