

# Ottoneu Player Visualization: Process Book

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Project Website

<https://ottoneuvvisproject.github.io>

# Overview and Motivation

## BACKGROUND

We have long been enamoured by baseball. From watching the game on our couch to wiffle ball to having a catch, baseball has played a central role in our lives. But, as the open green fields and blank schedules of youth have transformed into the paper-pushing-quotidian, 500-square-foot-quarters that mark early adulthood, we have transitioned quietly into primarily fans. Initially, our Major League Baseball fascination began by simply rooting for our respective home teams – Aren pulling for The Los Angeles Angels of Anaheim and Max rooting (more fruitfully) for the San Francisco Giants. While we still do enjoy the thrills of watching our clubs representing our home towns, we have added to the mix another lense through which we can enjoy the game from the sideline – fantasy baseball. Fantasy baseball widens the scope of enjoying the MLB, making games that are of no consequence to our home teams relevant for the fact that we root for players on our fantasy teams.

## OVERVIEW OF THE ENVIRONMENT

So, what is fantasy baseball anyway? Fantasy baseball is a game in which users compete against one other by compiling points derived from the performance of MLB players. *Ottoneu* is an online platform, created by the popular Sabermetric-baseball-blog-Fangraphs<sup>1</sup>, that hosts involved fantasy baseball leagues. *Ottoneu* will be the league type that we will stick to for this project<sup>2</sup>. *Ottoneu* hosts dynasty leagues – i.e., leagues in which fantasy teams may “keep” players on their team from season to season. Three main constraints exist in an *Ottoneu* league – the number of fantasy teams (12), the maximum possible roster spots available (40 players), and cap space (\$400). Each owned player is priced (in dollars) based on the results of an auction for that individual player. Maximizing points based on these constraints is the goal of the game.

As mentioned above, teams are filled with players via auctions. Two flavors of auctions exist – in-season acquisitions and the main, preseason draft. Both types of auction work in the following way: A team nominates a player to be auctioned. The league bids on this player in a timed atmosphere. The team with the highest bid when the time runs dry wins the player. The difference between in-season acquisitions and the preseason draft is the *duration* of the auction.

In-season auctions are *blind auction* in format and run the course of 48 hours. At the end of the 48 hours, the owner with the highest bid wins that player for the price of the second highest bid + \$1. An example

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<sup>1</sup> Say that five times fast.

<sup>2</sup> This tool, fed the proper input, should be useful for any fantasy sport.

of the in-season auction draft is pictured below.

| AUCTION FOR JORGE SOLER KCR OF R                |     |
|---|-----|
| Ended on May 5, 2018 11:03 PM                   |     |
| Auction started by <a href="#">The Jabronis</a> |     |
| TEAM  | BID |
| <a href="#">This Is My Team</a>                 | \$7 |
| <a href="#">The Jabronis</a>                    | \$6 |
| <a href="#">Llama's Mythical Bums</a>           | \$5 |

Auctions in main draft [pictured bottom right] take the form of *English Auctions* – i.e., all bids are aired, the auction ending when no owner wishes to bet further. Because English Auctions have no fixed length (bidders can quarrel back and forth *ad-infinitum*), the amount of time that each player auction takes is variable. The auction works in the following way: each time the bet is raised, the timer resets to 15 seconds. When the clock hits zero, the owner wins that player. So, the amount of time per player auction is  $(15 \text{ seconds}) \cdot (\text{the number of raises})^3$ . The length of a typical auction for a player lasts usually no longer than one minute.<sup>4</sup>

The screenshot shows a fantasy football auction interface. At the top, it says "AUCTION FOR JORGE SOLER KCR OF R" and "Ended on May 5, 2018 11:03 PM". Below that, it says "Auction started by [The Jabronis](#)". The "Current Status" section shows the auction is "LIVE" with 14 seconds left. It lists the "High Bidder: The Silk Road Gang" and their bid of \$19. The "Bid" section has a "Bid Amount" input field set to \$1, with a "Bid" button and a "+\$1" link. The "Nominate" section has a "Nominating Name will go here" input field and a "Start Auction" button. The "Last Auction" section shows "Mark Trumbo (BAL) 1B/OF Commissioner Megatron \$10". The "Watchlist" section lists players with their current bid: Yoenis Cespedes (LAD) at OF FA Nom. W- \$19, Jen Kleiner (DET) at 2B FA Nom. W- \$19, Justin Upton (DET) at OF FA Nom. W- \$19, Ben Zobrist (CHC) at 2B/OF FA Nom. W- \$19, Russell Martin (TOR) at C FA Nom. W- \$19, Daniel Murphy (WSN) at 1B/2B/3B FA Nom. W- \$19, and Jonathan Lucroy (MLB) at 1B/C FA Nom. W- \$19. The "Chat" section shows a conversation between users. The "Teams" section lists the twelve teams with their names, order, free cap, roster spots, and online status.

| Team                     | Order | Free Cap | Roster Spots | Online? |
|--------------------------|-------|----------|--------------|---------|
| The Ilich & Scruffy Show | 1     | \$330    | 27           | YES     |
| The Silk Road Gang       | 2     | \$191    | 26           | YES     |
| \$5 Tl Infinty           | 3     | \$81     | 17           | YES     |
| Catfish Hunters          | 4     | \$151    | 14           | YES     |
| FIPpoontomius            | 5     | \$230    | 26           | YES     |
| WAR Horse                | 6     | \$253    | 28           | YES     |
| Grunble Grunble          | 7     | \$108    | 14           | YES     |
| Tough Actin' TANAKA      | 8     | \$52     | 10           | YES     |
| Commissioner Megatron    | 9     | \$444    | 21           | YES     |

## THE PROBLEM AT HAND

*Okay, you think, everything seems pretty straightforward. What's the problem?* We're glad you asked. The answer, quite simply, is that decision making under time constraints is not easy. Further illustrating the problem requires diving deeper into the preseason auction draft.<sup>5</sup>

Entering the draft, each of the twelve teams arrives with partially filled rosters based on which players they decided to keep from the previous season. Thus, each team begins the draft with a variable amount of roster spots and cap space. The needs of each team therefore differ drastically based on the players that each respective team decides to keep.

The many scenarios following owner choices results in a huge number of possible team-player-budget-dollar-value permutations, a cluster that is ever changing throughout the season as players are added, dropped,

<sup>3</sup> Roughly. For example, if the clock is at 8 seconds and another bid is placed, the clock resets to 15 seconds.  $15 - 8 = 7$  seconds added

<sup>4</sup> Another rough estimate. It would be cool to back this up with data eventually.

<sup>5</sup> The importance of the preseason draft cannot be understated – the foundation of most teams are built firmly on their preseason auction fruits.

or traded. To prepare for the draft seems an impossible task given the dynamic nature of the variables. Luckily for owners, there is a *keeper deadline*. After this deadline passes, rosters are frozen – trades are allowed, but no adding or dropping of players is permitted. This narrows the scope of players to evaluate – now, owners are certain which players will be available in the preseason draft, and which will be rostered. The keeper deadline is enforced on January 31st – roughly two months before the draft. This gives owners ample time to size up their roster, evaluate the free agents available, and devise a draft strategy to fit their needs.

This strategy changes, however, with the first pick on draft day. As soon as the first player is drafted, a domino effect is set off. A multitude of variables quickly change – the players available diminish, budgets decrease, rosters increase. Keeping track of the changes in this environment is incredibly challenging. To combat this complexity, the wary owner will use an external tool to supplement the meager draft interface in order to track the rapid changes. But, in a timed environment, there is only so much that an owner can do.

Max's external tool of choice in this year's draft (before the birth of this project) was an Excel spreadsheet, pictured below.

The screenshot shows an Excel spreadsheet with the following columns:

- Name
- Fantasy
- Pos
- Team
- Age
- \$
- PS
- Delta
- FPTS
- Note
- % Owned
- Avg. Value
- 2017 Sala
- G
- PA

The data includes rows for various players like Jose Bautista, A.J. Reed, Willy Adams, Curtis Granderson, Brian McCann, Hanley Ramirez, Dominic Smith, Alex Avila, Michael Taylor, Jordy Mercer, Jorge Polanco, Albert Pujols, Dustin Fowler, Lonnie Chisenhall, Yonder Alonso, Robinson Chirinos, Chris Iannetta, Jesus Aguilar, Tyler Flowers, Matt Joyce, Mikie Mahtook, Gerardo Parra, Matt Kemp, Jacoby Ellsbury, Mitch Moreland, Steve Pearce, Raimel Tapia, Denard Span, Tucker Barnhart, Jos Reyes, C.J. Cron, Adam Frazier, Melky Cabrera, Nick Markakis, Tommy Joseph, Cameron Rupp, Ryan Schimpf, Jason Heyward, Stephen Vogt, Hunter Pence, and Matt Wieters. The spreadsheet uses conditional formatting to highlight specific rows, such as the top row for Jose Bautista and several rows for players like Dominic Smith and Matt Kemp.

Here was the process using this spreadsheet during the draft:

- 1) A player is drafted.
- 2) COMMAND + F to find the player in the spreadsheet.
- 3) Quickly look at the color of that player's row (a hot take summarizing my evaluation of that player).

- 4) Skim through his statistics and the note on that player.
- 5) Value the player in terms of dollars.<sup>6</sup>
- 6) Either draft or don't, based on what the market dictates.
- 7) Delete that player's row
- 8) Repeat.

The logical backbone of this method is sound–find player, evaluate price, draft or not, mark as drafted, repeat– but the tool seems suboptimal.<sup>7</sup>

#### A POTENTIAL SOLUTION

The goal of this project is to create an interactive visualization that owners can utilize in order to make smarter, more data-driven decisions come draft day in a timely manner. As we progressed, we also realized that the tool is useful for exploratory data analysis for in-season use, but that is merely tangential to the goal of this project.

## Related Work

There seems to be a relatively sparse collection of work relating to visualizing players in a fantasy sport setting, but there are some. Here we will cover research done by others as well as current draft interfaces.

#### TANGENTIAL PROJECTS

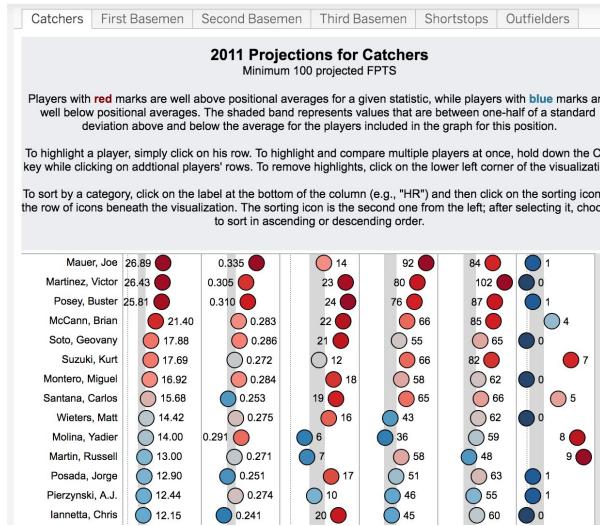
Mind you, this is simply preliminary research, as we have spent most of our time working out our own ideas and not researching the ideas of others. Here are some findings – projects that might be of use to draw inspiration from in the future, interestingly spanning three different fantasy sports – baseball, basketball, and football:

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<sup>6</sup> Initial dollar evaluations can be done beforehand.

<sup>7</sup> An analogy comes to mind of Shakespeare trying to pen plays a highlighter.

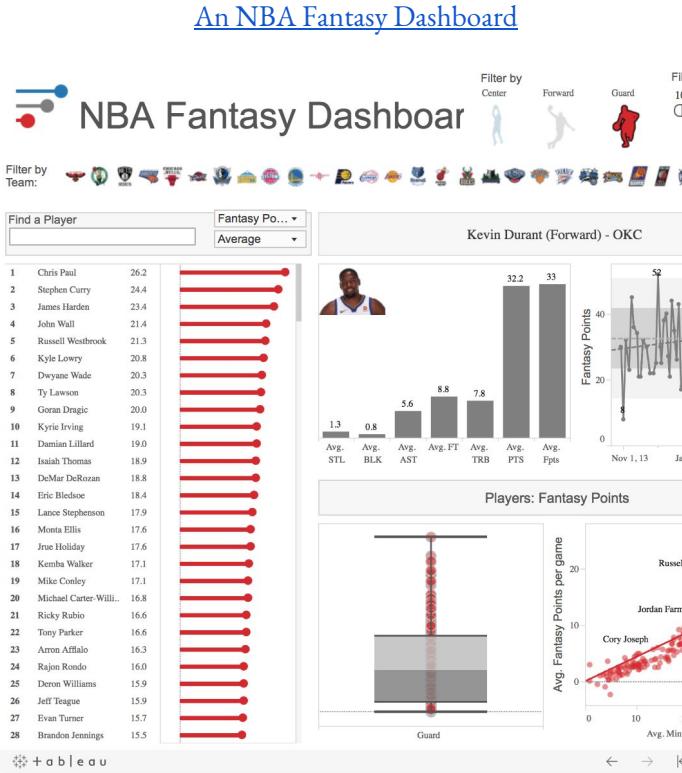
### Fantasy Baseball Draft Prep



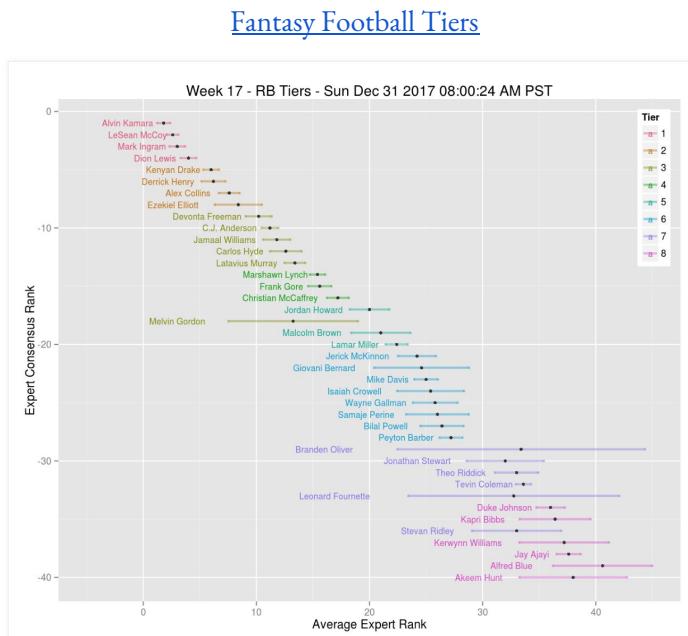
This visualization has *a ton* of information. This is namely because the league format under consideration in this project is what is called Rotisserie,<sup>8</sup> a scoring flavor in which users compete in different categories, the winner holding the highest average ranking across these categories. The categories to compete for differ from league to league, but the league in question uses *Batting Average*, *Home Runs*, *Runs*, *Runs Batted In*, & *Stolen Bases*. Consequently, the creator of this visualization was faced with a much greater challenge than we – they had to visualize not only one metric (as we only had to visualize Projected Fantasy Points), but *five* metrics of equal weight.

The dashboard, implemented with Tableau, is a bit clunky & requires scrolling, and I'm not too sure what the colors add, as their position on the line already indicates their value. I also don't like how you can't see the *total context* of all of the players together; they are instead sub-sectioned off into blocks based on their position. There are good details on demand similar to our project. An add on that breaks the statistics down into categories as this visualization does might be a good *add on* to our project, but other than that I don't like the general structure of this visualization.

<sup>8</sup> Rotisserie, or ROTO, leagues were the original scoring system of fantasy baseball.



Here's a pretty cool one – another using Tableau. We could definitely implement some of this guy's ideas. I really like the vertical, scrollable players bar. I also really like the bar chart breakdown of stats. The bottom two graphs don't provide too much information as far as I'm concerned, but I could be wrong. There's a fluidity to this dashboard that I very much appreciate, but I prefer ours because we can visualize all of the players on one screen.



There's some really good uncertainty visualization here. Also, much like in our project, the author of this project doesn't try to reinvent the wheel and go down the rabbit hole and to try to create his own projections (or rankings, in this case). Instead, he outsources it to the experts.

The grouping into tiers is a really interesting idea that we could consider implementing in the future, maybe using clustering as this author does.

## DRAFT DASHBOARDS

Online drafts of any kind necessitate draft interfaces. Here is the *Ottoneu* draft interface<sup>9</sup>, coupled with auction draft interfaces from two popular fantasy baseball hosts, *ESPN* and *Yahoo!*

*Ottoneu*

| <b>Current Status</b><br>LIVE<br>0 seconds left<br>Jason Heyward (CHC) OF<br>\$32<br>High Bidder: The Illitch & Scratchy Show   | <b>Bid</b><br>Bid Amount <input type="text"/> <input type="button" value="Bid"/> <input type="button" value="+\$1"/><br><b>Nominate</b><br>Nominating Name will go here<br>Initial Bid <input type="text"/> <input type="button" value="Start Auction"/> | <b>Last Auction</b><br>Rusney Castillo (BOS) OF<br>95 Til Infinity \$12  | <b>Chat</b><br>Joined Draft Chat<br>[08:33 PM] Catfish Hunters : Yessss...<br>[08:33 PM] Catfish Hunters : Vibbit says 300 homers!<br>[08:33 PM] The Silk Road Gang: should have kept Puig at \$32 |                       |                 |            |                      |                             |                             |                       |                       |            |                   |                    |            |                      |    |            |                      |          |            |                       |      |                 |   |       |    |     |             |   |       |    |     |           |   |       |    |     |                 |   |       |    |     |                       |   |      |    |     |                       |   |       |    |     |                 |    |      |   |     |                               |    |       |    |     |                           |    |       |    |     |
|---|--|--|--|-----------------------|-----------------|------------|----------------------|-----------------------------|-----------------------------|-----------------------|-----------------------|------------|-------------------|--------------------|------------|----------------------|----|------------|----------------------|----------|------------|-----------------------|------|-----------------|---|-------|----|-----|-------------|---|-------|----|-----|-----------|---|-------|----|-----|-----------------|---|-------|----|-----|-----------------------|---|------|----|-----|-----------------------|---|-------|----|-----|-----------------|----|------|---|-----|-------------------------------|----|-------|----|-----|---------------------------|----|-------|----|-----|
| <b>Find Players</b><br>   |  | <b>Watchlist</b><br><table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td>Yasiel Puig (LAD)</td><td>OF</td><td>FA Nom. W-</td></tr> <tr><td>Ian Kinsler (DET)</td><td>2B</td><td>FA Nom. W-</td></tr> <tr><td>Justin Upton (DET)</td><td>OF</td><td>FA Nom. W-</td></tr> <tr><td>Ben Zobrist (CHC)</td><td>2B/OF</td><td>FA Nom. W-</td></tr> <tr><td>Russell Martin (TOR)</td><td>C</td><td>FA Nom. W-</td></tr> <tr><td>Daniel Murphy (WWSN)</td><td>1B/2B/3B</td><td>FA Nom. W-</td></tr> <tr><td>Jonathan Lucroy (MIL)</td><td>1B/C</td><td>FA Nom. W-</td></tr> </table>   |  | Yasiel Puig (LAD)     | OF              | FA Nom. W- | Ian Kinsler (DET)    | 2B                          | FA Nom. W-                  | Justin Upton (DET)    | OF                    | FA Nom. W- | Ben Zobrist (CHC) | 2B/OF              | FA Nom. W- | Russell Martin (TOR) | C  | FA Nom. W- | Daniel Murphy (WWSN) | 1B/2B/3B | FA Nom. W- | Jonathan Lucroy (MIL) | 1B/C | FA Nom. W-      |   |       |    |     |             |   |       |    |     |           |   |       |    |     |                 |   |       |    |     |                       |   |      |    |     |                       |   |       |    |     |                 |    |      |   |     |                               |    |       |    |     |                           |    |       |    |     |
| Yasiel Puig (LAD)   | OF   | FA Nom. W-   |  |                       |                 |            |                      |                             |                             |                       |                       |            |                   |                    |            |                      |    |            |                      |          |            |                       |      |                 |   |       |    |     |             |   |       |    |     |           |   |       |    |     |                 |   |       |    |     |                       |   |      |    |     |                       |   |       |    |     |                 |    |      |   |     |                               |    |       |    |     |                           |    |       |    |     |
| Ian Kinsler (DET)   | 2B   | FA Nom. W-   |  |                       |                 |            |                      |                             |                             |                       |                       |            |                   |                    |            |                      |    |            |                      |          |            |                       |      |                 |   |       |    |     |             |   |       |    |     |           |   |       |    |     |                 |   |       |    |     |                       |   |      |    |     |                       |   |       |    |     |                 |    |      |   |     |                               |    |       |    |     |                           |    |       |    |     |
| Justin Upton (DET)  | OF   | FA Nom. W-   |  |                       |                 |            |                      |                             |                             |                       |                       |            |                   |                    |            |                      |    |            |                      |          |            |                       |      |                 |   |       |    |     |             |   |       |    |     |           |   |       |    |     |                 |   |       |    |     |                       |   |      |    |     |                       |   |       |    |     |                 |    |      |   |     |                               |    |       |    |     |                           |    |       |    |     |
| Ben Zobrist (CHC)   | 2B/OF  | FA Nom. W-   |  |                       |                 |            |                      |                             |                             |                       |                       |            |                   |                    |            |                      |    |            |                      |          |            |                       |      |                 |   |       |    |     |             |   |       |    |     |           |   |       |    |     |                 |   |       |    |     |                       |   |      |    |     |                       |   |       |    |     |                 |    |      |   |     |                               |    |       |    |     |                           |    |       |    |     |
| Russell Martin (TOR)  | C  | FA Nom. W-   |  |                       |                 |            |                      |                             |                             |                       |                       |            |                   |                    |            |                      |    |            |                      |          |            |                       |      |                 |   |       |    |     |             |   |       |    |     |           |   |       |    |     |                 |   |       |    |     |                       |   |      |    |     |                       |   |       |    |     |                 |    |      |   |     |                               |    |       |    |     |                           |    |       |    |     |
| Daniel Murphy (WWSN)  | 1B/2B/3B   | FA Nom. W-   |  |                       |                 |            |                      |                             |                             |                       |                       |            |                   |                    |            |                      |    |            |                      |          |            |                       |      |                 |   |       |    |     |             |   |       |    |     |           |   |       |    |     |                 |   |       |    |     |                       |   |      |    |     |                       |   |       |    |     |                 |    |      |   |     |                               |    |       |    |     |                           |    |       |    |     |
| Jonathan Lucroy (MIL)   | 1B/C   | FA Nom. W-   |  |                       |                 |            |                      |                             |                             |                       |                       |            |                   |                    |            |                      |    |            |                      |          |            |                       |      |                 |   |       |    |     |             |   |       |    |     |           |   |       |    |     |                 |   |       |    |     |                       |   |      |    |     |                       |   |       |    |     |                 |    |      |   |     |                               |    |       |    |     |                           |    |       |    |     |
|   |  | <b>Teams</b><br><table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr><th>Team</th><th>Order</th><th>Free Cap</th><th>Roster Spots</th><th>Online?</th></tr> </thead> <tbody> <tr><td>The Illitch &amp; Scratchy Show</td><td>1</td><td>\$272</td><td>26</td><td>YES</td></tr> <tr><td>The Silk Road Gang</td><td>2</td><td>\$191</td><td>26</td><td>YES</td></tr> <tr><td>95 Til Infinity</td><td>3</td><td>\$69</td><td>16</td><td>YES</td></tr> <tr><td>Catfish Hunters</td><td>4</td><td>\$151</td><td>14</td><td>YES</td></tr> <tr><td>FIPopotamus</td><td>5</td><td>\$230</td><td>26</td><td>YES</td></tr> <tr><td>WAR Horse</td><td>6</td><td>\$253</td><td>28</td><td>YES</td></tr> <tr><td>Grumble Grumble</td><td>7</td><td>\$108</td><td>14</td><td>YES</td></tr> <tr><td>* Tough Actin' TANAKA</td><td>8</td><td>\$52</td><td>10</td><td>YES</td></tr> <tr><td>Commissioner Megatron</td><td>9</td><td>\$165</td><td>22</td><td>YES</td></tr> <tr><td>Griffey Forever</td><td>10</td><td>\$72</td><td>7</td><td>YES</td></tr> <tr><td>If You d'Arnaud, Now You Know</td><td>11</td><td>\$121</td><td>18</td><td>YES</td></tr> <tr><td>Yordano &amp; the Headhunters</td><td>12</td><td>\$104</td><td>17</td><td>YES</td></tr> </tbody> </table> |  | Team                  | Order           | Free Cap   | Roster Spots         | Online?                     | The Illitch & Scratchy Show | 1                     | \$272                 | 26         | YES               | The Silk Road Gang | 2          | \$191                | 26 | YES        | 95 Til Infinity      | 3        | \$69       | 16                    | YES  | Catfish Hunters | 4 | \$151 | 14 | YES | FIPopotamus | 5 | \$230 | 26 | YES | WAR Horse | 6 | \$253 | 28 | YES | Grumble Grumble | 7 | \$108 | 14 | YES | * Tough Actin' TANAKA | 8 | \$52 | 10 | YES | Commissioner Megatron | 9 | \$165 | 22 | YES | Griffey Forever | 10 | \$72 | 7 | YES | If You d'Arnaud, Now You Know | 11 | \$121 | 18 | YES | Yordano & the Headhunters | 12 | \$104 | 17 | YES |
| Team  | Order  | Free Cap   | Roster Spots   | Online?               |                 |            |                      |                             |                             |                       |                       |            |                   |                    |            |                      |    |            |                      |          |            |                       |      |                 |   |       |    |     |             |   |       |    |     |           |   |       |    |     |                 |   |       |    |     |                       |   |      |    |     |                       |   |       |    |     |                 |    |      |   |     |                               |    |       |    |     |                           |    |       |    |     |
| The Illitch & Scratchy Show   | 1  | \$272  | 26   | YES                   |                 |            |                      |                             |                             |                       |                       |            |                   |                    |            |                      |    |            |                      |          |            |                       |      |                 |   |       |    |     |             |   |       |    |     |           |   |       |    |     |                 |   |       |    |     |                       |   |      |    |     |                       |   |       |    |     |                 |    |      |   |     |                               |    |       |    |     |                           |    |       |    |     |
| The Silk Road Gang  | 2  | \$191  | 26   | YES                   |                 |            |                      |                             |                             |                       |                       |            |                   |                    |            |                      |    |            |                      |          |            |                       |      |                 |   |       |    |     |             |   |       |    |     |           |   |       |    |     |                 |   |       |    |     |                       |   |      |    |     |                       |   |       |    |     |                 |    |      |   |     |                               |    |       |    |     |                           |    |       |    |     |
| 95 Til Infinity   | 3  | \$69   | 16   | YES                   |                 |            |                      |                             |                             |                       |                       |            |                   |                    |            |                      |    |            |                      |          |            |                       |      |                 |   |       |    |     |             |   |       |    |     |           |   |       |    |     |                 |   |       |    |     |                       |   |      |    |     |                       |   |       |    |     |                 |    |      |   |     |                               |    |       |    |     |                           |    |       |    |     |
| Catfish Hunters   | 4  | \$151  | 14   | YES                   |                 |            |                      |                             |                             |                       |                       |            |                   |                    |            |                      |    |            |                      |          |            |                       |      |                 |   |       |    |     |             |   |       |    |     |           |   |       |    |     |                 |   |       |    |     |                       |   |      |    |     |                       |   |       |    |     |                 |    |      |   |     |                               |    |       |    |     |                           |    |       |    |     |
| FIPopotamus   | 5  | \$230  | 26   | YES                   |                 |            |                      |                             |                             |                       |                       |            |                   |                    |            |                      |    |            |                      |          |            |                       |      |                 |   |       |    |     |             |   |       |    |     |           |   |       |    |     |                 |   |       |    |     |                       |   |      |    |     |                       |   |       |    |     |                 |    |      |   |     |                               |    |       |    |     |                           |    |       |    |     |
| WAR Horse   | 6  | \$253  | 28   | YES                   |                 |            |                      |                             |                             |                       |                       |            |                   |                    |            |                      |    |            |                      |          |            |                       |      |                 |   |       |    |     |             |   |       |    |     |           |   |       |    |     |                 |   |       |    |     |                       |   |      |    |     |                       |   |       |    |     |                 |    |      |   |     |                               |    |       |    |     |                           |    |       |    |     |
| Grumble Grumble   | 7  | \$108  | 14   | YES                   |                 |            |                      |                             |                             |                       |                       |            |                   |                    |            |                      |    |            |                      |          |            |                       |      |                 |   |       |    |     |             |   |       |    |     |           |   |       |    |     |                 |   |       |    |     |                       |   |      |    |     |                       |   |       |    |     |                 |    |      |   |     |                               |    |       |    |     |                           |    |       |    |     |
| * Tough Actin' TANAKA   | 8  | \$52   | 10   | YES                   |                 |            |                      |                             |                             |                       |                       |            |                   |                    |            |                      |    |            |                      |          |            |                       |      |                 |   |       |    |     |             |   |       |    |     |           |   |       |    |     |                 |   |       |    |     |                       |   |      |    |     |                       |   |       |    |     |                 |    |      |   |     |                               |    |       |    |     |                           |    |       |    |     |
| Commissioner Megatron   | 9  | \$165  | 22   | YES                   |                 |            |                      |                             |                             |                       |                       |            |                   |                    |            |                      |    |            |                      |          |            |                       |      |                 |   |       |    |     |             |   |       |    |     |           |   |       |    |     |                 |   |       |    |     |                       |   |      |    |     |                       |   |       |    |     |                 |    |      |   |     |                               |    |       |    |     |                           |    |       |    |     |
| Griffey Forever   | 10   | \$72   | 7  | YES                   |                 |            |                      |                             |                             |                       |                       |            |                   |                    |            |                      |    |            |                      |          |            |                       |      |                 |   |       |    |     |             |   |       |    |     |           |   |       |    |     |                 |   |       |    |     |                       |   |      |    |     |                       |   |       |    |     |                 |    |      |   |     |                               |    |       |    |     |                           |    |       |    |     |
| If You d'Arnaud, Now You Know   | 11   | \$121  | 18   | YES                   |                 |            |                      |                             |                             |                       |                       |            |                   |                    |            |                      |    |            |                      |          |            |                       |      |                 |   |       |    |     |             |   |       |    |     |           |   |       |    |     |                 |   |       |    |     |                       |   |      |    |     |                       |   |       |    |     |                 |    |      |   |     |                               |    |       |    |     |                           |    |       |    |     |
| Yordano & the Headhunters   | 12   | \$104  | 17   | YES                   |                 |            |                      |                             |                             |                       |                       |            |                   |                    |            |                      |    |            |                      |          |            |                       |      |                 |   |       |    |     |             |   |       |    |     |           |   |       |    |     |                 |   |       |    |     |                       |   |      |    |     |                       |   |       |    |     |                 |    |      |   |     |                               |    |       |    |     |                           |    |       |    |     |
| <b>Search</b><br>Name <input type="text"/><br>Position <input checked="" type="radio"/> All <input type="radio"/><br>Include Minor Leaguers <input type="checkbox"/><br><input type="checkbox"/> Free Agents Only |  | <b>Draft History</b><br><table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td>Rusney Castillo (BOS)</td><td>95 Til Infinity</td><td>\$12</td></tr> <tr><td>Miguel Cabrera (DET)</td><td>The Illitch &amp; Scratchy Show</td><td>\$58</td></tr> <tr><td>Troy Tulowitzki (TOR)</td><td>Commissioner Megatron</td><td>\$30</td></tr> </table>  |  | Rusney Castillo (BOS) | 95 Til Infinity | \$12       | Miguel Cabrera (DET) | The Illitch & Scratchy Show | \$58                        | Troy Tulowitzki (TOR) | Commissioner Megatron | \$30       |                   |                    |            |                      |    |            |                      |          |            |                       |      |                 |   |       |    |     |             |   |       |    |     |           |   |       |    |     |                 |   |       |    |     |                       |   |      |    |     |                       |   |       |    |     |                 |    |      |   |     |                               |    |       |    |     |                           |    |       |    |     |
| Rusney Castillo (BOS)   | 95 Til Infinity  | \$12   |  |                       |                 |            |                      |                             |                             |                       |                       |            |                   |                    |            |                      |    |            |                      |          |            |                       |      |                 |   |       |    |     |             |   |       |    |     |           |   |       |    |     |                 |   |       |    |     |                       |   |      |    |     |                       |   |       |    |     |                 |    |      |   |     |                               |    |       |    |     |                           |    |       |    |     |
| Miguel Cabrera (DET)  | The Illitch & Scratchy Show  | \$58   |  |                       |                 |            |                      |                             |                             |                       |                       |            |                   |                    |            |                      |    |            |                      |          |            |                       |      |                 |   |       |    |     |             |   |       |    |     |           |   |       |    |     |                 |   |       |    |     |                       |   |      |    |     |                       |   |       |    |     |                 |    |      |   |     |                               |    |       |    |     |                           |    |       |    |     |
| Troy Tulowitzki (TOR)   | Commissioner Megatron  | \$30   |  |                       |                 |            |                      |                             |                             |                       |                       |            |                   |                    |            |                      |    |            |                      |          |            |                       |      |                 |   |       |    |     |             |   |       |    |     |           |   |       |    |     |                 |   |       |    |     |                       |   |      |    |     |                       |   |       |    |     |                 |    |      |   |     |                               |    |       |    |     |                           |    |       |    |     |

<sup>9</sup> This actually is not the most up to date auction dashboard, but it contains identical features to the most recent updated interface, which namely changed aesthetics.

*Yahoo!*

Team 3  
is nominating a player

\$ -

0:21 Remaining

| Season    | AB  | H   | R    | HR   | RBI  | SB   | Avg  |
|-----------|-----|-----|------|------|------|------|------|
| Projected | 457 | 153 | 77.6 | 16.6 | 61.7 | 22.3 | .335 |
| 2017      | 590 | 204 | 112  | 24   | 81   | 32   | .346 |

Proj. Value \$49  
Avg. Cost \$54.7

Players Teams Draft Results Standings

All Players  Show Drafted  Projected Stats

| Proj. S | Player                     | Rank | Avg. \$ |
|---------|----------------------------|------|---------|
| 45      | Trea Turner Was - SS       | 4    | 49.5    |
| 45      | Nolan Arenado Col - 3B     | 3    | 51.4    |
| 44      | Clayton Kershaw LAD - SP   | 5    | 49.1    |
| 43      | Charlie Blackmon Col - OF  | 6    | 46.0    |
| 42      | Giancarlo Stanton NYY - OF | 7    | 46.2    |
| 41      | Mookie Betts Bos - OF      | 8    | 47.5    |
| 40      | Max Scherzer Was - SP      | 9    | 45.7    |
| 39      | Bryce Harper Was - OF      | 10   | 46.3    |
| 38      | Chris Sale Bos - SP        | 11   | 42.1    |
| 36      | Kris Bryant CHC - 3B,OF    | 12   | 42.1    |
| 35      | Paul Goldschmidt Ari - 1B  | 13   | 46.2    |
| 34      | Craig Kimbrel Cle - Sp     | 14   | 39.0    |

YAHOO! FANTASY

On Deck Circle - R... Fantasy Baseball Draft Give feedback

Smack Talk

My Queue

My Team 0 of 23

Poss Player Cost

C  
1B  
2B  
3B  
SS

Max joined

\$60 M. Trout LAA - OF

\$59 J. Altuve Hou - 2B

Enter a message

ESPN

ESPN Fantasy Baseball Draft - 8-Team Mock Auction 213402

PK 5 OF 200  
00:20

1. Team Alfaro \$190

2. Team 5 \$260

3. Team 4 \$260

4. Team 3 \$16

5. Team 8 \$223

6. Team 2 \$260

7. Team 7 \$260

8. Team 6 \$225

Queue Autobid

RANK PLAYERS

No players in queue

Roster

Charlie Blackmon COL CF  
2017 STATS: 37 HR, .331 AVG, 104 RBI  
2018 PROJECTED: 30 HR, .315 AVG, 84 RBI

CURRENT BID: \$16

Activity  All  Messages  Picks

Players Auction Summary Rules

2018 Projected

Player Name

| \$   | PLAYER                       | PTS   | R     | TB  | RBI | BB  | K   | SB  |    |
|------|------------------------------|-------|-------|-----|-----|-----|-----|-----|----|
| \$31 | Bryce Harper Wsh RF          | QUEUE | 504.0 | 109 | 307 | 102 | 103 | 129 | 12 |
| \$30 | Trea Turner Wsh SS           | QUEUE | 402.0 | 97  | 271 | 59  | 41  | 123 | 57 |
| \$28 | Paul Goldschmidt Ari 1B      | QUEUE | 466.0 | 102 | 289 | 102 | 101 | 147 | 19 |
| \$27 | Carlos Correa Hou SS         | QUEUE | 458.0 | 99  | 300 | 107 | 72  | 132 | 12 |
| \$26 | Giancarlo Stanton NYY RF, DH | QUEUE | 463.0 | 107 | 324 | 118 | 68  | 156 | 2  |
| \$25 | Clayton Kershaw LAD DL10     | QUEUE | 597.0 | -   | -   | -   | -   | -   | -  |
| \$24 | Max Scherzer Wsh SP          | QUEUE | 623.0 | -   | -   | -   | -   | -   | -  |
| \$23 | Kris Bryant CHC 3B           | QUEUE | 458.0 | 110 | 306 | 94  | 87  | 149 | 10 |

Position Tracker 2/25 Players

|      |      |      |      |
|------|------|------|------|
| C 0  | 1B 0 | 2B 0 | 3B 1 |
| SS 0 | LF 0 | CF 0 | RF 1 |
| DH 0 | SP 0 | RP 0 |      |

Max Alfaro joined the draft

Nolan Arenado / Col 3B  
\$36 - Team Alfaro

Mookie Betts / Bos RF  
\$34 - Team Alfaro

Message Your League

SEND

Note that the *Ottoneu* draft interface provides the least information out of the three dashboards.

Namely, it does not provide much information about the players. *ESPN* provides projected statistics & projected dollar value. *Yahoo!* provides a player ranking, average dollar value, and projected dollar value. *Ottoneu* provides none of that. It only provides only the player name, team, and position eligibility. This is not a mistake.

Providing a robust tool that helps to clarify valuation insight for *all* owners could be seen as evening the playing field too much – taking away, albeit slightly, the advantage of owners who prepared more than their

competitors. Imagine the following scenario on draft day<sup>10</sup> and believe us, it is not hypothetical – an ill-prepared team nominates a player simply because he is the top rated, and proceeds to bid the amount that the site recommends, nullifying your research due to one owner’s to have pre-loaded information from the site. This scenario is impossible in *Ottoneu* given the draft interface.

The goal of this section is to acknowledge that the lack of information available in current *Ottoneu* drafts is a design *choice*, not a flaw.

## Questions

We came up with a TON of questions throughout our process creating this visualization, many of which quickly grew beyond the scope of this project (see the FUTURE WORK tab). Here are some questions that became the spine of the project:

- 1) Can we create a tool which owners can manipulate to quickly find & assess a player when he is nominated?
  - a) Can we improve the on the “Excel sheet method?”
    - i) I.e., can we present a tool with the ability to search, provide information, and draft (delete) the player in a more elegant fashion?
- 2) Is there a way to create a visualization in which we can see all available players and not overwhelm our viewer?
- 3) Can we make recommendations to teams based on their current roster?
- 4) Can we show a concise history of performance of each player?
- 5) Can we communicate projections in a way that highlights the associated uncertainty inherent in predictions?
- 6) Can we create robust yet intuitive filtering?

Note that many of these questions revolve around implementation rather than discovery, rather than questions of exploratory nature, such as *Which second baseman have the greatest deviation in projection?* This is mostly due to the specific, tool-oriented approach to the visualization – we want it to perform a few functions so that it works as an adequate draft aid. Additionally, however, in playing around with the tool, we have come to some interesting findings through exploratory analysis. We encourage users to implement the visualization for exploratory analysis of their own, sifting through the data & answering questions of their own.

---

<sup>10</sup> From our pre-Ottoneu days

## Data Source

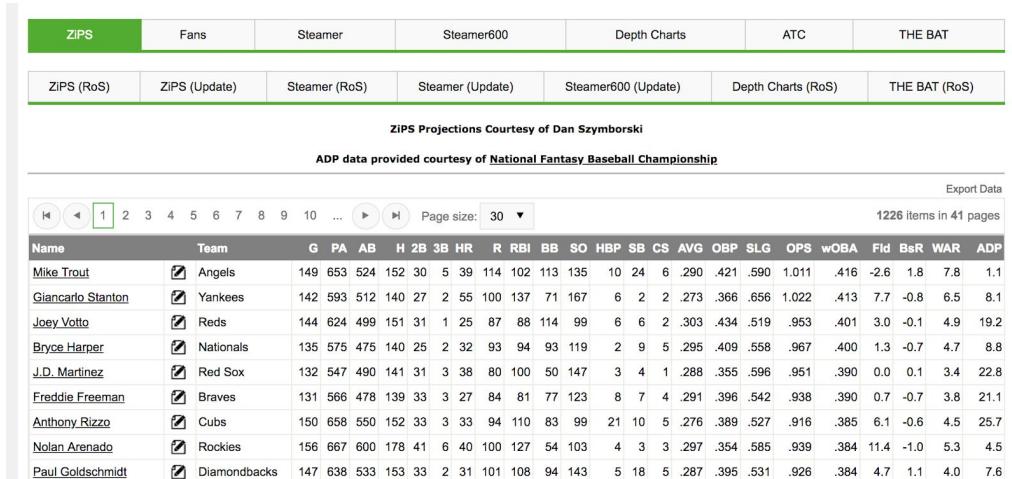
Data cleaning took up a substantial amount of our time, as expected with such projects. We were lucky because we were able to monosource everything from [Fangraphs](#), but were still left with cleaning challenges. There were four different components to our data:

- 1) Projections
- 2) Historical results
- 3) Current rosters
- 4) Average values

What follows is a more thorough breakdown of these components.

### PROJECTIONS

Fangraphs [provides](#) six sources for projections [pictured below] of players for the 2018 season. We began by exporting the six different projections into separate CSV files. Next, we cleaned the projections via R. Our main task in R was calculating the projected number of fantasy points given the projected statistics<sup>11</sup>, but we did a variety of other exciting data cleaning<sup>12</sup> that you can pore over at their own leisure in the attached R code.



The screenshot shows a web-based application for managing baseball projections. At the top, there's a navigation bar with tabs: ZIPS, Fans, Steamer, Steamer600, Depth Charts, ATC, and THE BAT. Below this is a secondary navigation row with sub-tabs: ZIPS (RoS), ZIPS (Update), Steamer (RoS), Steamer (Update), Steamer600 (Update), Depth Charts (RoS), and THE BAT (RoS). A banner at the top reads "ZIPS Projections Courtesy of Dan Szymanski" and "ADP data provided courtesy of National Fantasy Baseball Championship". Below the banner is a search bar with "Page size: 30" and a "Export Data" button. A page navigation bar shows pages 1 through 10, with page 1 highlighted. The main content area is a table with columns for Name, Team, and various statistical metrics (G, PA, AB, H, 2B, 3B, HR, R, RBI, BB, SO, HBP, SB, CS, AVG, OBP, SLG, OPS, wOBA, Fld, BsR, WAR, ADP). The table lists several players, including Mike Trout, Giancarlo Stanton, Joey Votto, Bryce Harper, J.D. Martinez, Freddie Freeman, Anthony Rizzo, Nolan Arenado, and Paul Goldschmidt, along with their team names and detailed stats.

We were able to join all of the projections with the following query in SQL:

<sup>11</sup> You can find the formula to calculate fantasy points [here](#).

<sup>12</sup> Like hand-matching name discrepancies. I.e., Charlie Blackmon vs. Charles Blackmon.

```

With all_ids as
select playerid from atcprojections
UNION select playerid from fansprojections
UNION select playerid from steamerprojections
UNION select playerid from steamer600projections
UNION select playerid from thebatprojections
UNION select playerid from zipsprojections
),
add_fans as(
select all_ids.playerid, fansprojections.fansfps
FROM all_ids FULL JOIN fansprojections ON all_ids.playerid = fansprojections.playerid
),
add_steamer as(
select add_fans.playerid, add_fans.fansfps, steamerprojections.steamerfps
FROM add_fans FULL JOIN steamerprojections ON add_fans.playerid = steamerprojections.playerid
)
,
add_steamer600 as(
select add_steamer.playerid, add_steamer.fansfps, add_steamer.steamerfps, steamer600projections.steamer600fps
FROM add_steamer FULL JOIN steamer600projections ON add_steamer.playerid = steamer600projections.playerid
),
add_bats as(
select add_steamer600.playerid, add_steamer600.fansfps, add_steamer600.steamerfps, add_steamer600.steamer600fps, thebatprojections.thebatfps
FROM add_steamer600 FULL JOIN thebatprojections ON add_steamer600.playerid = thebatprojections.playerid
),
add_zips as(
select add_bats.playerid, add_bats.fansfps, add_bats.steamerfps, add_bats.steamer600fps, add_bats.thebatfps, zipsprojections.zipsfps
FROM add_bats FULL JOIN zipsprojections ON add_bats.playerid = zipsprojections.playerid
),
finalTable as(
select add_zips.playerid, add_zips.fansfps, add_zips.steamerfps, add_zips.steamer600fps, add_zips.thebatfps, add_zips.zipsfps, atcprojections.atcfpts
FROM add_zips FULL JOIN atcprojections ON add_zips.playerid = atcprojections.playerid
),
uniqueFinalTable as(
select
    distinct on (playerid) playerid,
    fansfps,
    steamerfps,
    steamer600fps,
    thebatfps,
    zipsfps,
    atcfpts
    from finalTable
)
select * from uniqueFinalTable;

```

The result was the following:

| playerid | fansfps | steamerfps | steamer600fps | thebatfps | zipsfps | atcfpts |
|----------|---------|------------|---------------|-----------|---------|---------|
| 10155    | 1292.5  | 1200.1     | 1137.6        | 1272.8    | 1207.1  | 1265.6  |
| 10603    | 1216.5  | 1050.3     | 1098.6        | 1145.5    | 1139.7  | 1148.9  |
| 4314     | 1205.3  | 1059.6     | 986           | 1152.9    | 1043    | 1189.9  |
| 11579    | 1184.5  | 1058.2     | 1071.3        | 1073.6    | 981.8   | 1045.2  |
| 7859     | 1178.2  | 961.4      | 877.6         | 994.3     | 1058.7  | 1085.8  |
| 9218     | 1164.9  | 1036.5     | 969.6         | 1052.8    | 1039.5  | 1087.1  |

## LEAGUE ROSTERS

The league rosters file, [provided](#) by Ottoneu, is the key for mapping every player to his respective fantasy team and MLB team. Here is a visualization of the file before beautification:

| Custom Reports     |            |      |      |    |     |    |    |     |    |        |        |      |       |      |      |      |      |      | Export Data |                       |      |     |
|--------------------|------------|------|------|----|-----|----|----|-----|----|--------|--------|------|-------|------|------|------|------|------|-------------|-----------------------|------|-----|
|                    |            |      |      |    |     |    |    |     |    |        |        |      |       |      |      |      |      |      |             | 475 items in 16 pages |      |     |
| Name               | Fantasy    | \$   | FPTS | G  | PA  | HR | R  | RBI | SB | BB%    | K%     | ISO  | BABIP | Avg  | OBP  | SLG  | wOBA | wRC+ | BsR         | Off                   | Def  | WAR |
| Mookie Betts       | Llama's My | \$27 | 394  | 37 | 164 | 13 | 43 | 27  | 8  | 11.0 % | 11.6 % | .404 | .342  | .362 | .439 | .766 | .493 | .213 | 1.8         | 24.0                  | 0.9  | 3.1 |
| Mike Trout         | Angels In  | \$71 | 381  | 41 | 183 | 12 | 33 | 25  | 8  | 19.1 % | 18.0 % | .331 | .327  | .310 | .448 | .641 | .452 | .191 | 1.7         | 21.8                  | 1.0  | 3.0 |
| Jose Ramirez       | Llama's My | \$14 | 325  | 39 | 176 | 13 | 28 | 28  | 6  | 12.5 % | 9.1 %  | .327 | .250  | .288 | .381 | .614 | .418 | .163 | 2.5         | 15.9                  | 6.3  | 2.9 |
| Francisco Lindor   | Kate Upton | \$24 | 344  | 40 | 190 | 12 | 34 | 26  | 5  | 7.9 %  | 18.4 % | .294 | .341  | .318 | .383 | .612 | .420 | .165 | -0.8        | 14.0                  | 5.9  | 2.7 |
| Manny Machado      | The Jabron | \$36 | 375  | 41 | 181 | 13 | 25 | 38  | 2  | 12.7 % | 12.7 % | .318 | .344  | .350 | .431 | .669 | .452 | .188 | 0.1         | 19.1                  | -1.7 | 2.4 |
| Aaron Judge        | Llama's My | \$14 | 348  | 40 | 184 | 11 | 33 | 35  | 2  | 18.5 % | 29.3 % | .291 | .417  | .311 | .440 | .601 | .439 | .179 | -1.1        | 16.4                  | 0.4  | 2.3 |
| A.J. Pollock       | The Jabron | \$13 | 299  | 40 | 166 | 11 | 23 | 33  | 9  | 7.2 %  | 22.9 % | .327 | .320  | .293 | .349 | .620 | .403 | .156 | 1.3         | 12.4                  | 4.4  | 2.3 |
| Andrelton Simmons  | Sweet Crac | \$3  | 253  | 39 | 162 | 3  | 26 | 23  | 5  | 9.3 %  | 5.6 %  | .159 | .346  | .338 | .404 | .497 | .389 | .149 | 1.5         | 11.0                  | 5.0  | 2.2 |
| Jed Lowrie         | Billy Know | \$3  | 301  | 40 | 179 | 9  | 17 | 36  | 0  | 8.4 %  | 19.6 % | .233 | .375  | .331 | .385 | .564 | .405 | .158 | -0.5        | 12.0                  | 1.0  | 2.0 |
| Freddie Freeman    | Billy Know | \$31 | 332  | 40 | 183 | 8  | 29 | 31  | 3  | 15.3 % | 15.3 % | .252 | .350  | .325 | .432 | .576 | .421 | .169 | 0.2         | 15.3                  | -2.2 | 1.9 |
| Carlos Correa      | Llama's My | \$23 | 271  | 41 | 175 | 7  | 26 | 29  | 2  | 12.6 % | 22.9 % | .226 | .346  | .295 | .383 | .521 | .382 | .144 | -0.3        | 9.0                   | 3.2  | 1.8 |
| Tommy Pham         | Llama's My | \$6  | 243  | 34 | 139 | 7  | 28 | 17  | 7  | 16.5 % | 20.1 % | .233 | .370  | .319 | .432 | .552 | .422 | .172 | 0.9         | 12.7                  | 0.8  | 1.8 |
| Kris Bryant        | This Is My | \$42 | 279  | 34 | 159 | 8  | 27 | 21  | 0  | 13.2 % | 15.1 % | .305 | .289  | .281 | .415 | .586 | .420 | .167 | 0.0         | 12.7                  | -0.1 | 1.8 |
| Odubel Herrera     | Hemington  | \$5  | 279  | 38 | 158 | 6  | 23 | 24  | 2  | 10.1 % | 15.2 % | .201 | .400  | .360 | .430 | .561 | .426 | .172 | 0.2         | 13.7                  | -1.2 | 1.8 |
| Francisco Cervelli | Billy Know | \$2  | 217  | 32 | 128 | 6  | 15 | 24  | 0  | 12.5 % | 18.8 % | .267 | .338  | .305 | .414 | .571 | .416 | .167 | 0.0         | 10.2                  | 3.2  | 1.8 |
| Asdrubal Cabrera   | Blood and  | \$5  | 253  | 36 | 157 | 6  | 23 | 23  | 0  | 7.0 %  | 17.8 % | .224 | .369  | .329 | .376 | .552 | .394 | .155 | 1.3         | 11.6                  | 0.5  | 1.8 |

Post-beautification:

|                   |          |                  |   |
|-------------------|----------|------------------|---|
| Kirby Yates       | 9073     | Billy Knows Best | 4 |
| Dylan Cozens      | sa657955 | Billy Knows Best | 4 |
| Alejandro Ramos   | 8350     | Billy Knows Best | 4 |
| Brad Peacock      | 5401     | Billy Knows Best | 4 |
| Joe Smith         | 3281     | Billy Knows Best | 4 |
| Felix Hernandez   | 4772     | Billy Knows Best | 3 |
| Derek Fisher      | 16192    | Billy Knows Best | 3 |
| Curtis Granderson | 4747     | Billy Knows Best | 3 |
| Jed Lowrie        | 4418     | Billy Knows Best | 3 |

## AVERAGE VALUES

The [Average Values file](#) [pictured below] contains an assortment of helpful tidbits (such as %-owned, average \$ values). This file also contains the position eligibility of each player, which is hugely important.

| OTTONEU AVERAGE SALARIES                                      |       | Game Type: All game types |        |         |         |         |
|---|-------|---------------------------|--------|---------|---------|---------|
| <a href="#">Export to .csv</a> <a href="#">Export to .xml</a> |       |                           |        |         |         |         |
| NAME  |       | POS                       | SALARY | MINIMUM | MAXIMUM | % OWNED |
| Mike Trout  | OF    | \$72.38                   | \$1    | \$101   | 98.94%  |         |
| Clayton Kershaw   | SP    | \$68.48                   | \$1    | \$98    | 98.94%  |         |
| Bryce Harper  | OF    | \$57.10                   | \$1    | \$104   | 99.293% |         |
| Paul Goldschmidt  | 1B    | \$51.17                   | \$1    | \$79    | 99.293% |         |
| Giancarlo Stanton   | OF    | \$58.25                   | \$1    | \$85    | 99.293% |         |
| Jose Altuve   | 2B    | \$47.09                   | \$1    | \$78    | 98.94%  |         |
| Max Scherzer  | SP    | \$46.95                   | \$1    | \$68    | 99.293% |         |
| Kris Bryant   | 3B/OF | \$46.94                   | \$1    | \$81    | 99.293% |         |
| Chris Sale  | SP    | \$46.85                   | \$1    | \$70    | 98.94%  |         |
| Nolan Arenado   | 3B    | \$46.02                   | \$1    | \$99    | 99.293% |         |
| Joey Votto  | 1B    | \$44.56                   | \$1    | \$76    | 99.293% |         |
| Anthony Rizzo   | 1B/2B | \$44.56                   | \$1    | \$66    | 99.293% |         |
| Manny Machado   | SS/3B | \$43.24                   | \$1    | \$103   | 98.94%  |         |
| Carlos Correa   | SS    | \$41.20                   | \$1    | \$104   | 98.94%  |         |

Here is the resulting file, post-cleaning:

| Name              | playerid | ownPercentage | avgSalary | position | isPitcher | sp | rp | catcher | first | second | third | short | outfield | utility |
|-------------------|----------|---------------|-----------|----------|-----------|----|----|---------|-------|--------|-------|-------|----------|---------|
| Mike Trout        | 10155    | 98.596        | 72.36     | OF       | 0         | 0  | 0  | 0       | 0     | 0      | 0     | 1     | 1        |         |
| Clayton Kershaw   | 2036     | 98.947        | 60.72     | SP       | 1         | 1  | 0  | 0       | 0     | 0      | 0     | 0     | 0        |         |
| Bryce Harper      | 11579    | 98.596        | 57.06     | OF       | 0         | 0  | 0  | 0       | 0     | 0      | 0     | 1     | 1        |         |
| Paul Goldschmidt  | 9218     | 98.947        | 51.33     | 1B       | 0         | 0  | 0  | 0       | 1     | 0      | 0     | 0     | 1        |         |
| Giancarlo Stanton | 4949     | 98.947        | 50.09     | OF       | 0         | 0  | 0  | 0       | 0     | 0      | 0     | 1     | 1        |         |
| Jose Altuve       | 5417     | 98.596        | 47.04     | 2B       | 0         | 0  | 0  | 0       | 0     | 1      | 0     | 0     | 1        |         |
| Kris Bryant       | 15429    | 98.947        | 46.93     | 3B/OF    | 0         | 0  | 0  | 0       | 0     | 0      | 1     | 0     | 1        |         |
| Max Scherzer      | 3137     | 98.596        | 46.86     | SP       | 1         | 1  | 0  | 0       | 0     | 0      | 0     | 0     | 0        |         |

## HISTORICAL RESULTS

Fangraphs, yet again, [comes through](#) with season by season data for each player. We exported data from seasons 2010-2017:<sup>13</sup>

The screenshot shows the Fangraphs interface with the following settings:

- Single Season: 2016
- Split: Full Season
- Min PA: Qualified
- Filter: Split Seasons, Rookies, Multiple Seasons (all unchecked)
- Ages: 14 to 58
- Currently viewing seasons between 2016 and 2016
- Dashboard, Standard (highlighted), Advanced, Batted Ball, Win Probability, Pitch Type, Pitch Value, Plate Discipline, Value, Pitch Info tabs
- Show Filters, Custom Reports, Export Data
- Page size: 30 (146 items in 5 pages)

The main table displays the following columns for each player:

| #  | Name             | Team         | G   | AB  | PA  | H   | 1B  | 2B | 3B | HR | R   | RBI | BB  | IBB | SO  | HBP | SF | SH | GDP | SB | CS | Avg  |
|----|------------------|--------------|-----|-----|-----|-----|-----|----|----|----|-----|-----|-----|-----|-----|-----|----|----|-----|----|----|------|
| 1  | DJ LeMahieu      | Rockies      | 146 | 552 | 635 | 192 | 141 | 32 | 8  | 11 | 104 | 66  | 66  | 2   | 80  | 3   | 6  | 8  | 19  | 11 | 7  | .348 |
| 2  | Daniel Murphy    | Nationals    | 142 | 531 | 582 | 184 | 107 | 47 | 5  | 25 | 88  | 104 | 35  | 10  | 57  | 8   | 8  | 0  | 4   | 5  | 3  | .347 |
| 3  | Jose Altuve      | Astros       | 161 | 640 | 717 | 216 | 145 | 42 | 5  | 24 | 108 | 96  | 60  | 11  | 70  | 7   | 7  | 3  | 15  | 30 | 10 | .338 |
| 4  | Joey Votto       | Reds         | 158 | 556 | 677 | 181 | 116 | 34 | 2  | 29 | 101 | 97  | 108 | 15  | 120 | 5   | 8  | 0  | 16  | 8  | 1  | .326 |
| 5  | Charlie Blackmon | Rockies      | 143 | 578 | 641 | 187 | 118 | 35 | 5  | 29 | 111 | 82  | 43  | 4   | 102 | 13  | 4  | 3  | 2   | 17 | 9  | .324 |
| 6  | Jean Segura      | Diamondbacks | 153 | 637 | 694 | 203 | 135 | 41 | 7  | 20 | 102 | 64  | 39  | 1   | 101 | 12  | 2  | 4  | 6   | 33 | 10 | .319 |
| 7  | Mookie Betts     | Red Sox      | 158 | 672 | 730 | 214 | 136 | 42 | 5  | 31 | 122 | 113 | 49  | 1   | 80  | 2   | 7  | 0  | 12  | 26 | 4  | .318 |
| 8  | Dustin Pedroia   | Red Sox      | 154 | 633 | 698 | 201 | 149 | 36 | 1  | 15 | 105 | 74  | 61  | 0   | 73  | 0   | 3  | 1  | 24  | 7  | 4  | .318 |
| 9  | Miguel Cabrera   | Tigers       | 158 | 595 | 679 | 188 | 118 | 31 | 1  | 38 | 92  | 108 | 75  | 15  | 116 | 4   | 5  | 0  | 26  | 0  | 0  | .316 |
| 10 | Mike Trout       | Angels       | 159 | 549 | 681 | 173 | 107 | 32 | 5  | 29 | 123 | 100 | 116 | 12  | 137 | 11  | 5  | 0  | 5   | 30 | 7  | .315 |

In a similar fashion to how we created the projections (run through R file, calculate Fantasy Points, combine with an SQL Query), we were able to combine everything to produce the following structure:

| Player ID | 2017 Fpts | 2016 Fpts | 2015 Fpts | 2014 Fpts | 2013 Fpts | 2012 Fpts | 2011 Fpts | 2010 Fpts |
|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
|           |           |           |           |           |           |           |           |           |

## COMBINING EVERYTHING

We ran into a world of trouble with player names ([Jose Ramirez](#) vs. [Jose Ramirez](#)), so, instead of being shocked by the same wire twice, we decided to make PlayerID, which is consistent through all of the Fangraphs data<sup>14</sup> that we had on our hands, our primary key on which to join all of the above data above. So, using a base table that simply had a unique ID and its associated name, we loaded all of the clean CSVs into a Postgres Database and joined *everything* into one file after. Our final, absolute monster of a CSV, adequately named *toUse\_01.csv*, looked like this:

<sup>13</sup> Why 2010, specifically? This was relatively arbitrary. Maybe we could go further than that (I suppose going as far as the earliest active player's first season would be the most thorough). The problem with this though is that most projected players didn't play in 2010, let alone 1997, the year [Bartolo Colon](#) was a rookie.

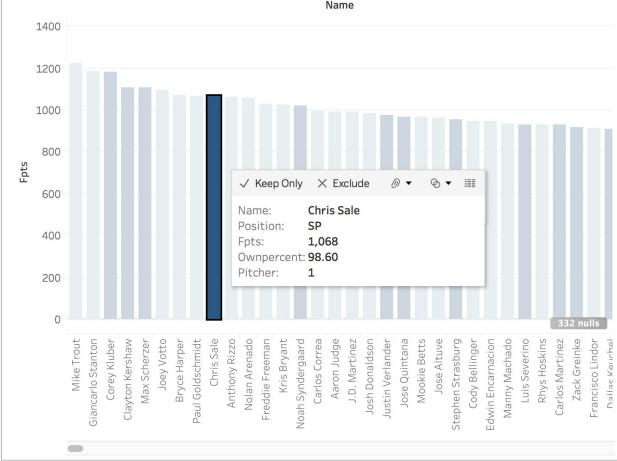
<sup>14</sup> Interesting, player name is not consistent through the different tables on Fangraphs.

*Note:* The binary 1s and 0s in the middle of the CSV denote position.

It is not the prettiest of things, but it is an absolute behemoth of a file that has everything we need to know to make our visualizations. To avoid pulling an eye muscle, we recommend not squinting into the image above (we promise the full file is attached for your pleasure).

# Exploratory Data Analysis

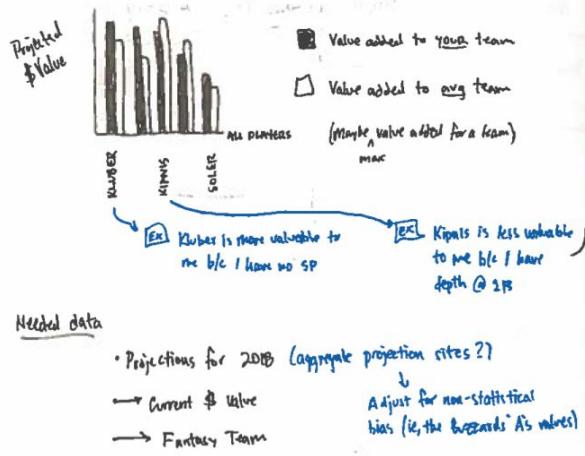
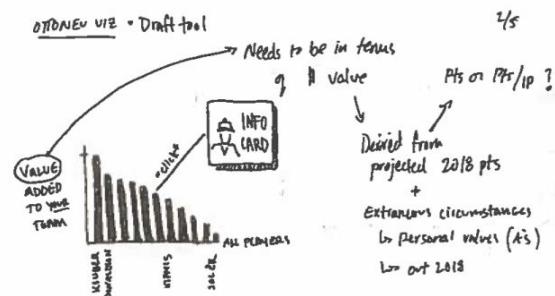
We explored our cleaned data initially in Tableau, where we created a rough prototype of the planned visualization [pictured below]. We gained some preliminary insights, such realizing our data was not void of NULLs, which sent us back running back to R. For the most part however, we immediately set to work on trying to implement in D3 a visualization identical to that in Tableau.



# Design Evolution & Implementation

## BRAINSTORMING & SKETCHES

What follows is a collection of handwritten ideas & sketches for the project.



OPTIONAL UI2 ↗ How? \$ values will change

The graphs on the left will dynamically update as players are selected

The tool on the left would definitely work for a specific draft.

↳ But what about auction?

↳ What if Sollee is put up for auction? → would need to be searchable

→ Will value trying to compare apples to oranges

The y-axis is  $\Delta$  points added (simple subtraction) quantified by  $\Delta$  value.

→ Nominate players with Pts differences early on:

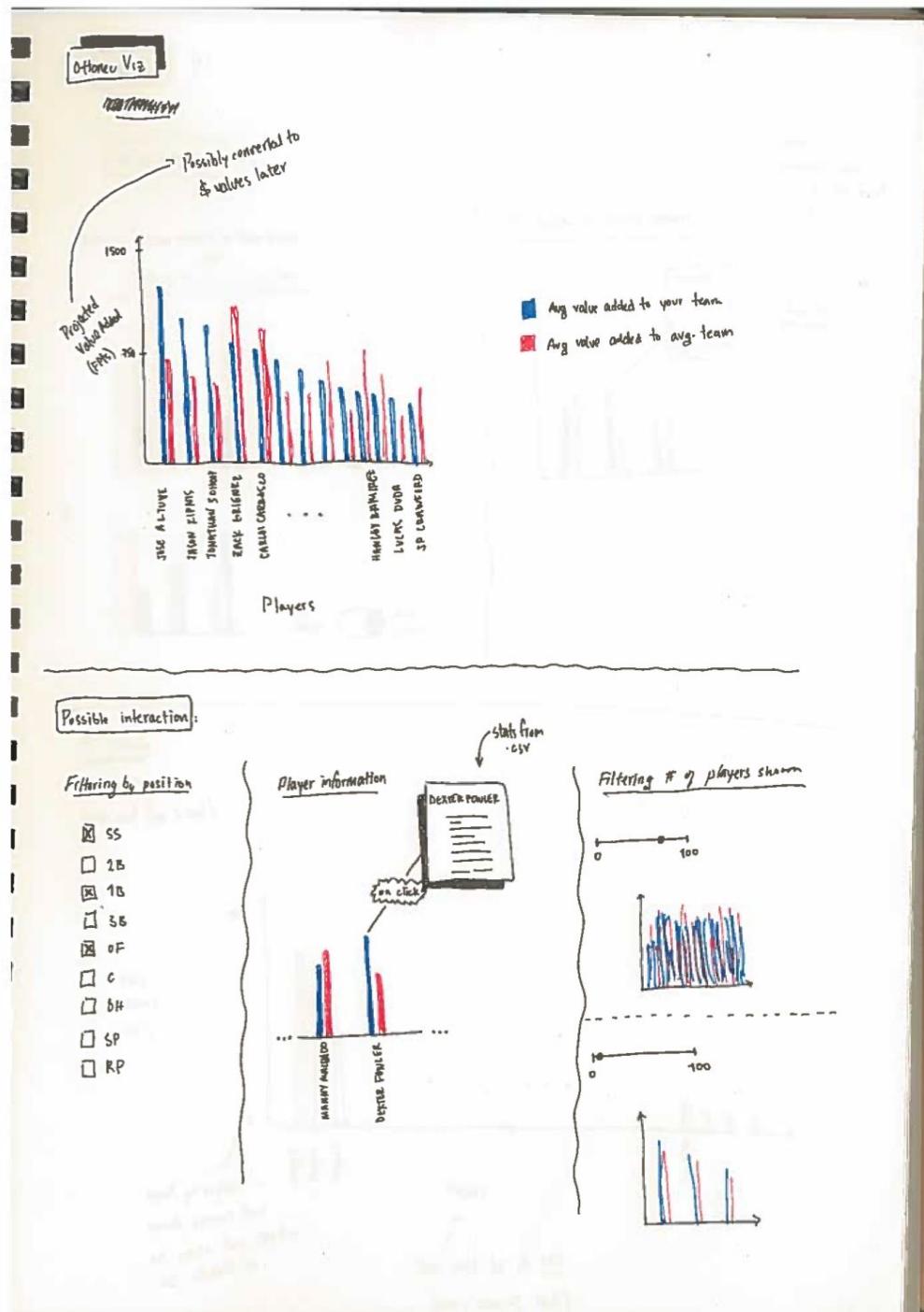
↳ Especially if my \$ value is much higher than the \$ value of the league avg.

↳ Does it work in the converse? Yes? Overvalued.

→ How to take into account for replacement value?

↳ sorts itself out

INFO CARD — Past \$ value



**Share V/Ft (1)**

**Possible Interaction (2)**

Sort by **VALUE ADDED TO YOUR TEAM**  
- or -  
**VALUE ADDED TO Avg TEAM**

1

2

**The ability to remove players**

undo? ...  
probably not.  
Too hard

---

**1st graph:**  
(to be implemented  
first and fine tuned!)

Value Added (PPG)

ISAD

Player 1 Player 2 Player 3

Players

Player 500

How? go negative — bench players that are worse than starters, are valuable too.

There will be A LOT (every row of CSV)

Note on color scheme

Matched Offers ✓

### Presentation

- Assume that people don't know ~~anything~~ anything
- 10 minutes
  - Intro → 1st slide w/ Title, names, website
  - Data
  - Screenshots (of process)
  - Demo VIDEO on website

### Further work

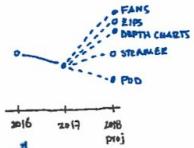
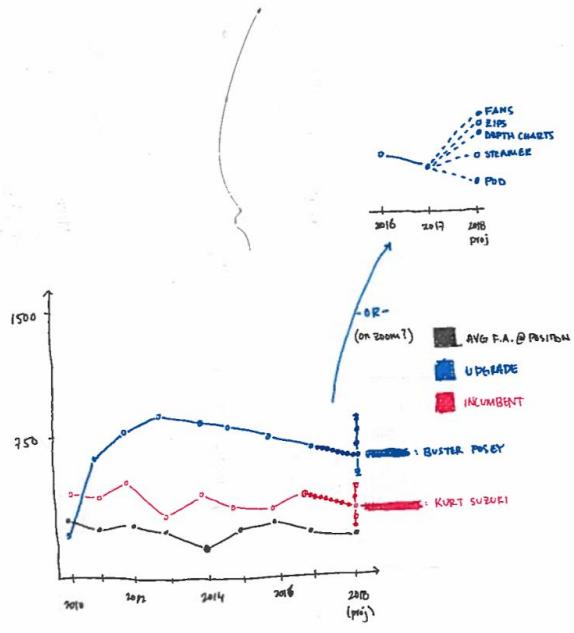
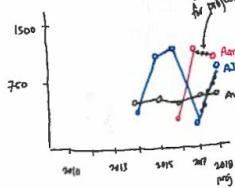
ToDo

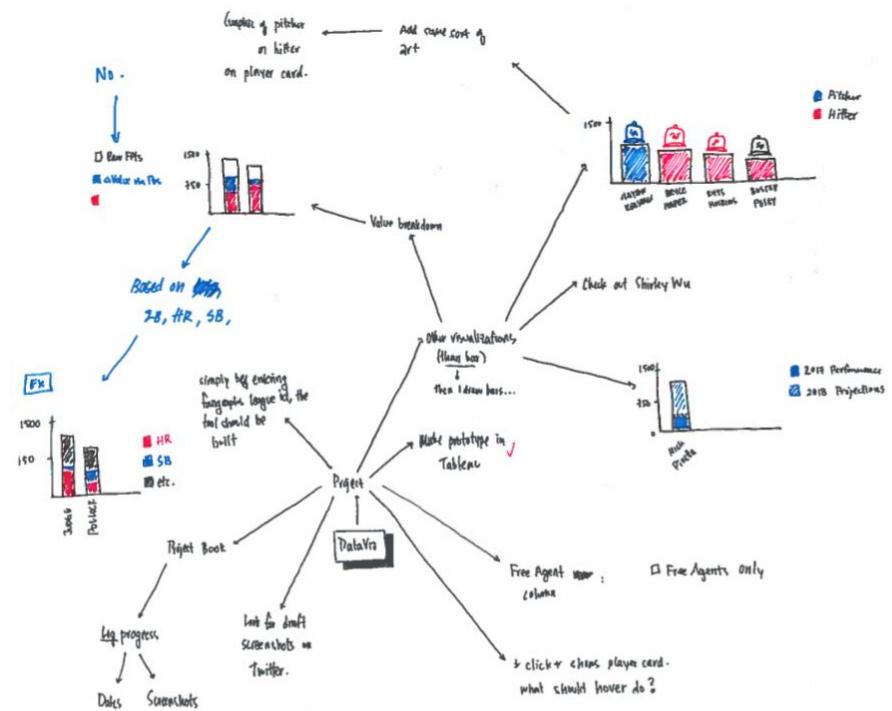
→ master a range bar across projections

Maybe w/ error bars based on difference between proj & reality

on hover, gray out other lines & add value to nodes  
 personalization: Aaron Judge → Yellow (FA)  
 Incumbent: for AJ Pollock → Green (Owning)  
 available player?  
 avg free agent → TIP-C Avg Proj under 50% owned

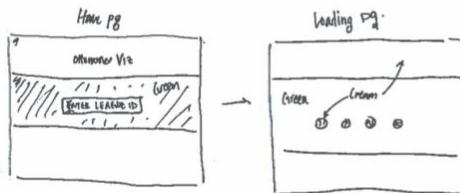
### Comparing 2 players

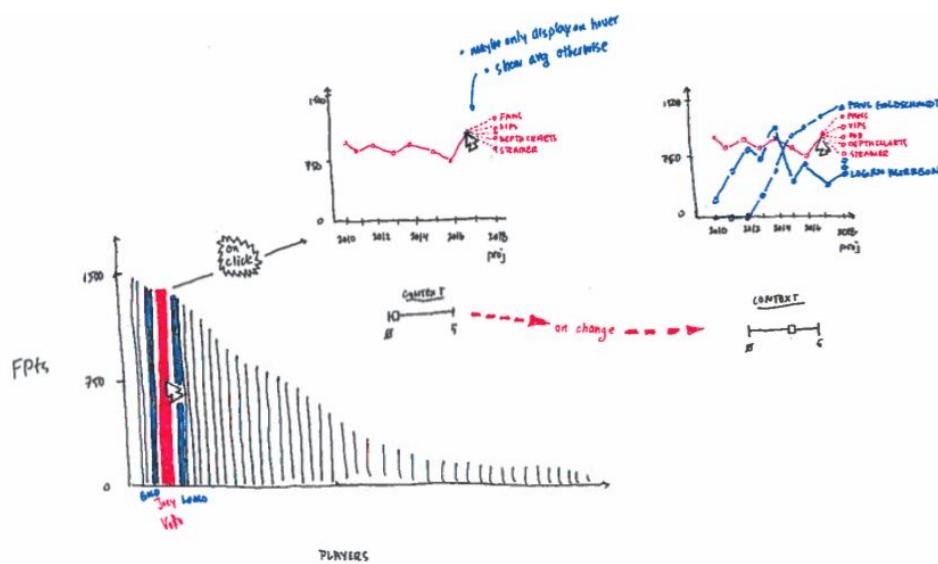




Zoom to player width w/in 100 points left & right

compare two players.

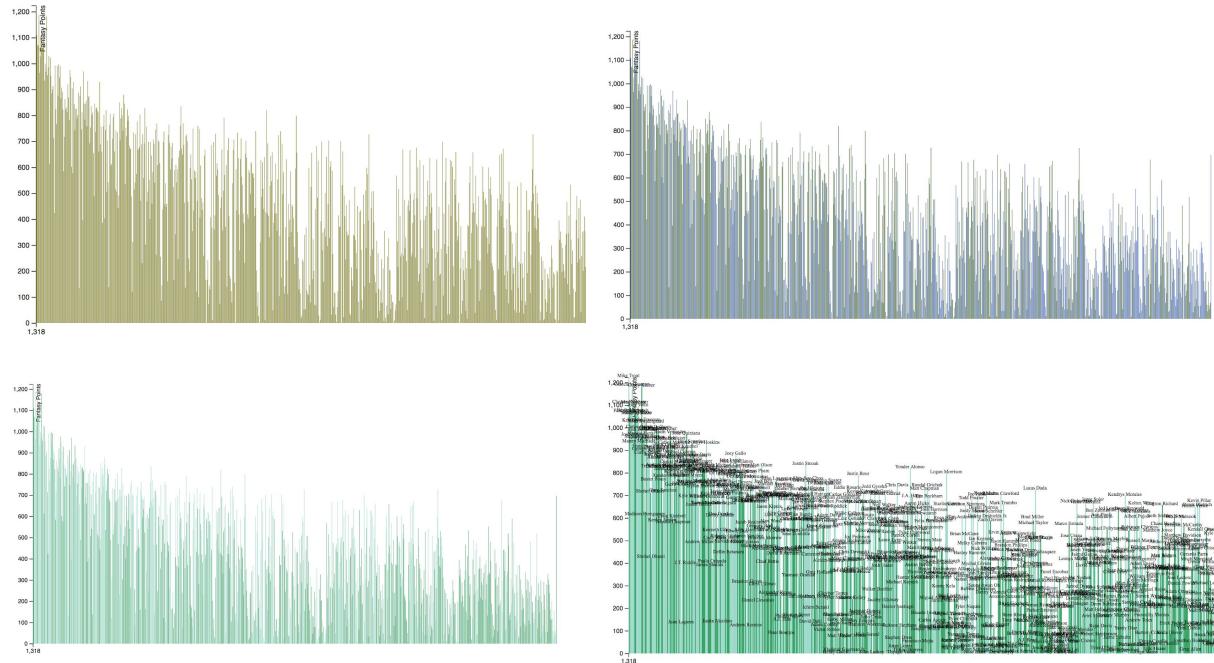





---

| Data   | player  |          |                |     |             |        |  |    |  |
|--|---|----------|----------------|-----|-------------|--------|--|----|--|
| Get historical data for <del>steamer</del><br><del>max</del> max(years played) = 22 years,<br>↓<br>Bartolo | d.fpts - steamer ≈ 1000<br>d.fpts - zips ≈ 500  |          |                |     |             |        |  |    |  |
|  | steamer<br>zips<br>depthtut   |          |                |     |             |        |  |    |  |
|  | <table border="1"> <thead> <tr> <th>playerid</th> <th>fpts - steamer</th> <th>...</th> <th>fpts - zips</th> </tr> </thead> <tbody> <tr> <td>100105</td> <td></td> <td>..</td> <td></td> </tr> </tbody> </table> | playerid | fpts - steamer | ... | fpts - zips | 100105 |  | .. |  |
| playerid   | fpts - steamer  | ...      | fpts - zips    |     |             |        |  |    |  |
| 100105   |   | ..       |                |     |             |        |  |    |  |

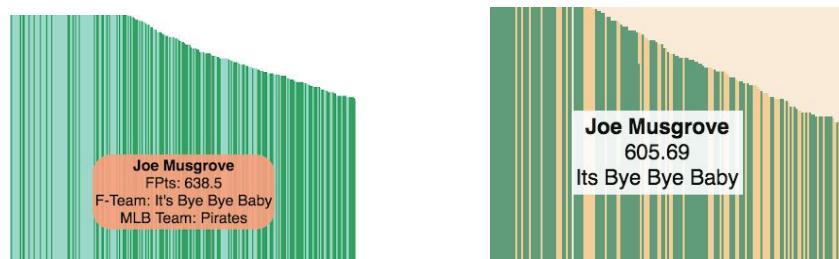
## VERY EARLY DESIGNS



First a note on the color – we’re very sorry that anyone, including us, has to look at these early models. It went from bad to worse to not good. Our initial color scheme was thoughtlessly based on whether that player was a pitcher or a hitter. This was later amended to signify “Free Agent” vs. “Owned,” which is much more practical. The “forest of names” on the bottom right also was dropped in subsequent sections, despite its avant garde appeal.

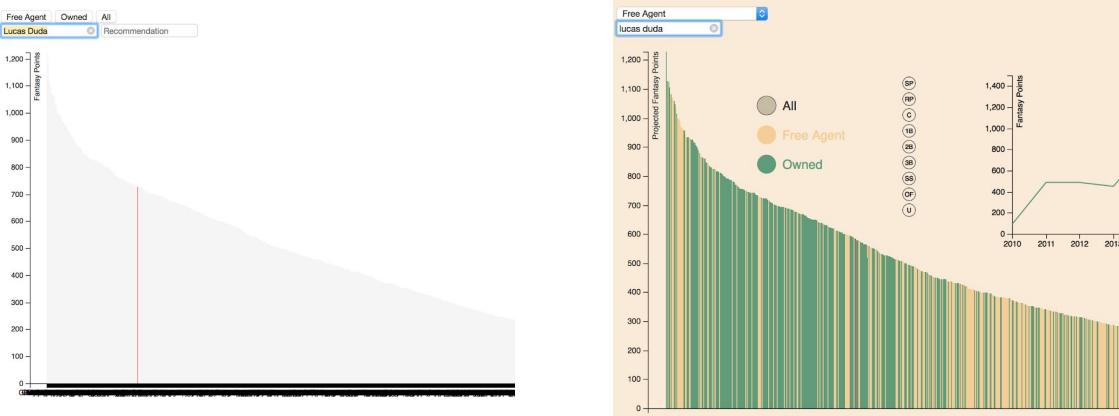
Despite the gory-mess nature of these visualizations, this initial stage was very exciting to reach, as it was the nearing to the initial Tableau sketch we had set our sights on as a first milestone.

## TOOLTIPS



We knew that we wanted details on demand. Additionally, since the bar chart featured 1200+ players, we knew that we would have to find an alternative to the afore-pictured “forest of names.” An early rendition of the tooltip [left] and a later modified version, with simplified color, shape, and details, are shown above.

## SEARCH



The search tool is quite straightforward – it takes a player name as the parameter, looks for that player in the internal database of players, and highlights & displays information for that player if he is found. We have had trouble throughout the project deciding on the best way to highlight the player, as we have to take two competing design choices into consideration – clarity & context. On one hand, we want to clearly show the result of the search to the user (the location of the searched player in the sea of bars). Taking this choice to the extreme results in the left product above. But, we also want to keep the context around the player, which the left design do not promote.<sup>15</sup> The extreme of this decision is pictured upper right, with the searched bar highlighted in red and the other keeping their original color. This is problematic because no color that we found pops out enough to clearly distinguish itself from the green & yellow bars. Red is the closest that we got.

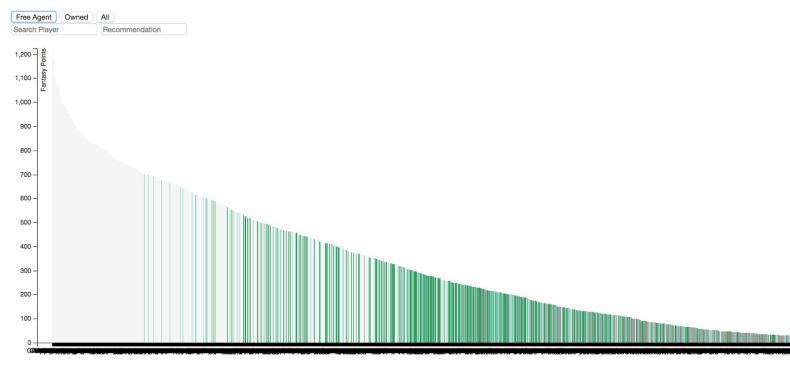
Here are two potential solutions –

- 1) partially gray out the non-highlighted bars, keeping color & tooltip ability for the now slightly gray bars.
- 2) Instead of highlighting, add the player’s name above or below the bar to indicate that that player’s bar is “clicked.”

## OWNERSHIP FILTERING

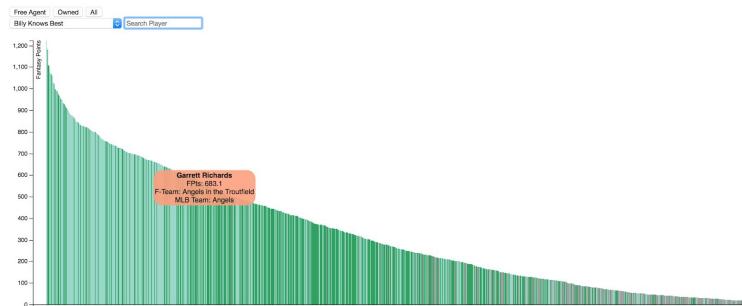
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<sup>15</sup>For example: what players are similar to Lucas Duda? Are there free agent first basemen who are projected around the same amount of points as he?



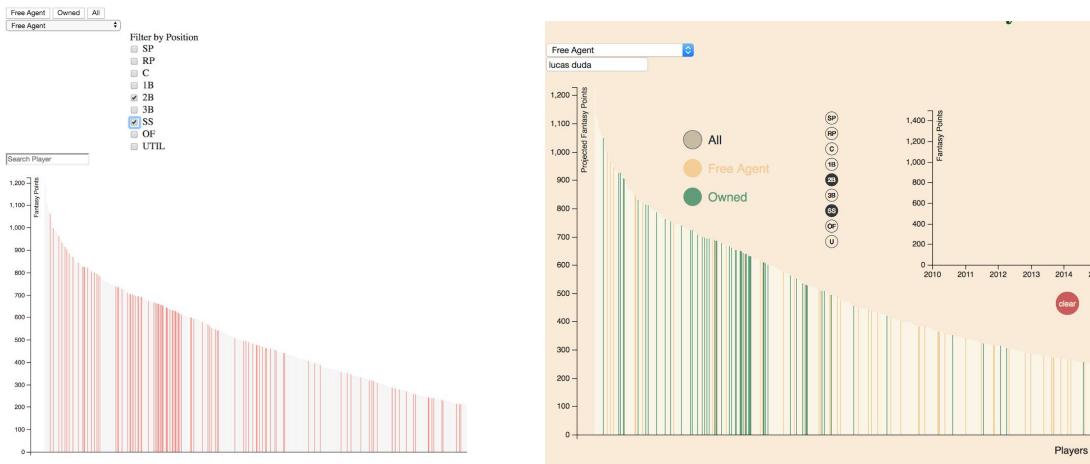
The ownership filtering button does one very simple task: it enables the user to highlight the bars of players who are Owned by a fantasy team, players who are Free Agents, or players who are either (i.e., all players).

## CLEANING OF X-AXIS



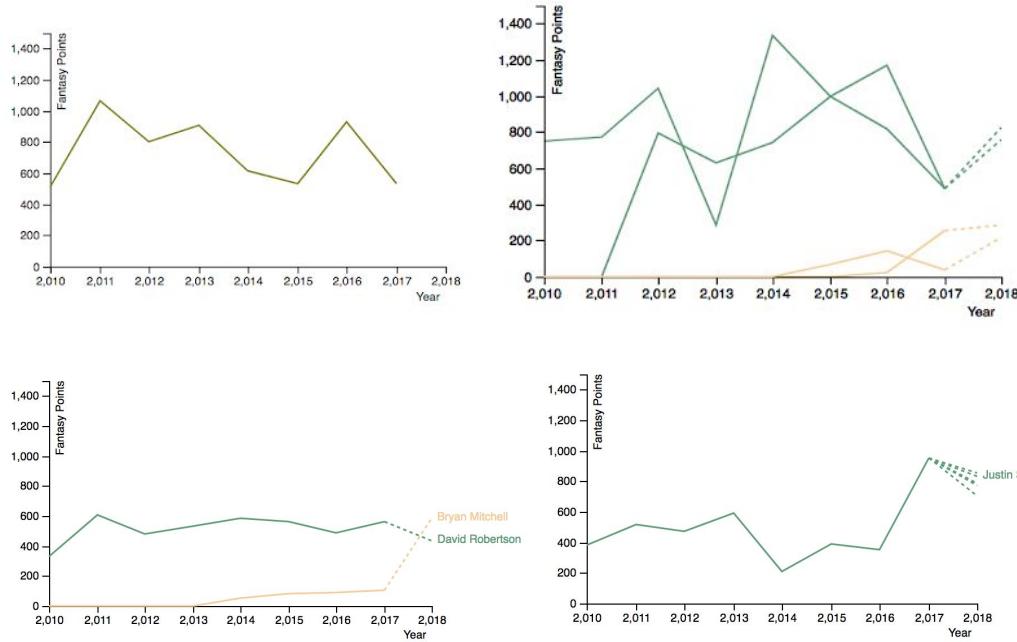
The decision to drop names from the x-axis coincided with the decision to not attempting to implement brush & zoom. We decided to condense all of the details-on-demand regarding the players into tooltips & the player card. A feature that might be interesting to deploy, which would also solve the search-highlight legibility issue, could be to display the highlighted player's name below the bar. Again, though, we would be inching toward the ominous “forest of names.”

## POSITIONAL FILTERING

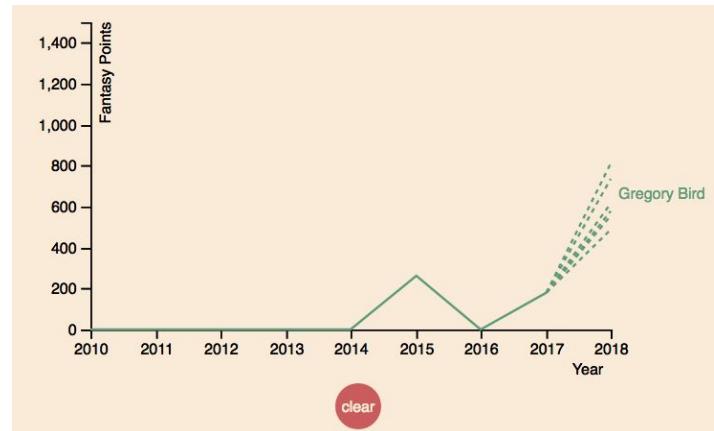


We'll let you guess what positional filtering does. As for the colors, we decided to not simply apply a mono-color (red on the right) based on the position of the player, but instead kept the coloring of the player's ownership (Free Agent in *yellow* or Owned in *green*), providing better context.

## PLAYER PERFORMANCE LINE CHART



Here is one of our prouder accomplishments. On the previous page, you can see different steps in the process that led to the final product [picture right]. Here, we wanted to accomplish two tasks: First, showing historical performance of the player, implemented in the solid line. Additionally, we wanted to address the uncertainty of projections, which we addressed by plotting all of the projections with perforated lines, indicating the predicted range of outcomes for that player in 2018.

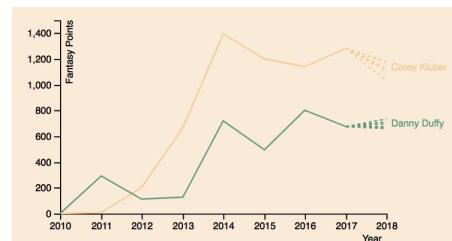


Some problems – the names pile up and get jumbled on top of each other. We considered using a title for the entire line chart (which would be something like: *Bryan Mitchell vs. David Robertson* in example on the bottom left of the previous page) instead of the name at the end of the line, but this gets confusing with more than one player and if the players are both of the same ownership status (as their names would be the same color). Instead, to address this issue of clutter, we added the “clear” button so the user can decide when the graph gets too cluttered. A possible solution to the cluttered names might be some sort of jitter feature that spreads the names out so they don’t touch. But this could get confusing, as the only tie between the player and the line is the positioning of the name at the end of the line.

## PLAYER RECOMMENDATION

An initial goal of this project was to aid users in deciding which players would benefit their team the most. Pictured is simply a rough implementation of this idea. Pick a team on the drop down menu of Fantasy Teams & you will be provided a recommendation in the line chart based on the specific needs of that team. The calculation of which player to recommend is very, very rough right now, and will need polishing in future iterations of this project if it is going to be useful. (See the last section to read about the many specific ToDo’s of this project). The current logic of the recommendation system is the following –

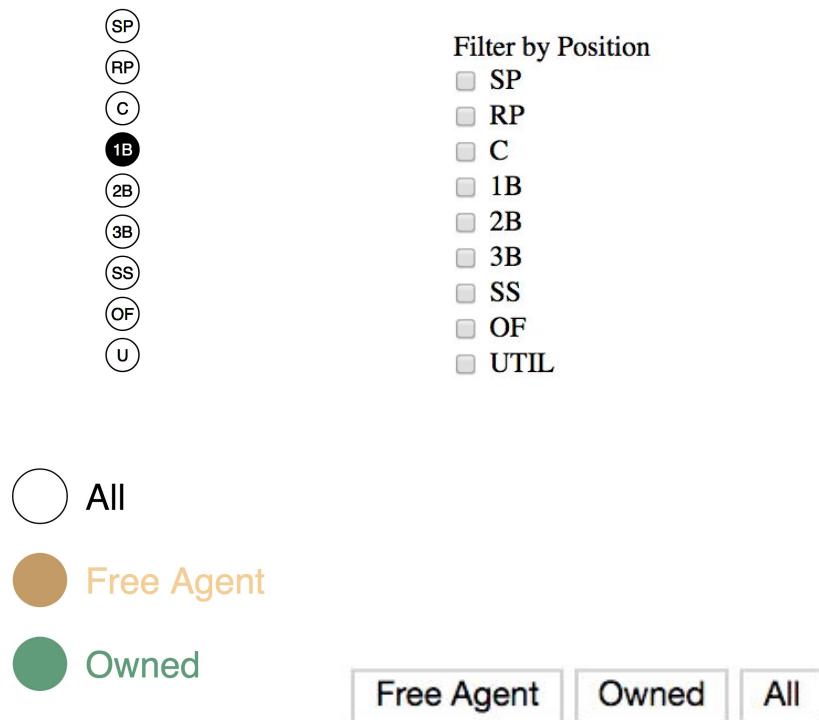
### Hemington High Rollers



- 1) Find all free agents.
- 2) Iterate over the positions (1B, 2B, ...) of the selected fantasy team, finding the current top players at each position for that team.
- 3) For each position, compare (based on average projected points) the top player on that team to the top free agent available.
- 4) Recommend the player that will add the most value.

The logic is not bad, but the tool is also not robust. There are many flaws in it, but here is one example: There are five starting pitcher slots, so pitchers past the top pitcher provide value. The tool doesn't take this into account. This is simple hole with a fix<sup>16</sup>, but there are *many* problems like this with the tool that will require hours of fine tuning.

#### BUTTON BETTERING



Just at the name implies. B-e-a-u-tiful.

#### PLAYER CARD

---

<sup>16</sup> One solution could be checking if the potential recommendation is more valuable than the *fifth* best pitcher.

|   |   |
|---|---|
| <b>Scott Schebler</b> outfield<br><b>Reds</b> | <b>Addison Russell</b> shortstop<br><b>Cubs</b> |
| Owned By: Its Bye Bye Baby                    | Owned By: This Is My Team                       |
| Avg. 2018 Proj: 645.77                        | Avg. 2018 Proj: 648.97                          |
| Avg. Value: \$3.51                            | Avg. Value: \$8.53                              |
| Previous Best Yr: 669 (2017)                  | Previous Best Yr: 669.7 (2016)                  |
| Own %: 95.789%                                | Own %: 97.544%                                  |

Our thirst for details on demands exceeded the meager tooltip. So, we decided to implement a player card which could house even more information. Previous iterations are pictured above and the final product is shown to the right. Here, we are able to display those aforementioned “useful tidbits” (Own Percentage & Average Value) that were available in the Average Values file. Additionally, we are able to display the MLB team, Fantasy Team & Price, as well as the position eligibility. We also include the full projected statistics from each provider, as we don’t specifically do this in the line chart. We include another uncertainty metric to pair with the perforated lines, this time a precise number—standard deviation. To top off the player card, we provide the user with a link to the Fangraphs Page, which has all of the specific statistics that the user could ever want. The upper half of the card is colored based on the MLB team of the player, and the Fantasy Team name is colored based on the ownership status of the player, the latter a color scheme consistent with the rest of the visualization.

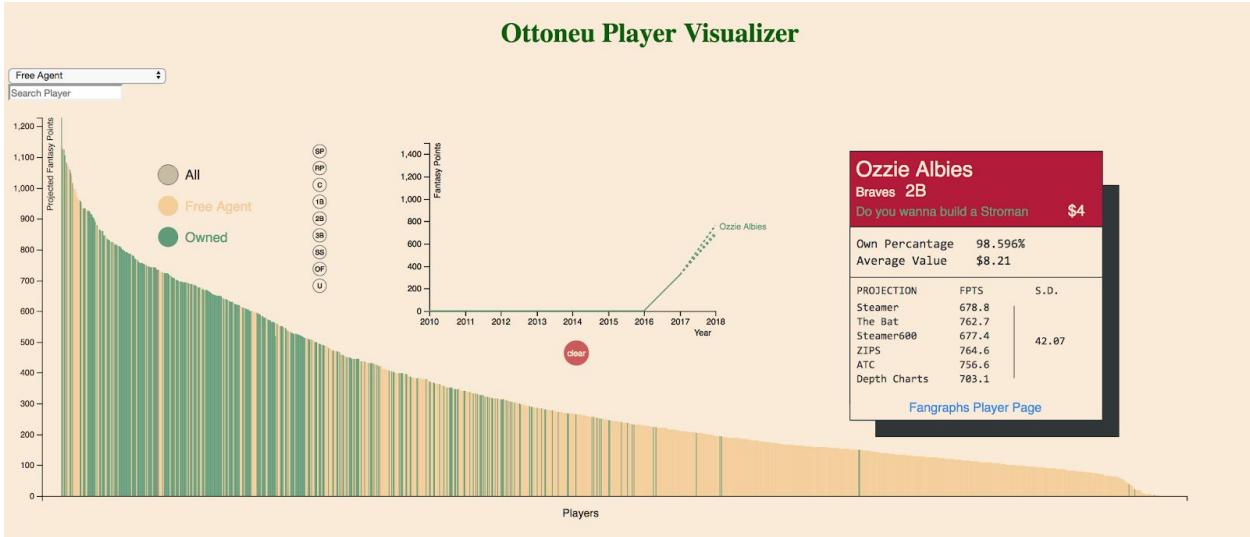
There are many ways to improve this card. Here are a two<sup>17</sup>:

- 1) Add a **DRAFT** button for when the player is selected.
- 2) Add a text box featuring the ability for the user to comment.



<sup>17</sup> For a full list, visit the last section of the paper.

## THE FINAL PRODUCT



## How to use our visualization

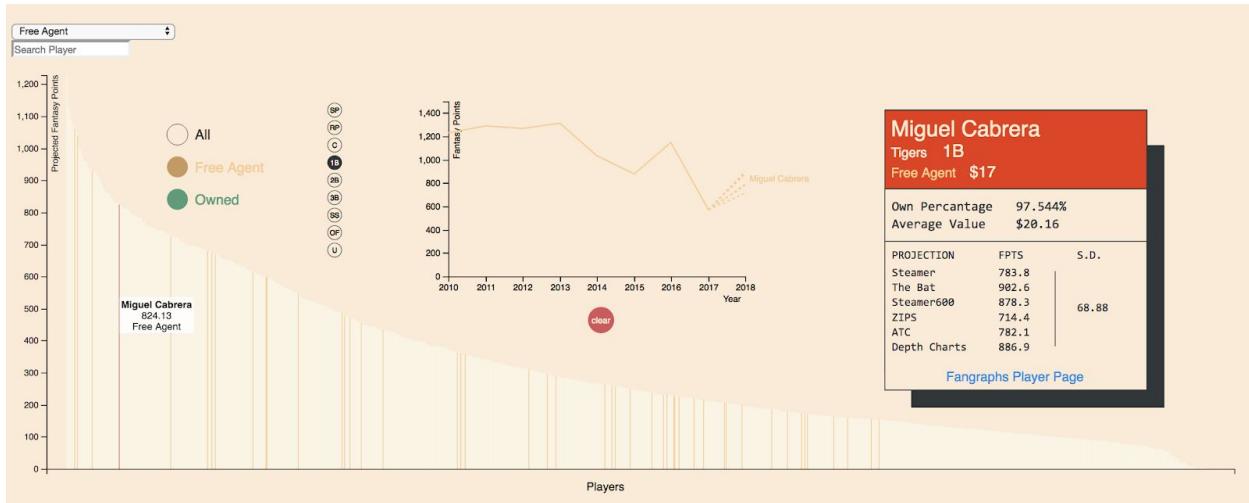
*How do I use all of these wonderful features?* Let us explain.

There are several different aspects of our visualization that we think are worth exploring, and we will run through a very quick real-world examples of each to illustrate their respective functions:

- 1) Filtering
- 2) Player recommendation
- 3) Search
- 4) Historical & Projected Performance
- 5) Player card

## FILTERING

Scenario: *My starting first baseman is Mark Canha. Help!*



Reaction: *Ah! Trusty old Muggy should do the trick!*

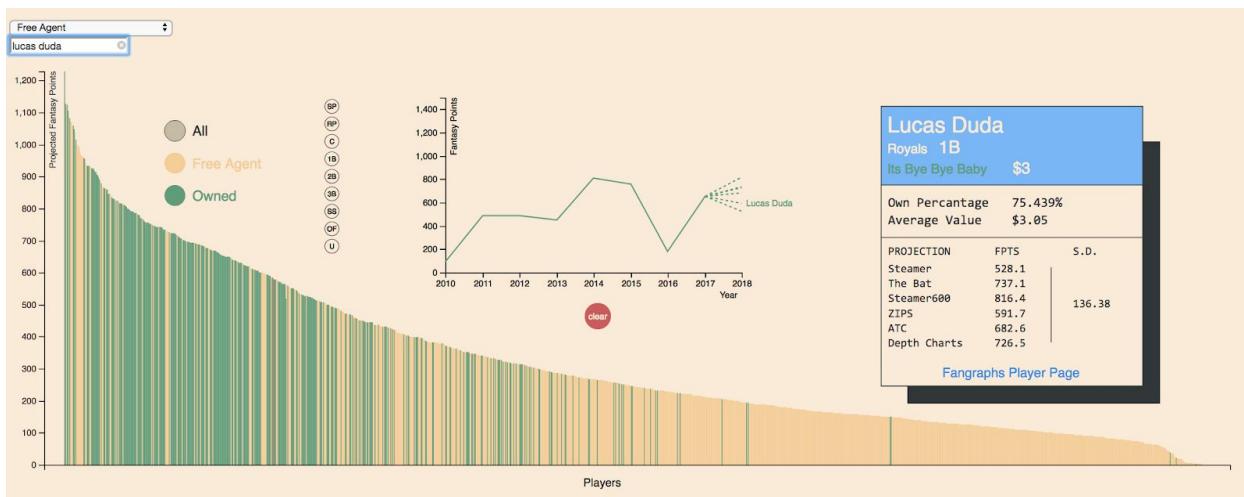
## PLAYER RECOMMENDATION

Scenario: *My team is loaded with studs. There can't be a player alive who can upgrade my squad!*

Reaction: *Ab-ha! I knew the prospect hype around J.P. Crawford was too good to be true!*

## SEARCHING

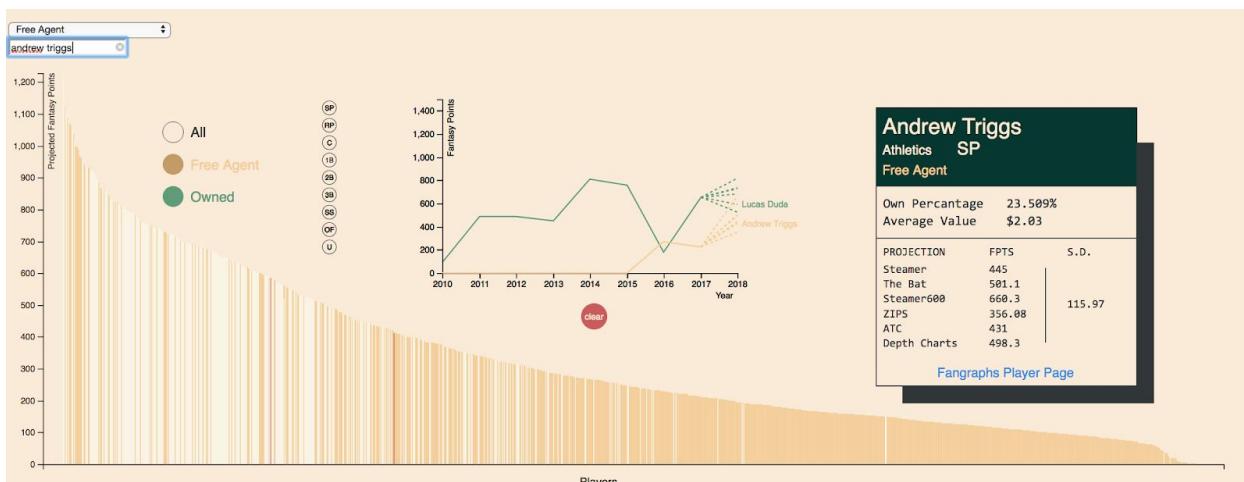
Scenario: *How the hell does Lucas Duda stack up against everyone?*



Reaction: *Kind of exactly how I thought.*

#### MULTIPLE PLAYER COMPARISON

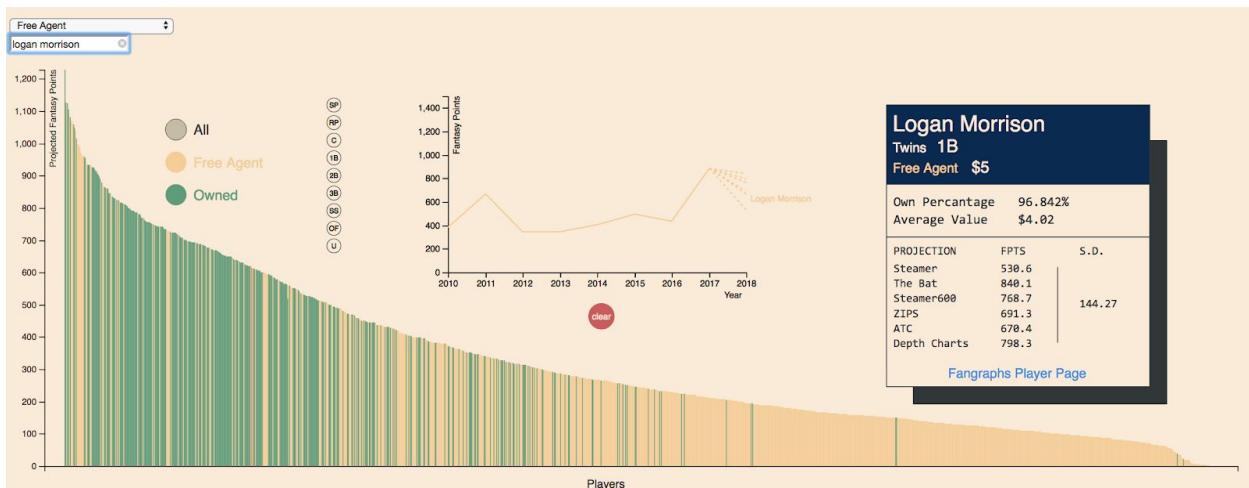
Scenario: *How the hell does Lucas Duda stack up against Andrew Triggs?*



Reaction: *No comment.*

#### HISTORICAL & PROJECTED PERFORMANCE

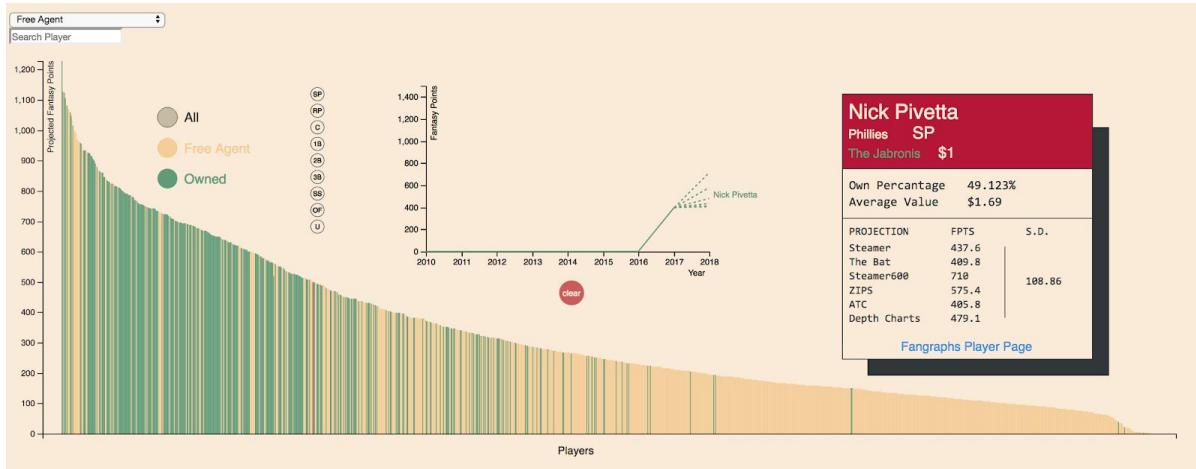
Scenario: *Has Logan Morrison really been in the league since 2010?*



Reaction: Yes.

#### PLAYER CARD

Scenario: I wonder if the jury is still out on Nick Pivetta. He sure does get a lot of strikeouts... But that 6.02 ERA is awfully ugly...



Reaction: \$1.69 average value? I'm going to roll the dice!

# Evaluation

## WHAT DID WE LEARN?

We grew familiar enough with D3 to consider it an old friend.

We learned some hard truths of color theory, such as the sad fact that neon yellow is not always the best highlight color.

We learned that elements on the x-axis need not always have labels.

We learned that buttons are built into HTML for a reason.

We learned for ourselves what everyone already knows about the time suck that is data cleaning.

We began to feel as an artist, who is never going to be satisfied with their work, feels when they have to finally conclude and present their work.

## DID WE ANSWER OUR QUESTIONS?

Given that our questions were simply based around the ability to execute the implementation of our visualization, I would reply with a resounding yes. We are very excited with the fruits of our labor, but, as you will see in the next subsection, we have a lot more ideas about how the project can be improved. Because draft season is in March, we still have a comfortable margin of time before our visualization will be of use.

## IMPROVEMENTS TO BE MADE & FUTURE WORK

Oh, don't get us started. Here are a few:

- 1) Player Card
  - a) Add **DRAFT** button
    - i) The ability to change a player to a specific team (i.e., drafted)
  - b) Add a comment (notes) section on the player card so that owners can take notes when they revisit players.
  - c) Check out baseball cards to get design inspiration for player card.
  - d) Add age of player
  - e) Maybe also add a link to the player's *Ottoneu* page
- 2) Line Chart
  - a) Add reference lines
  - b) Underline the name of the player in line graph whose card is displayed.
  - c) Reduce name clutter somehow
    - i) Maybe add heading instead of name @ end of line.

- d) Add the ability to add the “Current top at position”
  - i) Requires a team to be logged in / activated.
- 3) Buttons
  - a) Add click ability to text Positional boxes.
  - b) Reset select every time it’s clicked (viz’s pile up & look fuzzy).
  - c) Add MI button
- 4) Tooltips
  - a) Note the unit type of Fantasy Points displayed – *Projected Fpts*
- 5) Bar Chart
  - a) Change highlight color?
    - i) Red still seems wrong...
- 6) Search
  - a) Make more robust – partial search ability.
- 7) Recommendation tool
  - a) Make MUCH more robust
  - b) Pitchers other than the top-1 & bench hitters are valuable
    - i) Pitchers after 1500 projected IP benefit the team 0
- 8) Overall design
  - a) Clare’s [project](#)
  - b) Clean up code
    - i) Make position more easily accessible (maybe an array?)
  - c) Move y-axis title (maybe)
- 9) Additional features
  - a) Pts / IP & Pts / AB
  - b) Get top free agents button
  - c) Use arrows to navigate through players.
  - d) Add more data to file
  - e) Value of that player to *other* teams
    - i) The recommended player’s average value added to *other* teams.
  - f) The ability to look at teams’ rosters
    - i) Display lineup with prospective addition
  - g) Convert point recommendation to dollar value
- 10) Possible follow up projects
  - a) Question: is there a correlation between age & predicted performance?
    - i) If so, is it warranted (use projections vs. performance from previous seasons)
  - b) Accuracy of projections
    - i) Add projections from previous seasons to see how players (and projections) fared?
  - c) Create ETL pipeline
    - i) Only take in league id as a parameter & generate from there.
    - ii) Dynamically updating viz based not on projections, but in season pts/game.

- d) Ability to add own projection data.