
A's
OAKLAND ATHLETICS

Agenda

- Kirby Index for Command
- Release Angles and Tunneling
- Minor League Hitting Projections

Kirby Index

- Trying to better quantify command
- Calculated from Horizontal and Vertical Release Angles
- FBs for 2024 Season (200 to qualify)
- Currently comparing vs Command+ Grades and In Zone Rates
- Clustering HRA and VRA and comparing to pitch locations

Kirby Score Methodology

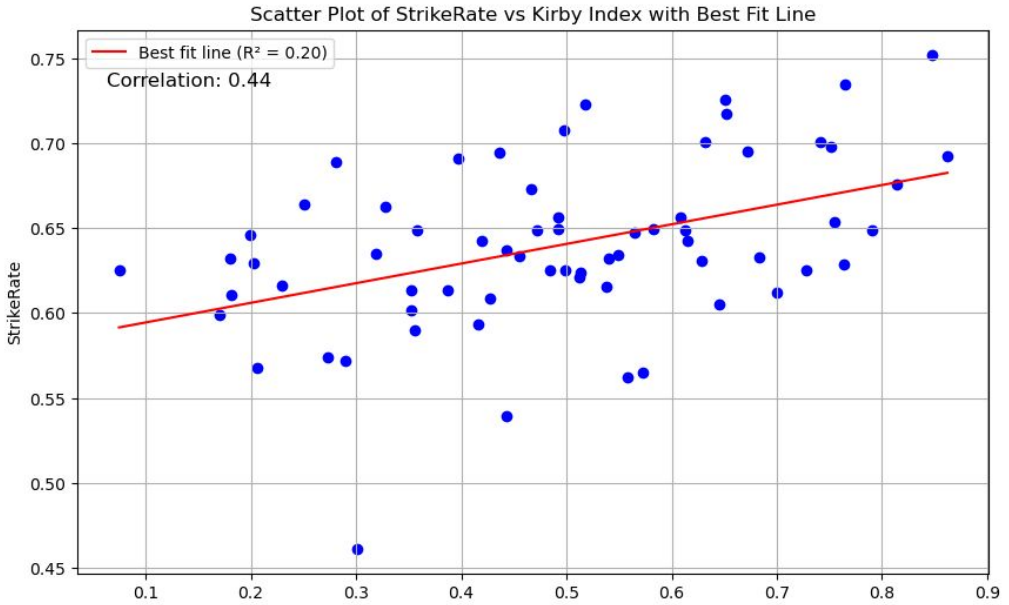
- Pulled Data from SQL from Play Event Pitch Table and Stat Pitcher Pitch Table
- Calculate HRA and VRA from vy0, vx0, ay, ax, and release extension
- Calculate player percentiles for HRA, VRA, Release X, ReleaseY
- Kirby Score = .42*VRA% + .27*HRA% + .17*Release Z% + .14*ReleaseX %

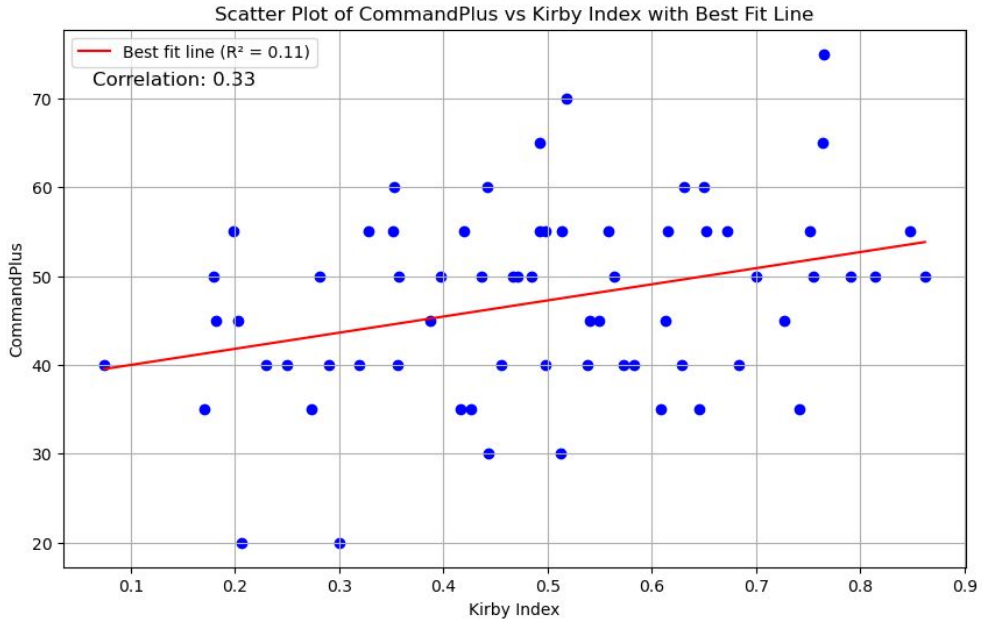
K-Means Clustering Methodology

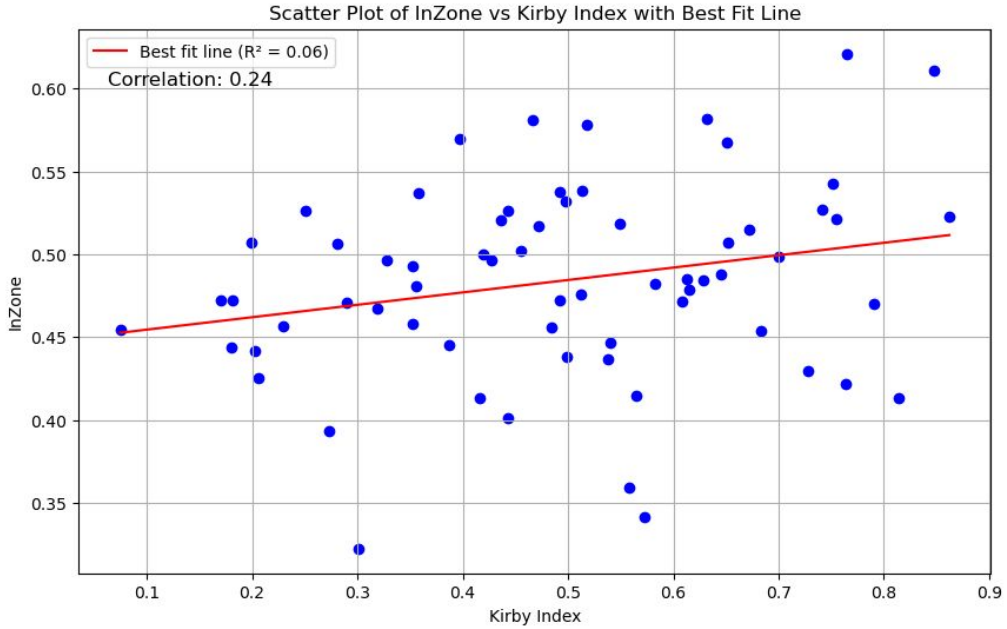
- Sklearn python package
- Plotting HRA on the x-axis, VRA on y-axis
- Using Silhouette Scores, min 3 clusters, max 10 clusters
- Iterate through each player's pitches and find optimal number of clusters
- For pitcher set number of clusters to optimal number and run K-Means
- Take HRA, VRA clusters and map to actual pitch locations

In Org Correlations

- Strike Rate Vs Kirby Score
- Positive correlations
- Not great R^2 (.1-.2)
- Big outliers in Zach Jackson, Joe Boyle





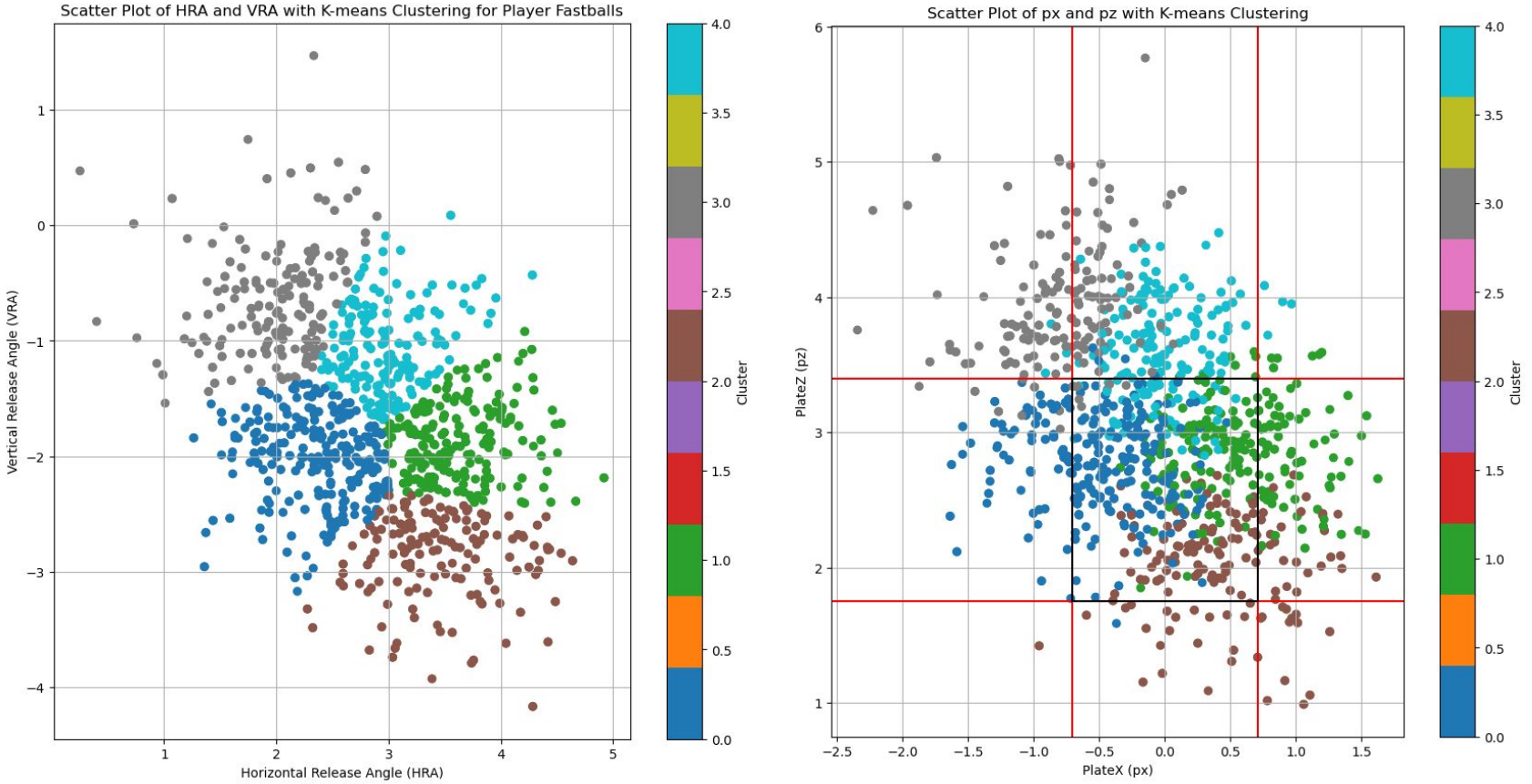


In Org Fastballs (200 TP Threshold)

- Top Kirby Scores
  - Kyle Muller .847
  - Joey Estes .813
  - Seth Elledge .862
- Middle Kirby Scores
  - Mitch Myers .497
  - Steven Echavarria .502
  - Hogan Harris .512
- Bad Kirby Scores
  - Tyler Baum .170
  - Joe Boyle .207
  - James Gonzalez .075

Joey Estes Fastballs

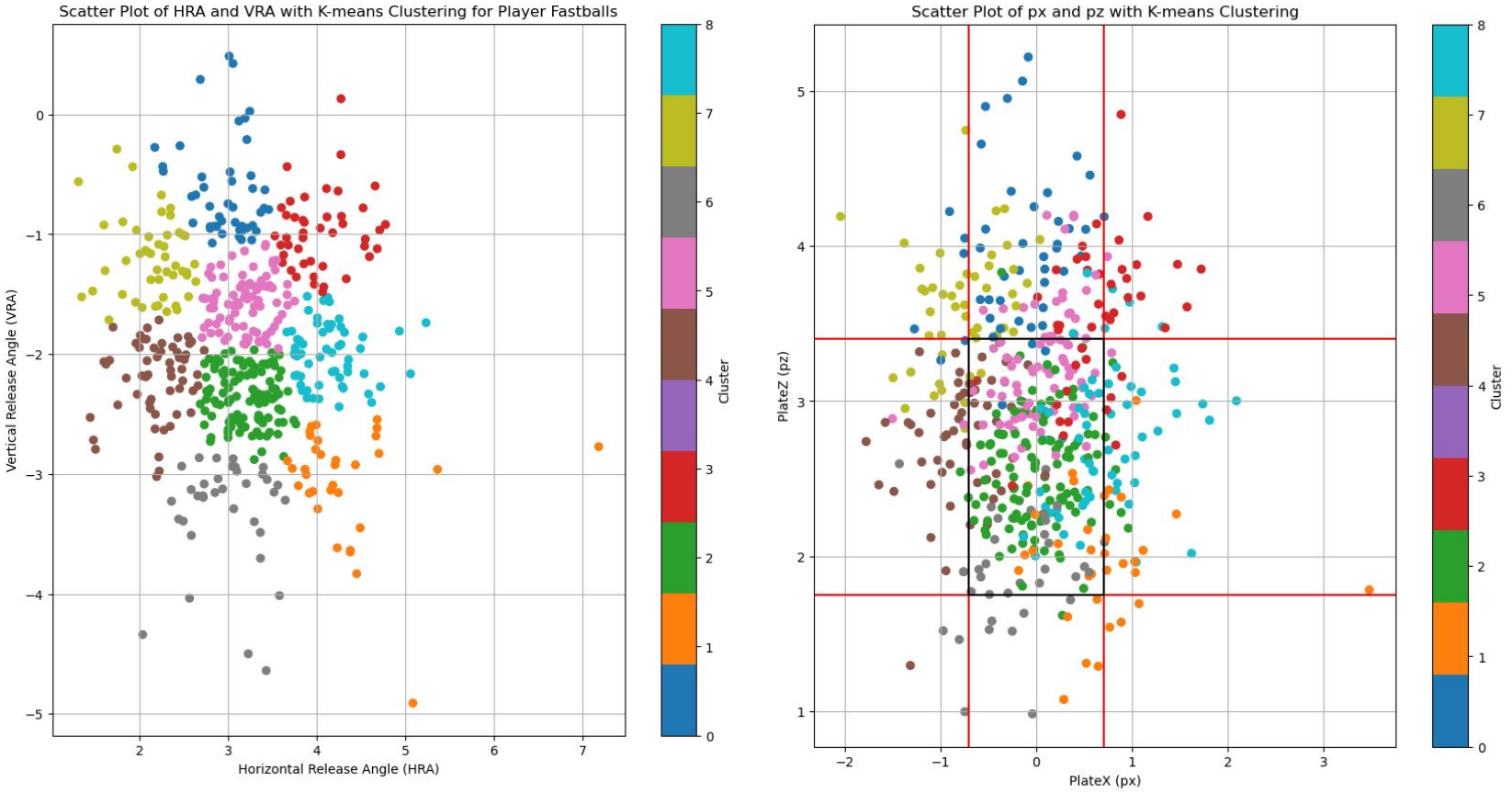
- Good Kirby Score (.813)
  - Tight HRA (most 1 to 4)
  - Great VRA (most 0 to -4)
  - 5 Clusters match well
  - Most pitches middle third and above
  - Very few pitches more than 1.5 feet from middle of the plate
  - Command+ = 60
  - In Zone = 55%
  - Strike Rate = 72%



Catcher View of Release Angles and Strike Zone

Chen Zhong-Ao Zhuang Fastballs

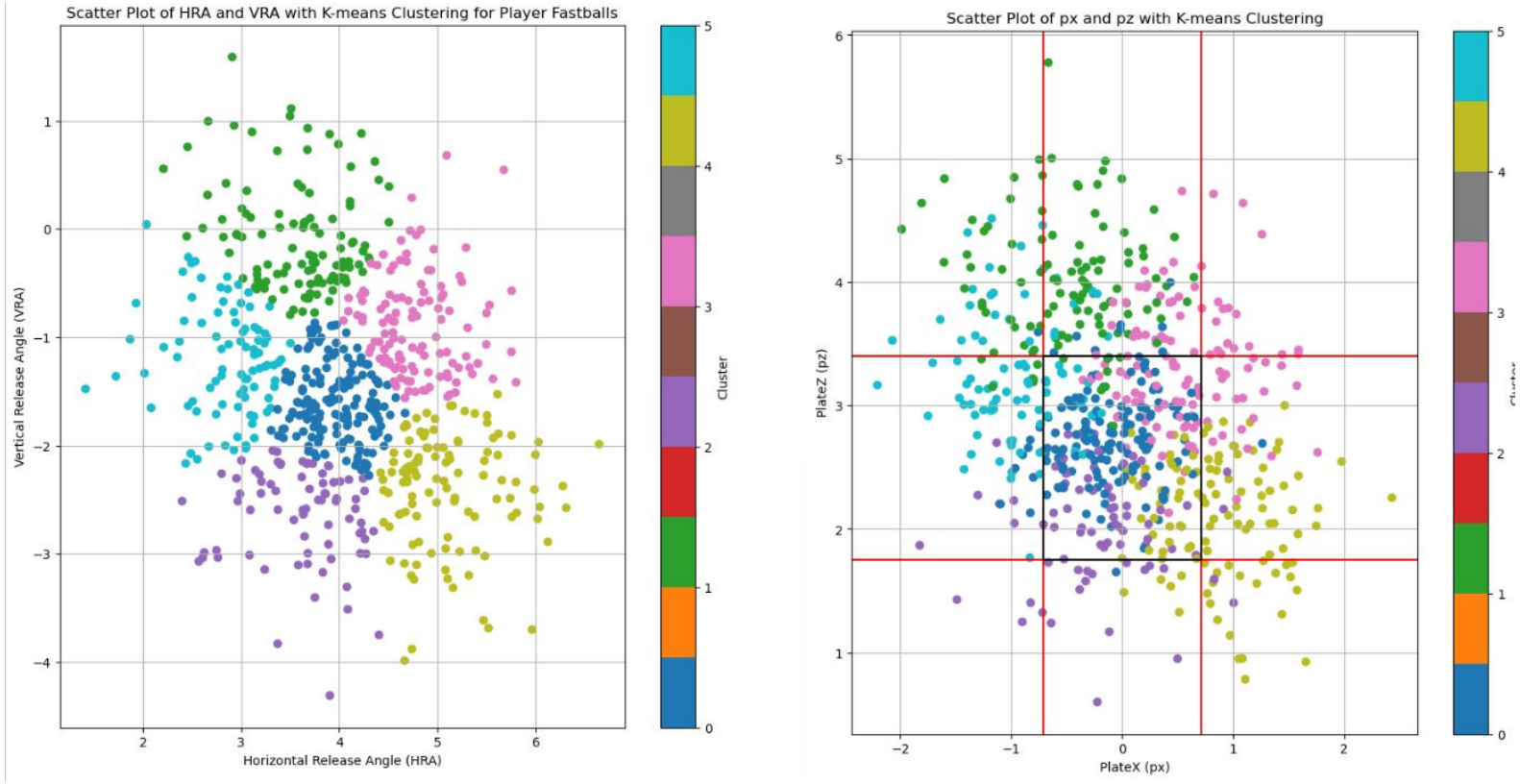
- Good Kirby Score (.765)
  - Fine HRA (most 1 to 5)
  - Great VRA (most .5 to -3.5)
  - 9 Clusters tight spread
  - Even pitch dispersion with some overlap
  - Two major outliers
  - Command+ = 75
  - In Zone = 62%
  - Strike Rate = 75 %



Catcher View of Release Angles and Strike Zone

Gunnar Hoglund Fastballs

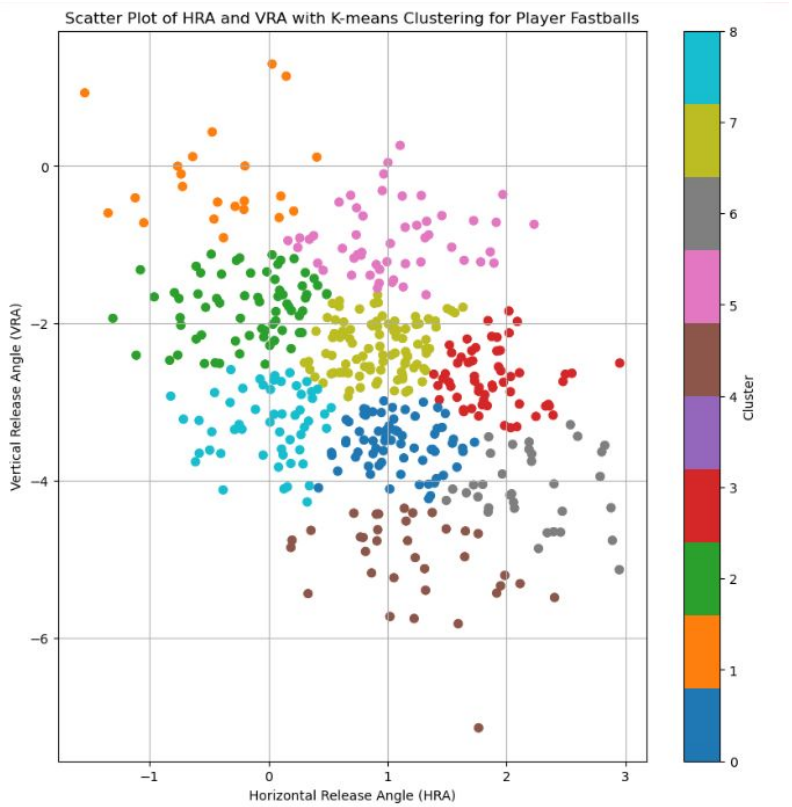
- Medium Kirby Score (.501)
  - Fine HRA most (2 to 6)
  - High VRA (1 to -4)
  - 5 Clusters with some overlap but mostly clean
  - Even pitch dispersion both in and round K zone
  - Some poor high misses, not many low misses
  - Command+ = 50
  - In Zone = 50.5%
  - Strike Rate = 64.8%

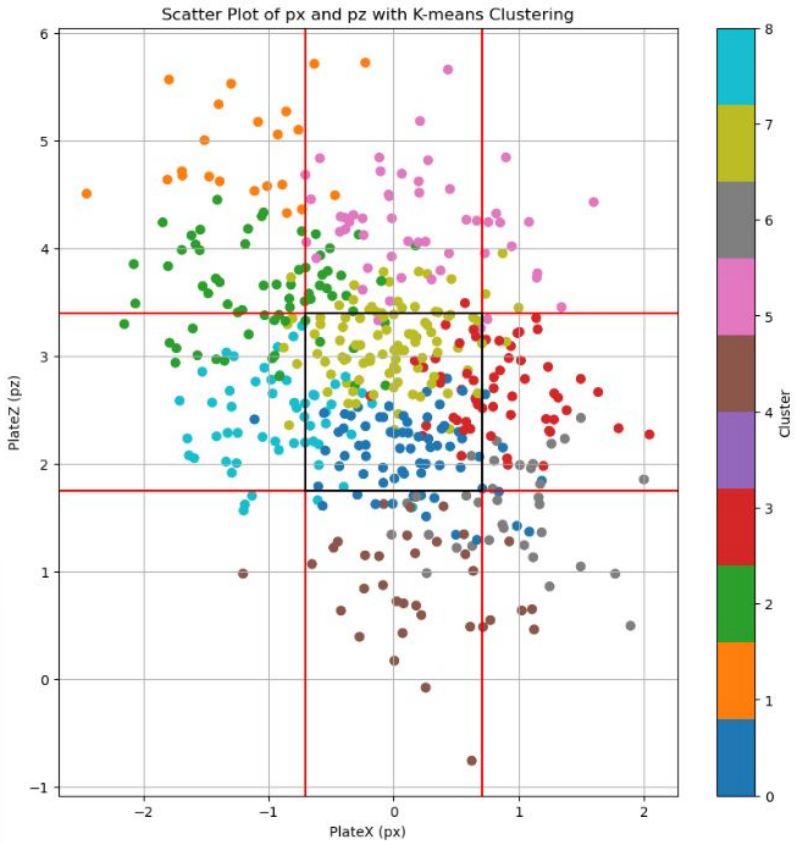


Catcher View of Release Angles and Strike Zone

Joe Boyle Fastballs

- Bad Kirby Score (.296)
  - Fine HRA (most -1 to 3)
  - Bad VRA (most 0 to -6)
  - 9 clusters
  - Clusters are pretty wide
  - Big pitch spray
  - Command+ = 20
  - In Zone = 36.1%
  - Strike Rate = 49.7%





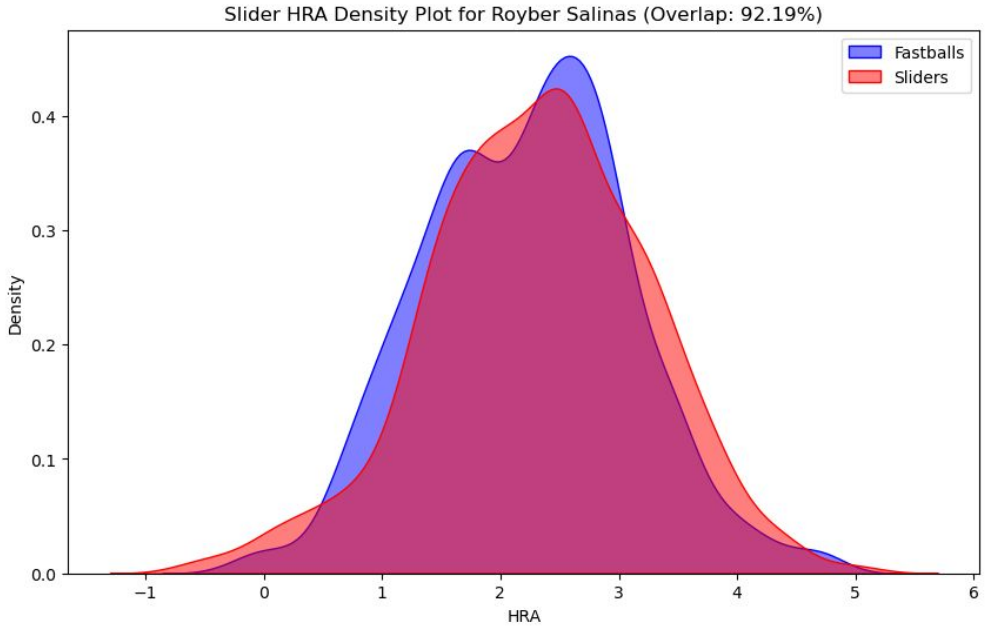
Catcher View of Release Angles and Strike Zone

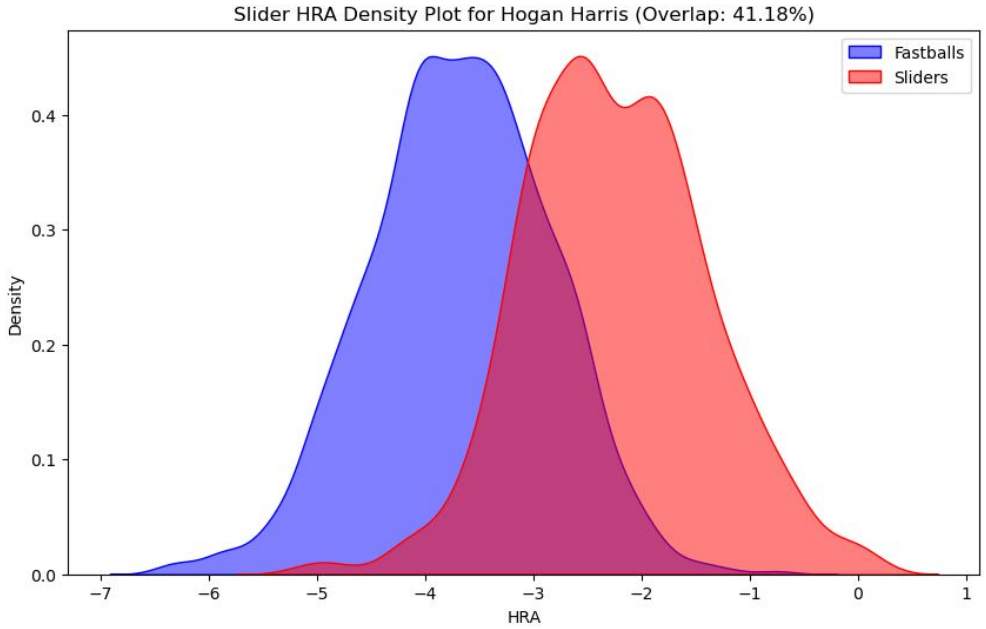
Takeaways

- Kirby Scores correlated with other command grades
- Best Kirby Scores throw to the top of the zone
- Tightness of clusters is more important than the number of clusters
- Outlier pitches can impact Kirby Scores more than other command grading systems

Release Angles and Tunneling

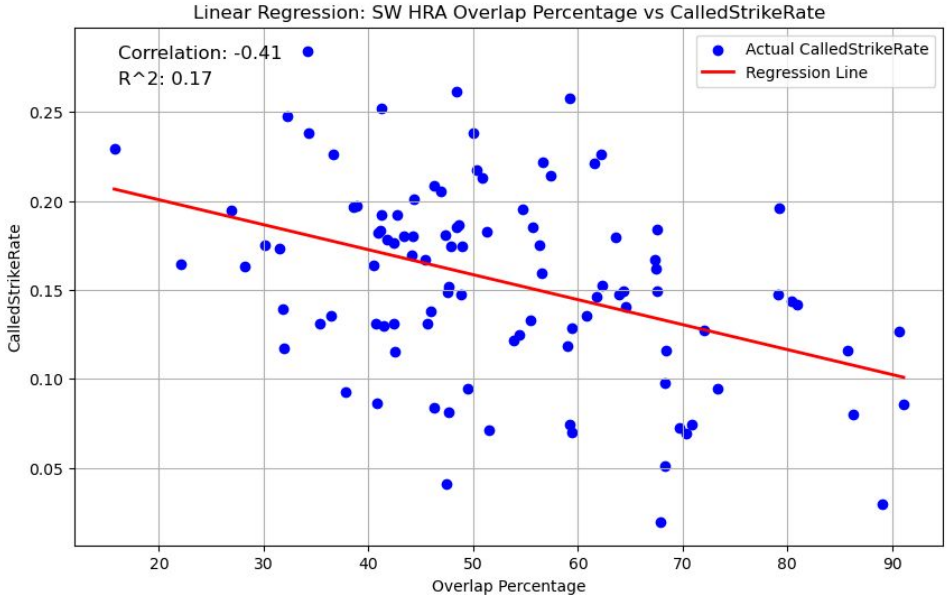
- Starting pitches in the same “lane”
- Density Plots
- Overlap in HRA between FB/SL, FB/Sink, FB/Cut, etc.
- Overlap in VRA between FB/CB, FB/CH, FB/Split

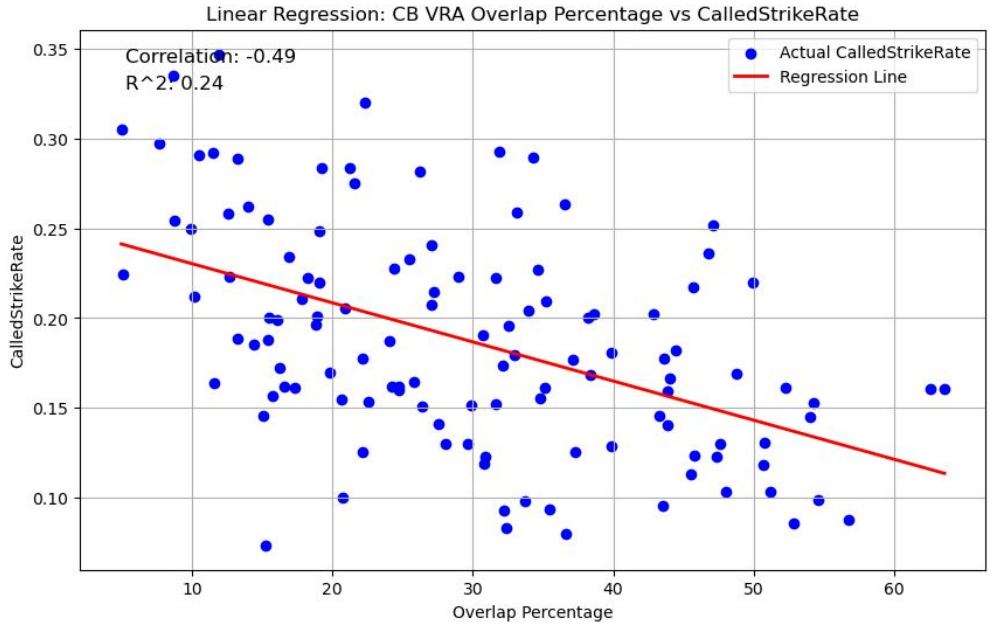




Stealing Called Strikes

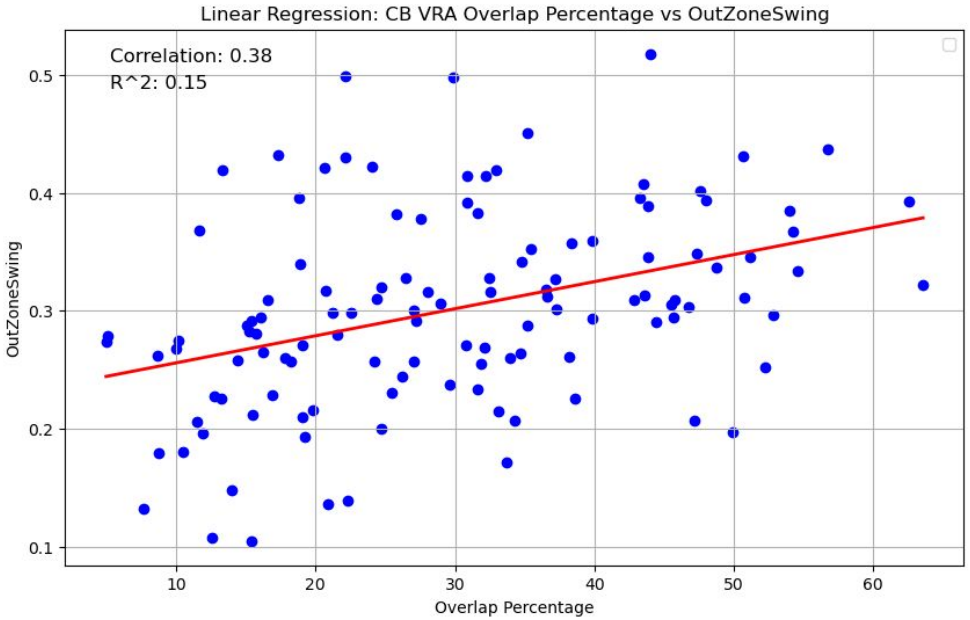
- Higher Called Strikes for pitchers with less release angle overlap
- Hitters give up on pitches that look like FBs out of the zone
  - Backdoor Sweepers
  - Top of Zone 12-6 Curveballs

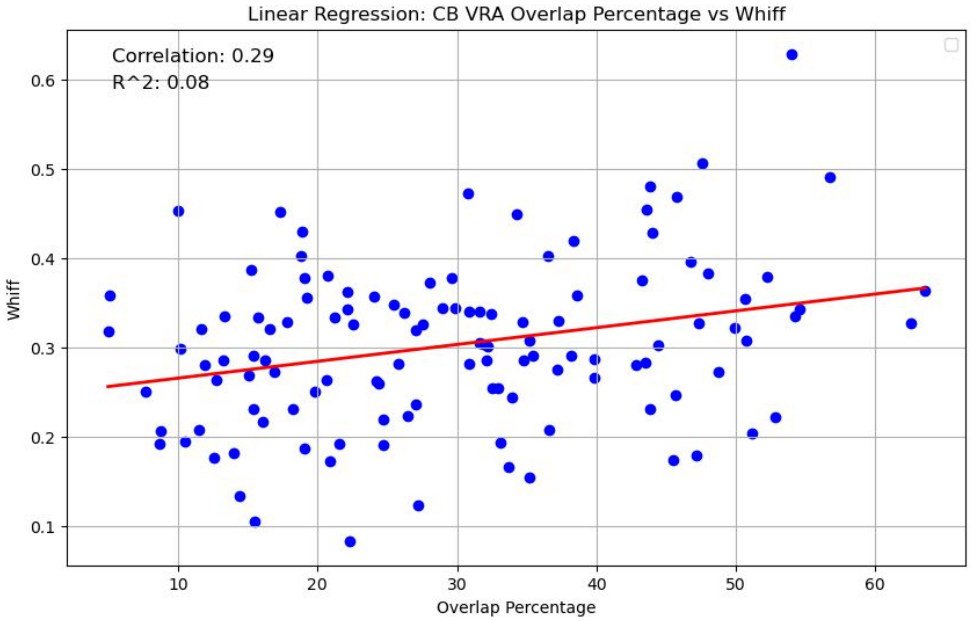




Curveballs and VRA

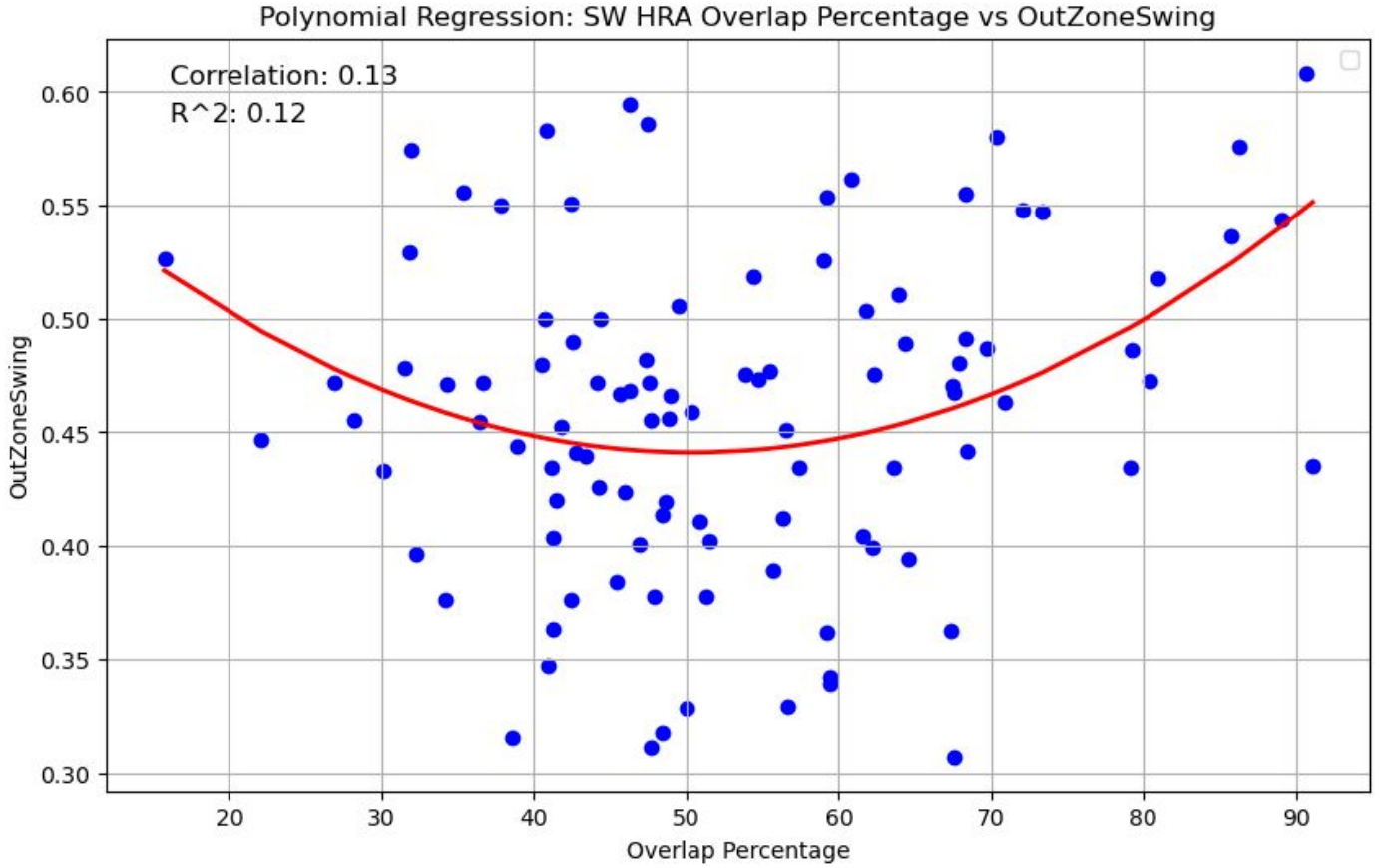
- Good VRA overlap leads to more chases and whiffs
- Blake Snell
  - 4th in overlap, 1st in Whiff and Chase
- Jared Jones
  - 8th lowest in overlap, 1st in Called Strike, 4th lowest in Swing Rate





Sweepers and HRA

- Polynomial Regression
- Don’t want to be in the middle
- Tyler Ferguson
  - 55% Overlap
  - 13% Called Strike
  - 28% Chase
  - 50 Grade Stuff+



Pitching Next Steps

- Angles aren’t everything, Stuff still matters
- Moving guys on the rubber to better match angles
- Larger Scale Targeting System

Minor League Hitting Models

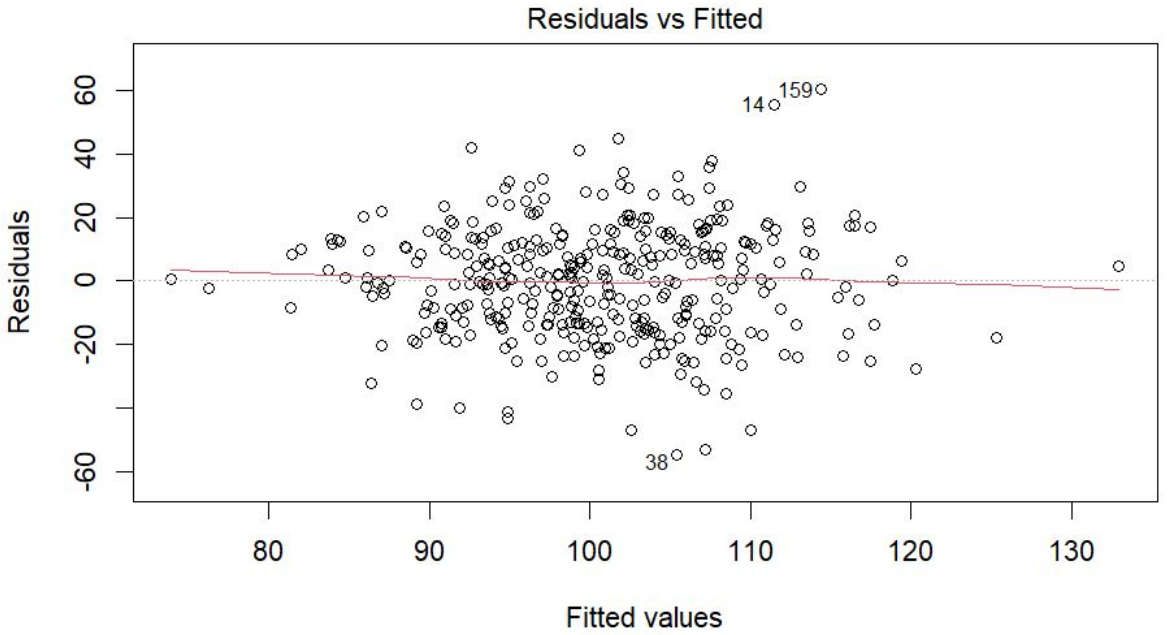
- Multiple Linear Regression Models in R
- Predicting wRC+
- Triple-A to the majors (min. 300 MLB PA)
- Across multiple levels for age 25 MLB Season
- Data pulled from MLB Stats Database
  - Seasons from 2015-2024
- Major challenge is balancing R-Squared and number of significant predictors and interaction terms
  - Stepwise Variable Selection Algorithms

Triple-A to MLB

- Taking average stats for each level for individual player's career
- Sample Size: 369 Players
- Significant Predictors
  - Age Grade, wRC+, ISO, BABIP, EV95, Hard Hit LA
  - K%, BB%, Whiff% and Chase% are not significant
- R-Squared: .182
- With 2nd and 3rd order Interaction terms, R-Squared jumps to .30 and .57
- SDAA1000 then becomes a significant predictor

Triple-A to MLB Results

- Due to high Multicollinearity, limiting higher order variables
- Average Diff is 3.3%
- Overperforming Outliers
  - Y Alvarez, Judge, Fry
- Underperforming Outliers
  - Brinson, Hedges, Fortes
- Best Predictions
  - Pinder, Bleday, Carlson



Full Level Progression

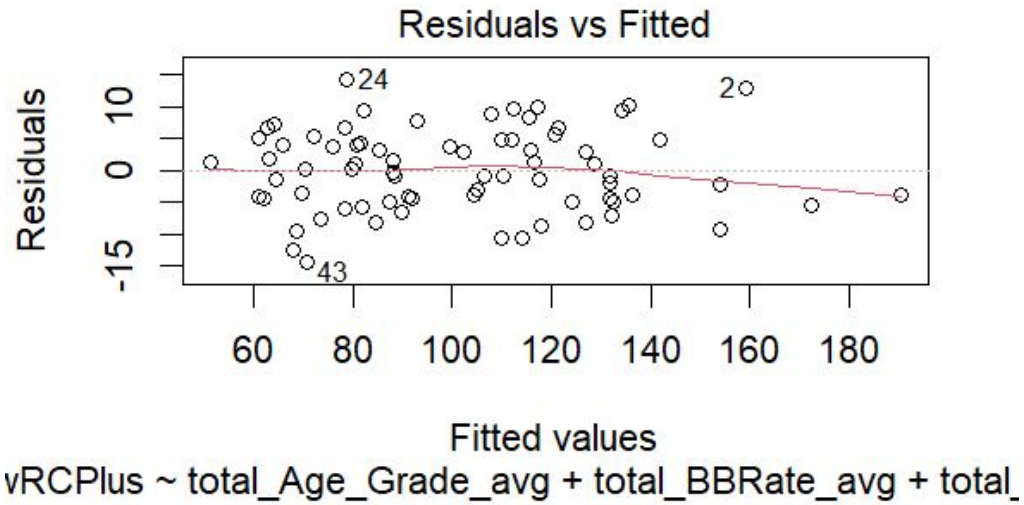
- Taking average stats across each level for individual player's career
- Age-Grade is main factor showing progression from level to level
- League Level tested as factor but Age-Grade was more significant
- Sample Size of 80 players, each level, 100 MLB PA
- Predicting Age-25 wRC+

Full Level Model Results

- Same stepwise linear regression process and variables
- Significant Predictors
  - Age-Grade, AVG, wAVG, wRC+, EV95, Hard Hit LA, SDAA 1000, Chase%
- Not Significant
  - ISO, BABIP, Whiff%
- No higher order, R-Squared: .374
- With 2nd order interaction terms, R-Squared: .955
- BB%, K%, wRC+ become significant

Full Level Model Results

- No Higher Order, Avg Diff is 6.4%
- Full interaction Term Model, Avg Diff is 0.6%
- Overperforming Outliers
  - Derek Hill, Blaze Alexander, Bo Bichette
- Underperforming Outliers
  - Jose Miranda, Christian Pache, Tyler Nevin
- Best Predictions
  - Brett Wisely, J Meyers, T Freeman



Butler Future Projection and Wrap-Up

- Projected Age 25 wRC+: 121
- Currently in Age 23 season with with wRC+ of 110
- Difficulty will always be balancing the right number of variables
- Age Grade and Batted Ball Profile is biggest factor
- Swing Decisions are critical in conjunction with measurable production