Crossing the Bridge Between a Reliever and a Starter

During the 2018 season, the Tampa Bay Rays began to experiment with an opener: a reliever who would start the first inning then handed the ball off for the scheduled starter to take over. In 2020, the same Rays team drew national backlash when they pulled Blake Snell after only 73 pitches. The lines between a starter and a reliever were somewhat blurred. A starter still takes a chunk of the game and relievers tend to go inning by inning. The blurred line lies in starters who tend to waver around five innings and long relievers that can give you up to three in a blowout. What factors differentiate between the two roles and what features does a pitcher need to cross the bridge between them?

Our first step in answering this question was to clean up our data. Throughout the course of a 162-game season a plethora of unexpected events can occur. Injuries can lead to call-ups and short stints in the major leagues. As a result, our data contained a lot of rows with pitchers who barely pitched. And due to how prevalent this was, using the conventional 3 standard deviations did little to filter outliers. Instead we looked into retaining as much of the game as possible while filtering out the pitchers who hardly pitched. As it turns out, the innings distribution is heavily top-loaded and we were able to keep 90% of the events that occurred by taking the top half of pitchers who pitched the most. This also addressed insanely skewed rate statistics like ERA's from a bad stint in the majors.
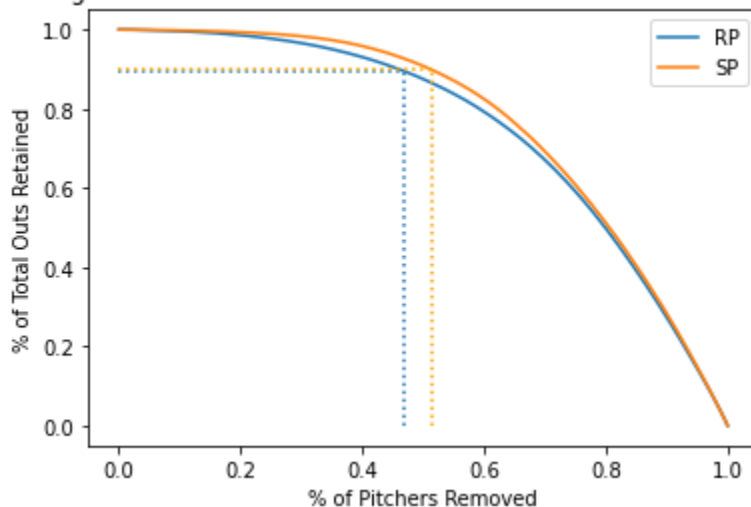

After cleaning the data, we looked to isolate characteristics that made pitchers successful at their respective role. The FanGraphs data provided a lot of features but we mainly focused on rate statistics as pitch stuff didn't apply equally to every pitcher because of pitch repertoire variance. For each rate statistic we ran linear regression with it and the pitcher's ERA, separated by role. With each rate we observed a difference in how the rate affected ERA for both groups. Because these differences can be a result of random sampling, we ran a permutation test for each pairing. The hypothesis test went as follows:

1. Shuffle role labels without replacement
2. Run linear regression with the statistic and ERA separated by role
3. Record the difference in the coefficients for our null distribution
4. Repeat the process until we get 10,000 samples
5. Return a p-value by comparing the null distribution and our observed difference

To limit our False Discovery Proportion we ran a Benjamini-Hochberg Analysis on the p values. After the analysis, we reject the null hypothesis if the p values were less than or equal to 0.02.
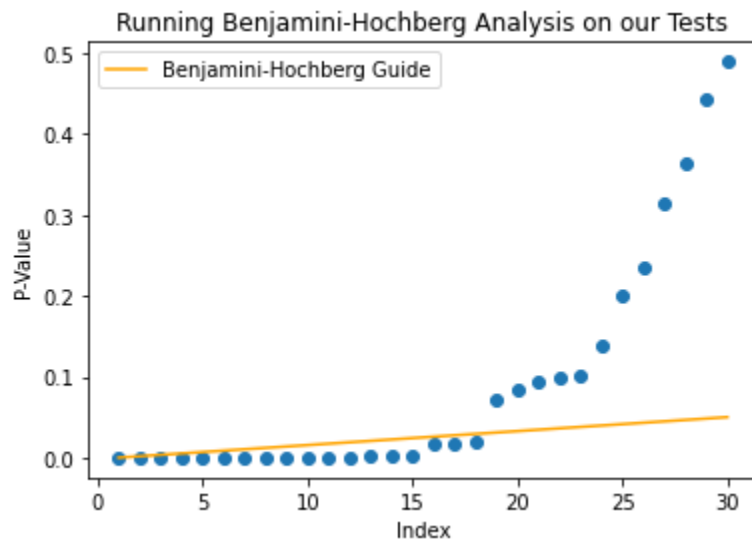
At the conclusion of our tests, we reject the null hypothesis for 18 rate statistics. Amongst them were Strikeout%, Barrel% and Contact%. The general theme from the results were that strikeouts and limiting contact were far more salient for a starter than a reliever. Perhaps a limited outing allows relievers to get away with allowing more contact whereas starters will eventually find their contact converting to damage over the course of a larger sample. Another theory is that seeing the same pitcher multiple times results in the contact allowed to be of a higher quality whereas contact against a new pitcher might be more comprised of uncomfortable swings to avoid a strikeout on a good breaking ball.

Another factor to consider is the pitcher's endurance. To measure this, we calculate the range in fastball velocity throughout the game. Intuitively, starter's tend to see a larger range than relievers. This can help us identify starters who aren't handling the long distance as well as it seems.

Starters Experience Higher Drops in Fastball Velocity Than Relievers
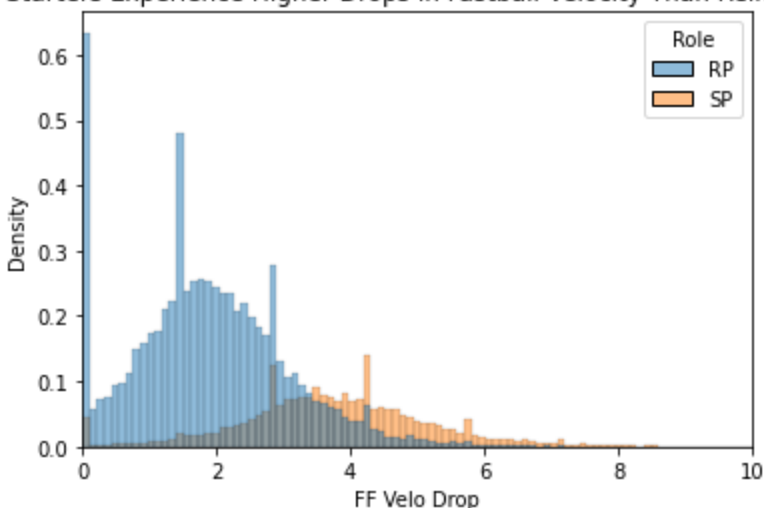
Lastly, relievers tend to display a smaller repertoire than starters. Going back to how pre-game preparation and in-game adjustments can be made against starters, they're better off having an expansive repertoire to keep batters guessing. Conversely, relievers don't allow much time for adjustments so they don't need as much mystery in their pitch selection.

Relievers Tend to Have Smaller Repertoires Than Starters
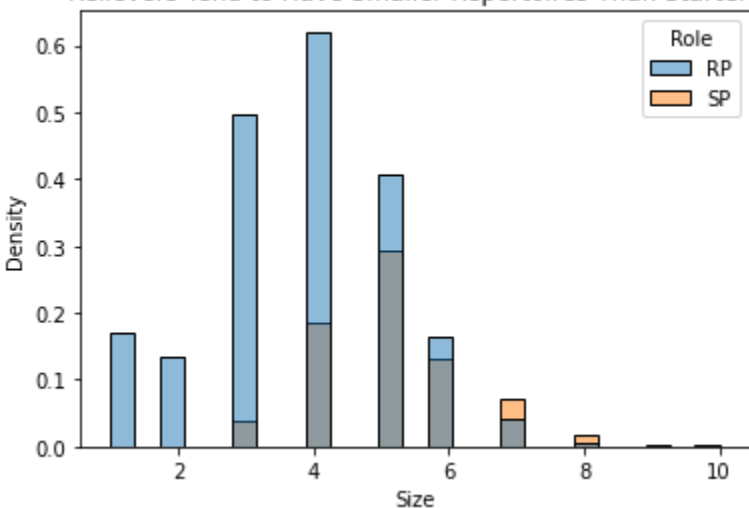
Patrick Corbin

Patrick Corbin's fall-off from 2019 is one that puzzles fans and front offices around the league. His underlying numbers indicated overperformance and projected regression but not anywhere near the amount he actually saw in the years following. His underlying numbers this season weren't great either. While his velocity doesn't drop as much as other starters, he rarely gets strikeouts and allows a good amount of contact. If he's kept on a roster, your best hope is to utilize him as a reliever to limit the damage of his allowed contact and strikeout droughts. The idea is that using him in the middle of the game prevents prior preparation and in-game adjustments. In 2023, Corbin posted a 7.65 K/9 facing the lineup the first time through the order

which was his highest split though his wOBA and ERA were best second time through. In addition to being a low-strikeout, high-contact pitcher, Corbin exhibits a six-pitch repertoire but three of those pitches account for 93.31% of his pitches in the data provided. Making the switch to reliever would allow him to completely ditch the other three pitches and focus on making quality pitches instead of mixing up lower quality pitches.

Patrick Corbin's Low Strikeout Rate Contributes to His Poor Performances as a Starter
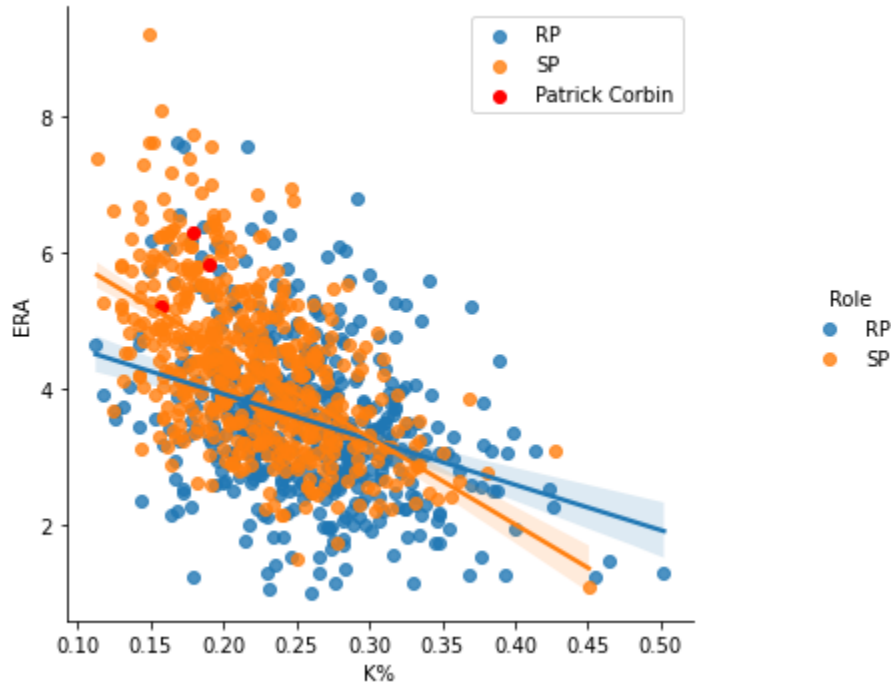
Jose Urquidy

Jose Urquidy is in a similar boat as Corbin. His strikeouts are hard to come by despite being one of baseball's best at throwing strikes. His contact percentage is off the charts but his ERA isn't as extreme as Corbin's is. Unlike Corbin, Urquidy experiences a significant drop in his fastball velocity during his games, averaging a 4.22 miles per hour decrease. Urquidy also throws his

fastball over 50% of the time which might bode better as a reliever.

Jose Urquidy Exhibits a High Contact Rate