



Pitcher Role Reversal Analysis

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Introduction

In recent years, Major League Baseball has witnessed a paradigm shift in pitching roles, transitioning from traditional starter-reliever distinctions to a more nuanced, strategic deployment of pitchers. This change emphasizes the importance of a fresh bullpen over extended starts. As a result, many pitchers have transitioned from starting to relief roles, a move that's not a demotion but an opportunity for reinvention and success. This evolution reflects a data-driven approach in the MLB, valuing flexibility, strategic matchups, and mental resilience. Our analysis seeks to explore these changes, identify the key characteristics of successful pitchers in this new era, and recommend role adjustments to optimize team performance and player careers.

An effective starting pitcher maintains a high level of performance consistently over approximately 100 pitches. Conversely, a proficient relief pitcher excels in the initial 20-30 pitches but may lack the sustained consistency required for a starting pitcher role.

Exploratory Data Analysis (EDA)

In our EDA, we classified pitchers into nuanced roles like Closer, Long Reliever, and Swingman, leveraging a robust set of metrics and predefined thresholds. We meticulously visualized and examined distributions of critical metrics (IP, ERA, WHIP) for Starting Pitchers, affirming or challenging their normality through the Shapiro-Wilk Test. The median, chosen for its robustness to outliers, served as our benchmark in defining success and identifying disparities in performance. This approach, complemented by additional pitch data (types, velocity, spin rate), allowed a multifaceted evaluation of pitcher effectiveness, paving the way for insightful comparisons and strategic enhancements in pitcher utilization.

Visualizations

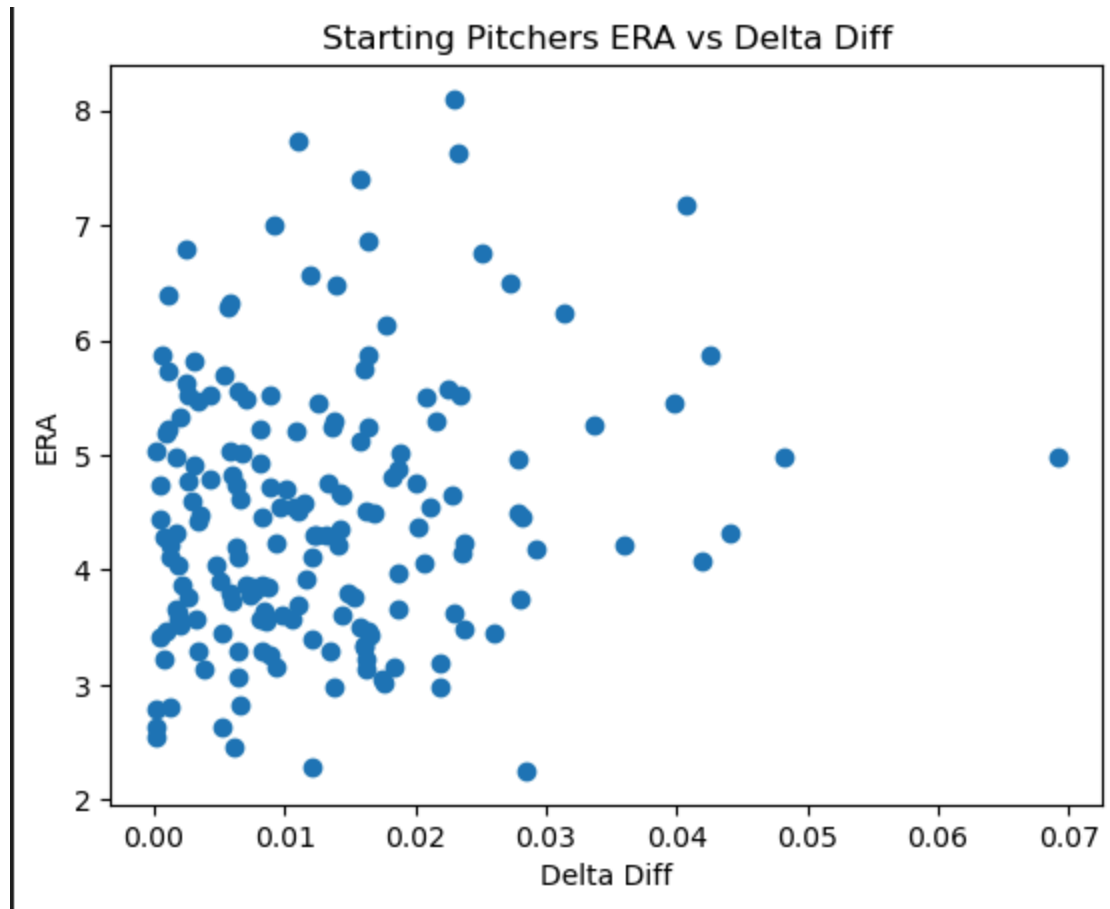


Figure 1

Note: Delta Diff is the difference in average delta run expectancy of the first and second half of all pitches

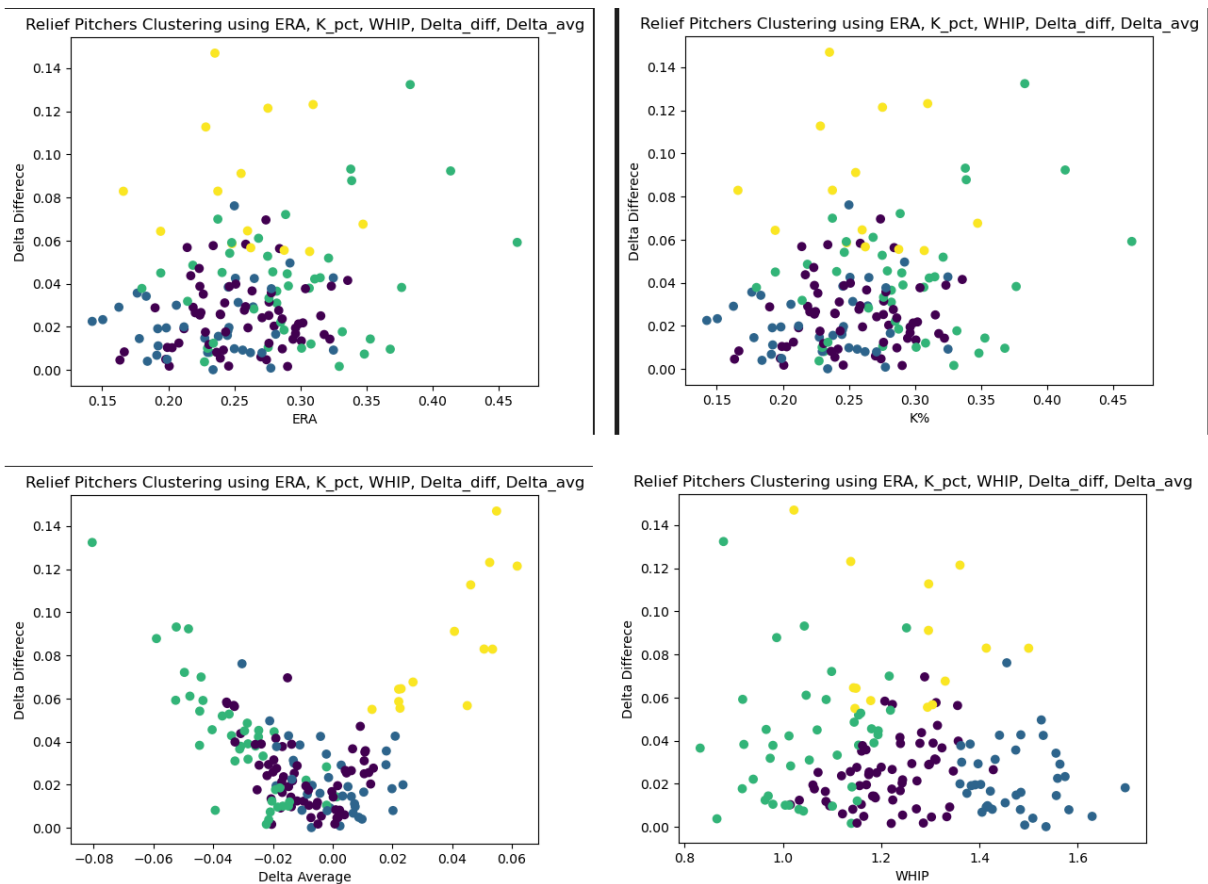


Figure 2

Note: Delta Diff/Delta Difference is the difference in average delta run expectancy of the first and second half of all pitches.

Analytical Process and Model Building

Statistics for assessing the quality of a baseball pitcher have held significant value throughout history. However, we realized during EDA that when ERA, WHIP, and K are calculated as seasonal averages, they may overlook an important metric: consistency. This formed the focal point of our analysis.

We aimed to observe how the change in run expectancy before and after a pitch changed from the early to later phases of the game. Visualizing consistency metrics vs overall performance metrics gave us a vision of outliers who would benefit from a role switch. For example, a starting pitcher with extremely poor performance in the latter half of their pitches will likely be a better relief pitcher.

To adopt a modeling approach for identifying candidates for role reversal, we turned to a clustering algorithm. Our intuition suggested that grouping certain players would help identify their similarities. Outliers were classified as players not currently serving as starting pitchers but were present in the cluster mostly composed of 'good' starting pitchers. This means that outliers, with their seasonal statistics paired alongside in-game consistency, are competing with pitchers at the top of their game. Therefore, outliers could serve as effective starting pitchers, contributing to more wins for their respective baseball teams.

Identification and Analysis of Role Switch Candidates

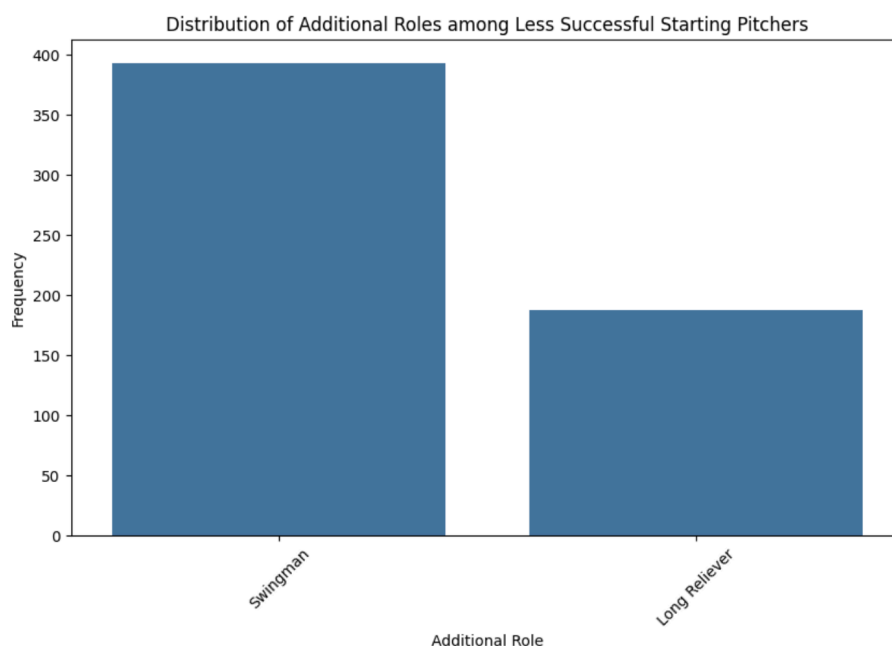
Tony Gonsolin, a starting pitcher for the Los Angeles Dodgers, presents an intriguing case for a role transition within the team. Despite boasting average season metrics, including ERA and WHIP, when compared to his peers, Gonsolin stands out as an outlier due to significant pitching inconsistency throughout different phases of the game. In the 2023 season, Gonsolin's Delta diff absolute value, a measure of the difference in performance between early and later pitches, is calculated at 0.069117, the highest of any pitcher we recorded. Tony Gonsolin is a clear outlier in [Figure 1](#).

This indicates a rapid fluctuation in his effectiveness during the course of a game. As consistency is a crucial metric for starting pitchers, Gonsolin's performance volatility becomes a focal point. Gonsolin's above-average season metrics could be maximized by adapting to a relief pitching role. The proposal is grounded in the belief that a shift to the bullpen, with fewer pitches per appearance, could mitigate Gonsolin's performance fluctuations. Furthermore, Gonsolin's injury track record [\[11\]](#) serves as additional evidence supporting the notion that a transition to relief pitching could enhance his overall durability and effectiveness. By tailoring his training regimen and limiting his pitch count, Gonsolin has the potential to evolve into a reliable and impactful relief pitcher for the Dodgers.

Jhoan Duran, currently serving as a closing pitcher for the Twins, presents a compelling case for a strategic transition back to the starting pitcher role in the foreseeable future. The rationale behind this proposed shift is rooted in two key elements: Power and Consistency. The decision to deploy Duran as a reliever by the Twins organization appears to be driven, in part, by a perceived need for injury prevention. While this precautionary measure is understandable, it raises questions about the possibility of using prehab to condition Duran for the demands of starting and throwing multiple innings. An in-depth analysis of Duran's performance, considering metrics such as seasonal ERA, K%, WHIP, Delta_avg, and Delta_diff,

reveals a noteworthy clustering with accomplished starting pitchers like Blake Snell and Gerrit Cole [\[3\]](#). This places Duran in esteemed company, demonstrating his potential to excel in a starting role. While the clustering group includes other impressive relief pitchers, Duran's in-game consistency emerges as a standout quality, rivaling even the best starting pitchers in the league. One cannot overlook Duran's ability to consistently deliver fastballs exceeding 100+ mph. This exceptional talent, coupled with his demonstrated in-game consistency, positions him as a valuable asset that demands consideration for a starting role in the near future.

Cole Ragans, of the Kansas City Royals. We recommend a transition to a relief pitcher role for Ragans, as he was first identified within a cluster of pitchers who, based on a model trained with metrics such as ERA, K%, WHIP, delta_avg, and delta_diff, shared similarities with successful relief pitchers. Our analysis also placed him among less successful starting pitchers, indicating that while his starting performance may need improvement, his skill set could be better utilized in relief. This is further supported by the fact that Ragans is categorized as a "swingman" by our labeling criteria, a role often occupied by pitchers who can alternate between starting and relief but may not excel as starters. His experience in both starting and relief positions, and his demonstrated resilience and adaptability through injuries suggest that a transition back to a relief pitcher could be a beneficial move for Ragans.



Next Steps

To enhance the robustness and strength of our recommendations, we will use metrics such as precision, recall, and F1 scores for our models to provide a quantitative measure of our model's performance.

We will also integrate additional datasets to develop a model that predicts the performance of relief pitchers based on the innings pitched by starting pitchers. This will help determine if these relief pitchers could potentially transition into starting roles.

While we did mention injuries briefly for Tony Gonsolin, we could create a more systemic approach for handling injury history and role changes. For example, starting pitchers who tend to get injured in certain areas more often should transition to relief roles. We could expand on this through more biological data of a pitcher's health and see how the pitcher's physical health affects their pitching over time.

Lastly, consulting with experts in baseball analytics and coaching, such as the Reds staff, could provide us with valuable insights into our approach and areas in which we can improve our model.

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