BULLPENNING

by

DEREK BLAIR

Table of Contents

Why It's Not Accepted

Within the game of baseball, there is always a large resistance to change. Many see from a traditional viewpoint and refuse to accept change. Over the history of the game, this has happened in many different situations. A more recent example is the implication of the wild-card game. The single-elimination playoff game was introduced to the game in 2012. At first, this creation was questioned as commissioner Bud Selig was trying to incorporate more excitement into postseason baseball. Fans and analysts primarily resisted the change because it put two teams season's at stake in only a single game. Each team had competed for a long six month season playing one-hundred sixty-two games, just for their season to be dictated by one game. You can see how this was unfair. However, it does give another team entry into the playoffs unlike before. Now instead of the playoffs consisting of four teams per league and eight per total, there is now five teams per league and ten in total. The resistance of the wild card game has passed by many now, and in current times it is cherished and anticipated.

Major League Baseball teams will reject change, even if it provides a competitive advantage. It was seen back in 2002 when Billy Beane changed how he constructed his roster of players for the Oakland Athletics. In that past offseason, Beane had lost three-star players who were Jason Giambi, Johnny Damon, and Jason Isringhausen. The Oakland Athletics were a small market team who had a payroll of only approximately forty million dollars. In comparison to other major league franchises, it was the third lowest in all of baseball. With a low payroll, Beane and the organization

were unable to resign their star players who wanted a large sum of money that the Athletic's couldn't afford. Being stuck in this unfortunate situation lead to Beane looking for different ways to win and for anything that could give him a competitive advantage. Beane formed a concept to attempt to buy runs and not wins. He was able to recognize that on-base percentage had a close correlation to runs scored. So, he was able to use this competitive advantage to sign free agents and draft players that were often overlooked because of an invalid flaw. Usually, the other teams would see the players as too fat, short, or skinny amongst other characteristics. Examples of players that Beane signed who possessed a flaw included Scott Hatteberg, Jeremy Giambi, and Chad Bradford. Scott Hatteberg was a former catcher that suffered from arm problems, so the A's converted him to become a first baseman. Hatteberg served useful for the team because he recorded a high on-base percentage, and as it shows getting on base leads to runs. Jeremy Giambi was in a similar scenario as he was able to get on base often as well. Jeremy was overlooked due to his reputation for being someone who partied often and for being seen in strip clubs. Finally, Chad Bradford posted sufficient numbers throughout his career but was thrown to the side because of his low velocity and awkward throwing motion. Bradford threw the ball from an extremely low arm slot which was only a few inches above the ground. This method was referred to as submarine pitching. During this time, organizations either looked at the wrong numbers or ignored them in Bradford's case. They only relied upon the ideology of what a ballplayer should look like and what his basic stats say about him. Basic stats include ones like batting average, home runs, and runs batted in. Home runs can be a proper

evaluation of how good a player is, but it is still vital to consider OPS, WAR, and defensive metrics. They all provide a much better assessment for the ability of a ballplayer. However, that is not what this book is about so let's move on.

Billy Beane then used his competitive advantage to lead his team to a one-hundred three-win season. Also during the season, the team he was able to put together with one of the lowest payrolls in all of baseball broke the American League record for consecutive wins by recording a twenty game win streak. However, unfortunately the A's were eliminated in the first round of the playoffs that year. The critical part of this example is that Beane accepted change and used his competitive advantage to change the game of baseball. Now his methods are used all over Major League Baseball. The Red Sox broke their curse by using his methodology in 2004 and winning the World Series for the first time in eighty-six years. So, when one team can go away from a groupthink concept and accepts a change for a competitive advantage, they end up succeeding above other franchises. This is why it is only a short time until the idea of bullpenning is accepted and used as a competitive advantage. For many of you readers, you do not know yet what bullpenning is, but its concept will soon be explained. Fans and analysts will resist the change that is forthcoming with the implication of bullpenning, but the eventual success can create a widespread effect on Major League Baseball.

When reflecting on the resistance of change in Major League Baseball, the creation of the designated hitter is also one that comes to mind. When teams were first pushing for the use of the designated hitter, they were initially able to recognize the

success that it would bring to their team. It would provide the ability to remove their pitcher from taking at-bats, which would usually result in outs, and provide them the opportunity to use a better hitter and bolster their lineup. Despite its sole use in the American league since 1973, some fans still oppose the use of it. The rule was initially suggested in 1906 but was rejected by both leagues to be implemented. In the early 1970's the Oakland Athletics manager Charlie Finley continued to push for the implication for the idea of the use of a designated hitter. Finally, on January 11, 1973 both leagues conducted a meeting and the matter was voted upon. Only the American League was in favor of the change, and so they implemented it into their league. So now, the two leagues were playing under separate rules. This movement is readily observable that it was not widely accepted as only half of the league approved the idea of it. People that were against the idea of using a full-time hitter to replace the pitcher's at-bat defended their concept because they believed that it would take away from the games integrity and wasn't true to its values. Many of baseball's historic players would have had their career cut short if it wasn't for the use of a designated hitter. Players like David Ortiz, Edgar Martinez, and Frank Thomas may have had their careers cut short when they lost their ability to no longer play the field. The group of individuals who initially wanted to implement the use of a designated hitter were most likely looking to gain a competitive advantage. With this implication it allows the pitcher to solely focus on pitching and can allow for a better hitter to take his place. It would also allow teams to use a player that wasn't a useful fielder to still have an impact on the team with their offensive capabilities. The designated hitter also permitted organizations to improve

their offense by replacing their weakest hitter in most scenarios and to implement a better one. It is clear how much of a competitive advantage the use of a designated hitter can be.

It can be astonishing that major league baseball was willing to resist change so much that they would allow the leagues to play under two separate rules. Imagine this happening in any other sports league today where two leagues played under different rules. However, it is difficult to make the comparison but image in the game of football if only one of the conferences kicked field goals. While the other only played solely based upon touchdowns. Maybe even imagine if in basketball only one conference played with the three-point line. These rules changes would forever change the game that they are a part of, and face an extreme amount of resistance. Now I acknowledge that these ideas will never happen and are only suggested for comparison to the rule of the designated hitter. It is important to remember that when a change to the rules is created, that its purpose is indeed to benefit the game and to usually increase its popularity. However, that is not often how it is seen especially through the game of baseball. Another change is soon coming for the game of baseball, and it too will face resistance. Bullpenning is the concept of not using a starting pitcher for as many innings as he can effectively deliver, but to use a pitcher for only two or three innings before making a change. A team would always be moving to a fresh arm so that the current pitcher in the game has a new arm which creates more velocity and more movement on his pitches. To support my conclusion, I will reference several data examples a little later on in the book.

In 2013, the Pittsburgh Pirates bought into a competitive advantage, and for them, it paid off. The Pirates ended twenty consecutive losing seasons that year and managed to make the playoffs. The competitive advantage that the Pirates participated in was shifting their infielders against opposing hitters. They made decisions on where to place their fielders based upon hitters tendencies. Shifting was a strategy that a few amount of teams would regularly use, and the Pirates significantly increased the number of times they shifted that season. The Pirates were able to look past the tradition of how defense had been played in baseball for all of its existence. So, the 2013 Pirates serve as a great example of when a team looks past tradition and buys into a competitive advantage, how one can succeed.

Bullpenning is rejected because it is seen as such a radical change to the game that people won't even acknowledge it. The psychology of why this change is not commonly accepted amongst human beings is an exciting idea or theory to observe. If the elaborate concept of bullpenning is indeed accepted, it means that everyone in baseball has been playing the game wrong in its modern history. So as a rational human being, people do not like to be proven wrong or to acknowledge that they have been wrong. So, they deny the numbers and remain closed minded to this concept. I am sure that some people are rejecting Bullpenning for this reason and they do not even realize it. They are subconsciously ignoring all of the reasons for why it works just because what they have believed in for so long. The way they know the game was forced upon them due to how the majority of them have been taught or for some, what they have experienced playing the game. For those select few, they can't even imagine

the game being played anyway else than they already know. This ideology of thinking can also be related to how some managers operate and interact with their players. In baseball, managers used to be hired based upon the performance levels of their careers. Organizations believed that players who excelled at the game had a better understanding of how the game was played. So by default, that those players would excel at being managers. Eventually, organizations also began to believe that catchers would make good managers because of their past experiences. Catchers are usually regarded as the leaders on the field and are expected to have a deeper understanding of what is going on during every pitch. They have the best viewpoint in the field, so then they are required to direct their teammates what to do in some situations. An example would be a ball hit to the outfield that is in the gap. The catcher can see everything in front of him, so he is to direct for what base the ball is to be thrown to. Catchers are also in charge of calling pitches based upon what he believes is the best pitch and location to get the batter out. With all of these tasks assigned to the catcher, they are expected to have a more thorough understanding of the game which by default means that they are believed to be good managers. However, these ideas are flawed in the sense that there is no real proof behind this thinking and that has unfortunately impacted the game in many different aspects of it ever since its beginning.

This was still the same mentality for people who saw change coming before in baseball. Examples include the designated hitter, original use of a reliever, and even the concept of first using numbers and analytics to measure a baseball player's performance. Let me relate this thinking again to an idea that is seen throughout society

in the past couple of years, the increased use of technology and social media. The younger demographic is much more prone to use technology and rely on it than the older demographic. The older demographic usually sees it as something that isn't an essential part of their life. They do not find it to be impactful because they have already lived the majority of their life without it. That generation of people will usually not adapt to the ever-changing society because they think that the way they live their life is best and that it doesn't need to be changed. The younger demographic finds technology to be more useful and take advantage of it to benefit themselves. This is because it has surrounded them for most, if not all, of their lives and becomes embedded in their lifestyle. The younger generation is more open to change because they don't yet have a lifestyle that they continuously stick to or believe in. This is a way of thinking that closely resembles baseball and how people involved with the game come about change. The older generations that are currently involved in baseball either haven't been adequately exposed to statistical finding or they reject the conclusions because it doesn't align with their beliefs. The younger generations that are involved in baseball have had more exposure to this new revelation and are more prone to accept it because this thinking is exposed to them when the game is newer to them. The reason for the difference in exposure is because the increased use of analytics is further within the game and people are more drawn to how the game was played during their playing career. Whether it was merely little league or all the way up through high school and college. I adopted this specific ideology from Daniel Levit who is an author of several books on baseball. I was able to witness a presentation by him at a SABR convention in

Pittsburgh. He had shown that people who play the game are much more likely to become a fan of the game. So, I took this reason and changed it to a similar concept that people are also drawn to how the game is played during the term of their playing experience. This is what seems to be a common factor for the variation in the use of analytics between demographics in the game of baseball.

Everyone that is involved in the game whether it's a fan, analyst, player, or front office executive, they all need to become more open to change and the evolvement of the game of baseball. This mentality that currently surrounds the game of baseball is unhealthy and is why the game isn't progressing. As we see baseball at a fall in the interest if the public, this is a prime reason as to why. It is because some remain closed mined and are unable to see the game be played any other way that they already know. Those people then result in rejecting rule changes that are proposed to improve the game. People with that type of mindset are why the experiment of Bullpenning is rejected and mistreated.

The History of Pitcher Usage In The Game

When the game of baseball was first invented, the role of the starting pitcher was to throw the entire game. In the origins of baseball, it was not hitter vs. pitcher, but it was hitter vs. fielder. Pitchers would place the ball where they thought it was best for the hitter to result in hitting it directed at their players. Their goal wasn't to go for high strikeout numbers. I initially discovered this viewpoint of the history of the game by listening to the great sabermetrician Brian Kenny. Before, I had no idea that was how the game used to be played and how much the game has now changed. The game we see now is filled with battles between pitchers and hitters, with the purpose of the fielders to help out the pitchers if they don't already strike out the batter. Except, that's not the way that the game used to be played. Back in the late 1800's, the hitters tried to hit the baseball where the fielders weren't playing. Which resulted in the origin of the phrase "Hit 'em where they ain't." They weren't trying to hit the ball over the fence like in the game that we see now. Players were more known to be slap hitters and not trying to drive the ball. In the recent history of major league baseball, slap hitters are almost non-existent. Although one does come to mind in the form of Ichiro Suzuki. When watching Ichiro, it almost seemed as if he was lunging at the ball trying to get a running start. This method did work for Ichiro as he had a long and successful career in baseball. Back when the game was different pitchers also weren't trying to throw the ball past the hitters to strike them out, they wanted to throw the ball where the hitter would produce soft contact. The goal for the starting pitcher was to pace himself to pitch

the entire game. To indicate just how much pitchers used to throw, the table below

shows the averaged number of innings for the league leader in innings pitched.

Decade	Average League-Leader Innings Pitched
1893 - 1899	421.5
1900 - 1909	401.1
1910 - 1919	370.1
1920 - 1929	328.9
1930 - 1939	312.9
1940 - 1949	320.7
1950 - 1959	311.8
1960 - 1969	314.4
1970 - 1979	342.3
1980 - 1989	281.7
1990 - 1999	262.8
2000 - 2003	258.4

*Seasons with under 130 games aren't counted. Years include 1918, 1981, and 1994

(Via Baseball Prospectus)

In the table, it can be seen that as time has moved forward, the number of

innings a starting pitcher throws in a season decreases. This is because franchises

began to realize that if they put a new pitcher in the game when their starter was no

longer able to get outs efficiently, then they would gain a competitive advantage. Teams

acknowledged that it would be better to insert a new and fresh arm into the game who

would be able to get outs in the current situation better than the starting pitcher. This

change was effective because pitchers threw for such a significant portion of the ball

game that they threw at a lower velocity then if they might only pitch an inning or two. However, teams never entirely removed the idea of a starting pitcher despite it giving them a clear competitive advantage in modern-day baseball. If you take a look below at the increasing usage of a relief pitcher, the trend does lean towards the idea that someday, bullpenning might happen. Both of the columns show continuous growth when graphed and how the more numbers of relievers in the game result in a decreasing percentage of complete games.

Decade	Average Number Of Relievers In A Game	Percentage of Complete Games Thrown By Starters
1893 - 1899	0.00	83.8%
1900 - 1909	0.00	79.0%
1910 - 1919	0.00	56.8%
1920 - 1929	0.02	49.6%
1930 - 1939	0.03	44.6%
1940 - 1949	0.14	42.6%
1950 - 1959	0.41	33.5%
1960 - 1969	1.18	25.2%
1970 - 1979	1.27	25.3%
1980 - 1989	1.81	15.6%
1990 - 1999	2.71	7.4%
2000 - 2003	3.59	4.4%

Cy Young is remembered to be one of the greatest pitchers in the history of Major League Baseball. So much, that the award every year for the best pitcher in each league is named after him. Fans can be astonished when they remember that the legendary pitcher recorded a total of five-hundred eleven wins in his career. Young also holds the records for the most innings pitched in a career with 7,356 total innings. But

does he truly deserve this honor of being considered one of the greatest pitchers in the history of the game?

Cy Young's career lasted from 1890 until 1911. During this time, starting pitchers would finish approximately eighty-percent of the games that they would start. Imagine if Hall of Fame starters like Randy Johnson or Sandy Koufax would complete eighty-percent of the games that they started, astonishing. Cy Young holds the record for most games started and games finished in a career. He completed a total of 749 of the 815 games he would start. That equals out to be a career 91.9% completion percentage. So, it would be expected for Young during this period to rack up an extraordinarily high number of wins and losses. Speaking of which, Cy Young also holds the record for the most losses in a career with three-hundred sixteen.

This was a time where a pitcher's win-loss record was a more accurate indication of their performance. Now, in today's ballgame when pitchers complete less than five percent of the games they started, a win-loss record is an even worse representation than it used to be. This is genuinely a stat that includes factors a pitcher is unable to control. One is the offensive production that he has to support him. If a starter goes out and gives his team a quality outing, something like seven innings pitched, and two runs were given up. He can still be tagged with the loss or a no-decision if his teammates are unable to get two or more runs. Another factor that pitchers have no impact on is the skill level of his defense. If they cannot make plays that a pitcher needs to win, then he can be dealt the loss. A stat that can be used to evaluate a pitcher's "luck" or skill level of his defense is BABIP (Batting Average On Balls In Play). This stat shows exactly

what it says. The stat does remove home runs and only factors in balls that are put into play and calculating the total opposing hitters batting average. So, if you are looking at ERA and comparing the two pitchers, it is vital to consider BABIP to evaluate the defense behind them. Just imagine that the pitcher could be continuously giving up hard-hit balls, but if the defense continues to make plays, then he is unscarred. Then on the other hand, a pitcher can be producing soft contact but the balls drop in between fielders, or the ball could be hit on the ground but is placed between two fielders. It is simple, in today's game a win-loss record is simply no longer a good representation of a pitcher's performance.

Back to the evaluation of Cy Young and his career. Young had a career FIP (Fielding Independent Pitching) of 2.84, which is quite impressive. FIP factors in all of the variables that a pitcher controls. While at the same time, it eliminates all of the ones that he can't, like defensive ability. It accounts for home runs, walks, hit by pitches, and strikeouts. All of the variables that only a pitcher can control. Well, except the size of the ballpark and climate affecting the flight of the ball. In today's current game the drag of the ball is changing. In the summer of 2018 I attended the annual SABR convention in Pittsburgh. To quickly clarify, SABR is the Society for American Baseball Research. When I participated in this convention, I was able to witness a presentation from Alan Nathan who was a part of a committee that studied if the baseballs used by Major League Baseball were in fact juiced. This has been a common question recently as there had been a considerable rise in home runs around the league. He concluded that the baseballs were not juiced and the reason behind the increased number of home

runs was the drag on the ball through the air. Up to this point, they haven't concluded as

to what has caused the drag, but they have tested several variables. Examples include

the height of the seams, texture of the ball, and even placement of the core in the

baseball. They are still currently conducting tests to figure out the cause of the drag and

hopefully make a conclusion. So, home runs are increasing, but pitchers can still control

them. They are considered to be one of the three true outcomes of an at-bat. Those

outcomes are walks, strikeouts, and home runs. All are included for the calculation of

FIP. True outcomes are increasing in baseball which makes FIP more and more valid to

evaluate a pitcher. In the most current completed season, 2017, the three true

outcomes made up 33.5% of all possible results. This was the highest ever in the

history of Major League Baseball. When calculating FIP, the setup of the formula is

pretty self explanatory to understand as see below:

$$FIP = \frac{(13 \times HR) + (3 \times (BB + HBP)) - (2 \times K)}{IP} + C$$

One component that does require an explanation is the C at the right end of the

equation. It represents a constant that is added to the equation. The purpose of the

constant is to put the calculated number on a scale that is more relatable to ERA. That

way, when evaluating the stat, it is much easier to comprehend and relate to ERA. Each

year the constant changes to vary with league-wide offensive production. The variation

in the constant is also essential so that pitcher's FIP can be compared to previous years

when the league's offensive production could have been much different. Overall, it is one of the best statistics to measure a pitcher's performance.

If you take notice into FIP and the high placement put onto home runs, it can be used to explain why Cy Young had such a low career FIP. This is because during his time very few home runs were hit compared to the game that we see today. Throughout his career, Cy Young never gave up more than ten home runs in a season besides one occasion where he gave up nineteen. Even nineteen is an insufficient number compared to today's game. If we evaluate Max Scherzer, up through his 2017 season, in a full year he has never given up less than eighteen home runs in a season. He has also reached numbers as high as thirty-one. So to evaluate Cy Young by FIP almost isn't the proper evaluation of a player in this period. However, now it is incredibly relevant to evaluate a pitchers performance.

As we reflect upon Cy Young's astonishing career, it is almost as if he played a different game than we do now. He is well deserved to have the award for the best pitcher in each opposing league to be named after him because he was a dominant pitcher during his time. The way the game was played was so different, and there will never be a pitcher anything like him again. As we move further and further away from pitchers like Cy Young, we become closer to the concept of bullpenning and someday, it eventually take over the modern game of baseball.

Why It Works

Today in major league baseball teams usually conduct a five-man rotation with the rare exception of an occasional four or six-man rotation. Starting Pitchers will then go until somewhere around the one hundred pitch count or until they can't efficiently get continuous outs. Now let's take a moment to understand what bullpenning is and how it works. The concept of Bullpenning is the idea of not using a starting pitcher that goes until his pitch count gets too high or is no longer getting outs, but it is the concept of using pitchers that goes for only two or three innings before changing to a fresh arm. Try to attempt to recognize the idea of being able to have a pitcher on the mound giving it his very best and not pacing himself to make it through the entire game. Statistics have proven that hitters begin to gain an advantage the more times in a game that they have seen the same pitcher. For example, observe the table below indicating the lineup's OPS each time that they go through the lineup. For those who are unaware of OPS, it is when the hitters on-base percentage is added to their slugging percentage.

2014 Batters' OPS By Times Facing Opponent

First Time Against The Starter	0.677
Second Time	0.708
Third Time	0.755
First Time Against Reliever	0.682

(Via Ahead of the Curve By Brian Kenny)

To better understand the scale of comprehending what a quality OPS is, the table below via Fangraphs gives us an indication. It is also important to remember that

OPS can exceed one as the on-base percentage is being added to the hitters slugging percentage.

Rating	OPS
Excellent	1.000
Great	0.900
Above Average	0.800
Average	0.710
Below Average	0.670
Poor	0.600
Awful	0.570

Now after evaluating the increase of a hitters OPS as he continues to face the same pitcher it can give a more explicit indication of why the concept of bullpenning can be successful. Starting pitchers pace themselves because they know that when they are given the ball, that their goal is to pitch the entire game. Even though that usually doesn't happen, starting pitchers can still be satisfied and have the feeling of fulfillment if they can provide their team with six or seven quality innings. When relievers enter the game, in most situations, they are not trying to pace themselves because they know that they are only going to go at most an inning or two. Now, there are some exceptions wherein a blowout or in a situation where a team has used up all of their arms, that the reliever will pace himself to try and give the team more innings of work. So, back to when a reliever enters the game in most situations. They are out there to crank up their velocity and throw as hard as they can. If you observe the leaderboard from the 2017 season for the highest average pitch velocity, nine out of the top ten are relievers. The

only starting pitcher in the top ten is Noah Syndergaard. Now let's observe the correlation between velocity and strikeouts. The diagram below charts the average fastball velocity and then the pitchers K/9 to the pitcher's velocity. In the bottom right-hand corner you can see the line R2 = 0.2299, which is a number that expresses the relation between the x-axis and the y-axis. The amount that is given when calculating R2 will be between 0 and 1, and as the number becomes closer to one then the closer the two variables are correlated. When observing the diagram below it can be seen that the correlation between the two numbers isn't directly related. However, it still provides a reasonable sense of association that needs to be accounted for. So, why wouldn't you want a fresh arm to enter the game who can throw harder than leave a starting pitcher out on the mound trying to pace himself and not throwing as fast as he can?

Velocity and K/9 Correlation
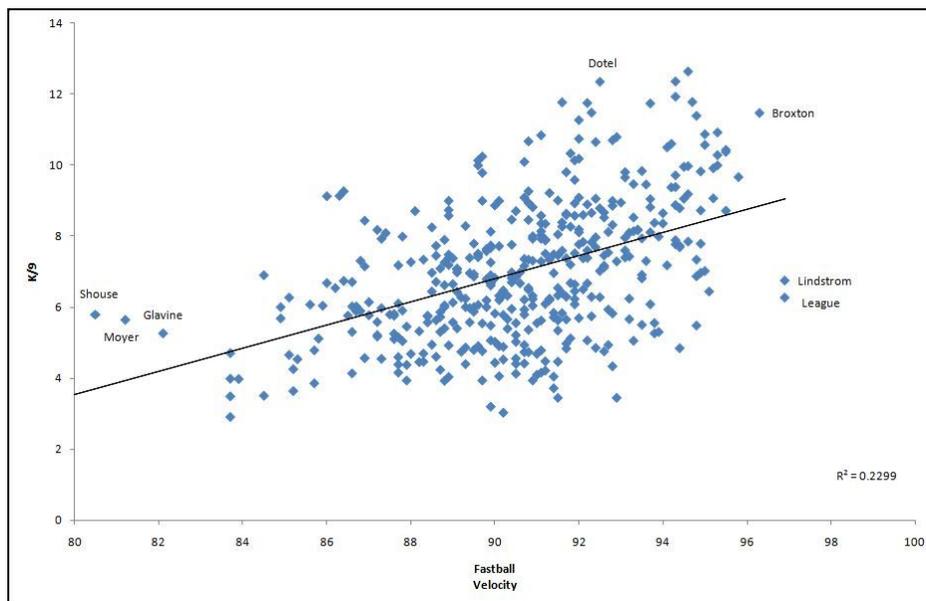
(Via Fangraphs)

When determining the value of a pitcher, velocity isn't everything. How fast a pitcher throws is always what fans and analysts seem to look at first and consider it to be a pitcher's determining factor of skill level. However, it is imperative to review as many reasonable factors as possible to evaluate a pitcher. One crucial element that is a quality tool for evaluation is spin rate. This statistic can show you just how much movement pitchers have on each of their specific pitches. Clearly, the higher the spin rate than the better the pitch. It is an important statistic because it allows for pitchers who don't throw extremely hard to still not be overlooked by the demanding stat of velocity.

A prime example of a Major League pitcher who proves the value of spin rate is Marco Estrada. In 2016 his average fastball velocity was 88.1 mph which was one-hundred twelfth best in all of major league baseball. So, he wasn't a pitcher who was going to be able to throw it past an average major league hitter. However, his average spin velocity was 2,401 which was ranked eighth best in the league. But still, for the average fan watching him pitch, their first impression would be that this pitcher most likely isn't very effective if he isn't able to throw into the nineties. Except, when you take a closer look at his 2016 stats you can see that he posted an ERA of 3.48. Estrada also recorded a FIP of 4.15, which was ranked forty-fifth in all of Major League Baseball. Fielding Independent Pitching, as mentioned earlier, is one of the best statistics to measure a pitchers performance as it considers all of the factors that a pitcher directly contributes to. The stat eliminates their defense's performance to reduce a factor that can give a pitcher an unfair positive or negative advantage when measuring their

performance. Estrada also lead the league with a low .234 in BABIP (Batting Average On Balls In Play). The stat factors in all balls put into play besides home runs. BABIP is used as a tool to measure how effective a pitchers defense is performing. So considering that Estrada had a strong defense behind him is why he had an ERA of 3.48 and not a higher, more suitable one. So that is why Marco Estrada's' recorded FIP of 4.15 is a much more accurate description of his performance. When it is evaluated that Marco Estrada has an average fastball velocity that ranks one-hundred twelfth, it is impressive that his recorded FIP ranked forty-fifth in all of baseball in the 2016 season. To put the importance of spin rate into terms for all of major league baseball, the diagram below represents the percentage of batters swinging and missing at the pitch and its relation to velocity and spin rate.

Swinging Strike Percentage Based on Velocity and Spin Rate

Velocity	Spin 1600	1700	1800	1900	2000	2100	2200	2300	2400	2500	2600	2700
83			0.0%	1.1%	4.3%	11.6%	10.0%	5.7%				
84			1.8%	2.8%	4.5%	5.9%	3.8%	7.1%	10.5%			
85			0.0%	0.0%	3.5%	3.4%	5.2%	3.6%	4.4%			
86			5.9%	3.1%	2.8%	5.9%	4.7%	4.0%	5.9%	8.7%		
87			5.0%	2.0%	3.5%	4.3%	4.9%	4.6%	5.1%	6.6%		
88		5.2%	3.4%	4.4%	4.0%	4.3%	4.3%	5.4%	7.5%	6.9%	8.5%	
89	4.8%	2.0%	3.3%	4.3%	5.5%	3.5%	5.1%	5.7%	5.9%	6.0%	8.9%	
90	1.9%	5.5%	4.1%	3.5%	4.6%	5.0%	5.3%	5.6%	7.5%	8.4%	10.3%	4.3%
91	7.9%	4.1%	3.7%	3.9%	4.8%	5.4%	6.5%	6.8%	6.8%	7.8%	9.2%	7.9%
92		7.0%	4.1%	5.2%	5.2%	5.9%	6.5%	7.1%	7.6%	8.3%	8.7%	10.4%
93	1.8%	1.9%	4.1%	5.2%	5.2%	6.9%	6.7%	7.5%	8.3%	9.6%	9.6%	12.2%
94	5.6%	3.9%	3.1%	5.2%	5.6%	6.8%	7.4%	7.9%	8.5%	9.2%	10.9%	11.4%
95		1.5%	4.7%	6.6%	6.4%	7.3%	8.1%	8.7%	10.1%	10.0%	12.0%	12.4%
96			14.0%	6.8%	5.9%	7.4%	8.9%	9.3%	10.2%	10.8%	11.3%	12.5%
97				4.7%	7.4%	7.8%	8.9%	9.8%	10.9%	12.8%	13.6%	19.2%
98					8.2%	7.6%	9.3%	10.5%	11.7%	13.2%	13.3%	16.8%
99					5.4%	10.2%	9.1%	11.2%	12.8%	13.4%	16.0%	19.7%
100						9.7%	11.2%	9.1%	14.3%	17.2%	18.0%	

(Via Jeff Zimmerman)

Reflecting upon all of the numbers and examples of the value of spin rate, it is vital to incorporate the statistic in evaluating a pitcher. The connection between bullpenning and spin rate is that as a pitcher begins to lose his stamina, his spin rate will decline along with his velocity. Both factors that are so important to get hitters to swing and miss and they drop as a pitcher stays in the game longer. So, if a pitcher is losing his ability to get swing and misses on his pitches, then why is he still in the game? Instead, teams should be making changes to bring in new pitchers more often. Bullpenning is a competitive advantage, but this change to the game is yet to be accepted by Major League Baseball.

The implication of bullpenning will also only work if teams can move past the traditional usage of their closers. In modern-day baseball, closers are usually only used to record three outs in the ninth when their team has a lead of three runs or less. The truth is, the save has ruined how bullpens have been used. Teams now use their closers in moments where they have a narrow lead and seem to be under the assumption that the game is on the line at that very moment. Teams seem to believe that in a situation where it is the beginning of the last inning and the opposing team is yet to threaten the lead that inning, that the game is on the line. This is where they are wrongfully mistaken. Why would you want your closer to come into the game at a time where the game indeed isn't on the line and teams assume that it is. All of baseball has been taught that the save statistic is so essential and it defines how good your best reliever because traditionally your best relief pitcher is your closer. All of baseball needs to open their mind to a new and better way for them to properly use their closer.

It's the top of the fifth inning, and the bases are loaded with only one out. The home team decides to go to the bullpen because the current pitcher is no longer getting the job done. They turn to one of their average middle relievers. The new arm gets the next two outs but not before giving up a single that scored two runs. Now, the outcome of the game is completely changed, and the home team has lost their lead. Let's rewind to the point when the middle reliever was first inserted into the game. With the bases loaded and only one out while protecting a one-run lead, the game is clearly on the line. So, why not go to your closer during the most crucial part of the game? The reason that teams won't go to their closer in this situation is solely because the save statistic has created a single-minded way of thinking for all of baseball. It would be much more beneficial and productive for a team to use their closer when the game is on the line. However, this isn't a tactic that most people acknowledge because everyone in baseball puts the ninth inning on a pedestal and believe that it is harder to get outs in that inning than at any other point in the game. People need to ask themselves if they would rather lose the game in the fifth inning or in the ninth inning.

Let's take a look at Zach Britton and his 2016 performance. That year Zach Britton, the Orioles closer, had one of the best seasons ever for a relief pitcher. He obviously should have won the Cy Young award, but the writers were blinded by Rick Porcello's 22-4 win-loss record season even though he had a 3.15 ERA and 3.40 FIP. Porcello was dealt with a fair amount of luck during his award-winning season as he had the eighteenth lowest BABIP is all of baseball. So, Porcello had a pretty good defense behind him that did an excellent job to help him out. It is a shame that Porcello was the

recipient of this award because both of the two other finalists were much more deserving candidates. Justin Verlander had a little bit better of a similar season as he recorded a 3.04 ERA and a 3.48 FIP. However, the writers really only saw that Verlander had a 16-9 record to put him below Porcello. If you look a little further at the data, it can be seen that Verlander had a 10.04 K/9 which was a big leap of Porcello who had a dismal 7.63 K/9. You can make a case for each of the two starters for who had a better season, but the data does seem to show more support for Verlander to be a better pitcher. However, in the 2016 season neither deserved to win the Cy Young Award in the American League. Zach Britton was unfortunately snubbed from the award despite his spectacular season. Britton recorded an impossible 0.54 ERA along with a 1.94 FIP. Those are just numbers that you almost never see put up by a pitcher in Major League Baseball. Not that his case for Cy Young needs any more support but Britton did also strike out 9.94 batters per nine innings. Before this award was given out constant conversation from writers and analysts was about whether or not a reliever could win the Cy Young award. It had happened a few times before but not since Mike Marshall in 1974. However, in this case he was clearly deserving of the award.

So, now it is time to tie Zach Britton into the concept of how managers use their closers the wrong way. In the 2016 Wild Card game, the Orioles were set to face the Toronto Blue Jays. The Orioles lost five to two in eleven innings after horrible decisions made by the Orioles manager Buck Showalter. As the game continued he never put Britton into the game and was left in the bullpen for when a save situation would arise. Of course, it never did. The Orioles starter, Chris Tillman, only pitched four and a third

innings. Throughout the rest of the game, the Orioles used a total of six different relief pitchers. So to be clear, Buck Showalter used a total of seven different pitchers in a win or go home game and didn't even put his best pitcher in the game. Even when the game was on the line the most in the eleventh inning, Showalter inserted one of the Orioles worst pitchers in the game as he stuck Ubaldo Jimenez in even once he got into a jam. Jimenez entered the game with one out and nobody on. He proceeded to give up back to back singles to Blue Jays hitters, and now there was one out with runners on first and third. Edwin Encarnacion came to the plate, and on the first pitch he saw, ended the Orioles season by launching a home run into the left-field seats. For anyone who would adequately evaluate this situation, I would find it hard for them to side with Buck Showalter's decision on trying to save Zach Britton for a save situation. It seems obvious, why would anyone not use their best pitcher in a win or go home game? Well, we can credit this to the horrible mentality of always trying to wait and use your closer in a save situation. For the usage of bullpenning to be successful, teams and front office staff need to be able to move past the idea that the save is a necessary stat to be fulfilled. They need to start using their closer when the game is on the line, no matter what inning or unuseful external factors there are.

A modern example of a team using their best relievers when needed was the 2016 Cleveland Indians. At the trade deadline, the Indians traded for stud reliever Andrew Miller from the New York Yankees. They did give up a few prospects, but the franchise acknowledged their need to bolster their bullpen in order to be successful in the upcoming playoffs. The Indians did already have an established closer in Cody

Allen, but Miller was a reliable addition to the team. Once the playoffs arrived, Cody

Allen did remain in that closer spot but it allowed for the Indians manager, Terry

Francona, to use Miller freely and whenever he needed. Miller would come in at any

time and could pitch for an extended time as well. In game one of the American League

Division Series Andrew Miller entered the game in the fifth inning with two on and two

outs. Miller proceeded to strike out Ortiz to escape the jam. Miller went on to pitch a

total of two shutout innings as he helped the Indians to win game one. Miller was

continuously used throughout the playoffs at any point the game was most on the line.

His success continued throughout the postseason as he was named ALCS MVP for his

efforts. This method was a successful one for the Indians as it helped to carry them to

the World Series before losing to the Chicago Cubs in game seven of the series.

Despite the Indians already having a closer, the Indians used Andrew Miller in a way

that all closers should be used. If baseball franchises would implicate their own way of

how the Indians used Miller in the 2016 playoffs, then they would be more successful.

Another modern day example is the Oakland Athletics usage of Chad Bradford in the

2002 season. The A's did have an established closer, but Bradford was considered to

be their bullpen ace. So, Bradford was used in situations where the game was on the

line. No matter what point in the game if the game was on the line, Billy Beane wanted

him in the game. As the movie and book Moneyball portrayed, Billy Beane ran the team

and not manager Art Howe. One example that represents this relationship was when

Beane wanted Scott Hatteberg to start at first base when the season began, but Art

Howe continued to start Carlos Pena. Beane then dealt with this problem by trading

Pena away so that Art would be forced to start Scott Hatteberg. Billy Beane did whatever he could to manage the game that he wanted to. He viewed Bradford as such a valuable asset that it didn't matter what the matchup was. Beane wanted him in the game not even caring if it was a righty or lefty up to bat. All that mattered to him was that Bradford was in the game. That mentality is how teams should act now with their closers. Closers are almost always the teams best relief pitcher so why not have him in the game when the game is on the line. Let's evaluate a different situation when a manager wrongly used his bullpen. In game five of the 2015 World Series, the New York Mets were down in the series three games to one. In game five the Mets turned to their leader known as the dark knight, Matt Harvey. Up into the ninth inning Harvey had provided his team with eight solid innings and not allowing a run. Earlier in that season as it was coming to a close, talks surrounded Harvey as how he would hold up for the rest of the season as he had recently recovered from arm problems. Many were even curious as to if Harvey would be shut down for the remainder of the season. So after the conclusion of the ninth inning, it appeared that Harvey would be exiting the game and the Met's manager, Terry Collins, would be giving the ball to his elite closer, Jeurys Familia. Although, Harvey was somehow able to convince his manager that we would be able to finish the game and Collins sent him back out to the bump in the ninth with the score being a close two to zero. Harvey would walk the first batter that he faced. So, at this point, it would make sense for Terry Collins to go to his all-star closer to wrap up the game and look towards game six. Except Collins still left Harvey in the game. The next batter that Harvey faced doubled and the score became two to one. Finally, at this

point, Familia was entered into the game. The Royals would go to tie the game in the ninth, but Familia did his job by recording three ground balls. The Royals tied the game by smart basing running from the ground balls that were put into play. The game went into extra innings until the Royals would win the game and the series in the twelfth inning. Just imagine how different the game and possibly even the series would have turned out if Terry Collins would have put Familia into the game and not let Harvey go back out to the mound. Through all of these examples a constant theme is seen, that before the concept of Bullpenning can be accepted, teams need to first use their closers the right way.

How It Would Work

In modern-day baseball, the same model of bullpenning wouldn't work for everyone. Each team would need to build their model around what would work best for them. For example, if there is a team that has a stacked five-man rotation, then their model would look a lot different than a team with maybe only one or two quality pitchers. All teams would have a different modification of how bullpenning would work for them, and if used correctly bullpenning can work for all organizations. If teams have the proper intelligence and analytics while looking at the right numbers, then they can succeed with bullpenning.

For a team with a stacked rotation, the concept of bullpenning might not even be what's best for them at that point. Except, imagine the ability to be able to send your ace out to the mound every three or four days instead of every five as we see now. If you could send your ace out every three days, he could pitch for approximately three innings and then hand the ball to a new arm. You repeat this every day in almost a small three-man rotation. If you continue this process each one of your aces would finish the season with approximately one-hundred sixty-two innings. Some might argue that the number is low and that the team is not fully maximizing their pitcher's usage. But look at it this way, your arms won't be burnt out by the time the postseason arrives. You can still maximize your pitching though if done correctly. From time to time, your modified starter can go an extra inning if they are performing exceptionally well or maybe there is an off day before their next start. Following the removal of your modified starter, another pitcher is put into the game for about either two, three, or maybe even four innings. This

process is repeated, and teams use their best relievers for the heart of the order and when the game is on the line. As in, the opposing team has runners on base and are threatening to score. This would be a process that is continuously repeated game after game.

What makes bullpenning so great is that there is no written way that you have to do it. You can begin the game with an ace that goes three innings, or you can wait till later in the game to put him in. Let's say that your going to start a left-handed pitcher but the top three hitters in the lineup are just about all hit right-handed and are clearly their best hitters. If this is the case, then you can put a right-handed pitcher in to start the game. Teams can have one of their better, if not their best right-handed relief pitcher come in to start the game and only go one inning to get their better hitters out of the way. Then they can put your approximately expected three-inning starter into the game. Next, when the big hitters come back up again, you either leave your starter in if he is performing well or put in a new arm. There are all just so many different ways that teams can use the concept of bullpenning to give themselves a competitive advantage. Organizations need to evaluate what works for them based on matchups, statistics, and analysis.

Let's run through a laid out example of how a team with a stacked rotation could format their bullpenning strategy. For this hypothesis, we are going to use the 2015 New York Mets, which was a team that lost the World Series to the Kansas City Royals which I touched on a little earlier. Below are their best starting pitchers that were used along with some of their regular season statistics to express their performance.

Pitcher	FIP	K/9
Erik Goeddel - RP	2.47	9.2
Jacob deGrom - SP	2.70	9.7
Addison Reed - RP	2.74	10.0
Jeurys Familia - RP	2.74	9.9
Sean GIlmartin - RP	2.75	8.5
Matt Harvey - SP	3.05	8.9
Noah Syndergaard - SP	3.25	10.0
Carlos Torres - RP	3.53	7.5
Steven Matz - SP	3.61	8.6
Bartolo Colon - SP	3.84	6.3
Hansel Robles - RP	3.91	10.2

The 2015 New York Mets finished sixth best in the league in FIP and tenth best in strikeouts per nine innings. Now let's create a possible model that the Mets could have used in a three-game series. In this experiment, the Mets will be playing the Washington Nationals using the same lineup as they did in 2015. The lineup for the Nationals would usually look like the following:

Denard Span - LH
Ian Desmond - RH
Yunel Escobar - RH
Bryce Harper - LH
Ryan Zimmerman - RH
Wilson Ramos - RH
Dann Espinosa - S
Michael Taylor - RH
Starting Pitcher

If the Mets plan on using Jacob deGrom the first game, Matt Harvey second, and Noah Syndergaard third then we can set a foundation. This means that there will be three right-handed starting pitchers starting throughout the series. To start off game one ideally, deGrom goes three innings of quality work. Then if the top of the order is due up, the Mets should put Steven Matz into the game to neutralize Span and Harper. Matz can hopefully provide the Mets with another three quality innings, or four if he is performing well and the Mets want him to face at least Span and maybe Harper again. Following the removal of Matz from the game, the Mets have a few options to choose from. If the game is close, then they can go to either Familia or Goeddel. If the game doesn't seem within reach of the result changing for good or worse, as in they are either winning or losing by a large margin than the Mets can go to someone like Bartolo Colon or Hansel Robles. Hopefully, either then the two quality relievers can complete the game or the lower group can wrap up the game without having to overuse the pitching staff. All in all, it is difficult to provide a bullpenning scenario primarily because all games are different. There are always factors to consider like lefty on lefty matchups, the current score, the upcoming schedule, and even the level of their competition. All elements are crucially important and are necessary for determining whom to put in the game and at what point. This same process can be continued throughout the rest of the series but obviously using different pitchers depending upon their previous amount of workload. This simulation was used to hopefully give a more practical example of bullpenning in used and how the concept can be implemented to succeed.

Now, let's evaluate a possible bullpenning situation for a team with a below average rotation and how they could possibly model bullpenning. A simple example that was actually put into play was the 2018 Tampa Bays Rays. On May 19, 2018 the Rays manager Kevin Cash decided to start a usual relief pitcher, Sergio Romo, against the Los Angeles Angels. Romo was a former established closer with the San Francisco Giants and had won three world series championships with the ball club. He was now at the point in his career where he was past his prime at age thirty-five. The Rays referred to this experimental strategy as the "opener." The Rays evaluated that with Romo's effective slider from the right-handed side, that he would fare much better against the Angeles big bats than their other options. This moment was a big step for the movement of bullpenning and helped it to begin receiving national recognition. So, Romo started the game set to face Zack Cozart, Mike Trout, and Justin Upton. All of the batters were right-handed which was why Romo was chosen to start. Romo fared well against the Angels bats as he struck out all three batters. For the second inning, the Rays put in their starter Ryan Yarbrough. Who pitched six and a third innings while only giving up a run. The Rays would later go on to win the game by a score of five to three. Now the first impression of this experiment seemed to be successful. The Rays gave Yarbrough an advantage by allowing him to skip the top of the order and to start his outing towards the middle of the lineup. This benefited Yarbrough because he only has to face the opposing team's first three hitters who are also the best hitters on the team for the second time when he is pitching through the lineup for the third time. And as shown

earlier in the book, the more times a hitter sees a pitcher in a game, then the more of an advantage he has.

The very next day Romo started again against the Angels and performed well. In this outing, he recorded four outs to exceed yesterday's total of only three. Romo didn't give up any hits or runs and struck out three batters, but he did walk two hitters. Following his removal from the game, Kevin Cash put Matt Andriese into the game. Andriese didn't fare well as he lasted only two innings and giving up two unearned runs. From that point, a variety of relievers were used, and none seemed to fair well, all giving up runs. The Rays would lose five to two in their second game of experimenting with the "opener." The loss merely does not mean that the experiment didn't work, the Angels had one of their best pitchers on the mound and still have a solid lineup. However, the strategy that the Rays used most likely even put them in a better position to win than any other options that they had. To come about a conclusion for any hypothesis, there must be a large sample size, not just one game. The large sample size of MLB history concludes that bullpenning is indeed effective.

Following this two day experiment, the Rays returned to using their original format of using their starting pitcher from the beginning of the game. Then almost a week later they started Sergio Romo again. It was game one of a weekend series against the Baltimore Orioles. Unfortunately, Romo didn't perform well in this outing as he only recorded two outs and giving up one run. Once again, Ryan Yarbrough was his replacement who pitched a total of seven innings while just giving up a single run. The Rays went on to lose the game zero to two, but once again, the experiment can be

considered a success as they only gave up two runs the entire game. Romo may not have done his job as useful as many expected, but he still set the next pitcher in a position to succeed. One way to view the outcome is that Romo was able to get past those problematic outs despite it hurting the Ray's. Then the starter came in unharmed and ready to start his outing with the advantage of skipping the top of the order. If Yarbrough had started the game then maybe we would have given up even more runs in the first inning and then allowing it to affect the remainder of his outing.

The very next night the Rays decided to stick with their strategy but with a twist. This time instead of using Sergio Romo, the Rays went with right-hander Ryne Stanek whose performance was similar to Romo's in his first outing as the opener. Stanek pitched one and two-thirds innings while not giving up any runs or hits while striking out a total of three hitters. His purpose was to retire the Orioles right-handed bats at the beginning of their lineup including Manny Machado, Adma Jones, and Jonathan Schoop. When the first left-handed hitter for the Orioles came to the plate in Chris Davis, Kevin Cash putt left-hander Anthony Banda into the game. Banda pitched six and a third innings as the Rays would go on to win the contest five to one. This game in particular, serves as a great example of when teams use their pitchers efficiently, how dominant they can be.

In the finale of the three-game set, Sergio Romo was tabbed yet again to serve as the opener. This would be a game that would resemble game one of the series, in a way. The Rays would win the game three to eight, but Romo would only record one out while giving up all of those three runs. Cash then went to a former major league starter

who was now a reliever, Vidal Nuno. Nuno pitched three shutout innings after letting all of his inherited runners from Romo to score. He was then removed from the game and Austin Pruitt would pitch, who would throw the final five and two-thirds of the game. This lead to Pruitt recording a very unorthodox save.

One final example of Bullpenning that in fact occurs every year, is the All-Star Game. Each year in the All-Star game pitchers will usually only throw one inning. Now, it is not done for a competitive advantage, but it is used so that as many pitchers as possible can have a chance to pitch in the memorable game. This game that occurs once a season in Major League Baseball is an excellent example of Bullpenning. The only flaw is that if a team were actually to attempt this idea, some of their pitchers would have to go more than one inning. They would more likely need to get two or three innings out of the majority of their pitchers when they are put into the ballgame. There still are plenty of instances though when a pitcher may only need or be able to go for a single inning or less. To reflect upon all of the examples of hypothetical and also real cases of bullpenning, it has proven to be effective. However, it is only valid when used correctly. Managers and analytical staff need to properly evaluate the situation with matchups, statistics, and analytics to make the best decision.

Players It Would Work For

Following the Rays experiment in the 2018 season, some players spoke out on their opinion of the matter. Zack Cozart of the Angels said, "It's Weird" and "I hope baseball doesn't go in that direction." Cosart was one of the players to first experience this strategy by the Rays when he faced Sergio Romo. The most important part of the project, Sergio Romo, spoke out and expressed that he did like the idea and he embraced his role. All players will have a different opinion of the concept of bullpenning but as it becomes more well used, players will end up adapting to the situation and the mental mindset that it takes. As far as the psychological adjustment for pitchers go, the relievers wouldn't have to change their mindset unless they enter the game early on. Which would mean that maybe a reliever that before might come out in the seventh or eighth innings, might now end up coming out in the fourth or fifth or at any point in the game really. For relievers, the adjustment should be painless and easy.

However, when we start looking at the adjustment that starters would need to make, it can be a difficult adjustment. When a starting pitcher enters the game, his goal is to pitch the entire game so he paces himself so that he has the energy to last the entirety of his outing. Even though starting pitchers rarely go for the whole game, that is still their mindset and goal. There would be an adjustment period for starters from having the mindset of trying to pitch the entire game to now knowing that no matter what, they are only going to go somewhere between two and four innings on average. The period of adjustment doesn't mean that a team's starters are going to struggle, it will be a time

period of mental adjustment until starters use all of their energy as a relief pitcher does now.

For some pitchers, it will be a smoother adjustment than others, based upon their repertoire and mental mindset. One example of a pitcher that would benefit from this change is Dylan Bundy. When Dylan first arrived at the major league level, he served as a relief pitcher and appeared in two different games in September of 2012. For the next three years, he dealt with various injuries including Tommy John surgery that kept him from returning to the major leagues until 2016. When Bundy first returned to the Orioles, he continued to work out of the bullpen. However, not for long as Bundy soon earned a spot into the rotation. Up through this point and at the conclusion of the 2017 season he continued his place in the rotation for an Orioles ball club that moved around from a 2016 playoff appearance to not even finishing with a winning record in 2017. Dylan Bundy though is the primary focus of this example. As a reliever Bundy was successful, and as a starter, he was never a good as he once was out of the bullpen. Below are the two groups of numbers to compare his two separate types of performances.

	IP	FIP	K/9
Reliever	38	3.69	7.58
Starter	241.1	4.63	8.36

After evaluating the splits between Dylan Bundy as a starter and reliever, it seems like a more significant advantage for teams to use him as a reliever. The reason behind the splits in stats can vary. A likely conclusion for this split could be the use of

his velocity. As a reliever, he could use up more energy because he knew he would only be in the game for a short time. On the contrary, as a starter he was forced to pace himself as a starter which results in a decrease of velocity. If this was the case, the strikeouts per nine innings should be higher for a reliever than as a starter, but this is not what the data shows. However, the evidence does show that Dylan Bundy does perform better as a reliever than as a starter, and that is the final conclusion. So, then why not use him in a bullpenning situation?

When It Will Be Accepted

If you were to walk into the front office of a major league baseball team today, you would see something much different than you would've seen twenty years ago. Back then a franchise would fill their front office with former players from various backgrounds. Some would have a resume built upon a successful major league career while others had only ever lasted in the minor leagues. Out of the group some were drafted out of high school while others were drafted out of college. From the group of players that had college degrees, the educational value could vary from an elite academic school down to anything below it. Among all, one similarity would exist among the employees; they had professional playing experience. Now if you were to walk into a major league front office, you would see a lot less of the group having previous professional experience. What would mainly make up the franchises front office would be highly educated men with ivy league degrees. With various majors including business, economics, statistics, marketing, and sports management. The only similarity between these two separate time periods would be the lack of a community of women holding jobs in this field of work. As times have moved forward, more and more women have become more present in front offices. Yet, it is still not a workplace with a high amount of gender diversity. Since this significant shift from players to brainiacs, it makes me wonder, why? What was the purpose and how did these geniuses work their way into the game?

This proposed question does seem to have a simple and straightforward conclusion. With the increased involvement of numbers in baseball, it has also lead to

the advancement in the appearance of people who had similar thinking with a logical and numbers based background. With an economics degree comes the education of being taught logical thinking, which is usually earned for the purpose of involvement in the stock market. However, the concepts learned are still beneficial to succeed in a major league front office. A business or marketing degree is built upon similar principles but tailored differently. A statistics degree can be helpful to evaluate numbers and analyze them properly. This shift occurred when the franchises executives began to understand that the so-called "absurd" numbers were correct and that they lead to success. With this discovery also lead to the realization that these former professional players lacked the knowledge to formulate these numbers and evaluate them. These former players were only able to provide their opinion based upon what they could see. Which is commonly known as the job of a scout. These scouts relied upon what they had been taught and what they had experienced for themselves. They believed that with the naked eye a player's value could be determined. When we think of a scout, we often perceive an image similar to the scout in the movie Ahead of the Curve. We see an elderly man with a long prior history of experience in baseball. Usually, someone that could spend an entire day telling stories upon stories about his experiences in the game of baseball. At the conclusion of the movie, the old and traditional scout gets the evaluation correct when he informs the Atlanta Braves franchise, which he works for, that they shouldn't draft this one specific hitter based upon what he could see in his swing. The team goes on to draft the prospect based upon what a numbers-based front office executive says about the player. Eventually, the scout is proven right as the

player's career never pans out. The executive who used numbers to support his decision to draft the player was made out to look like a fool.

This is not at all what we see now in the major leagues despite this movie being set during the rise of the use of sabermetrics. Now more and more franchises rely on numbers instead of a scouts opinion. Now don't get me wrong, scouts still have a prominent role in baseball today. They are just not as impactful in the evaluation of players as they once were. Remember, that my theory on the changes in major league baseball front offices is not proven but is important enough to acknowledge. The use of numbers are rising and now have a massive impact on the game. Just look at the relatively new method of statcast and its rising number of references and usage for the evaluation of players. As the use of numbers increase and the atmosphere of major league franchises adapts to the proof in the numbers, bullpenning will begin to see a rise in its usage in major league baseball.

Where This Will Be Accepted

In order for bullpenning to be widespread across the league, it is going to have to originate somewhere. It is most likely to first be adopted by a small market organization. This is because those teams experiment with different methods to gain a competitive advantage in order to compete with big market teams. Just look at the Athletics in the early 2000's who operated with a low payroll. They used on-base percentage when deciding what players to choose and build their roster around. They also used players that would be overlooked due to a physical flaw despite still recording quality stats, to help in making their team. Therefore due to the history of how small market teams operate, they are the first to turn to a new competitive advantage that is yet to be commonly accepted. After all, the Tampa Bay Rays were the first to use "the opener" with Sergio Romo. These teams are almost forced in a way to look for different and unseen advantages because they have to find some way to compete with high payroll ball clubs. Major League Baseball is truly unfair to the teams with low payrolls. I'll touch on that subject later on in the final chapter.

These small market teams are also more susceptible to implicate bullpenning because they won't receive as much backlash from the media and fan base as other organizations might. These teams only have a couple of news sources that regularly cover them unlike places like New York or Boston who have several. When small market teams don't receive as much coverage as big market teams, then they are able to almost in a sense, get away with more without being noticed. As for the fanbase, these small teams have a much smaller following then teams that are in large markets.

Which includes places like New York, Boston, Los Angeles, and Chicago along with a few others. So with a smaller fan base, the ownership and executives might not face as much of a backlash from their supports, unlike other teams. Overall, the original usage of bullpenning is more likely to work better for small market organizations.

For teams out there that do acknowledge that bullpenning is a valid theory but are too timid to try it, there is another option. They can experiment with it in their minor league system. There they can toy around with so many different ways of using it before finally creating the best system that could possibly work for them. However, it is still important to remember that all teams are different and a method that works for a minor league team might not work for a major league team. Again, if an organization does decide to experiment with bullpenning in the minor leagues, then they might be able to become more comfortable with implicating it into their major league team. Another way to make the implication of bullpenning easier is to use it if and when their team is out of contention for the playoffs. So then at that point of the season, the team is already playing meaningless games. Why not experiment with tons of theories then to see if they work? Now I'm not saying for the teams to do whatever they please and throw away the game but what does it hurt to only attempt to implicate a concept that has mathematical support to be successful.

What This Means For Baseball

In the future, if the concept of Bullpenning is accepted there will be some other components of the game that will change as well. An immediate one that stands out is the inability to accomplish a no-hitter or a perfect game. Well, teams can still complete combined no-hitters or perfect games, but to most fans, it is not as meaningful. It is astonishing to imagine a single pitcher having the capability to pitch the entirety of a nine-inning game without giving up a hit, or even a baserunner. No-hitters and perfect games are a special part in the game of baseball, and it is unfortunate that if bullpenning is established, then it is a part of the game that will be gone. However, despite this loss teams are hopefully able to look past it and take part in a competitive advantage that they need to win.

A modern problem that we are seeing in baseball right now is, in fact, the length of the game and that it is extending. It seems that some are contributing this to the current decrease in the popularity of baseball compared to other major sports leagues. Although, the reason for the increased length in baseball games is due to how the game is played. We now see hitters taking more and more pitches and increasing the numbers of walks and strikeouts. I learned about this conclusion for why the game takes so long from David Smith who gave a presentation on the topic at the 2018 SABR Convention in Pittsburgh. It was interesting to see why the game honestly does take so long compared to its history. So, with the implication of bullpenning would probably continue to extend the length of the game. Which would be forced due to a likely increase in strikeout totals. Strikeouts should increase because the level of pitching will

be on the rise. Except, is this really a problem for why Major League Baseball is decreasing in popularity? I find it to be that the long season makes it difficult for the average fan to engage in a constant interest. So as much as I would not like it, it seems that the shortening of the season would hopefully increase interest. This merely is just a theory without any hard evidence to support it. It seems difficult to draw any firm conclusions on the topic unless the experiment was actually tested. If bullpenning does indeed become something that is regularly used by organizations, then it is possible to shorten the pitching changes. Major League Baseball can even reduce the time between innings. With the use of bullpens in the outfield along with a facility to throw behind the dugouts and below the stands, then pitchers can come in ready. They can then only have the need to throw just a few pitches to readjust to the mound. Genuinely, bullpens should be moved to be behind dugouts. This can prevent the long run in from the bullpen. I think that it may even be possible to shorten the length between innings to about a minute. Despite the new adjustment to how the game is played now and may be played in the future, there are adjustments that can be made in order to help in shortening the game.

Other Thoughts

      Despite this book being based upon the idea of Bullpenning, there are a few other subjects that I want to touch base on. These concepts that I am about to go over are merely observations I have made as of recent while composing the majority of this book. The first theory is that Major League Baseball needs a salary cap. Now you can make the argument that the luxury tax acts as a salary cap and in a way it is. Except it doesn't have as strong of an impact as a firm salary cap. Teams like the Yankees, Red Sox, and Dodgers are always spending so much money, and as a result, they are all able to put a competitive team out on the field. The teams with the most amount of money are always the ones that are winning year after year. Then there are the small market teams with little money. Examples include the Athletics, Rays, and Brewers. If you look at the history of those teams, you don't tend to see a lot of success. They aren't able to afford the big market athletes that want as much money as they can get their hands on. Now there have been years when those teams do succeed and manage to compete with some of the opposing high payroll teams. However, it is usually short lived and can't be repeated for an extended period of time. So, teams with a low payroll cannot be expected to compete with teams who are able to spend a lot more money than them. Let's put this into business terms. After all, Major League Baseball is in fact a business. If two separate groups of people are each just starting a company and are competing to sell a product to the same target demographic, the company with more money to spend will end up succeeding. That company has more money to spend on advertising, market research, and product development to name a few. This market

inefficiency can also be explained through a political explanation. If there are two separate candidates that are competing against each other in an election, and between those two candidates one has more than twice the amount of money to fund their campaign, then they are at a considerable advantage. That one can spend so much more on advertising and all variables of campaigning than the other candidate. These two examples are exactly how the disadvantage of low payroll baseball teams can be explained. This current separation between payrolls that exist amongst teams are unfair and are detrimental to Major League Baseball.

  If a salary cap was to be introduced in baseball not only would we see a more level and equal playing field but I believe that we would see an increase in popularity in the game of baseball. Since these teams with such high payrolls are able to be competitive year after year, they attract the highest fan bases. While on the opposite end of the spectrum the teams with low payrolls aren't able to draw a crowd let alone a fan base when they don't compete. So, if a salary cap is introduced and makes the game fair, then there will be a rise in the competition from the low payroll teams. Then by default, those teams will be able to attract more fans and create an overall higher revenue for Major League Baseball. This can make a huge impact for all of baseball as a whole especially since the game is currently declining in popularity. As baseball is at a low point compared to years past, the introduction of a salary cap is something that should be given a serious amount of consideration to be implemented. As for the specific rules for the salary cap, I believe that a hard cap should be introduced. Which means that teams can't go over it and there is no luxury tax because they can't exceed

it. Organizations should also be required to spend a certain amount of their salary cap each year. This is similar to what the NBA does with their salary cap. Then whatever teams don't spend on their salary cap, they are able to spend during the next season. However, there is only a small carry over to prevent a single team from gaining a substantial advantage with their payroll. In other terms, not taking one year with a low payroll only to turn around the next season and use their carry over to practically double their available money to spend. Currently in Major League Baseball teams will save their revenue for a specific time period to then try and land some big free agents and make their team able to compete against the high payroll organizations that can sign those big free agents just about every year. So, if we remove the need to save money, then teams should be required to spend a significant portion of their salary cap. That way teams are unable to use the tactic of saving up their money to purchase large free agents. Personally, I don't know what the exact number should be for a salary cap. To determine that requires access to a lot of data that the public doesn't have access to. However, I do believe that there is still enough evidence to support the theory that the introduction of a salary cap in Major League Baseball would be beneficial for the game. In my last theory, I touched on how the implication of a salary cap would increase the popularity of baseball. Well, to build on that theory I believe there is another reason why baseball is losing popularity. It is receiving less coverage and promotion from the media. On Sportscenter shown on ESPN, their primary focus is always the NBA and the NFL. They will do a few small segments on the MLB and hardly ever even talk about the NHL. ESPN seems to talk about the NBA the most because they cover more games

than any other nonlocal network. Well, they at least broadcast enough games that it would seem it is their most significant production of revenue. So, they apparently want to draw the most attention to their biggest source of income. Each league does have their own network and personally, I find the MLB Network to be exceptional. However, when the majority of people watch ESPN it is clear that the NBA and NFL will gain an advantage over the MLB when it comes to coverage and exposure. This theory has very little hard evidence to support it, but if you watch an episode of Sportscenter, then you will find this to be true.

   As this book comes to a close, I challenge you to now be more open-minded to how you perceive sports. Many people are stuck in their ways and seem to be unable to accept change. Sports are always changing which is one of the most overlooked parts of the games. In basketball three-point shots are increasing more and more. In football, the NFL is a heavy pass dominant league while when the game was first invented, the ball was rarely thrown. Baseball is no exception to being a part of a change. Home runs are higher than ever, and if trends continue, there will be a season with more strikeouts than hits for the first time ever. So, never stop questioning the game and do not be afraid to ask the question that no one else is.

Bibliography

2002 Oakland Athletics Statistics," *Baseball-Reference.com*. [Online]. Available: https://www.baseball-reference.com/teams/OAK/2002.shtml. [Accessed: 06-Jul-2018]

"2015 Major League Baseball Season Summary," *Baseball-Reference.com*. [Online]. Available: https://www.baseball-reference.com/leagues/MLB/2015.shtml. [Accessed: 06-Jul-2018]

"2015 New York Mets Statistics," *Baseball-Reference.com*. [Online]. Available: https://www.baseball-reference.com/teams/NYM/2015.shtml. [Accessed: 06-Jul-2018]

"A Brief History of the Single-Elimination Wild-Card Game," *The New York Times*, 20-Jan-2018. [Online]. Available: https://www.nytimes.com/2016/10/04/sports/baseball/wild-card-game-a-brief-history-of-single-elimination.html. [Accessed: 05-Jul-2018]

NewRelicInc, "Ahead of the Curve - Using Data to Analyze Baseball: FutureStack16 NYC:" *YouTube*, 17-Aug-2016. [Online]. Available: https://www.youtube.com/watch?v=Cqsp46oZtyU. [Accessed: 05-Jul-2018]

"American League adopts designated hitter rule," *History.com*. [Online]. Available: https://www.history.com/this-day-in-history/american-league-adopts-designated-hitter-rule. [Accessed: 05-Jul-2018]

R. J. Anderson, "How Sergio Romo and the Rays 'opener' strategy are impacting how pitching stats are tracked and viewed," *CBSSports.com*, 30-May-2018. [Online]. Available: https://www.cbssports.com/mlb/news/how-sergio-romo-and-the-rays-opener-strategy-are-impacting-how-pitching-stats-are-tracked-and-viewed/. [Accessed: 05-Jul-2018]

"Baseball Prospectus Basics: A Brief History of Pitcher Usage," *Baseball Prospectus*, 02-Mar-2004. [Online]. Available: https://www.baseballprospectus.com/news/article/2627/baseball-prospectus-basics-a-brief-history-of-pitcher-usage/. [Accessed: 05-Jul-2018]

"Cy Young Relief Pitchers," *Wezen Ball*. [Online]. Available:
    http://wezen-ball.com/2009-articles/cy-young-relief-pitchers.html. [Accessed:
    05-Jul-2018]

"Cy Young Stats," *Baseball-Reference.com*. [Online]. Available:
    https://www.baseball-reference.com/players/y/youngcy01.shtml. [Accessed:
    06-Jul-2018]

"Dylan Bundy," *ESPN*. [Online]. Available:
    http://www.espn.com/mlb/player/gamelog/_/id/32094/year/2016. [Accessed:
    05-Jul-2018]

"Dylan Bundy 2016 Pitching Game Logs," *Baseball-Reference.com*. [Online].
    Available:
    https://www.baseball-reference.com/players/gl.fcgi?id=bundydy01&t=p&year=201
    6. [Accessed: 06-Jul-2018]

"FIP | FanGraphs Sabermetrics Library," *The Hardball Times*. [Online]. Available:
    https://www.fangraphs.com/library/pitching/fip/. [Accessed: 06-Jul-2018]

C. Gaines, "The Simple Reason Why MLB's Wild Card Format Is So Terrible,"
    Business Insider, 29-Sep-2014. [Online]. Available:
    http://www.businessinsider.com/simple-reason-why-mlbs-wild-card-format-is-so-te
    rrible-2014-9. [Accessed: 05-Jul-2018]

Lizzie, "'It's Weird:" Critical takes on the Rays 'Opener' experiment," *DRaysBay*,
    21-May-2018. [Online]. Available:
    https://www.draysbay.com/2018/5/21/17375586/its-weird-critical-takes-on-the-rays
    -opener-experiment. [Accessed: 05-Jul-2018]

B. Kenny, *Ahead of the curve: inside the baseball revolution*. New York: Simon &
    Schuster Paperbacks, 2017.

M. Lewis, *Moneyball: The Art of Winning an Unfair Game*. s.l.: WW Norton & Co,
    2011.

B. Lindbergh, "Baseball's Three True Outcomes Are Continuing Their Takeover in
    2018," *The Ringer*, 28-Mar-2018. [Online]. Available:

https://www.theringer.com/mlb/2018/3/28/17171162/spring-training-home-run-strik eout-stats-three-true-outcomes-trend. [Accessed: 05-Jul-2018]

O'connell, Michael. "Spin Rate: What We Know Now." *Driveline Baseball*, Driveline Baseball, 12 May 2018, www.drivelinebaseball.com/2016/11/spin-rate-what-we-know-now/.

"OPS and OPS | FanGraphs Sabermetrics Library," *The Hardball Times*. [Online]. Available: https://www.fangraphs.com/library/offense/ops/. [Accessed: 05-Jul-2018]

"Orioles vs. Blue Jays | 10/04/16," *MLB.com*. [Online]. Available: https://www.mlb.com/gameday/orioles-vs-blue-jays/2016/10/04/487595#game_sta te=final,game_tab=play-by-play,game=487595. [Accessed: 06-Jul-2018]

"Radical Acceptance," *Psychology Today*. [Online]. Available: https://www.psychologytoday.com/us/blog/pieces-mind/201207/radical-acceptanc e. [Accessed: 05-Jul-2018]

"Statcast," *Major League Baseball*. [Online]. Available: http://m.mlb.com/statcast/leaderboard#avg-pitch-velo,r,2017. [Accessed: 05-Jul-2018]

"Statcast Leaderboard," *baseballsavant.com*. [Online]. Available: https://baseballsavant.mlb.com/statcast_leaderboard?year=2017&abs=100&playe r_type=pitcher. [Accessed: 05-Jul-2018]

"The Curse of the Bambino," *Babe Ruth Central Babe Ruth Babe Ruth Photos Babe Ruth Statistics Babe Ruth Biography*. [Online]. Available: http://www.baberuthcentral.com/babesimpact/legends/the-curse-of-the-bambino/. [Accessed: 05-Jul-2018]

"Top prospect Bundy to undergo Tommy John," *Sportsnet.ca*. [Online]. Available: https://www.sportsnet.ca/baseball/top-prospect-bundy-to-undergo-tommy-john/. [Accessed: 05-Jul-2018]

"Velocity and K/9," *The Hardball Times*. [Online]. Available: https://www.fangraphs.com/blogs/velocity-and-k9/. [Accessed: 05-Jul-2018]

"What Statcast spin rate means for fastballs," *MLB.com*. [Online]. Available: https://www.mlb.com/news/what-statcast-spin-rate-means-for-fastballs/c-2127356 20. [Accessed: 05-Jul-2018]