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Math Connections

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The Math Behind Baseball

Introduction: to the Statistics into Baseball

In 1980 Bill James coined the term Sabermetrics, which is one part an acronym one part denotes measurement. The Society for American Baseball Research "Saber". One of the first documented cases of using analytical research of baseball happened in 1910 when reporter Hugh Fullerton published an Article titled "The Inside Game: The Science of Baseball". F.C. Lane was one of the first to openly support the use of advanced stats. He pointed out the inaccuracies of the statistical categories that everyone was accustomed to. Though the works of Lane and James were the beginning of the uses of modern day statistical analysis of baseball it was widely unnoticed at the time of publications. That is until 1982 when Sports Illustrated published Baseball Abstract written by James in 1977. From there many people took notice and have since further developed the use of Sabermetrics into what we know today.

Original countable stats

The original box score was introduced in the early 19th century. Tallied hits, home runs, errors, and total bases. These basic stats led to the creation of many easily calculated stats. The most simple of them is Batting Average which calculates the rate a batter gets a hit by taking Hits/At Bats. From there on base percentage was introduced which is (H+BB+HBP)/(AB+BB+BP+SF). The final hitting statistic Slugging percentage which calculates how many total bases a batter is expected per at bat by total bases/At bats. Pitchers have Earned Run Average-ERA which calculates the expected runs a pitcher gives up over the course of a complete game by (earned runs*9)/IP. Others include K/9 and BB/9 which takes the amount of strikeouts and walks per 9 innings. These stats are quite simple calculations and can easily see how each player is performing. The

Modern Day Sabermetrics

In 2002 Bill James developed a formula to calculate how valuable a player is regardless of position in which he used to denote a value to all players present and past into a single number that can be comparable across eras. However since then the more modern use is Wins-Above-Replacement or more commonly known as WAR. Which has since then become two different formulas though one is most common. Batting War

or bWar is calculated by (Batting Runs + Fielding Runs Above Average + Positional Adjustment Baserunning Runs + League Adjustment + Runs Added-Double Plays)/Runs per win. Here it's calculating how efficient a player is at the most efficient aspects of a hitter. Batting, fielding, and baserunning. Some include calculations that factor in the era of baseball and include park factor. While pitchers have a much different formula. fWar is [(league FIP-FIP/Pitcher Specific Runs Per Win)+ Replacement lever * (IP/9)]* Leverage Multiplier for Relievers + League factor. FIP is Fielding independent Pitching $(13xHR + 3(BB + HBP) - 2x\,SO)/IP$ + FIP constant. FIP tells how well a pitcher is able to "control" the outcomes. Saying there are only three true outcomes that a pitcher can control is a strikeout(SO), walk(BB or HBP), and a homerun (HR). There is even expected FIP now which takes in account fly/ground ball rates into account that. These are a few of the more commonly used more widely known SaberMetrics others include; ERA+ which takes ERA and normalizes it across the league, Weighted On Base Percentage(WOBA), expectedWOBA(XWOBA), weighted Runs Created (WRC),WRC+, BABIP, SIERA, OPS+, RE24, ISO, DRS, spin rates, and UZR. These more complicated SaberMetrics are what currently shaped modern baseball. They have led to what many older baseball fans claim to have ruined the game.

Has SaberMetrics Ruined the Game

Many 'casuals' do not look into the underlying analytical drive behind the game. Baseball has introduced the shift to target players typically hitting the ball in one area, usually the pull side of a hitter. Many people ask why not drive the ball to the open side of the field other than the fact that it's virtually impossible to hit a baseball the underlying data stats though they are playing in a shift my exit velocity + launch angle says that the best outcome for a hitter is a homerun the easiest way to do that is to hit a homerun and the shortest distance for that is usually pull side for a hitter. Lots of people state the shift is bad for the game because it takes away many what would be hits without it. SaberMetrics has also prioritized home runs regardless of situations which many people disapprove of. In 1982 the league batting average was .261 and though it did mainly increase through 2009 peaking out at .270 multiple times. Which it has since diminished to .244 and .243 the past two full seasons. You may ask what happened in 2010 the introduction of the shift throughout the league prior to 2010 the shift was occasionally utilized but in 2010 its usage rates increased significantly. People say that hitters who focus solely on homeruns or teams that shift 40-50% of the time ruin baseball ,but that's not what I see. I see teams and player utilizing the math behind the game to optimize a strategy to win day in and day out.

Measuring with SaberMetrics

As SaberMetrics developed into what is now seen as today. Much more new information is available to the everyday enjoyer of baseball and its players. Many sites have graphics which are often tossed around because of the simplicity of an image. As those started to pop up a new style of sabermetrics began to pop up such as WRC+ and ERA+ which compares players. From a standpoint of 100 being average with those less being below average and vice versa for those above. Which have become a 'hotspot' for those who like to compare players because you do not need to know the underlying information to see which player has a higher WRC+ you can take a player with a 115 WRC+ and compare that to a player with a 99 WRC+ and know which player has produced more weighted runs if that's how you determine how to evaluate a player offensively. As technology increases and the desire to view and compare stats with sabermetrics new and more innovative ways of using and displaying these stats will pop up.

SaberMetrics is here to stay

In my opinion SaberMetrics has done more good than bad. As an avid enjoyer of the sport and math. I nerd out and analyze the underlying stats and SaberMetrics. Though I do understand the flip side of the coin where the average casual fan does not. That can be problematic where a major part of your game is using these advanced analytics to evaluate and utilize players. There does seem to be an underlying issue with the use of these SaberMetrics. The expected side of SaberMetrics are more projections that can show if a player is 'lucky' or 'unlucky' regardless of how their countable stats are. Every year players both under and over perform the expected stats. Depending on which stats an organization may value you can have this dilemma where a player is under performing their expected values or vice versa a player over performing. Which determines contracts thus as a player it may be hard to see why you are being undervalued though your countable stats are doing well.

SaberMetrics has shuffled how players are evaluated. That being said, the pitching has improved drastically. Pitchers have access to spin rate data on all their pitches which can show how well a pitch does in an rpm range to show this curveball is unhittable when thrown at 2900 rpms. How well a fastball does with x amount of horizontal or vertical run. Which locations a pitch does well or bad. Implications of SaberMetrics have brought baseball performance to what we see in everyday games across the entirety of sport. Thus we can expect the stats we may measure players to continue to evolve into something entirely unexpected. We may see Sabermetrics even come to be obsolete the same way some of the sabermetric gurus label those who still evaluate players like its 1940 do. Hence there is no most correct way. Whether you like

to nerd out like I do or not these metrics are here to stay until some new method of evaluation comes to be.

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