**[Getting Started](https://library.fangraphs.com/getting-started/" \o "Permanent link to Getting Started)**

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One of the goals of the FanGraphs Library is to create a static location where you can come to learn about or brush up on the advanced metrics we use on the site. This kind of resource is difficult to cultivate because so much of the great content that helps explain the numbers gets lost in the expansive oceans of daily blog posts. You’re no doubt familiar with this space as a depository for specific information on individual statistics, but we also have a blog section that walks you through a variety of concepts and ideas that don’t really fit well in a “What’s wOBA?” style page.

To that end, welcome to the Library’s new “Getting Started” page. Here you can find an explanation about the kinds of metrics we offer, but also a guide that walks you through the process of learning about sabermetrics. In the summer of 2014, I began a series of posts that hit on these major concepts, but I noticed how quickly that knowledge was fading from view. If you were new to the discussion at precisely the right time, you probably read it. If you were a month late, you missed it.

Now, if you click to our Library you can find this page very easily that helps catalog important topics outside of basic questions like “is wRC+ park-adjusted?” It will be a constantly updated section, so if you think of something that belongs here, please let us know.

[**Why Sabermetrics**](https://library.fangraphs.com/getting-started/#1) | [**The Basics**](https://library.fangraphs.com/getting-started/#2) | [**What We Offer**](https://library.fangraphs.com/getting-started/#3) | [**Key Concepts & Terms**](https://library.fangraphs.com/getting-started/#4)

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**Why Sabermetrics?**

Sabermetrics is about trying to evaluate the sport more accurately. For decades, statistics like home runs, runs batted in, batting average, wins, and earned run average were all we had to determine which players were good, which were bad, and which were in between. But as gathering, collecting, and sharing information became easier, a group of baseball teams and analysts started to develop statistics that were slightly harder to track and disseminate, but ones that were a much better reflection of talent or performance.

The most obvious example of this is the difference between batting average and on-base percentage. A walk is a positive outcome for the batter, and while it isn’t as valuable as a single or a double, it is much better than making an out. Batting average completely ignores walks, meaning that it is failing to capture important information about the hitter. Beyond that, batting average and on-base percentage assume that each hit or time on base is equally valuable, when we know that extra base hits lead to more runs than singles and walks. So there needs to be a way to credit hitters for getting on base, but also for how much their particular way of reaching base is worth. Sabermetrics, at its heart, is about making sure we capture as much of that as possible.

That’s just an example about one or two statistics, but the goal is always better evaluation and using the proper tool for question at hand. We have questions about the game and sabermetrics is about bringing all of the relevant data into the conversation to answer them.

**The Basics**

One of the most common questions we get from fans who are curious but not well-versed in sabermetrics is where they should begin. What are the first few statistics they should learn to better understand everything we offer. As you can probably tell, we have hundreds of statistics available on the site, but I believe that if you learn four statistics/concepts, you’ve picked up most of what you need to know to interpret most sabermetrics.

**Weighted On-Base Average (wOBA)**

wOBA is really the key to everything. If you understand and accept wOBA as a statistic, you’re ready for anything that we might throw at you. Essentially, wOBA is an offensive rate statistic that reads like OBP which tries to offer you a complete look at a player’s performance. It is superior to AVG/OBP/SLG and OPS for two key reasons. First, it includes everything from walks and HBP to home runs and sacrifice flies. Second, it weighs those actions based on how much they contribute to run scoring on average.

Everyone knows that a single and a double are differently valuable. If you had to choose one or the other, the double is always as good or better than the single. So right away, batting average and on-base percentage fail to capture this important difference. Yet slugging percentage and OPS do not properly resolve this issue because they weight the actions based on a 1-2-3-4 system that is simply designed to count bases. A double is worth more than a single, but it is not worth precisely twice as much, which is how slugging percentage sees it. Granted, OPS is generally going to tell a similar to story to wOBA, but OPS dramatically overvalues slugging relative to OBP. Enter wOBA.

*wOBA = (0.689×uBB + 0.722×HBP + 0.892×1B + 1.283×2B + 1.635×3B +  
2.135×HR) / (AB + BB – IBB + SF + HBP)*

Above is the wOBA formula for the 2014 season, with the league average sitting at .310 due to the low run environment. We set the league average wOBA to equal the league average OBP to make it easier to read and then we use those weights in the formula to give different credit for different types of offensive actions. A single isn’t worth half of a double, it’s worth more like 70% of one. These numbers are based on linear weights, which is a fancy way of saying they’re based on the actual run value changes that singles, doubles, etc have caused during the season.

Players should get credit for the degree to which their actions lead to run scoring and wOBA offers a much more complete accounting of that than something like RBI, AVG, or OPS. To learn more about wOBA, check out [**our glossary entry**](http://www.fangraphs.com/library/offense/woba/) and this post about **[wOBA as a gateway to sabermetrics](http://www.fangraphs.com/library/woba-as-a-gateway-statistic/)**.

**Weighted Runs Created Plus (wRC+)**

wRC+ is really just an adjusted form of wOBA. It takes the same inputs for the same reasons we just discussed, but it does two important things that matter a lot in sabermetrics: It adjusts for park effects and league average. To know wRC+, you have to understand that context has an influence on the numbers you produce. A home run in Colorado in 2000 is not as impressive as one in San Francisco in 2014. You know this intuitively, but we need to account for it in our measures of performance.

So wRC+ is essentially wOBA, but we adjust it for park to even out the way the different environments might affect a player’s raw production. If you play your home games in Colorado compared to San Francisco, your raw stat line is going to look a lot better as a hitter (and worse as a pitcher) in terms of hits and runs, but it won’t actually be more impressive because everyone hits better at Coors. Here we apply what we call a “park adjustment.”

wRC+ also scales to league average during that season so that we can more accurately compare players. In 2000, the average player had a .341 wOBA and in 2014 that number was .310. That’s a dramatic shift in the run environment due in part to drug testing and in part to the changing strike zone, but no matter the cause, it changes how we should think about certain numbers. In 2000, it was no big deal for a player to hit 30 HR, but in today’s game it’s extremely rare. Run scoring is down, so the best players and the average player are both worse in an absolute sense than they were a decade ago.

wRC+ helps us by taking the average offensive performance at setting it equal to 100 and then giving players credit based on how much better they are than league average during that year. So a player with a 120 wRC+ was 20 percent better than league average. This lets us compare across leagues and time more effectively. Basically, a .340 wOBA means something different depending on the context and wRC+ helps us see that. Context and environment always important in sabermetrics.

To learn more, check out our g[**lossary entry on wRC+**](http://www.fangraphs.com/library/offense/wrc/) and this post about [**the importance of context**](http://www.fangraphs.com/library/wrc-and-lessons-of-context/).

**Defense Independent Pitching Statistics (DIPS) and Batting Average on Balls in Play (BABIP)**

[**DIPS**](http://www.fangraphs.com/library/principles/dips/) and [**BABIP**](http://www.fangraphs.com/library/offense/babip/) are central to our understanding of everything on the field. Hitters, pitchers, fielders, it doesn’t matter. wOBA and wRC+ are about proper measurement, but DIPS and BABIP are about figuring out who is responsible for what. How much of baseball is luck? How much can you control? How much do your teammates matter?

Both of these concepts are complicated, but they are important because they help us understand how much randomness is in play during a baseball game. For hitters, you can crush a baseball and it can find someone’s glove. We’ve always known that. But until relatively recently, we didn’t realize how long it took for that luck to even out. It can take 2-4 years before a player’s unlucky hits (or hits allowed) and unlucky outs even out. What happens once the ball is put into play is driven by far more than just the hitter and pitcher, even though they’re the ones who traditionally receive all of the credit.

On the pitching side, this means that we want to try to evaluate pitchers independent of their defense, which leads us to numbers like [**Fielding Independent Pitching (FIP)**](http://www.fangraphs.com/library/pitching/fip/) and other variants. Pitchers have much less control over their BABIP than hitters and while certain pitchers might be able to run unusually low BABIPs, for the most part they can’t do much beyond determining the number of balls that are put into play.

Hitters have a much larger range of possible true talent BABIPs, but BABIP is still a very important concept to know for them as well. Hitters can maintain .335 BABIPs, but sample size matters a lot when you’re looking at their stat line. A career .295 BABIP hitter might very easily put up a .350 BABIP for a month and a half, but that doesn’t mean he has changed his talent level to that degree. Putting the ball in play and doing so with authority is a very real skill, but you can’t use the outcome of a few PA to determine if that skill has changed.

DIPS and BABIP really help us understand the importance of evaluating process and results separately. You can do everything right in baseball and the outcome might still not be very good, which means when we want to know how talented a player is or how well they’ve done their job, you want to look at their process in addition to their results. For example, a batter might go 0-4 one day, but they might have smoked three hard line drives that the left fielder happened to run down. On the other hand, the next day they might go 3-4 thanks to four weak ground balls. In small samples, you can’t always tell much about the process from the results.

Here are a couple of posts to learn more about [**BABIP**](http://www.fangraphs.com/library/why-we-care-about-babip/) and [**FIP**](http://www.fangraphs.com/library/era-fip-and-answering-the-right-question/) in addition to the links above.

**Runs and Wins**

Finally, learning to speak in the language of runs and wins is vital for understanding sabermetrics. It’s very easy, but with any new language, it’s jarring at first. The goal of baseball is to score more runs than the other team over nine innings in 162 separate games. Wins are the currency of the season and runs are the currency of each game. You want to maximize the number of runs you score, minimize the runs the other team scores, and you want to do so all year long.

This means that when we compare teams and players, we want to do so by using the currency of the game. Often times we speak about a player being X number of runs above or below average in a given area. A good defender might save 5 or 10 runs more than the average player at his position, or a great hitter might be worth 60 runs more than the average hitter that year. Their performances add runs to their teams totals and makes it more likely that they will win.

In general, about 9-10 runs above replacement is equal to one win above replacement. The average full-time player produces about 20 runs for his team above replacement per year, or about two wins. By definition a completely average team should win 81 games during a season and score the same number of runs as they allow. Roughly speaking, adding ten runs to an average team’s run differential will usually make them an 82-80 win team.

That’s the logic of runs and wins, we’re simply deconstructing team success down to the individual players and making sure players who perform well and play often are credited with these runs. [**Learn more about this terminology here**](http://www.fangraphs.com/library/learning-to-speak-saber-runs-and-wins/).

**What We Offer**

FanGraphs provides all kinds of information to help you get up to speed and to make use of the statistics about which you’re now informed. The most obvious tool is our [**FanGraphs Library**](http://fangraphs.com/library) which has detailed posts explaining the available statistics and concepts we use every day on the site. If you don’t know how or why you should use a specific stat, this area of the site will help you figure it out.

Additionally, we have loads of customizable leaderboards and pages to help you get the most out of your inquiries. Want to compare the careers of five specific players during similarly aged seasons? You can do that in less than five minutes here. Want to export some data into Excel? No problem. These posts on how to use the [**leaderboards**](http://www.fangraphs.com/library/how-to-use-fangraphs-leaderboards/) and [**player pages**](http://www.fangraphs.com/library/how-to-use-fangraphs-player-pages/) will show you how.

There are also a lot of other features on the site such as live scoreboards, win expectancy graphs, and in-game live statistics. We also provide standings (projected and real) in conjunction with depth charts and postseason odds that are updated daily. We have historical and current player and team statistics, and Ottoneu, which is a FanGraphs powered fantasy baseball game.

Finally, we have a great team of writers who offer insight and thoughtful analysis at least five days a week. We’re always adding new features and stats, so stay close if you’re looking for updates.

**Key Concepts and Terms**

Now that you have a basic grasp of sabermetrics and have a sense of what you can find on FanGraphs, it’s important to get a handle on some terms and concepts that we use a lot on the site.

**Projection**

The word “projection” shows up everywhere on FanGraphs because a lot of our conversations about baseball concern our estimates of future performance. We want to know how good a player will be in the future and to determine that, we need to use everything we know about him and similar players to project his future results.

Projections aren’t perfect estimates of the future, but they’re a “best guess” that serve as baselines for comparison. To learn more about projections, check out this [**post**](http://www.fangraphs.com/library/what-exactly-is-a-projection/).

**True Talent**

Because baseball includes so much randomness, it’s common for luck to dramatically influence the outcome of plate appearances, games, and even seasons. If you do everything right, sometimes the ball still bounces in the wrong direction. Random variation takes over and the results we observe in any one iteration don’t line up with the true, underlying talent distribution.

To put it another way, if you flip a coin 20 times, on average a fair coin will land on heads 10 times and on tails 10 times. But in any one single set of 20, virtually any combination of heads and tails is possible. It wouldn’t be that odd to get a 15/5 split once in a while. Baseball is like this in that sometimes you get a funny result even if it’s a fair coin. True talent is how good a player or team actually is, but due to the nature of the game, sometimes good teams lose to bad teams, etc.

**Regression (Toward the Mean)**

Regression is discussed so often these days that it’s become something of a meaningless buzzword, but it’s a very important idea that you have to understand to master sabermetrics. Like you read above, some of baseball is based on skill and some is based on luck. A player’s true talent level doesn’t change dramatically day to day or week to week, but their true talent level isn’t the only thing at work.

Due to luck, randomness, etc, players perform better or worse than their true talent level quite often when we’re dealing in relatively small samples. This means that until you have a very large sample size, you expect a player to regress to his “population’s” average to some degree. In other words, if a great hitter posts a .400 BABIP, you have a pretty good idea that he cannot possibly continue to post that high of a BABIP and you expect it to look something like the average BABIP for hitters of his type going forward.

**Replacement Level**

Replacement level is sometimes hotly debated because people sometimes believe it was pulled out of thin air, but it’s actually grounded pretty heavily in fact. Replacement level, or a replacement player, is defined as a player or team of players who you could acquire for essentially nothing on the free agent market. In other words, replacement level is what you could get out of a minor league free agent/AAAA type player.

We calculate that a team of only those players would still win about 48 games per season, and given that there are 2,430 games to be won each year, there are about 1,000 wins above replacement (WAR) to be earned by MLB players. We like to compare players to replacement level because it offers us a common yard stick. “How much better is this player than some random player we could grab for nothing?” It’s a useful baseline and it’s mathematically pretty accurate. If you take the MLB performance of minor league free agents over a year or two, it quite often averages out to roughly 0 WAR.

**Defensive Metrics**

Defensive metrics are also controversial because they’re new and they sometimes disagree with our eyes, and we like to trust our eyes. Essentially, these metrics try to determine how well a defender has performed by combining the difficulty of making each play (based on how often the average player makes the play) and the run value of each play (the average change in run expectancy for similar batted balls).

The inputs used to create these measurements are not perfect, but the overall structure and philosophy is very useful. We want to know how many runs a defender has saved, but we can’t always trust the tools we have to make the measurements. To learn more, click over to this detailed [**explanation**](http://www.fangraphs.com/library/the-beginners-guide-to-measuring-defense/).

**Statistics and Terminology**

Finally, it’s important to keep a level head [**about statistics**](http://www.fangraphs.com/library/the-beginners-guide-to-using-statistics-properly/) and [**language**](http://www.fangraphs.com/library/defensive-metrics-their-flaws-and-the-language-of-writers/) more generally. Some statistics are better than others, without a doubt, but no single statistic is perfect. wOBA is always a better bet than batting average, but wOBA isn’t without its flaws. To properly analyze something, you need to bring [**as much information**](http://www.fangraphs.com/library/why-its-always-better-to-use-multiple-statistics/) into the debate as possible.

You need to understand who is writing/speaking and who their audience is. If you read an article on FanGraphs that cites WAR but doesn’t mention some of the potential flaws of the statistic, it’s because the writer is assuming the reader is already aware of that information. We may list 3.5 WAR above 3.0 WAR in the leaderboards, but we know that those players are very difficult to distinguish with WAR because they are so close. However, if you aren’t familiar and don’t speak the language, you might think the we are making a bold statement about which player is better. In general, the best advice is to use caution when making inferences because there is a lot of information that is implied but never verbalized.

[MORE TO COME]

[**Complete List (Offense)**](https://library.fangraphs.com/offense/offensive-statistics-list/)

by [Neil Weinberg](https://library.fangraphs.com/author/nwein44/)

October 30, 2014

Here in the [**FanGraphs Library**](http://www.fangraphs.com/library), we have many pages devoted to extremely detailed breakdowns of some of our most prominent statistics. You can find hundreds of words about [**Weighted On-Base Average (wOBA)**](http://www.fangraphs.com/library/offense/woba/) or [**Batting Average on Balls in Play (BABIP)**](http://www.fangraphs.com/library/offense/babip/) for instance, but sometimes you aren’t looking for hundreds of words. Sometimes you just want some very basic information.

With that in mind, we present this post which will serve as a *complete*directory for every single offensive statistic available at FanGraphs. This post is organized in accordance with our leaderboards, so if you see something in the “Advanced” tab of the leaderboard that you don’t recognize, come to this page and find the matching acronym in the “Advanced” section. You can also use “CTRL + F” in most browsers and type in the stat you’re looking to identify.

There are a few stray statistics located around the site that don’t show up on the leaderboards, so please let us know if you find something that needs to be added. In any of the cases in which we have a full post about the stat, you’ll find links to that page.

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**Dashboard**

G (Games Played): Number of games in which the player has appeared.

PA (Plate Appearances): Number of times the player has come to the plate.

HR (Home Runs): Number of home runs.

R (Runs Scored): Number of runs scored.

RBI (Runs Batted In): Number of times a run scores as a result of a batter’s plate appearance, not counting situations in which an error caused the run to score or the batter hit into a double play.

SB (Stolen Bases): Number of stolen bases.

[**BB% (Walk Percentage)**](http://www.fangraphs.com/library/offense/rate-stats/): Frequency with which the batter has walked, calculated as walks divided by plate appearances.

[**K% (Strikeout Percentage)**](http://www.fangraphs.com/library/offense/rate-stats/): Frequency with which the batter has struck out, calculated as strikeouts divided by plate appearances.

[**ISO (Isolated Power)**](http://www.fangraphs.com/library/offense/iso/): Average number of extra bases per at bat, calculated several ways such as SLG minus AVG.

[**BABIP (Batting Average on Balls in Play)**](http://www.fangraphs.com/library/offense/babip/): The rate at which the batter gets a hit when he puts the ball in play, calculated as (H-HR)/(AB-K-HR+SF).

AVG (Batting Average): Rate of hits per at bat, calculated as H/AB.

[**OBP (On Base Percentage)**](http://www.fangraphs.com/library/offense/obp/): Rate at which the batter reaches base, calculated as (H+BB+HBP)/(AB+BB+HBP+SF).

SLG (Slugging Percentage): Average number of total bases per at bat, calculated as Total Bases/AB.

[**wOBA (Weighted On Base Average)**](http://www.fangraphs.com/library/offense/woba/): Combines all the different aspects of hitting into one metric, weighting each of them in proportion to their actual run value. While batting average, on-base percentage, and slugging percentage fall short in accuracy and scope, wOBA measures and captures offensive value more accurately and comprehensively.

[**wRC+ (Weighted Runs Created Plus)**](http://www.fangraphs.com/library/offense/wrc/): The most comprehensive rate statistic used to measure hitting performance because it takes into account the varying weights of each offensive action (like wOBA) and then adjusts them for the park and league context in which they took place.

[**BsR (Base Running Runs Above Average)**](http://www.fangraphs.com/library/offense/bsr/): Number of runs above or below average a player has been worth on the bases, based on stolen bases, caught stealing, extra bases taken, outs on the bases, and avoiding double plays. It is the combination of wSB, UBR, and wGDP.

[**Off (Offensive Runs Above Average)**](http://www.fangraphs.com/library/offense/off/): Number of runs above or below average a player has been worth offensively, combining Batting Runs and BsR.

[**Def (Defensive Runs Above Average)**](http://www.fangraphs.com/library/defense/def/): Number of runs above or below average a player has been worth on defense, combining Fielding Runs (Total Zone before 2002, UZR after) and the positional adjustment.

[**WAR (Wins Above Replacement)**](http://www.fangraphs.com/library/misc/war/): A comprehensive statistic that estimates the number of wins a player has been worth to his team compared to a freely available player such as a minor league free agent. You can learn [**exactly how we calculated it here**](http://www.fangraphs.com/library/war/war-position-players/).

**Standard:**

G (Games Played): Number of games in which the player has appeared.

AB (At Bats): Number of trips to the plate in which the batter does not walk, get hit by a pitch, sacrifice (fly or bunt), or reach on interference.

PA (Plate Appearances): Number of times the player has come to the plate.

H (Hits): Number of hits.

1B (Singles): Number of singles.

2B (Doubles): Number of doubles.

3B (Triples): Number of triples.

HR (Home Runs): Number of home runs.

R (Runs Scored): Number of runs scored.

RBI (Runs Batted In): Number of times a run scores as a result of a batter’s plate appearance, not counting situations in which an error caused the run to score or the batter hit into a double play.

BB (Walks): Total number of walks (includes IBB).

IBB (Intentional Walks): Number of times the batter was intentionally walked.

SO (Strikeouts): Number of strikeouts.

HBP (Hit By Pitches): Number of times the batter reached after being hit by a pitch.

SF (Sacrifice Flies): Number of times a batter’s fly out allowed a runner to tag up and score.

SH (Sacrifice Bunts): Any bunt in which there was a runner on base and less than two outs in which the batter was put out and at least one runner advanced.

GDP (Grounded into Double Play): Number of times the batter hit into a double play.

SB (Stolen Bases): Number of stolen bases.

CS (Caught Stealing): Number of times caught stealing.

AVG (Batting Average): Rate of hits per at bat, calculated as H/AB.

**Advanced:**

PA (Plate Appearances): Number of times the player has come to the plate.

[**BB% (Walk Percentage)**](http://www.fangraphs.com/library/offense/rate-stats/): Frequency with which the batter has walked, calculated as walks divided by plate appearances.

[**K% (Strikeout Percentage)**](http://www.fangraphs.com/library/offense/rate-stats/): Frequency with which the batter has struck out, calculated as strikeouts divided by plate appearances.

BB/K (Walk to Strikeout Rate): Ratio of walks to strikeouts, calculated as Walks/Strikeouts.

AVG (Batting Average): Rate of hits per at bat, calculated as H/AB.

[**OBP (On Base Percentage)**](http://www.fangraphs.com/library/offense/obp/): Rate at which the batter reaches base, calculated as (H+BB+HBP)/(AB+BB+HBP+SF).

SLG (Slugging Percentage): Average number of total bases per at bat, calculated as Total Bases/AB.

[**OPS (On Base Plus Slugging)**](http://www.fangraphs.com/library/offense/ops/): Combination of OBP and SLG, calculated as OBP+SLG.

[**ISO (Isolated Power)**](http://www.fangraphs.com/library/offense/iso/): Average number of extra bases per at bat, calculated several ways such as SLG minus AVG.

[**Spd (Speed Score)**](http://www.fangraphs.com/library/offense/spd/): A slightly outdated statistic that attempts to measure a player’s running ability.

[**BABIP (Batting Average on Balls in Play)**](http://www.fangraphs.com/library/offense/babip/): The rate at which the batter gets a hit when he puts the ball in play, calculated as (H-HR)/(AB-K-HR+SF).

[**UBR (Ultimate Base Running)**](http://www.fangraphs.com/library/offense/ubr/): The number of runs above or below average added by a player on all non-SB/CS base running players.

[**wGDP (Weighted Grounded Into Double Play Runs)**](http://www.fangraphs.com/library/offense/wgdp/): The number of runs above or below average added by a player by staying out of double plays.

[**wSB (Weighted Stolen Base Runs Above Average)**](http://www.fangraphs.com/library/offense/wsb/): Number of runs above or below average added by a player on stolen base attempts.

[**wRC (Weighted Runs Created)**](http://www.fangraphs.com/library/offense/wrc/): Number of runs a player has generated for his team as a result of his wOBA and playing time.

[**wRAA (Weighted Runs Above Average)**](http://www.fangraphs.com/library/offense/wraa/): Number of runs above or below average a player has added as a hitter.

[**wOBA (Weighted On Base Average)**](http://www.fangraphs.com/library/offense/woba/): Combines all the different aspects of hitting into one metric, weighting each of them in proportion to their actual run value. While batting average, on-base percentage, and slugging percentage fall short in accuracy and scope, wOBA measures and captures offensive value more accurately and comprehensively.

[**wRC+ (Weighted Runs Created Plus)**](http://www.fangraphs.com/library/offense/wrc/): The most comprehensive rate statistic used to measure hitting performance because it takes into account the varying weights of each offensive action (like wOBA) and then adjusts them for the park and league context in which they took place.

**Batted Ball**

[**BABIP (Batting Average on Balls in Play)**](http://www.fangraphs.com/library/offense/babip/): The rate at which the batter gets a hit when he puts the ball in play, calculated as (H-HR)/(AB-K-HR+SF).

GB/FB (Ground Ball to Fly Ball Ratio): The ratio of ground balls a batter hits to fly balls, calculated as GB/FB.

[**LD% (Line Drive Percentage)**](http://www.fangraphs.com/library/offense/batted-ball/): The percentage of a batter’s balls in play that are line drives, calculated as LD/BIP.

[**GB% (Ground Ball Percentage)**](http://www.fangraphs.com/library/offense/batted-ball/): The percentage of a batter’s balls in play that are ground balls, calculated as GB/BIP.

[**FB% (Fly Ball Percentage)**](http://www.fangraphs.com/library/offense/batted-ball/): The percentage of a batter’s balls in play that are fly balls, calculated as FB/BIP.

IFFB% (Infield Fly Ball Percentage): Percentage of a batter’s fly balls that were infield fly balls, calculated as IFFB/FB.

HR/FB (Home Run to Fly Ball Rate): Percentage of a batter’s fly balls that go for home runs, calculated as HB/FB (even though some HR are line drives).

IFH (Infield Hits): Number of infield hits.

IFH% (Infield Hit Percentage): Percentage of ground balls that are infield hits, calculated as IFH/GB.

BUH (Bunt Hits): Number of bunt hits.

BUH% (Bunt Hit Percentage): Percentage of bunts that go for hits, calculated as Bunt Hits/Bunts.

[**Pull%**](http://www.fangraphs.com/library/offense/batted-ball-direction/) (Pull Percentage): Percentage of batted balls hit to the pull field.

[**Cent%**](http://www.fangraphs.com/library/offense/batted-ball-direction/) (Center Percentage): Percentage of batted balls hit to the middle of the field.

[**Oppo%**](http://www.fangraphs.com/library/offense/batted-ball-direction/) (Opposite Field Percentage): Percentage of batted balls hit to the opposite field.

[**Soft%**](http://www.fangraphs.com/library/offense/quality-of-contact-stats/) (Soft Contact Percentage): Percentage of soft-hit batted balls.

[**Med%**](http://www.fangraphs.com/library/offense/quality-of-contact-stats/)(Medium Contact Percentage): Percentage of medium-hit batted balls.

[**Hard%**](http://www.fangraphs.com/library/offense/quality-of-contact-stats/) (Hard Contact Percentage): Percentage of hard-hit batted balls.

**Win Probability**

[**WPA (Win Probability Added)**](http://www.fangraphs.com/library/misc/wpa/): The total impact a batter’s plate appearances (or SB/CS) have on his team’s win expectancy relative to league average.

[**-WPA (Negative Win Probability Added)**](http://www.fangraphs.com/library/misc/wpa/): The sum of a batter’s negative WPA events.

[**+WPA (Positive Win Probability Added)**](http://www.fangraphs.com/library/misc/wpa/): The sum of a batters positive WPA events.

[**RE24 (Run Expectancy 24 Base Out State)**](http://www.fangraphs.com/library/misc/re24/): The total impact a batter’s plate appearances (or SB/CS) have on his team’s run expectancy relative to league average.

[**REW (Run Expectancy Wins)**](http://www.fangraphs.com/library/misc/re24/): RE24 converted from runs to wins.

[**pLI (Average Leverage Index)**](http://www.fangraphs.com/library/misc/li/): The average leverage index of each batter’s plate appearances.

[**phLI (Average Leverage Index while Pinch Hitting)**](http://www.fangraphs.com/library/misc/li/): The average leverage index of each batter’s plate appearances while pinch hitting.

PH (Pinch Hits): Number of hits while serving as a pinch hitter.

[**WPA/LI (Situational Wins)**](http://www.fangraphs.com/library/misc/wpa-li/): A player’s WPA controlling for leverage index, calculated as the sum of each event’s WPA/LI, not total WPA/LI.

[**Clutch (Clutch Score)**](http://www.fangraphs.com/library/misc/clutch/): The difference between a player’s totalWPA/pLI and their WPA/LI defined above.

**Pitch Type**

*This section refers to data from Baseball Info Solutions. Raw PITCHf/x data is found in the PITCHf/x section. The % numbers refer to percentage and the “v” numbers refer to average velocity.*

FB% (Fastball Percentage)

FBv (Average Fastball Velocity)

SL% (Slider Percentage)

SLv (Average Slider Velocity)

CT% (Cutter Percentage)

CTv (Average Cutter Velocity)

CB% (Curveball Percentage)

CBv (Average Curveball Velocity)

CH% (Changeup Percentage)

CHv (Average Changeup Velocity)

SF% (Split-Finger Percentage)

SFv (Average Split-Finger Velocity)

KN% (Knuckleball Percentage)

KNv (Average Knuckleball Velocity)

XX% (Unidentified Pitch Percentage)

**Pitch Value**

*This section refers to pitch data from Baseball Info Solutions and denotes the number of runs above average a batter was against a specific pitch type (or that type per 100 pitches). Learn more about them*[***here***](http://www.fangraphs.com/library/offense/pitch-type-linear-weights/)*.*

wFB (Weighted Fastball Runs)

wSL (Weighted Slider Runs)

wCT (Weighted Cutter Runs)

wCH (Weighted Changeup Runs)

wSF (Weighted Split Finger Runs)

wKN (Weighted Knuckleball Runs)

wFB/C (Weighted Fastball Runs per 100 pitches)

wSL/C (Weighted Slider Runs per 100 pitches)

wCT/C (Weighted Cutter Runs per 100 pitches)

wCH/C (Weighted Changeup Runs per 100 pitches)

wSF/C (Weighted Split Finger per 100 pitches)

wKN/C (Weighted Knuckleball Runs per 100 pitches)

**Plate Discipline**

*These statistics are based on data from Baseball Info Solutions. Learn more about them*[***here***](http://www.fangraphs.com/library/offense/plate-discipline/)*.*

O-Swing% (Outside the Zone Swing Percentage): Swings at pitches outside the zone divided by pitches outside the zone.

Z-Swing% (Inside the Zone Swing Percentage): Swings at pitches inside the zone divided by pitches inside the zone.

Swing% (Swing Percentage): Swings divided by total pitches.

O-Contact% (Outside the Zone Contact Percentage): Contact made outside the zone divided by swings outside the zone.

Z-Contact% (Inside the Zone Contact Percentage): Contact made inside the zone divided by swings inside the zone.

Contact% (Contact Percentage): Contact made divided by swings.

Zone% (Zone Percentage): Pitches inside the zone divided by total pitches.

F-Strike% (First Pitch Strike Percentage): Percentage of PA that begin with a strike.

SwStr% (Swinging Strike Percentage): Swinging strikes divided by total pitches.

**Value**

*To learn more about each of these statistics, visit our*[***page on position player WAR***](http://www.fangraphs.com/library/war/war-position-players/)*.*

Batting (Batting Runs Above Average): Number of runs above or below average added as a hitter.

Base Running (Base Running Runs Above Average): Number of runs above or below average added as a base runner.

Fielding (Fielding Runs Above Average): Number of runs above or below average added as a fielder.

Positional (Positional Runs Above Average): The number of runs above or below average allocated based on the number of innings at player at specific positions.

Offense (Offensive Runs Above Average): Number of runs above or below average added on offense (Batting + Base Running)

Defense (Defensive Runs Above Average): Number of runs above or below average added on defense (Fielding + Positional)

League (League Adjustment): An adjustment made per PA to make sure each league has exactly 0 runs above average.

Replacement (Replacement Runs): Number of runs an average player is worth compared to a freely available player, given their PA.

RAR (Runs Above Replacement): Sum of Off+Def+League+Replacement.

WAR (Wins Above Replacement): A comprehensive statistic that estimates the number of wins a player has been worth to his team compared to a freely available player such as a minor league free agent. You can learn [**exactly how we calculated it here**](http://www.fangraphs.com/library/war/war-position-players/).

Dollars (Dollar Value of Performance): The amount of money a player’s production would be worth on the free agent market in millions of dollars. This column uses $5.5MM/WAR, but that is a calculation from several years ago. The current number is between $6 million and $7 million.

**PITCHf/x Pitch Type**

*The following represent pitch type percentages according to PITCHf/x data. The name of the pitch is next to each.*

FA% (Four Seam and Unclassified Fastballs)

FT% (Two Seam Fastballs)

FC% (Cutters)

FS% (Split Fingers)

FO% (Forkballs)

SI% (Sinkers)

SL% (Sliders)

CU% (Cuvreballs)

KC% (Knuckle-Curves)

EP% (Ephesuses)

CH% (Changeups)

SC% (Screwballs)

KN% (Knuckleballs)

UN% (Unknowns)

**PITCHf/x Velocity**

*The following are the average velocities according to PITCHf/x data. The name of the pitch is next to each.*

vFA (Four Seam and Unclassified Fastballs)

vFT (Two Seam Fastballs)

vFC (Cutters)

vFS (Split Fingers)

vFO (Forkballs)

vSI (Sinkers)

vSL (Sliders)

vCU (Cuvreballs)

vKC (Knuckle-Curves)

vEP (Ephesuses)

vCH (Changeups)

vSC (Screwballs)

vKN (Knuckleballs)

vUN (Unknowns)

**PITCHf/x H-Movement**

*The following are the average horizontal movements of the pitches according to PITCHf/x. The name of the pitch is next to each. (Negative values move toward RHH, positive values move toward LHH)*

FA-X (Four Seam and Unclassified Fastballs)

FT-X (Two Seam Fastballs)

FC-X (Cutters)

FS-X (Split Fingers)

FO-X (Forkballs)

SI-X (Sinkers)

SL-X (Sliders)

CU-X (Cuvreballs)

KC-X (Knuckle-Curves)

EP-X (Ephesuses)

CH-X (Changeups)

SC-X (Screwballs)

KN-X (Knuckleballs)

UN-X (Unknowns)

**PITCHf/x V-Movement**

*The following are the average vertical movements of the pitches according to PITCHf/x. The name of the pitch is next to each. (Numbers are relative to a pitch with no spin, meaning gravity’s effect is removed)*

FA-Z (Four Seam and Unclassified Fastballs)

FT-Z (Two Seam Fastballs)

FC-Z (Cutters)

FS-Z (Split Fingers)

FO-Z (Forkballs)

SI-Z (Sinkers)

SL-Z (Sliders)

CU-Z (Cuvreballs)

KC-Z (Knuckle-Curves)

EP-Z (Ephesuses)

CH-Z (Changeups)

SC-Z (Screwballs)

KN-Z (Knuckleballs)

UN-Z (Unknowns)

**PITCHf/x Pitch Type Value**

*The following are runs above average against each pitch using PITCHf/x data. The name of the pitch is next to each. Learn about pitch values*[***here***](http://www.fangraphs.com/library/offense/pitch-type-linear-weights/)*.*

wFA (Four Seam and Unclassified Fastballs)

wFT (Two Seam Fastballs)

wFC (Cutters)

wFS (Split Fingers)

wFO (Forkballs)

wSI (Sinkers)

wSL (Sliders)

wCU (Cuvreballs)

wKC (Knuckle-Curves)

wEP (Ephesuses)

wCH (Changeups)

wSC (Screwballs)

wKN (Knuckleballs)

wUN (Unknowns)

**PITCHf/x Pitch Value/100**

*The following are runs above average against each pitch per 100 pitches using PITCHf/x data. The name of the pitch is next to each. Learn about pitch values*[***here***](http://www.fangraphs.com/library/offense/pitch-type-linear-weights/)*.*

wFA/C (Four Seam and Unclassified Fastballs)

wFT/C (Two Seam Fastballs)

wFC/C (Cutters)

wFS/C (Split Fingers)

wFO/C (Forkballs)

wSI/C (Sinkers)

wSL/C (Sliders)

wCU/C (Cuvreballs)

wKC/C (Knuckle-Curves)

wEP/C (Ephesuses)

wCH/C (Changeups)

wSC/C (Screwballs)

wKN/C (Knuckleballs)

wUN/C (Unknowns)

**PITCHf/x Plate Discipline**

*The following are plate discipline numbers using PITCHf/x data. Learn about plate discipline numbers*[***here***](http://www.fangraphs.com/library/offense/plate-discipline/)*.*

PA (Plate Appearances): Number of times the player has come to the plate.

O-Swing% (Outside the Zone Swing Percentage): Swings at pitches outside the zone divided by pitches outside the zone.

Z-Swing% (Inside the Zone Swing Percentage): Swings at pitches inside the zone divided by pitches inside the zone.

Swing% (Swing Percentage): Swings divided by total pitches.

O-Contact% (Outside the Zone Contact Percentage): Contact made outside the zone divided by swings outside the zone.

Z-Contact% (Inside the Zone Contact Percentage): Contact made inside the zone divided by swings inside the zone.

Contact% (Contact Percentage): Contact made divided by swings.

Zone% (Zone Percentage): Pitches inside the zone divided by total pitches.

Pace (Average Time Between Pitches): Average time between pitches seen by a batter, based on PITCHf/x timestamps.

[**Complete List (Pitching)**](https://library.fangraphs.com/pitching/complete-list-pitching/)

by [Neil Weinberg](https://library.fangraphs.com/author/nwein44/)

December 18, 2014

Here in the [**FanGraphs Library**](http://www.fangraphs.com/library), we have many pages devoted to extremely detailed breakdowns of some of our most prominent statistics. You can find hundreds of words about [**Weighted On-Base Average (wOBA)**](http://www.fangraphs.com/library/offense/woba/) or [**Batting Average on Balls in Play (BABIP)**](http://www.fangraphs.com/library/offense/babip/) for instance, but sometimes you aren’t looking for hundreds of words. Sometimes you just want some very basic information.

With that in mind, we present this post which will serve as a *complete*directory for every single pitching statistic available at FanGraphs. This post is organized in accordance with our leaderboards, so if you see something in the “Advanced” tab of the leaderboard that you don’t recognize, come to this page and find the matching acronym in the “Advanced” section. You can also use “CTRL + F” in most browsers and type in the stat you’re looking to identify.

There are a few stray statistics located around the site that don’t show up on the leaderboards, so please let us know if you find something that needs to be added. In any of the cases in which we have a full post about the stat, you’ll find links to that page.

\*\*\*\*\*

**Dashboard**

W (Wins): Number of wins.

L (Losses): Number of losses.

SV (Saves): Number of saves.

G (Games): Number of games in which the pitcher appeared.

GS (Games Started): Number of games the pitcher started.

IP (Innings Pitched): Number of total innings pitched (.1 represents 1/3 of an inning, .2 represents 2/3 of an inning).

[**K/9 (Strikeouts per 9 innings)**](http://www.fangraphs.com/library/pitching/rate-stats/): Average number of strikeouts per 9 innings.

[**BB/9 (Walks per 9 innings)**](http://www.fangraphs.com/library/pitching/rate-stats/): Average number of walks per 9 innings.

HR/9 (Home Runs per 9 innings): Average number of home runs allowed per 9 innings.

[**BABIP (Batting Average on Balls in Play)**](http://www.fangraphs.com/library/pitching/babip/): The rate at which the pitcher allows a hit when the ball is put in play, calculated as (H-HR)/(AB-K-HR+SF).

[**LOB% (Left On-Base Percentage)**](http://www.fangraphs.com/library/pitching/lob/): Percentage of pitcher’s own base runners that they strand over the course of a season. Not equal to the LOB column in the box score.

[**GB% (Ground Ball Percentage)**](http://www.fangraphs.com/library/pitching/batted-ball/): The percentage of a pitcher’s balls in play that are ground balls, calculated as GB/BIP.

[**HR/FB (Home Run to Fly Ball Rate)**](http://www.fangraphs.com/library/pitching/hrs/): Percentage of a pitcher’s fly balls that go for home runs, calculated as HB/FB (even though some HR are line drives).

[**ERA (Earned Run Average)**](http://www.fangraphs.com/library/pitching/era/): The average number of earned runs a pitcher allows per 9 innings. ((ER\*9)/IP)

[**FIP (Fielding Independent Pitching)**](http://www.fangraphs.com/library/pitching/fip/): An estimate of a pitcher’s ERA based on strikeouts, walks/HBP, and home runs allowed, assuming league average results on balls in play.

[**xFIP (Expected Fielding Independent Pitching)**](http://www.fangraphs.com/library/pitching/xfip/): An estimate of a pitcher’s ERA based on strikeouts, walks/HBP, and fly balls allowed, assuming league average results on balls in play and home run to fly ball ratio.

[**WAR (Wins Above Replacement)**](http://www.fangraphs.com/library/misc/war/): A comprehensive statistic that estimates the number of wins a player has been worth to his team compared to a freely available player such as a minor league free agent based on FIP.

**Standard:**

W (Wins): Number of wins.

L (Losses): Number of losses.

[**ERA (Earned Run Average)**](http://www.fangraphs.com/library/pitching/era/): The average number of earned runs a pitcher allows per 9 innings. ((ER\*9)/IP)

G (Games): Number of games in which the pitcher appeared.

GS (Games Started): Number of games the pitcher started.

CG (Complete Games): Number of starts in which the pitcher recorded every out of an official game.

ShO (Shutouts): Number of complete games in which the pitcher allowed no runs.

SV (Saves): Number of saves.

HLD (Holds): Number of holds.

BS (Blown Saves): Number of times the pitcher entered in a save situation as lost the lead.

IP (Innings Pitched): Number of total innings pitched (.1 represents 1/3 of an inning, .2 represents 2/3 of an inning).

TBF (Total Batters Faced): The number of batters a pitcher has faced, akin to plate appearances.

H (Hits Allowed): Number of hits allowed by the pitcher.

R (Runs Allowed): Number of runs allowed by the pitcher.

ER (Earned Runs Allowed): Number of earned runs allowed by the pitcher, determined by the official scorer.

BB (Walks): Number of walks allowed by the pitcher.

IBB (Intentional Walks): Number of intentional walks issue by the pitcher.

HBP (Hit By Pitches): Number of hit batters.

WP (Wild Pitches): Number of wild pitches.

BK (Balks): Number of balks.

SO (Strikeouts): Number of strikeouts.

**Advanced:**

[**K/9 (Strikeouts per 9 innings)**](http://www.fangraphs.com/library/pitching/rate-stats/): Average number of strikeouts per 9 innings.

[**BB/9 (Walks per 9 innings)**](http://www.fangraphs.com/library/pitching/rate-stats/): Average number of walks per 9 innings.

K/BB (Strikeout to Walk Ratio): Strikeouts divided by walks.

HR/9 (Home Runs per 9 innings): Average number of home runs allowed per 9 innings.

[**K% (Strikeout Percentage)**](http://www.fangraphs.com/library/pitching/rate-stats/): Frequency with which the pitcher has struck out a batter, calculated as strikeouts divided by total batters faced.

[**BB% (Walk Percentage)**](http://www.fangraphs.com/library/pitching/rate-stats/): Frequency with which the pitcher has issued a walk, calculated as walks divided by total batters faced.

K%-BB% (Strikeout Percentage minus Walk Percentage): The percentage differential between K% and BB%, often a better indicator of performance than K/BB, which can be skewed by very low walk rates.

AVG (Batting Average Against): Rate of hits allowed per at bat, calculated as H/AB.

[**WHIP (Walks Plus Hits per Inning Pitched)**](http://www.fangraphs.com/library/pitching/whip/): The average number of base runners allowed via hit or walk per inning.

[**BABIP (Batting Average on Balls in Play)**](http://www.fangraphs.com/library/pitching/babip/): The rate at which the pitcher allows a hit when the ball is put in play, calculated as (H-HR)/(AB-K-HR+SF).

[**LOB% (Left On-Base Percentage)**](http://www.fangraphs.com/library/pitching/lob/): Percentage of pitcher’s own base runners that they strand over the course of a season. Not equal to the LOB column in the box score.

[**ERA- (Earned Run Average minus)**](http://www.fangraphs.com/library/pitching/era-fip-xfip/): ERA adjusted for park effects and league average (set to 100 for each year).

[**FIP- (Fielding Independent Pitching minus)**](http://www.fangraphs.com/library/pitching/era-fip-xfip/): FIP adjusted for park effects and league average (set to 100 for each year).

[**xFIP (Expected Fielding Independent Pitching minus)**](http://www.fangraphs.com/library/pitching/era-fip-xfip/): xFIP adjusted for park effects and league average (set to 100 for each year).

[**ERA (Earned Run Average)**](http://www.fangraphs.com/library/pitching/era/): The average number of earned runs a pitcher allows per 9 innings. ((ER\*9)/IP)

[**FIP (Fielding Independent Pitching)**](http://www.fangraphs.com/library/pitching/fip/): An estimate of a pitcher’s ERA based on strikeouts, walks/HBP, and home runs allowed, assuming league average results on balls in play.

E-F (ERA-FIP Differential): The difference between the pitcher’s ERA and FIP.

[**xFIP (Expected Fielding Independent Pitching)**](http://www.fangraphs.com/library/pitching/xfip/): An estimate of a pitcher’s ERA based on strikeouts, walks/HBP, and fly balls allowed, assuming league average results on balls in play and home run to fly ball ratio.

[**SIERA (Skill Interactive ERA)**](http://www.fangraphs.com/library/pitching/siera/): An ERA estimator that attempts to more accurately capture a pitcher’s performance based on strikeouts, walks/HBP, home runs, and batted ball data.

**Batted Ball**

[**BABIP (Batting Average on Balls in Play)**](http://www.fangraphs.com/library/pitching/babip/): The rate at which the pitcher allows a hit when the ball in put play, calculated as (H-HR)/(AB-K-HR+SF).

GB/FB (Ground Ball to Fly Ball Ratio): The ratio of ground balls a pitcher allows to fly balls, calculated as GB/FB.

[**LD% (Line Drive Percentage)**](http://www.fangraphs.com/library/pitching/batted-ball/): The percentage of a pitchers’s balls in play that are line drives, calculated as LD/BIP.

[**GB% (Ground Ball Percentage)**](http://www.fangraphs.com/library/pitching/batted-ball/): The percentage of a pitchers’s balls in play that are ground balls, calculated as GB/BIP.

[**FB% (Fly Ball Percentage)**](http://www.fangraphs.com/library/pitching/batted-ball/): The percentage of a pitcherss balls in play that are fly balls, calculated as FB/BIP.

IFFB% (Infield Fly Ball Percentage): Percentage of a pitchers’s fly balls that were infield fly balls, calculated as IFFB/FB.

[**HR/FB**](http://www.fangraphs.com/library/pitching/hrs/) (Home Run to Fly Ball Rate): Percentage of a pitcher’s fly balls that go for home runs, calculated as HB/FB (even though some HR are line drives).

RS (Run Support): Number of runs the pitcher’s team has scored during their appearances.

RS/9 (Run Support per 9 innings): Number of runs the pitcher’s team has scored during their appearances per 9 innings.

Balls (Balls): Number of total balls thrown.

Strikes (Strikes): Number of total strikes thrown.

Pitches (Pitches): Number of total pitches thrown.

[**Pull%**](http://www.fangraphs.com/library/pitching/batted-ball-direction/) (Pull Percentage): Percentage of batted balls hit to the pull field.

[**Cent%**](http://www.fangraphs.com/library/pitching/batted-ball-direction/) (Center Percentage): Percentage of batted balls hit to the middle of the field.

[**Oppo%**](http://www.fangraphs.com/library/pitching/batted-ball-direction/) (Opposite Field Percentage): Percentage of batted balls hit to the opposite field.

[**Soft%**](http://www.fangraphs.com/library/pitching/quality-of-contact-stats/) (Soft Contact Percentage): Percentage of soft-hit batted balls.

[**Med%**](http://www.fangraphs.com/library/pitching/quality-of-contact-stats/) (Medium Contact Percentage): Percentage of medium-hit batted balls.

[**Hard%**](http://www.fangraphs.com/library/pitching/quality-of-contact-stats/) (Hard Contact Percentage): Percentage of hard-hit batted balls.

**Win Probability**

[**WPA (Win Probability Added)**](http://www.fangraphs.com/library/misc/wpa/): The total impact a pitcher’s batters faced (or SB/CS) have on his team’s win expectancy relative to league average.

[**-WPA (Negative Win Probability Added)**](http://www.fangraphs.com/library/misc/wpa/): The sum of a pitcher’s negative WPA events.

[**+WPA (Positive Win Probability Added)**](http://www.fangraphs.com/library/misc/wpa/): The sum of a pitcher’s positive WPA events.

[**RE24 (Run Expectancy 24 Base Out State)**](http://www.fangraphs.com/library/misc/re24/): The total impact a pitcher’s batters faced (or SB/CS) have on his team’s run expectancy relative to league average.

[**REW (Run Expectancy Wins)**](http://www.fangraphs.com/library/misc/re24/): RE24 converted from runs to wins.

[**pLI (Average Leverage Index)**](http://www.fangraphs.com/library/misc/li/): The average leverage index of each pitcher’s batters faced.

[**inLI (Inning Leverage Index):**](http://www.fangraphs.com/library/misc/li/) The average leverage index at the beginning of the inning for the pitcher.

[**gmLI (Game Leverage Index)**](http://www.fangraphs.com/library/misc/li/): The average leverage index at the beginning of the game for the pitcher.

[**exLI (Exit Leverage Index)**](http://www.fangraphs.com/library/misc/li/): The average leverage index at the end of the appearance for the pitcher.

Pulls (Pulls): Number of times the pitcher has been removed from a game.

[**WPA/LI (Situational Wins)**](http://www.fangraphs.com/library/misc/wpa-li/): A player’s WPA controlling for leverage index, calculated as the sum of each event’s WPA/LI, not total WPA/LI.

[**Clutch (Clutch Score)**](http://www.fangraphs.com/library/misc/clutch/): The difference between a player’s totalWPA/pLI and their WPA/LI defined above.

[**SD (Shutdowns)**](http://www.fangraphs.com/library/pitching/sd-md/): Number of relief appearances worth 0.06 WPA or more.

[**MD (Meltdowns)**](http://www.fangraphs.com/library/pitching/sd-md/): Number of relief appearances worth -0.06 or less.

**Pitch Type**

*This section refers to data from Baseball Info Solutions. Raw PITCHf/x data is found in the PITCHf/x section. The % numbers refer to percentage and the “v” numbers refer to average velocity.*

FB% (Fastball Percentage)

FBv (Average Fastball Velocity)

SL% (Slider Percentage)

SLv (Average Slider Velocity)

CT% (Cutter Percentage)

CTv (Average Cutter Velocity)

CB% (Curveball Percentage)

CBv (Average Curveball Velocity)

CH% (Changeup Percentage)

CHv (Average Changeup Velocity)

SF% (Split-Finger Percentage)

SFv (Average Split-Finger Velocity)

KN% (Knuckleball Percentage)

KNv (Average Knuckleball Velocity)

XX% (Unidentified Pitch Percentage)

**Pitch Value**

*This section refers to pitch data from Baseball Info Solutions and denotes the number of runs above average a batter was against a specific pitch type (or that type per 100 pitches). Learn more about them*[***here***](http://www.fangraphs.com/library/pitching/linear-weights/)*.*

wFB (Weighted Fastball Runs)

wSL (Weighted Slider Runs)

wCT (Weighted Cutter Runs)

wCH (Weighted Changeup Runs)

wSF (Weighted Split Finger Runs)

wKN (Weighted Knuckleball Runs)

wFB/C (Weighted Fastball Runs per 100 pitches)

wSL/C (Weighted Slider Runs per 100 pitches)

wCT/C (Weighted Cutter Runs per 100 pitches)

wCH/C (Weighted Changeup Runs per 100 pitches)

wSF/C (Weighted Split Finger per 100 pitches)

wKN/C (Weighted Knuckleball Runs per 100 pitches)

**Plate Discipline**

*These statistics are based on data from Baseball Info Solutions. Learn more about them*[***here***](http://www.fangraphs.com/library/pitching/plate-discipline-o-swing-z-swing-etc/)*.*

O-Swing% (Outside the Zone Swing Percentage): Swings at pitches outside the zone divided by pitches outside the zone.

Z-Swing% (Inside the Zone Swing Percentage): Swings at pitches inside the zone divided by pitches inside the zone.

Swing% (Swing Percentage): Swings divided by total pitches.

O-Contact% (Outside the Zone Contact Percentage): Contact made outside the zone divided by swings outside the zone.

Z-Contact% (Inside the Zone Contact Percentage): Contact made inside the zone divided by swings inside the zone.

Contact% (Contact Percentage): Contact made divided by swings.

Zone% (Zone Percentage): Pitches inside the zone divided by total pitches.

F-Strike% (First Pitch Strike Percentage): Percentage of PA that begin with a strike.

SwStr% (Swinging Strike Percentage): Swinging strikes divided by total pitches.

**Value**

*Note: The pitcher WAR section of the Library is still in need of revision!*

[**RA9-WAR (Runs Allowed based WAR)**](http://www.fangraphs.com/library/pitching/fdp/):  A comprehensive statistic that estimates the number of wins a player has been worth to his team compared to a freely available player such as a minor league free agent based on his runs allowed per 9.

[**BIP-Wins (BABIP Wins)**](http://www.fangraphs.com/library/pitching/fdp/): An estimate of how many wins a pitcher has added by having a [**BABIP**](http://www.fangraphs.com/library/offense/babip/) above or below league average. It adjusts for park and league.

[**LOB-Wins (Left On-Base Wins)**](http://www.fangraphs.com/library/pitching/fdp/): An estimate of how many wins a pitcher has added as a result of stranding runners on base.

[**FDP-Wins (Fielding Dependent Wins)**](http://www.fangraphs.com/library/pitching/fdp/): The sum of BIP-Wins and LOB-Wins. It is also the difference between RA9-Wins and FanGraphs’ standard FIP-based pitching WAR.

RAR (Runs Above Replacement): The number of runs a player has been worth to his team compared to a freely available player based on FIP.

[**WAR (Wins Above Replacement)**](http://www.fangraphs.com/library/misc/war/): A comprehensive statistic that estimates the number of wins a player has been worth to his team compared to a freely available player such as a minor league free agent based on his FIP.

Dollars (Dollar Value of Performance): The amount of money a player’s production would be worth on the free agent market in millions of dollars. This column uses $5.5MM/WAR, but that is a calculation from several years ago. The current number is between $6 million and $7 million.

**PITCHf/x Pitch Type**

*The following represent pitch type percentages according to PITCHf/x data. The name of the pitch is next to each.*

FA% (Four Seam and Unclassified Fastballs)

FT% (Two Seam Fastballs)

FC% (Cutters)

FS% (Split Fingers)

FO% (Forkballs)

SI% (Sinkers)

SL% (Sliders)

CU% (Cuvreballs)

KC% (Knuckle-Curves)

EP% (Ephesuses)

CH% (Changeups)

SC% (Screwballs)

KN% (Knuckleballs)

UN% (Unknowns)

**PITCHf/x Velocity**

*The following are the average velocities according to PITCHf/x data. The name of the pitch is next to each.*

vFA (Four Seam and Unclassified Fastballs)

vFT (Two Seam Fastballs)

vFC (Cutters)

vFS (Split Fingers)

vFO (Forkballs)

vSI (Sinkers)

vSL (Sliders)

vCU (Cuvreballs)

vKC (Knuckle-Curves)

vEP (Ephesuses)

vCH (Changeups)

vSC (Screwballs)

vKN (Knuckleballs)

vUN (Unknowns)

**PITCHf/x H-Movement**

*The following are the average horizontal movements of the pitches according to PITCHf/x. The name of the pitch is next to each. (Negative values move toward RHH, positive values move toward LHH)*

FA-X (Four Seam and Unclassified Fastballs)

FT-X (Two Seam Fastballs)

FC-X (Cutters)

FS-X (Split Fingers)

FO-X (Forkballs)

SI-X (Sinkers)

SL-X (Sliders)

CU-X (Cuvreballs)

KC-X (Knuckle-Curves)

EP-X (Ephesuses)

CH-X (Changeups)

SC-X (Screwballs)

KN-X (Knuckleballs)

UN-X (Unknowns)

**PITCHf/x V-Movement**

*The following are the average vertical movements of the pitches according to PITCHf/x. The name of the pitch is next to each. (Numbers are relative to a pitch with no spin, meaning gravity’s effect is removed)*

FA-Z (Four Seam and Unclassified Fastballs)

FT-Z (Two Seam Fastballs)

FC-Z (Cutters)

FS-Z (Split Fingers)

FO-Z (Forkballs)

SI-Z (Sinkers)

SL-Z (Sliders)

CU-Z (Cuvreballs)

KC-Z (Knuckle-Curves)

EP-Z (Ephesuses)

CH-Z (Changeups)

SC-Z (Screwballs)

KN-Z (Knuckleballs)

UN-Z (Unknowns)

**PITCHf/x Pitch Type Value**

*The following are runs above average against each pitch using PITCHf/x data. The name of the pitch is next to each. Learn about pitch values*[***here***](http://www.fangraphs.com/library/pitching/linear-weights/)*.*

wFA (Four Seam and Unclassified Fastballs)

wFT (Two Seam Fastballs)

wFC (Cutters)

wFS (Split Fingers)

wFO (Forkballs)

wSI (Sinkers)

wSL (Sliders)

wCU (Cuvreballs)

wKC (Knuckle-Curves)

wEP (Ephesuses)

wCH (Changeups)

wSC (Screwballs)

wKN (Knuckleballs)

wUN (Unknowns)

**PITCHf/x Pitch Value/100**

*The following are runs above average against each pitch per 100 pitches using PITCHf/x data. The name of the pitch is next to each. Learn about pitch values*[***here***](http://www.fangraphs.com/library/pitching/linear-weights/)*.*

wFA/C (Four Seam and Unclassified Fastballs)

wFT/C (Two Seam Fastballs)

wFC/C (Cutters)

wFS/C (Split Fingers)

wFO/C (Forkballs)

wSI/C (Sinkers)

wSL/C (Sliders)

wCU/C (Cuvreballs)

wKC/C (Knuckle-Curves)

wEP/C (Ephesuses)

wCH/C (Changeups)

wSC/C (Screwballs)

wKN/C (Knuckleballs)

wUN/C (Unknowns)

**PITCHf/x Plate Discipline**

*The following are plate discipline numbers using PITCHf/x data. Learn about plate discipline numbers*[***here***](http://www.fangraphs.com/library/pitching/plate-discipline-o-swing-z-swing-etc/)*.*

IP (Innings Pitched): Number of total innings pitched (.1 represents 1/3 of an inning, .2 represents 2/3 of an inning).

O-Swing% (Outside the Zone Swing Percentage): Swings at pitches outside the zone divided by pitches outside the zone.

Z-Swing% (Inside the Zone Swing Percentage): Swings at pitches inside the zone divided by pitches inside the zone.

Swing% (Swing Percentage): Swings divided by total pitches.

O-Contact% (Outside the Zone Contact Percentage): Contact made outside the zone divided by swings outside the zone.

Z-Contact% (Inside the Zone Contact Percentage): Contact made inside the zone divided by swings inside the zone.

Contact% (Contact Percentage): Contact made divided by swings.

Zone% (Zone Percentage): Pitches inside the zone divided by total pitches.

Pace (Average Time Between Pitches): Average time between pitches seen by a batter, based on PITCHf/x timestamps.

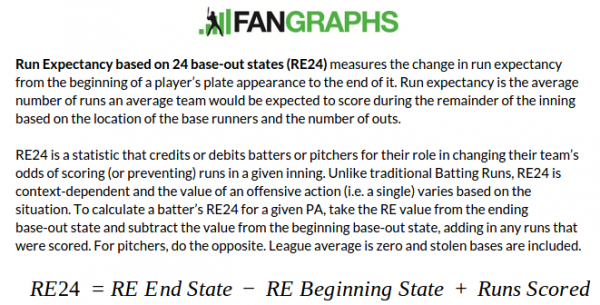
**Other**

[**GSv2 (Game Score Version 2.0)**](http://www.fangraphs.com/library/pitching/game-score/): FanGraphs’ version of Game Score, which rates starts based on outs, strikeouts, walks, hits, and home runs.

[**RE24**](https://library.fangraphs.com/misc/re24/)

by [Neil Weinberg](https://library.fangraphs.com/author/nwein44/)

July 30, 2014

**[](http://www.fangraphs.com/library/wp-content/uploads/2014/07/RE24-Flash-Card-8-16-15-e1439774974729.png)**

*RE24 (or run expectancy based on the 24 base-out states)*may sound like a computer error or a random assortment of letters and numbers, but the actual logic and mechanisms behind the statistic make it extremely useful for fans and analysts. It is based on the concept of run expectancy, which provides the average number of expected runs per inning given the current number of outs and placement of baserunners. The number “24” refers to the potential number of base-out states (zero, one, two outs and eight different baserunner arrangements).

Since run expectancy tells you the number of expected runs, any number of runs created above or below that value can be treated as runs above or below average for the batter or pitcher depending on the outcome of each plate appearance. Unlike **[wRAA](http://www.fangraphs.com/library/offense/wraa/)**, **[wRC](http://www.fangraphs.com/library/offense/wrc/)**, or Batting Runs, RE24 is context-dependent and assigns more credit for hits with men on base than with the bases empty. With league average set to 0, hitters with positive RE24 are creating more runs than we would expect given the situations they have been placed in and pitchers with positive numbers are preventing more runs than average given the situations in which they have been placed.

On the hitting side, RE24 is a measure of how well hitters are capitalizing on their opportunities while also not assigning extra credit (like RBI) to hitters who happen to come to the plate with men on base very often. For pitchers, particularly relievers, RE24 is useful because it allows for multiple pitchers to share credit for allowing a baserunner to score and assigns credit to pitchers who strand the runners of the pitcher they relieved.

**Calculation:**

Calculating RE24 for a specific play or game is extremely easy as long as you are working with the appropriate run expectancy matrix. A run expectancy matrix presents the expected number of runs scored between a given point and the end of an inning based on the overall run environment, the number of outs, and the placement of the baserunners. For example, in the RE matrix below (run environment set at 4.15 runs per game), the expected number of runs given a runner on first and no outs is 0.831 runs.

| **Runners** | **0 Outs** | **1 Out** | **2 Outs** |
| --- | --- | --- | --- |
| Empty | 0.461 | 0.243 | 0.095 |
| 1 \_ \_ | 0.831 | 0.489 | 0.214 |
| \_ 2 \_ | 1.068 | 0.644 | 0.305 |
| 1 2 \_ | 1.373 | 0.908 | 0.343 |
| \_ \_ 3 | 1.426 | 0.865 | 0.413 |
| 1 \_ 3 | 1.798 | 1.140 | 0.471 |
| \_ 2 3 | 1.920 | 1.352 | 0.570 |
| 1 2 3 | 2.282 | 1.520 | 0.736 |

To calculate the RE24 of a given plate appearance, simply take the run expectancy of the result of the play, subtract the run expectancy of the the starting state, and add in any runs scored during the play. For example, if the play started with a man on first and no outs there was an original run expectancy of 0.831. If the batter hits a single that results in the runner getting to third and the batter ending on first, the resulting run expectancy would be 1.798. Since no runs were scored on the play, you would simply do the following:

*1.798 – 0.831 + 0 = 0.967 RE24*

A great thing about calculating RE24 is that whatever positive credit goes to the batter is mirrored exactly by the pitcher. So for allowing that single with a man on first, the pitcher would get -0.967 RE24. If a baserunner advances on a stolen base, wild pitch, or passed ball, the baserunner is credited with the RE24 and the pitcher is debited. In all other cases, the batter and pitcher are the only ones who are assigned credit for the play.

When runs are scored on the play, the calculation works the same way, but make sure you don’t forget to factor in the runs scored. So imagine that a batter singles with men on first and third and no outs (1.798 RE), moving us from that state to a state with men on first and second with no outs (1.373 RE).

*1.373 – 1.798 + 1 = 0.575 RE24*

As long as you have the proper matrix in front out you (there are unique ones for each park and year based on run scoring and the one presented above is roughly neutral for 2014), calculating this stat is a snap, even if the name makes it sound esoteric. [**This interactive tool allows you to change the run environment and calculate custom matrices.**](http://www.fangraphs.com/blogs/introducing-the-batter-specific-run-expectancy-tool/) A player’s season RE24 is simply the sum of the individual RE24 values of each plate appearance of the season with total run values on par with what you might see in a stat such as wRAA.

**Why RE24:**

RE24 is valuable because it provides an answer to a different question than context-neutral run values like wRAA, wRC, and Batting Runs for hitters. If you want to know how frequently a batters hits a single or a double and how valuable his performance would have been in a neutral context, one of the other run value statistics is your best bet. Those stats tell you what happened in the batter’s box. RE24 tells you how what happened in the batter’s box impacted the context of the inning.

A batter who hit a double with two outs and the bases empty performed the same action as a batter who hit that double with the bases loaded, but the bases loaded double was much more productive given the situation. The bases empty double was worth about .2 runs above average while the bases loaded double was worth about 2.5 runs above average.

Whether you wish to use a context neutral or context dependent statistic is up to you. Generally, there is very little evidence that hitting with men on base is a unique skill independent of hitting in general, but there are good arguments for why using RE24 as a value metric is reasonable even if it isn’t a direct measure of skill. For example, looking at a player’s RE24 probably won’t be more predictive of a player’s future performance than looking at their wRAA, but when assigning retroactive credit, say in an MVP race, RE24 could make sense given your philosophical approach.

For pitchers, RE24 is scaled differently than our typical runs allowed metrics, so the comparison to context neutral statistics isn’t as obvious, but it provides a measure of how many runs above or below average each pitcher allowed given the state of the game. For starters, RE24 is only going to be particularly relevant when dealing with innings in which they were pulled from the game. All other innings will yield equivalent results to runs allowed because even if the pitcher gets docked for allowing runners to reach, they will be credited for stranding those same runners. For relievers, however, this is a very useful measure.

Relievers enter into games and leave games with men on base frequently, so the standard rule book definition of runs allowed doesn’t always capture a reliever’s true performance. For example, if a reliever enters with the bases loaded and no outs, stranding the runners and allowing all three to score have the exact same impact on that relievers RA9 or ERA. When using RE24, stranding the runners is worth 2.282 RE24 and allowing them to score and then getting out of the inning is worth -0.72 RE24.

For starting pitchers, you’re only going to notice significant differences if the starter is unusually lucky or unlucky with respect to how often their relievers allow inherited runners to score. There are a number of pitchers affected by that type of luck each year, but the value of RE24 remains more apparent when looking at relief pitchers.

**How to Use RE24:**

RE24 is very simple to use for hitters if you’re already familiar with runs above average numbers like wRAA. With league average set to zero, any positive value is that many runs above average and any negative value is that many runs below average. RE24 includes batting and between at bat baserunning (stolen base, wild pitches, etc), so if a player has 30.5 RE24, that means they were about 30 runs better than the average player would have been if given the same opportunities. Each win is worth between 9 and 10 runs depending on the year, so you can convert RE24 into wins by dividing it by that year’s runs per win. On FanGraphs, we call this REW instead of RE24.

Remember that RE24 is providing you with context adjusted runs, so when looking at this statistic you are measuring a player’s performance above or below average given the context in which they were placed. If you want to compare their context neutral stats with their context adjusted stats, an easy trick is to compare RE24 to Batting Runs plus wSB (or OFF minus UBR). This will allow you to see how well or poorly timed a hitter’s performance has been, but remember, context dependent numbers are less predictive of future performance than context neutral ones.

For pitchers, using RE24 in the language of RA9 or ERA is a bit trickier. You could simply learn to think in terms of runs above average for pitchers like you do for hitters, but the alternative is to take about 0.46 runs per inning and subtract the pitcher’s RE24 total to see it in terms of runs allowed. Then if you treat that new number as runs allowed and multiply be 9 and divide by innings pitcher, you’ll wind up with something akin to RE24 on a per 9 inning scale. Remember that RE24 is based on the run environment and park so this won’t be perfect. Remember also that while allowing runs is bad, a positive RE24 is good because it is a measure of runs better than average for pitchers. For starters, you won’t typically see dramatic differences, but for relievers you might.

Additionally, while RE24 controls for outs and baserunner placement, it does not make any adjustments based on the score of the game or the inning, meaning that a bases loaded situation is the same if the score is tied in the ninth inning or if the gap is seven runs in the fourth. In other words, while it controls for the likely number of runs, it does not control for how important those runs might be in the context of the game. RE24 also does not include any defensive value. All offensive events go to the hitter (or baserunner on steals) and all defensive events are credited to the pitcher. So while you can swap in RE24 for Batting Runs + wSB, you cannot look at a player’s RE24-Wins and call that WAR because it does not include all baserunning, any defense, any positional adjustment, or replacement level.

**Context:**

RE24 is measured in runs above average based on the current run environment, but since league average is always set to zero, the following rules of thumb apply:

**Rules of Thumb**

| **Rating** | **RE24 (Hitters)** | **RE24 SP** | **RE24 RP** |
| --- | --- | --- | --- |
| Excellent | 45 | 25 | 15 |
| Great | 30 | 15 | 10 |
| Above Average | 15 | 10 | 5 |
| Average | 0 | 0 | 0 |
| Below Average | -5 | -5 | -5 |
| Poor | -10 | -10 | -10 |
| Awful | -20 | -20 | -15 |

**Things to Remember:**

● RE24 is based on the run expectancy matrix for the given park in a particular year, so while a neutral matrix like the one above will help you apply the concept, you might not be able to match RE24 values that we have on the leaderboards with your own calculations.

● RE24 only includes hitting and baserunning such as stolen bases and advancing on wild pitches for hitters. It does not include other baserunning, defense, position, or replacement level.

● RE24 assigns all defensive credit to the pitcher, so errors and bad defensive plays go against the pitcher as if the outcome of the play was caused by a sharp single.

● RE24 is context dependent by base-out state, but not by score or inning.

**Links for Further Reading:**

[**Get to Know RE24 – FanGraphs**](http://www.fangraphs.com/blogs/get-to-know-re24/)

[**RE24 – Inside The Book Blog**](http://www.insidethebook.com/ee/index.php/site/article/re24/)

[**Context Batting Runs – FanGraphs**](http://www.fangraphs.com/blogs/context-batting-runs/)

[**Introducing The Batter-Specific Run Expectancy Matrix – FanGraphs**](http://www.fangraphs.com/blogs/introducing-the-batter-specific-run-expectancy-tool/)

[**Win Expectancy**](https://library.fangraphs.com/misc/we/)

by [Steve Slowinski](https://library.fangraphs.com/author/steve-slow/)

February 17, 2010

*Win Expectancy (WE)* is the percent chance a particular team will win based on the score, inning, outs, runners on base, and the run environment. These percentages are calculated using historical data, meaning if a team is losing and has a 24% win expectancy, only 24% of teams in similar situations in the past have ever come back to win.

To get an in-depth feel for how win expectancy works, check out Tom  Tango’s [**Win Expectancy Charts**](http://www.tangotiger.net/welist.html) or download and explore this [**extremely detailed and adjustable spreadsheet**](ftp://ftp.baseballgraphs.com/wpa).

**Calculation:**

Calculating win expectancy from scratch is one of those things that’s extremely easy conceptually and very challenging in practice. All you would have to do to find the win expectancy of a situation would be to identify all similar situations in the last ten years or so (the sample you choose depends on the run environment) and then find the winning percentage of teams who found themselves in those situations.

This isn’t exactly the kind of thing you’d want to mindlessly do between pitches, which is why FanGraphs hosts live Win Expectancy Graphs for every regular and postseason game. Click on an individual game under the “Scores” tab at the top of the page to find the WE graph from the game of your choosing. It updates every time the inning, score, and base-out state changes and tells you the probability of the home team winning the game. A win expectancy of 57%, for example, means that the home team is expected to win 57% of the time and the road team is expected to win 43% of the time.

Our WE numbers start at 50% for each club, but you could factor in a home-field advantage and the quality of both pitchers and lineups to derive a more accurate starting point for that particular game. Our Game Odds feature does that! Remember though, that standard win probability only knows the inning, score, and base-out state. It doesn’t know anything about who is playing, who is due up, etc.

**Why Win Expectancy:**

Win Expectancy is the ultimate story statistic. It tells you which moments in the game had the biggest effect on each team’s chances of winning and also gives you a sense of how likely it might be for the trailing team to rally back and win. You have to remember that WE is merely reporting the long-run averages, so a 24% WE doesn’t necessarily mean the true odds in this exact moment are 24%.

WE is also going to provide the basis for [**Win Probability Added (WPA)**](http://www.fangraphs.com/library/misc/wpa/), which is a statistic that tracks each players impact on the team’s odds of winning the game by measuring the change in WE from the beginning of their PA to the end of it.

**How to Use Win Expectancy:**

Using Win Expectancy is extremely easy. It is simply the percent chance that teams in similar situations in the past have won their game. You don’t need to know anything else to make use of this statistic. WE is the long-run average, however, so you need to remember that a 40% chance of winning is based on average players. If Miguel Cabrera is at the plate against Aaron Crow, the true odds favor the Tigers more than the WE graph indicates.

**Context:**

As a game goes on, the win expectancies for both teams are constantly changing on a play-by-play basis.  This is what a win expectancy chart for a game looks like:

This is the win expectancy chart for [**Game Six of the 2011 World Series**](http://www.fangraphs.com/wins.aspx?date=2011-10-27&team=Cardinals&dh=0&season=2011). Notice how as the game goes on, the green line moves closer and closer to the Rangers’ side of the chart, indicating that the Rangers are becoming more and more likely to win. That peaks in the ninth inning, when the Rangers came one strike away from winning the game before the Cardinals rallied to tie the game and then win it.

Those final innings were a whirlwind, and the bouncing win expectancy line mimics indicates that. Win expectancy is a *great* story-telling stat.

Also, notice that certain key events change the win expectancy more than others (see: [**Win Probability Added**](http://www.fangraphs.com/library/misc/wpa/)).

[**LI**](https://library.fangraphs.com/misc/li/)

by [Steve Slowinski](https://library.fangraphs.com/author/steve-slow/)

February 17, 2010

During the course of a game, some situations are more tense and suspenseful than others. For instance, we know that a one-run lead in the bottom of the ninth inning is more suspenseful than a one-run lead in the top of the third inning. Batting with two runners on and two outs in the eighth inning is filled with more pressure than batting in the same situation in the second inning. *Leverage Index (LI)* is merely an attempt to quantify this pressure so we can determine if a player has been used primarily in high-leverage or low-leverage situations.

There are many different iterations of LI, including the following ones available on the site:

**pLI**: A player’s average LI for all game events.  
**phLI**: A batter’s average LI in only pinch hit events.  
**gmLI**: A pitcher’s average LI when he enters the game.  
**inLI**: A pitcher’s average LI at the start of each inning.  
**exLI**: A pitcher’s average LI when exiting the game.

**Calculation:**

Leverage Index certainly isn’t something you would calculate during a game, but you can track it on our live Win Expectancy graphs located in the Scores section of the site during games. The reason you wouldn’t calculate it live is because there are a large number of simple calculations that go into each Leverage Index, which makes tracking it with a table or a graph ideal (the bar graph below the line graph is the LI).  
  
Source: [**FanGraphs**](http://www.fangraphs.com/livewins.aspx?date=2014-10-29&team=Royals&dh=0&season=2014)

The mechanics behind Leverage Index, however, are easy enough to follow. If you’re extremely interested, you should read [**this full explanation**](http://www.hardballtimes.com/crucial-situations/) from Tom Tango, the creator of this flavor of LI. Leverage Index is essentially a measure of how critical a particular situation is. To calculate it, you are measuring the swing of the possible change in win expectancy.

You take the current base-out state, inning, and score and you find the possible changes in Win Expectancy that could occur during this particular plate appearance. Then you multiple those potential changes by the odds of that potential change occurring, add them up, and divide by the average potential swing in WE to get the Leverage Index.

A simple example will make that much easier to comprehend. Imagine the home team has a WE of 0.60 and then let’s assume that there are only two possible outcomes of this play (Single, Strikeout) just for clarity’s sake. Imagine each occurs 50% of the time on average (Again, just for clarity). Let’s say the WE after a single would be 0.7 and the WE after a strikeout would be 0.4. Let’s also say that the average swing is 0.04.

To get the LI of this fictional situation, you would take (0.1\*0.5 +0.2\*0.5)/0.04. This would be an LI of 3.75, which is extremely high! This makes a great deal of sense because the potential change in WE during this one at bat is quite large. It could end at 70% or 40% when most only have a spread of about 4%.

If you’re curious, you should read the linked article from Tango because he offers a more thorough explanation. In real life, there are more than two possible outcomes, so you have to average over far more possible scenarios. There are also other ways of arriving at the same answer, but this method is typically the easiest to understand.

An LI of 1 is average. We officially classify anything below 0.85 as low leverage and anything above 2.0 as high leverage.

**Why Leverage Index:**

Leverage Index is a measure of how “on the line” the game is at that particular moment. The great thing about LI is that it’s extremely intuitive, even if the calculation might not be. You know when the game arrives at a high leverage moment. If we polled people from various baseball backgrounds (statisticians, players, coaches, fans) they would all generally agree on which moments were high leverage. LI is simply a quantification of that intensity based on Win Expectancy.

This allows you to determine how players perform in different situations (high, medium, and low leverage). It allows you to review the way managers use their relief pitchers. It warns you that the game might change very dramatically.

Performance in high or low leverage moments isn’t a repeatable skill, but it’s important for teams to manage according to the situation and there’s plenty of room to admire players who contribute during big moments.

**How To Use Leverage Index:**

Leverage Index is a snap to use. An LI of 1 is average. Anything above 1 is above average and anything below it is below average. We bin the situations into three groups (Low: 0-0.85, Medium: 0.85-2.0, High: 2.0+), but then can range from essentially 0 to around 10 for the most intense moments.

You can look at the LI of a situation and recognize that this moment could really swing the game in either direction if the number is high. If it’s low, you can acknowledge that no matter what occurs here, the game is unlikely to be fundamentally altered.

When looking at LI for players across multiple games and seasons, you can get a sense of how they were used. For batters, there typically won’t be a huge range of average LI for starters, but pinch hitters who are used in big spots will have high phLI. Relievers who get the big innings will usually have higher LI.

You can also use the “Splits” to see how each player performed in each of these types of situations. Although it is important to remember that performance based on leverage is not a particularly repeatable or predictive skill. A .400 wOBA in high leverage situations one year tells you very little about the player that you couldn’t glean from their overall stat line.

**Context:**

An average (or neutral) LI is 1. High leverage is 2.0 and above, and low leverage is below 0.85. 10% of all real game situations have a LI greater than 2, while 60% have a LI less than 1. You can use [**this table**](http://www.insidethebook.com/li.shtml) of Leverage Indexes to familiarize yourself. Leverage Index is conditional on Win Expectancy and because that changes with the run environment, LI will be a little different from year to year. Average will always be 1 and the cut points are the same, but the specific events and situations will change a bit.

**Things to Remember:**

● Leverage Index depends on the inning, score, outs, and number of runners on base.

● Leverage Index is a measure of the potential swing in WE relative to average. Average is always 1.0.

●

● There are a variety of ways to calculate LI and several variants available at FanGraphs, showing things like the average LI when a pitcher enters and the average LI when they exit a game.

● If you go to a player’s “Splits” section his FanGraphs player page, you can find how the player performed in low, medium, and high leverage situations. While some players may have performed well in high-leverage situations compared to their average performance, that does not necessarily mean they will continue to produce that way in the future. “Clutch hitting” is generally the result of [**small sample sizes**](http://www.fangraphs.com/library/principles/sample-size/) and random variation. A player shown to be very clutch one season does not necessarily mean that he will be very clutch in the next.

[**WPA**](https://library.fangraphs.com/misc/wpa/)

by [Steve Slowinski](https://library.fangraphs.com/author/steve-slow/)

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*Win Probability Added (WPA)* captures the change in [**Win Expectancy**](http://www.fangraphs.com/library/misc/we/)from one plate appearance to the next and credits or debits the player based on how much their action increased their team’s odds of winning. Most sabermetric statistics are context neutral — they do not consider the situation of a particular event or how some plays are more crucial to a win than others. While **[wOBA](http://www.fangraphs.com/library/offense/woba/)** rates all home runs as equal, we know intuitively that a home run in the third inning of a blowout is less important to that win than a home run in the bottom of the ninth inning of a close game. WPA captures this difference.

For example, say the Rays have a 45% chance of winning before Ben Zobrist comes to the plate. During his at-bat, Zobrist hits a home run, pushing the Rays’ win expectancy jumps to 75%. That difference in win expectancy (in decimal form, +.30) from the beginning of the play to the end is Ben Zobrist’s WPA for that play. The pitcher receivers a -0.30. If Zobrist strikes out during his next at bat and lowers his team’s win expectancy by 5%, his overall WPA for the game so far would be +.30 – .05 = +.25, as WPA is a cumulative statistic and is additive.

**Calculation:**

WPA is rather straightforward to calculate as long as you have access to the Win Expectancy chart or graph for the game. During each plate appearance, the inning, score, or base-out state changes from the beginning to the end, which leads to a change in Win Expectancy. That change is assigned to both the pitcher and batter (inversely). The sum of a player’s individual WPA generates their WPA for the season.

If a batter flies out on the first pitch of the game, the home team’s WE goes up from 50% to about 52%. This means that the pitcher who induced the out gets a WPA of +0.02 and the batter gets a WPA of -0.02.

The credits are always symmetrical, meaning that anything that the hitter gains, the pitcher loses, and vice versa. At the end of every game, the winning team’s players will have a total WPA of +0.5 and the losing team’s players will have a total WPA of -0.5. Although it is important to remember that pitchers are held entirely accountable for everything that happens on defense and position players’ scores are unaffected by anything they do while in the field.

Average is set to zero, so a season long WPA of 2.0 is two wins better than average, not replacement level.

**Why Win Probability Added:**

WPA is the ultimate context dependent statistic. You get credit based on how much your action contributes to the odds of winning, meaning a home run in a 1-1 game in the 9th is dramatically more valuable than one in a 10-1 game in the 9th. For this reason, WPA is terrific at telling the story of the game and the players who delivered in big situations. When did the winning team pull away? Who had the decisive hit? These are questions WPA can answer.

It doesn’t tell you how well a player performed, it tells you how important their performance was.

**How to Use Win Probability Added:**

WPA is tricky because there’s an innate desire to use it as a measure of “which player has delivered when it matters most!” In reality, it’s far more complicated than that because it’s an additive measure. To accrue big WPA totals, you need to be presented with many opportunities to come through with the game on the line. A player with a 5.0 WPA for the year hasn’t necessarily been more “clutch” than one with a 2.0 WPA, they may simply have had many chances with the bases loaded late in close games.

Also, WPA is not a predictive statistic and there is little evidence that there is anything like a WPA-skill. Players who have higher WPAs in one year don’t necessarily repeat that performance in the following year, other than to say good players typically have higher WPAs than worse players.

You can view WPA for hitters and pitchers. You’ll notice three columns on the site — WPA, -WPA, and +WPA. The first is the total WPA for the year (or time period), “-WPA” is the sum of all of the negative events, and “+WPA” is the sum of all of the positive events. There’s also single game WPA numbers and play-by-play WPA numbers in the box scores, game logs, and play logs throughout the site.

**Context:**

Technically, WPA values for events that contribute positively to a win can range from about 1% (.01 WPA) to 95% (.95 WPA). The extreme swings in WPA are not terribly common, just as walk-off home runs are exciting events we don’t see every day.

Cumulatively, season-long WPA is not predictive, making it an ineffective number for projections of a player’s talent. However, it is a good describer of what happened in the game and how a win was achieved. And since +1 WPA equals 100% in win expectancy, +1 WPA is the equivalent of one win above average.

For MLB *regulars*, here’s a quick breakdown on season-long WPA scores:

|  |  |
| --- | --- |
| **Rating** | **WPA** |
| Excellent | +6.0 |
| Great | +3.0 |
| Above Average | +2.0 |
| Average | +1.0 |
| Below Average | 0.0 |
| Poor | -1.0 |
| Awful | -3.0 |

**Things to Remember:**

● WPA is not highly predictive. Generally, it is not used for player analysis and projecting the future. But it does give us a picture of which players helped their team the most during the course of a game. A fun way to think of WPA is as a*storytelling statistic*. It highlights the big (and most exciting) moments of a game as well as the players who contributed most to a win (or loss).

● WPA is a cumulative statistic, meaning that players with more playing time will have more opportunities to accrue a higher WPA, but they can also lose WPA if they perform poorly.

● Pitchers receive all of the positive or negative credit on a defensive play. Position players only gain or lose WPA on offense.

● Zero is average, not replacement level.

[**DIPS**](https://library.fangraphs.com/principles/dips/)

by [Steve Slowinski](https://library.fangraphs.com/author/steve-slow/)

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Analyzing pitching is complicated for many reasons, but one of the most important issues is that we judge pitchers on their ability to prevent runs, yet preventing runs is a team effort among the pitcher and his defenders. It’s ultimately a team game, but when you want to evaluate individual players you want to isolate their individual contributions.

For many years, the primary method of judging pitchers was based on the number of earned runs they allowed. While this seems like a sensible strategy on its face — subtracting out runs that occurred due to errors — team defense is still a huge factor in ERA. Bad defense isn’t just about errors, it’s about not getting to the ball in the first place as well. Pitchers play generally in front of one defensive unit all year so pitchers with good defenders will allow fewer runs than a pitcher of the same quality who throws in front of bad defenders.

So far, this is all very straightforward. We want to measure pitchers based on their contributions, not the contributions of the other players on the field. Actually doing so is quite difficult, but we can approach the problem in a number of ways. The overarching idea however is that we want a class of measurements that are independent of defense, or as we sometimes say Defense Independent Pitching Statistics (DIPS).

Over the years, DIPS as an idea has been confusingly blended with specific DIPS-based metrics like [**Fielding Independent Pitching (FIP)**](http://www.fangraphs.com/library/pitching/fip/). There are some parts of pitching which are independent of one’s defense and some that are dependent on one’s defense. This is undeniable. Certain metrics attempt to measure pitching using only those events which are independent of defense, but a metric is built in the DIPS tradition if it attempts to separate out what pitchers can control in *some* fashion.

DIPS theory took off about 15-20 years ago when research by Voros McCracken was published demonstrating how little control pitchers have over outcomes on balls in play. In more typical parlance, pitchers have limited control over their BABIP-allowed. As a result of this finding, a family of metrics was created that estimated a pitcher’s performance based on those defense-independent outcomes (walks, hit batters, strikeouts, home runs). The most famous of these is FIP, but you probably have also seen [**Expected Fielding Independent Pitching (xFIP)**](http://www.fangraphs.com/library/pitching/xfip/) quite often, which replaces home runs with fly ball rate.

Because FIP and xFIP (along with tERA and SIERA) were the most popular first generation DIPS metrics, it became standard to equate *the DIPS concept* with these particular implementations. In other words, it is common to suggest that DIPS theory states that pitchers can’t control their BABIP *at all*. This is obvious not true, but these things tend to get oversimplified as they gain popularity and some of the nuance was lost. FIP treats all balls in play as equal, but DIPS doesn’t require that. ***DIPS simply requires that you do something to try to strip out the effect of one’s defense.***

With the passage of time, we’ve gained new data and improved the tools we use to analyze that data. This means that while in 2001, we didn’t really have a good way to determine how much control a pitcher was exercising over their BABIP, we have a better idea how to sort that out today. In 2001, we realized that it was better to assign zero responsibility than 100% responsibility, but we didn’t have the tools to get closer to the objective truth. Today, we have better tools. You may have read research in recent years that claims to “prove DIPS wrong” by showing pitchers control their BABIP to some degree. In reality, what that research shows is that we now have the data to construct better metrics than the ones that use the 0% assumption. We knew 0% was wrong in 2001, we just knew it was better than 100%.

DIPS is about building pitching statistics that isolate pitcher performance. The first generation metrics that used DIPS often utilized the assumption that pitchers couldn’t control outcomes on balls in play at all, but newer metrics, such as Deserved Run Average (DRA), have started to leverage more advanced processes that attack the problem in a different way. But the concept holds across the board that we are aiming for metrics that strip out the quality of the defense. That’s what DIPS is all about. DIPS is not a theory about pitcher value that states pitchers can’t control balls in play. DIPS is a conceptual approach to pitcher evaluation that states we should attempt to measure pitchers independent of their teammates.

*-Neil Weinberg*