CHAPTER 1

# Fair Ball!

## Why Adjustments Are Needed

King Arthur's quest for it in the Middle Ages became a large part of his legend. Monty Python and Indiana Jones launched their searches in popular 1974 and 1989 movies. The mythic quest for the Holy Grail, the name given in Western tradition to the chalice used by Jesus Christ at his Passover meal the night before his death, is now often a metaphor for a quintessential search.

In the illustrious history of baseball, the "holy grail" is a ranking of each player's overall value on the baseball diamond. Because player skills are multifaceted, it is not clear that such a ranking is possible. In comparing two players, you see that one hits home runs much better, whereas the other gets on base more often, is faster on the base paths, and is a better fielder. So which player should rank higher?

In *Baseball's All-Time Best Hitters*, I identified which players were best at getting a hit in a given at-bat, calling them the *best hitters*. Many reviewers either disapproved of or failed to note my definition of "best hitter." Although frequently used in baseball writings, the terms "good hitter" or *best hitter* are rarely defined.

In a July 1997 *Sports Illustrated* article, Tom Verducci called Tony Gwynn "the best hitter since Ted Williams" while considering only batting average. With the likes of Willie Mays, Hank Aaron, and Mickey Mantle as candidates to rival Gwynn, it is clear that Verducci used *best hitter* in the same, limited way.

### *Best Batters* and the Offensive Events Used to Determine Them

A broader category is *best batters*. These are the players with the best all-around ability to produce runs based on events emerging from their plate appearances. Those in the "holy grail" category would be the *best players*, the players who are best in all-around play.

The goal of *Baseball's All-Time Best Sluggers* is to identify the *best batters* in baseball history. Consequently, neither pitching nor fielding is considered in this book.

When a player steps up to the plate, one of more than a dozen events can happen. Here are the major ones. The player can get a single, double, triple, or home run, based on the number of bases earned on a hit. Home runs can be either inside or outside the park. Players also make outs. Outs, like hits, can be divided into several categories, including strikeouts, groundouts, and flyouts. Another major event is a base on balls, sometimes subcategorized into intentional or nonintentional. Additional events include sacrifice flies, sacrifice hits, hit-by-pitch, and reached-base-on-an-error.

The currency of baseball is runs. Since scoring more runs than one's opponent wins ballgames, a batter's primary role is to produce runs. A value could be placed on each offensive event, based on how it contributes to or hampers run scoring. A batter's overall value would then be calculated by multiplying the values of these events by the rate at which he gets them.

This concept, known as linear weights, dates back to the early 1960s and the pioneering work of George Lindsey. In the 1980s, John Thorn and Pete Palmer expanded on this idea with their "Batting Runs" formula, which plays a central role in their "Total Player Rating" in *Total Baseball.* Batting Runs has adjustments for both era-of-play and ballpark effects.

The study in this book extends the work of Thorn and Palmer. The basic formula, called Event-Specific Batting Runs, is developed. For the adjustment process, we will look at 10 *basic offensive events*: batting average, *doubles-plus-triples* (the sum of doubles and triples), triples, home runs, runs, RBIs, walks, strikeouts, stolen bases, and hit-by-pitches. Four adjustments are applied to these events: the effects of aging, ballpark effects, and two factors based on the era of play, as described later in this chapter.

Seven offensive events are used to rank the batters—the four kinds of hits, walks, and total outs. Four of these—triples, home runs, walks, and hit-by-pitches—are basic offensive events. The other three are derived from basic offensive events.

Singles are obtained from subtracting Extra-Base Hits (doubles-plus-triples plus home runs) from hits, where hits equals the batting average multiplied by at-bats. Doubles are obtained by subtracting triples from doubles-plus-triples. Total outs are obtained by subtracting hits from at-bats.

The reasons why doubles-plus-triples (DPTs), rather than doubles, are considered a basic offensive event are discussed in Chapters 4 and 8. In brief, a double is a hit intermediate between a single and a triple, but more like a triple in nature. The answer to the question of which batted balls become doubles versus triples is blurry, and depends significantly on the speed of the batter. Thus it is better to apply the four adjustments to doubles-plus-triples and to triples and obtain adjusted doubles by subtracting the latter from the former.

Why not use the other four basic offensive events in the Event-Specific Batting Runs formula? Individual run and RBI totals depend on the ability of one's teammates and the batter's position in the lineup, not just on the relative abilities of pitcher and batter. Batters fortunate to have teammates on base more often can garner RBIs more easily; a single hit with a man on third nets an RBI, but a bases-empty single doesn't.

Hence runs and RBIs are not used in the best-batter ranking system. They are used, however, to build a case for the existence of clutch hitters, with Yogi Berra, Pie Traynor, and Joe DiMaggio all ranking among the top 10.

Strikeouts, like other outs, hurt run scoring. They haven't been shown, however, to have a significantly different negative value from non-strikeout outs. Consequently they are not needed in the valuation.

Stolen bases are not used for two reasons. First, although they are an offensive event, they are not a batting event. Second, to evaluate stolen bases fairly, one also needs caught stealing data. Caught stealing data, however, have been consistently available only since 1951. Thus it becomes difficult to compare players from before and after that time.

Rankings are also provided for five additional *derived offensive events*: OBP, slugging average, OPS, Event-Specific Batting Runs (ESBRs), and Career Batter Rating (CBR). The first three events are popular ways to evaluate players, while the final two are the main formulas developed in this book—to identify the best batters and get a preliminary ranking of baseball's best players. Finally, position-adjusted results are also given for ESBRs and CBR.

## Philosophy of Player Comparison Over Time

It is a tall order to develop a method that can compare athletic performance fairly over time. For most running and swimming events, race times have progressively declined over time. Does this mean that recent world record holders are better than their forebears? Not necessarily. To ensure fairness, the philosophy of this study involves a complete time-transport of players. In other words, the athlete from bygone times needs to have all the modern advantages today's stars enjoy—such as current equipment, today's sports medicine, training advances, new techniques, and nutritional advances. How can this be done?

The basic strategy is first to rank players within their own eras and then to integrate these era-restricted rankings into an overall ranking. We could develop a statistical method to test whether the collective abilities of players in the league are stable, improve, or decline over time. Such a method would be quite complex, however, and is therefore not attempted. Instead the rankings in this book are based on the assumption that the players from each era are equally talented, as described in Chapter 2.

## The Evolving Game of Baseball

To the casual fan, baseball is a game that seemingly has changed little over time. Baseball announcers and reporters encourage this view, often unwittingly, when the accomplishments of current players are compared to those achieved in bygone eras without any caveats. Record-breaking performances—heralded events in the lore of baseball—invite such misperceptions. For example, Mark McGwire's 70 home runs and Sammy

Sosa's 66 home runs in 1998 vaulted them to the top of the single-season home run list—past Roger Maris's 61 in 1961 and Babe Ruth's 60 in 1927. Then in 2001 Barry Bonds established a new mark, with 73 home runs. Constancy is only a thin veneer, however, and among the most enduring features of more than a century of major league baseball play is that the game is constantly changing. In Chapter 3, we look at how offensive events have varied across baseball history.

## Adjusting Player Averages

In this book, four principal adjustments are applied to a batter's raw statistical data in order to rank his overall batting ability. These adjustments are for hitting feasts and famines, ballpark differences, the talent pool, and late career declines, which are conceptually the same as those used in *Baseball's All-Time Best Hitters*. Since the rationale for each adjustment is explained in that book, only a brief description suffices here.

*Hitting Feasts and Famines:* Across time, different aspects of the game are in the ascendancy. For example, batting averages were quite high in the 1920s and 1930s. In today's game, power events such as doubles and home runs are at or near all-time highs. These shifts are adjusted out under the assumption that they have occurred as a result of changes other than shifts in player ability, such as rules, training, equipment, or ballparks. This adjustment makes the performance of the average *regular player* (defined in Chapter 2) equivalent across time.

*Ballpark Effects:* It is much easier to collect hits, hit home runs, and score runs in some ballparks than in others. Since players play half their games at home, their true value is more fairly appraised by adjusting out the effects of their home parks. In this book, the adjustments are made using ballpark effects that will be obtained for every basic offensive event except stolen bases and HBPs.

*Talent Pool:* A key consideration in comparing players from different eras is whether play has remained the same or has improved or declined over time. In *Full House*, Stephen J. Gould considered the standard deviation of the offensive event being studied to be a measure of the talent pool from which players in that season were selected: a large standard deviation means greater variability in performance among the players, implying that they were drawn from a smaller talent pool.

Although I believe that the standard deviation for a given event only imperfectly measures the talent pool for it, it is still an appropriate adjustment under a "percentile equivalence" assumption explained in Chapter 2.

*Late Career Declines:* Age and experience certainly play roles in the seasonal performances of ballplayers. Although experience is beneficial, the abilities of most players decline at the end of their careers. I believe that a better comparison can be made between players by discounting late career plate appearances of players with long careers. An aging profile for each offensive event is shown, and a cutoff based on number of at-bats or at-bats plus walks plus hit-by-pitches is used to define a player's "productive career" average.

## The 100 Best Batters

Let's take a sneak preview of the best batters through the 2003 season (Table 1.1). It will surprise few baseball fans that Babe Ruth and Ted Williams claim the top two spots. Next comes Rogers Hornsby, who was the standout player in the National League in the 1920s, counterbalancing Ruth's American League dominance. In fourth place is the greatest star from our time, Barry Bonds, who fashioned three seasons—2001, 2002, and 2003—to cap an already fabulous career. Lou Gehrig, Ruth's longtime teammate, claims fifth place. Mickey Mantle places sixth, giving the Yankees three of the top six batters. Stan Musial, Ted Williams' National League counterpart, ranks seventh. Ty Cobb, who received more votes than Babe Ruth in the inaugural Hall of Fame class, ranks as the eighth best batter of all-time. Jimmie Foxx and Willie Mays round out the top 10.

As the four adjustments are further developed and applied throughout this book, we will see how this ranking was obtained.

## Organization of the Book

In this book, a number of statistical and baseball terms are used. They are italicized at their point of first definition in the text. In other chapters, they are italicized when first used. All such terms are defined in the glossary, in addition to the chapter or appendix in which they are presented in detail.

The book is divided into two major sections: "The Methods" and "The Findings."

### The Methods
A summary of the method for adjusting player averages is given in Chapter 2, with the detailed statistical aspects provided in Appendices A–G. The four adjustments are discussed in detail in Chapters 3–6. Because the adjustments are based on statistical principles, these chapters necessarily contain some references and descriptions of statistical methods, although the more technical details are provided in the appendices.

Chapters 3–6 provide additional insights into how the method detailed in Chapter 2 works. However, the essential ingredients for actually making the adjustments are given in Chapter 2 using data given in Appendices H–J. Readers anxious to see the findings may choose to skip those chapters.

### The Findings
The basic offensive events are discussed in Chapters 7–12. Throughout the book, the basic offensive events are presented in the following order: batting average, doubles-plus-triples, triples, home runs, runs, RBIs, walks, strikeouts, and stolen bases. In each chapter, some additional results that go beyond the adjusted averages approach defined in "The Methods" are given. At the end of each chapter, the top 10 single-season and *productive career* performances based on the adjustment methods are highlighted. Lists of the top 100 single-season and productive career averages are given in Appendices L and M.

**Table 1.1  The 100 Best Batters**

| | | | | | |
|---|---|---|---|---|---|
| 1 | Babe Ruth | 34 | Dick Allen | 68 | Cap Anson |
| 2 | Ted Williams | 35 | Eddie Murray | 69 | Reggie Smith |
| 3 | Rogers Hornsby | 36 | **Gary Sheffield** | 70 | Billy Hamilton |
| 4 | **Barry Bonds** | 37 | Rickey Henderson | 71 | Boog Powell |
| 5 | Lou Gehrig | 38 | Harry Heilmann | 72 | Sherry Magee |
| 6 | Mickey Mantle | 39 | Carl Yastrzemski | 73 | **John Olerud** |
| 7 | Stan Musial | 40 | Jesse Burkett | 74 | Joe Medwick |
| 8 | Ty Cobb | 41 | Wade Boggs | 75 | Keith Hernandez |
| 9 | Jimmie Foxx | 42 | Paul Waner | 76 | Norm Cash |
| 10 | Willie Mays | 43 | Duke Snider | 77 | Arky Vaughan |
| 11 | Mel Ott | 44 | **Fred McGriff** | 78 | Ralph Kiner |
| 12 | Honus Wagner | 45 | Al Kaline | 79 | Bob Johnson |
| 13 | Frank Robinson | 46 | Jack Clark | 80 | **Larry Walker** |
| 14 | Tris Speaker | 47 | Harry Stovey | 81 | Orlando Cepeda |
| 15 | Hank Aaron | 48 | **Ken Griffey Jr** | 82 | **Jason Giambi** |
| 16 | **Frank Thomas** | 49 | Rod Carew | 83 | Charlie Gehringer |
| 17 | Mike Schmidt | 50 | Tony Gwynn | 84 | Hack Wilson |
| 18 | Joe DiMaggio | 51 | **Manny Ramirez** | 85 | Joe Kelley |
| 19 | **Jeff Bagwell** | 52 | Joe Morgan | 86 | Jack Fournier |
| 20 | Roger Connor | 53 | Eddie Collins | 87 | Fred Clarke |
| 21 | Dan Brouthers | 54 | Joe Jackson | 88 | **Albert Belle** |
| 22 | Mark McGwire | 55 | Will Clark | 89 | Babe Herman |
| 23 | Reggie Jackson | 56 | Hank Greenberg | 90 | Elmer Flick |
| 24 | Willie McCovey | 57 | Dave Winfield | 91 | Pete Browning |
| 25 | Eddie Mathews | 58 | Zach Wheat | 92 | **Chipper Jones** |
| 26 | Nap Lajoie | 59 | **Jim Thome** | 93 | Tim Raines |
| 27 | **Edgar Martinez** | 60 | Al Simmons | 94 | Dolph Camilli |
| 28 | Harmon Killebrew | 61 | **Rafael Palmeiro** | 95 | Cy Williams |
| 29 | Ed Delahanty | 62 | Goose Goslin | 96 | Roberto Clemente |
| 30 | George Brett | 63 | **Mike Piazza** | 97 | Chuck Klein |
| 31 | Willie Stargell | 64 | Mike Tiernan | 98 | **Alex Rodriguez** |
| 32 | Johnny Mize | 65 | Billy Williams | 99 | Bill Terry |
| 33 | Sam Crawford | 66 | Ken Singleton | 100 | Paul Molitor |
| | | 67 | Frank Howard | | |

*Note:* Active players are shown in bold.

Chapters 13–17 close in on the major goal of this book—determining the 100 best batters. Chapter 13 begins with two traditional, derived offensive event measures—OBP and slugging average—and their sum, OPS. Chapter 14 introduces two new methods, *Event-Specific Batting Runs* and *Career Batter Rating*, which yield the 100 best batters. Chapter 15 lists the 25 best batters at each position. Later, a list of the 100 best batters after adjustment for fielding position is provided. This list accounts for the fact that offensive performance tends to be lower for positions that have greater defensive demands.

Because of the involved nature of the adjustments, the findings are given through the 2003 season. However, Chapter 16 provides a brief update of the top performances and players from the 2004 season. Chapter 17 compares the Career Batter Rating to the work of Pete Palmer and Bill James, and maps a course for further improving the ranking of batting ability across baseball history.

Appendix N contains a complete list of all 1140 players who qualified for inclusion in this book, along with their adjusted averages and Career Batter Ratings.