CHAPTER 7

How to Scout

We're not professing that once you digest what you're about to read you'll be able to head to the field and effectively pan for big leaguers. A lot of scouting is developing experiential knowledge that takes several years to develop. You will fuck up booking travel, your notes or video taking, eating on the road, how you deal with stretches of social isolation, family re-immersion, and countless other little details that will snowball and make you worse at scouting until you learn to be better at everything.

We can't replicate that in these pages. So much of what makes a great scout good at their job is how they've refined their approach and eye in ways that are often specific to where and what they're scouting. It's the little things, like knowing the gate code to a spring training complex's backfields, noticing cameras set up at a secondary field means a sim game might go on over there later, noting who's charting today means they're likely to pitch the next game, noticing scouts going down the side to watch a hitter means he's a prospect, knowing the good places to eat near a ballpark, etc.

It also takes time to build a proper context for evaluating individual skills. In order to properly evaluate physical tools, a scout needs to see what kinds of bodies, athletes, and swings play in the big leagues, learn what an effective big league repertoire looks like. Watch only high school games and the kid sitting 87–91 with a curveball he can throw in the strike zone is going to look like Kerry Wood. Go to a big league game and spend nine innings watching fastballs no slower than 94 mph and it will change your perspective on that high school kid. Without having some idea what it is they're supposed to be looking for, scouts have impotent eyes.

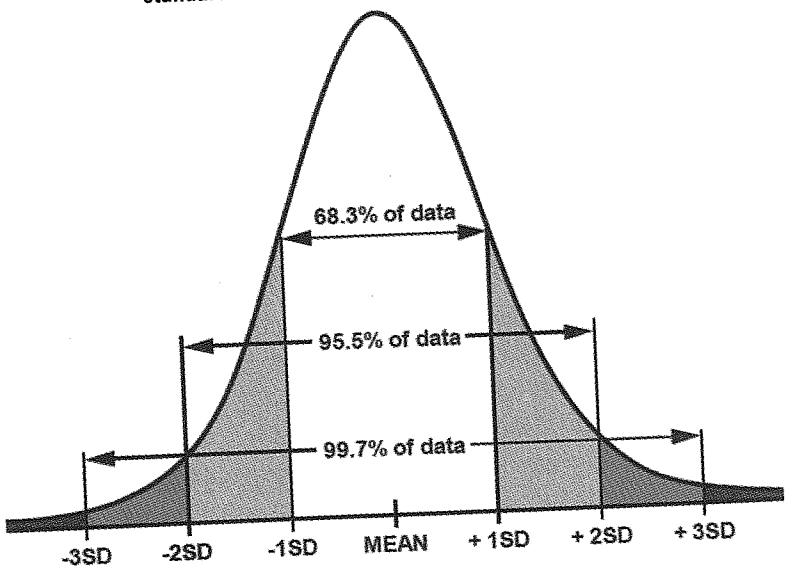
Proper evaluation skills are just one necessary trait. The other, of utmost importance, is report writing and communication skills. Scouts need a

way of communicating with one another across an organization, they need to be speaking the same language. Over time, systems of measure and communication have evolved (and some are now antiquated) to enable scouts to not only communicate amongst themselves within an organization, but so they can move freely from team to team in search of employment without a ton of new verbiage, sort of like heading to a new football team that uses the same scheme. That system of communication, infamous and immortal, is the 20–80 scale.

The Scouting Scale

It may be apocryphal in the same way Thomas Jefferson is often credited with inventing mac and cheese, but the invention of the 20–80 scouting scale is often credited to legendary executive Branch Rickey (80 eyebrows), and it was maybe the third-most important thing Rickey ever did, as he also pioneered player development through farm systems, and was instrumental in Jackie Robinson breaking the color barrier. Assuming two scouts have well-calibrated scales, you can read their reports on two separate players and know which of the two you prefer without having seen either one. It's part evaluative measure, part language, a mix of objectivity and subjectivity, an intersection between science and art.

Areas under the normal curve that lie between the 1, 2, and 3 standard deviations on each side of the mean



Whether he intended this or not, the 20–80 scale mirrors various scientific scales. A 50 on the scale is the mean, the average. Then, each 10 point increment represents a standard deviation, better or worse than average. In a normal distribution, three standard deviations in either direction includes 99.7 percent of your sample, so that's why the scale is 20 to 80 rather than 0 to 100, as anything outside the 20–80 range is likely statistical noise.

Imagine if Usain Bolt decided to play pro baseball. While he'd certainly be the fastest baseball player on the planet, he'd still just be graded as having 80 speed, since his talent is so exceptional that it's unlikely to ever be seen again as to necessitate another notch on the scale.

It's important to note that 50 represents Major League average, not the average across all of professional baseball. The distribution of tools isn't a perfect bell curve for every tool, but is somewhere close to it for most of them because the player population is so large. Let's go through some well-known examples of hitter tools on the 20–80 scale so you can begin to build a foundation of context.

Grade	Player and Tool
80 (aka elite)	Michael Brantley's hit tool, Andrelton Simmons' glove, Joey Gallo's power
70 (plus-plus)	DJ LeMahieu's hit tool, Francisco Lindor's glove, Eloy Jiménez's power
60 (plus)	Ronald Acuña's speed, Rhys Hoskins' hit tool, Trevor Story's power
55 (above-average)	Nick Castellanos' hit and power, Eduardo Escobar's defense
50 (average)	Matt Chapman's hit, Andrew Benintendi's power, Buster Posey's arm
45 (fringe)	Xander Bogaerts' speed, Mike Trout's arm, Adam Eaton's power
40 (below-average)	Yoán Moncada's hit tool, Juan Soto's defense, Jean Segura's defense
30	Cesar Hernández's power, Jake Marisnick's hit tool
20	Late-career Chris Davis' hit, Brian McCann's speed

Most large populations of things show a normal distribution and create a visual bell curve when you plot out the data on a bar graph. If, for instance, we were to apply the scientific scale to the length of Great White Sharks, a shark in the 13- to 15-foot range would be a 50 since that's the average range for adult White Sharks. The 20-foot behemoths among the largest ever caught would be an 80, and the fictional 35-foot shark from *Jaws* would be noise.

Because so much of any population is typically packed close to the middle, near the average, scouts often use 45 and 55 to describe skills and tools that are just shy of or just above average, respectively. Values 35 and 65 are sometimes used too, but less often, and lots of scouts think it's chickenshit to use either of those and would rather you make a call on whether something is a 30 or a 40, or a 60 or 70 instead of splitting the difference. We've been told a story from a team's draft room where a scouting director told two scouts who both put a 65 on a tool grade to pick 60 or 70 at the count of three. They both said 60 at the count of three and a former first rounder and big leaguer in his first draft room said, "Wait, so that's how you guys picked me?"

These half grades like 65 and 75 don't have separate terms because many teams use a 2–8 scale rather than 20–80 and 2–8 is the scale that was predominant when many of today's top scouts were starting out. Now 20–80 is more commonly used, but often you'll hear older scouts at the ballpark call someone a "six or seven," while we might call that a 65 here. It helps in our situation to have more numbers to describe things when we're trying to differentiate between literally hundreds of prospects that have 50 or 55 power grades, for example.

Though some teams have scouts grade each of these components, it's the five core scouting grades that are paid attention to universally. It's common practice in scouting reports for scouts to explain in the comments when, say a 55 fielding grade includes some 60 or higher components (range, hands, instincts, etc.) and some 50 or lower components, but often a 55 means a number of average to above skills and doesn't merit much additional explanation. Scouts also use present and future grades for each tool. Present grades often are 20s for high school players while, in the upper levels of the minors, the gap between present and future grades is very small.

Just so we're clear in a housekeeping sense about shorthand: a present 20 and future 50 grade on a tool is noted as 20/50. This is not the same as the present and future grades on a player's overall ability, which we call present value and future value. We'll go into more depth on that process in another chapter.

You can apply the scale to nearly anything, either objective or subjective. Kiley likes to apply it to produce to add Consumer Reports–level precision to a grocery store visit. If we were going to draft Batman movies and we'd only

be able to watch these Batman movies for the rest of our lives, this is how Eric would have them all evaluated:

20: *Batman & Robin*
30: *Batman v Superman, Batman Forever*
40: *Batman Begins, Batman: Gotham Knight*
45: *Dark Knight Rises, Batman: The Movie* (1966)
50: *Batman Returns, Mask of the Phantasm, The Dark Knight Returns Part 2*
55: *Batman* (1989), *Batman Beyond: Return of the Joker*
60: *Batman: Year One, Batman: Under the Red Hood*
70: *The Dark Knight*
80: *The Dark Knight Returns Part 1*

The Dark Knight is probably at or near the top of everyone's Batman movie pref list, so in a sense it's objectively excellent, but exactly where you have it on your pref list will have a huge impact on whether or not you end up with it in the draft, so the subjectivity on the margins is very meaningful. Also, if you don't recognize some of the above titles it means Eric knows about more Batman movies than you, giving him a better chance of leaving the draft with more good movies, the same way good scouting departments can separate themselves from others in the middle rounds of drafts.

The Tools

Scouts head to the field looking to evaluate—using the 20–80 scale—the core physical abilities needed to play baseball, and these abilities are called "tools," as you probably know. The five tools for position players are: 1) Hitting, 2) Power, 3) Running, 4) Fielding, and 5) Throwing. Yes, this is overly simplistic and should bring about several pertinent questions in the minds of most readers because it plainly ignores several aspects of baseball. Scouts apply 20–80 grades to all kinds of traits beyond those five (like athleticism, which is a 20–80-scaled attribute we'd like you to keep in the back of your mind for later in this chapter), but for now consider just these traditional five.

In the past, scouts would slap a 20–80 on each tool, then calculate the average of the five tools and the resulting number would be the player's OFP or Overall Future Projection (or Overall Future Potential). This is a terrible way of going about it because it weighs all five tools equally, when in fact they are not, varying wildly by position. Here's an example:

Player A: 30 hit, 20 power, 80 speed, 80 fielding, 50 throwing = 52 OFP
Player B: 70 hit, 70 power, 20 speed, 30 fielding, 20 throwing = 42 OFP

Using the Old Testament OFP, our department would greatly prefer Billy Hamilton (Player A) to David Ortiz (Player B) and we'd all get fired.

This misguided form of aggregation has been scrubbed from the game, and now scouts are more often tasked with evaluating all the tools individually, then putting an overall 20–80 grade on the entire player's profile, which is informed by the tool grades but not derived from a faulty equation, more from an overall consideration of his value.

Because the 20–80 scale is scientific in nature and we have such a huge sample of big league players generating statistics, we can pull stats generated by big leaguers to both set the lines of demarcation that comprise the scale, and also give scouts an idea of what they're looking at. Let's start with a relatively simple tool to evaluate: speed.

Click-click... Click-click

The traditional means of evaluating speed is with a stopwatch, specifically one of the many Accusplit models, which come in a variety of colors. In a showcase environment, scouts are timing a 60-yard dash, which is a straight-line speed measure akin to the NFL Combine's 40-yard dash. You start your watch when the player makes their first move, and stop when they cross the finish line, which is typically where all the scouts are standing.

Scouts also take runners' times from base to base, most often when the hitter is making a max-effort sprint from home to first. This is a more accurate form of data generation as the scout can anticipate both when the hitter will make contact with the baseball (start the watch) and when he'll make contact with first base (stop the watch). Often scouts use their raw times to grade a player's speed on the scale (frequently comparing them with nearby peers to verify accuracy, especially if someone runs a blazingly fast time) but sometimes they'll round up or down based on weather or field conditions, or how good of a jump out of the box the hitter gets, a full swing or a drag bunt, etc. Some hitters have a natural "jailbreak" out of the box which favorably alters their home-to-first times to a grade or two above their true speed. (Ichiro and Rickie Weeks are two recent, prominent examples of this.)

The scale for 60-yard dashes and home-to-first times, along with some examples, looks like this:

Grade	60-Yard Time	LH Home to 1B	RH Home to 1B	Example
80	6.3 or less	3.90 or less	4.00 or less	Byron Buxton
70	6.5	4.00	4.10	Dee Gordon
60	6.7	4.10	4.20	Ronald Acuña
55	6.8	4.15	4.25	Albert Almora
50	6.9–7.0	4.20	4.30	Yasiel Puig
45	7.1	4.25	4.35	Carlos Correa
40	7.2	4.30	4.40	Jason Heyward
30	7.4	4.40	4.50	Joey Votto
20	7.6 or more	4.50 or more	4.60 or more	Brian McCann

The actual average home-to-first time in baseball is about 4.4 seconds, but that number is dragged down by glacial runners at the bottom of the league. Though less mathematically correct in the purest sense, the traditional scale above is better, we think, at assessing relevant speed. There's also a way to perform a sanity check using a broad rubric: an average runner with an average jump hitting an average ground ball to an average fielder with an average arm should be a bang-bang play.

Right-handed hitters have a greater distance to run to first, so their times are, on average, a little slower than lefty hitters. Righty batters hit the ball to the left side of the infield more often, which means longer throws for the defense and more potential opportunity for high-effort sprints to first because of this, but we're not sure how that impacts the data beyond giving us a more reliable sample for righty hitters.

In the past we'd have considered a selection bias to be possible for lefty hitters since they're the kinds who would've been bunting for hits when that was more common, and so it may have been more important that the lefty hitter have speed and that big league teams would select for that, thus creating a bias. But those parts of the game are less pervasive now and so we're less worried about lefty hitter data being dirty. The tenth-of-a-second gap between the left- and right-handed batters is the industry-accepted delta, though independent research Eric conducted while at Baseball Info Solutions indicated the average gap between handedness is actually closer to two tenths

of a second, and that the average for left- and right-handed hitters, respectively, is closer to 4.15 seconds and 4.35 second per run to first. We're fine with the speed scale times being slightly off what they're technically supposed to be, mathematically, because there's big value in communicative ease and this is the scale scouts have been using forever. Moving away from it to an altered scale may go the way of the American adoption of the Metric system.

Not So Fast, Sprint Speed

The popular, modern, public-facing way of measuring big league speed is with "Sprint Speed," a Statcast metric that quantifies quickness by measuring how many feet per second a player runs in his fastest one-second window of movement, essentially measuring top, or peak speed. While this is an interesting piece of data, it isn't solely what we'd lean on to evaluate players' speed. It ignores important aspects of running, like acceleration, entirely, and it only encompasses roughly one fourth of the event that occurs as a player runs from one base to the next in that one-second window. Here are some examples of what tool grades would be if we used Sprint Speed as a means of evaluation for big league players, with the player's home-to-first time-based speed and its corresponding grade in parentheses after their name. We've intentionally included players with discrepancies to illustrate our point.

Grade	Sprint Speed (feet/sec)	Example
80	31.6	None
70	30.1	Mike Trout (4.28 to first, 50)
60	28.7	Andrew McCutchen (4.32, 50)
55	28.0	Matt Chapman (4.40, 40)
50	27.2	Jonathan Schoop (4.52, 30)
45	26.5	Franmil Reyes (4.60, 20)
40	25.8	Eugenio Suárez (4.71, 20)
30	24.3	Willians Astudillo (20)
20	22.9	Brian McCann (20)

There are lots of hitters who have exactly the same Sprint Speed as another player but their home-to-first times are significantly different, and if all else is equal, we'll take the guy who can haul ass down the line, as that's the speed actually impacting the game. Running from home to first is the most common

event in which a player's speed is relevant. It's the difference between being out and safe, and the difference between making an out and not is significant when you only have 27 to spend over the course of a game. Measuring times from home to first encompasses a combination of the player's top speed as well as their acceleration, and it can all be measured by a light portable device with a seemingly everlasting battery that can fit in your pocket.

This is painfully straightforward compared to other tools. Time the runners from home to first, check the handy scale for the applicable 20–80 grade, and voilà. Skepticism regarding the accuracy of a given run time should be tempered by the frequency of trials and the eventual realization that every scout gets pretty good at starting the watch at point of contact and stopping it when the runner steps on the bag. Hitters who make a lot of high-quality contact are less likely to need to run full tilt to first base and sometimes those guys are tougher to get a time for, so scouts also take times with the turn, which means stopping the watch when the runner hits the bag even when he's taken a turn toward second base. Typically, times with the turn are .3 seconds slower than times straight through the bag, and scouts make the easy conversion. There's some judgment, with .1 or .2 deductions for less-than-typical turns.

Baserunning skills, instincts, and good jumps out of the batter's box are also folded into the run grade when scouts see enough of a player to have an idea of his abilities in this area.

Lasers and Leather Wizards

Now that you know how to tell not just who is fast and who is not, but exactly how much faster or slower one player is than another, you need to level up and consider defensive abilities, including arm strength.

Scouting arm strength sounds very easy, like it should be much the same as scouting fastball velocity with a radar gun. This is mostly true for outfielders who crow hop and step into their throws most of the time. Statcast has measured throws from the likes of Aaron Hicks and Brett Phillips in excess of 100 mph, and that's what an 80 outfield arm looks like. Outfield arms are fairly easy to scout during pregame defensive drills when outfielders are making throws to third base and home from their respective outfield positions, assuming that they're all trying to throw hard. This is the type of thing that takes a while to gain feel for as a scout; you just need to watch a lot of guys throwing from the outfield to polish your eyes up and be able to identify the 50s and those on either side of it. Just a handful of nudges from a

seasoned evaluator sitting next to you ("Hey, that one was a 50") can quickly calibrate your scale.

Some scouts have a rule of thumb for evaluating outfield arms based on the number of hops it takes on the way to the plate (they adjust based on the arc; no slow-but-bounceless rainbow to home is going to garner a good grade, even among scouts who do this), but we suggest starting your arm-strength note taking by listing the players in order of best arm to worst arm. Two throwers too close to separate from one another? Good, list them side by side rather than on top of one another and, as you collect more and more throwers, you'll start to see a bell curve emerge, like this fake example:

RF Timmy DeLaser
RF Marcus Zipp
CF Chuck Fine, RF Viyabell Brazo
CF Armie Soft, LF Raul Tirarlento
LF Larry McWetnoodle

Things get a little more complicated for infielders, who just don't have as many opportunities to make clean, strong throws. When they do have that kind of time to gather themselves and make a max-effort throw to first it's because the runner is slow, or because the ball was hit right at them, and often in these cases they have no reason to reach back and let it rip. On rare occasions, players like Carlos Correa and Fernando Tatís Jr. have uncorked throws around 93 mph from shortstop (Correa threw one measured at 97 mph in high school), and that's what the top of the scale looks like if we want to measure infield arm strength in this way. Though, 2020 Draft prospect Sabin Ceballos threw a ball 99 mph across the infield at a 2019 high school showcase, so maybe Tatís and Correa are 70s in this regard, not 80s.

It's common at high school showcases where there's grounders hit, for scouts to scatter in the seats behind first base with their radar guns just to collect velos on the throws to first. Accordingly, of course, the throws will often miss wildly, sometimes three or four times in a row, all in pursuit of a big velo number that has nothing to do with playing the position.

That's why we think this type of measure, while notable like sprint speed, is insufficient. Like we just said, it's not often that infielders can set themselves and throw to first the way Tom Emanski would like them to. Most of the time, they just have to chuck it over there as quickly as possible. Often, this is happening from weird athletic platforms, like when infielders charge to field high hoppers and have to throw while running in, or when shortstops throw

across their bodies after making plays on balls up the middle, etc. The same way some quarterbacks are better at throwing on the run while others have bigger arms standing tall in the pocket, some infielders have great set-and-throw arms but can't make All The Throws, and vice versa.

We call this concept "Arm Utility,"™ and it's really a function of how an infielder's athleticism enables his arm to play in game situations rather than in a way that can be measured by a radar gun. Remember earlier in the chapter when we asked you to remember that athleticism is typically 20–80'd? This is the first of several instances where two measurable skills intersect and have some kind of impact on one another, creating a double counting of sorts. And again, we ask you to put a pin in this concept for later in the chapter.

Throws like these don't have a vapor trail coming off the back of them, but they are great throws. Infield drills force players to make a wide-enough variety of throws that you can get a good idea of raw arm strength, but ideally a scout would see the player get enough game action to have some idea of arm utility, as well. Here are some examples of big league arms on the 20–80 scale followed by what we think their arm utility is. We've intentionally chosen players for whom we think there's a gap, or who best help illustrate the concept. The 20- and 30-grade arms are either in left field or DHing.

Grade	Raw Arm Strength	Arm Utility
80	Carlos Correa	Fernando Tatís Jr.
70	Fernando Tatís Jr.	Nick Ahmed
60	Abraham Toro	Freddy Galvis
55	Nick Ahmed	Carlos Correa
50	Freddy Galvis	Kolten Wong
45	Ryan Mountcastle	Abraham Toro
40	Kolten Wong	—
30	—	Ryan Mountcastle
20	—	—

The notion of arm utility is new enough for the two of us that we haven't decided whether/how to explicitly fold it into our work at FanGraphs since arm utility is a harder thing for us to collect at a global scale without an entire

staff of scouts. Throwing accuracy is folded into the throwing tool grade, and most scouts think poor accuracy is fixable, particularly when athleticism is present.

Catcher Arm Strength

Much like run times, scouts use a stopwatch to evaluate catcher arm strength. They start the watch when the pitch hits the catcher's mitt, and stop it when the middle infielder catches their throw. The average big league catcher pop time is two seconds, flat. Again, as is the case with run times, the stopwatch is measuring a couple of different things. The catcher's arm strength is part of it, but so is the "exchange," aka the amount of time it takes the catcher to get rid of the ball after he receives it. Catchers with inefficient economy of movement may have more projection on the arm if scouts think their mechanics can be polished up and they can shave a few fractions of a second off of their exchange. Here's the 20–80 scale for both pop times and raw catcher arm strength along with some examples. As usual, we've highlighted players who would fit in a different tool tier depending on which you used. We prefer the pop times.

Grade	Pop Time	Example	Arm Strength	Example
80	1.88	J.T. Realmuto	90.5 mph	Jorge Alfaro
70	1.91	Jake Rogers	87.4 mph	J.T. Realmuto
60	1.95	Jorge Alfaro	84.3 mph	Tom Murphy
55	1.97	Mike Zunino	82.7 mph	Austin Romine
50	2.00	Isiah Kiner-Falefa	81.2 mph	Mike Zunino
45	2.02	Sandy León	79.6 mph	Jake Rogers
40	2.05	Tom Murphy	78.1 mph	Sandy León
30	2.10	Austin Romine	75.0 mph	Isiah Kiner-Falefa
20	2.15	Stephen Vogt	72.0 mph	Vogt (he's at 73)

Scouts also take note of arm accuracy and know to note whether an infielder came off the bag to receive an inaccurate throw and how that might have impacted a pop time. It generally adds 0.1 seconds to the time until the tag if the ball is delivered at the fielder's head, rather than on the bag. Typically, they cut the ball off well before the bag if they have no chance of getting the runner, which can deflate pop times and mislead less fastidious scouts.

In showcase settings, catchers often cheat to throw, since in a game you also have to catch the ball, stay behind the hitter, and don't know until later if the runner is going. They also don't have a hitter in the box and don't wear full equipment, so those pop times can be essentially useless. One prominent showcase company has three or four stopwatches going for every 60-yard dash (along with a laser timer) and all five pop times and just takes the lowest, even if it's clearly a mistake. Scouts have agreed that taking 0.3 seconds off of the 60-yard dash time on the website is usually the correct adjustment, while the pop times aren't as easy to manually adjust.

Defense and Reductionism

Now we're starting to get into more complex and important territory. Speed and arm strength are relevant, but less significant than what we've yet to cover, and also far less complicated. Evaluating defense is about 20–80ing the player's ability, but more importantly it's about first gauging where the player fits on what is called the "defensive spectrum." This means determining what positions they're athletically capable of playing.

It further complicates things that positional requirements are changing in the big leagues, particularly middle infielders, due to the effect of shifts. Because the players being scouted are often very young, there's a lot of variation between what position/s a player might be fielding now and what position/s the scout thinks they'll be playing upon arrival in the big leagues and throughout the bulk of their careers thereafter. Even if you've never set foot in an amateur or minor league stadium, you've seen this happen. Ryan Braun and Albert Pujols came up as third basemen. Carlos Santana once caught and played third base. Hanley Ramírez was once a 30/30 shortstop. Throughout their big league careers, all of them tumbled down the spectrum to lesser positions as they became unable to play their original spots.

The concept of the defensive spectrum, a phrase coined by Bill James but not a concept introduced by him, is that there's an ordinal ranking of defensive positions by difficulty. James used it to track player movement across the spectrum during their careers. Some positions are more athletically demanding than others, and therefore more valuable. This is grounded in common sense and proven by looking, somewhat ironically, at the offensive performance at those positions. Think about shortstop and second base.

Both positions require a lot of the same things, except the shortstop needs to be able to make throws farther away from first base. And so, there are some players who meet all other requirements but lack the arm for shortstop, and so they need to play second base, but everyone capable of shortstop can hypothetically play second.

Here's a version of the OG Bill James defensive spectrum, from the most difficult position to the least, along with the minimum, prerequisite traits scouts would traditionally be seeking in order for someone to play there, though of course there are exceptions. You can see the requirements for each position withering away as you descend.

Catcher: above-average arm, all kinds of things so specific to catching that it arguably shouldn't be on the spectrum, though most agree it's the hardest.

Shortstop: above-average arm, plus speed/range, plus footwork, average hands/actions.

Second Base: below-average arm, plus speed/range, plus footwork, average hands/actions.

Center Field: below-average arm, plus speed/range, feet/hands/actions barely matter.

Third Base: above-average arm, 30 speed/range, average footwork, average hands/actions.

Right Field: above-average arm, 40 speed/range, feet/hands/actions barely matter.

Left Field: 30 arm, 40 speed/range, feet/hands/actions barely matter.

First Base: 40 arm, 30 speed/range, 40 footwork/hands/actions.

Designated Hitter: none.

Said in a more objective way, here's the positional adjustments we use at FanGraphs to calculate WAR. This is assuming a full season (162 full defensive games) for a starter, played only at this position, so this is the amount to move the WAR figure up or down. According to these adjustments, 10 runs basically equals 1 WAR or 1 win, with some variance year-to-year, usually between 9 and 11.

Catcher: +12.5 runs
Shortstop: +7.5 runs
Second Base: +2.5 runs
Third Base: +2.5 runs
Center Field: +2.5 runs

Right Field: -7.5 runs
Left Field: -7.5 runs
First Base: -12.5 runs
Designated Hitter: -17.5 runs

These component parts eventually combine to result in a 20–80 grade on the player's overall fielding ability, but it's much more important to draw conclusions about where they can play. Splitting up defense into its component parts is another perhaps unintentional application of scientific principles, this time the idea of methodological reductionism, which means we're breaking up the whole (a player's defensive abilities) into component parts (feet, hands, action, etc.) in order to better understand it.

Scouts will 20–80 each of these skills—sometimes in their notes rather than explicitly in a box on their sheet—which they've become adept at from watching thousands of hours of baseball. We've already talked about arm strength and speed (and here's your second instance of several attributes intersecting and modulating one another), but the others help make up most of the Fielding tool grade. "Hands" means something similar to what it does in football: How well does the fielder catch the ball? Infielders with good, soft hands field everything cleanly, deep in their mitt where the webbing meets the palm, and they successfully adjust to bad hops. Infielders with lesser hands are obviously more mistake prone, but they can also be identified if they're making plays with the ball clanging around in their glove.

Footwork is about positioning yourself to field and then throw the ball quickly and accurately to first, properly gauging the length and tempo of your paces, as well as your path to the ball. Some will include the entire lower half in this part of the evaluation since bending at the knees and waist is important for infield defenders' success.

Actions are all the little baseball things not encompassed in the other categories. It's the stuff that happens between when an infielder catches a ball and sends it onward to another base, it's how quickly and precisely they lay a tag on someone, and all kinds of other little things that frequently make a difference between getting someone out or not.

Instincts is the catchall term that can help all of these abilities play up or down, whether it's reading the pitch/location/swing and moving to the spot as the ball is hit, or knowing your 50 arm won't work deep in the

shortstop/third base hole, so you circle the ball to get your momentum moving toward first base before uncorking a throw, like David Eckstein.

As players lose a step throughout their careers, these skills erode away and they have to move down the defensive spectrum. If they can hit, they stick around at newer, lesser positions. Hanley Ramírez, Miguel Cabrera, Victor Martínez, and Daniel Murphy are all good recent examples of this.

This impacts how prospects are valued. If a college center fielder lacks the speed to play center field in the big leagues and is viewed as a future left fielder, he'll be competing against not only the 30 starting left fielders in baseball for a job, but also all the best-hitting center fielders who are slowing down as they age. And so the best hitters typically filter down to the less athletically demanding positions, raising the bar for offense at that position and making it harder for the younger player to profile there. This is how 4A hitters get squeezed out of big league jobs: downward pressure on their profile from big league mashers tumbling down the spectrum and into their positional bucket.

It's also worth noting we haven't gone into a ton of detail in terms of how to grade an outfielder's defensive value. This is one area where the average fan can do a passable job as-is. While that fan may overrate the arm strength grade on a rainbow throw that's right on the money, they'll probably be close on arm utility grades since it's more focused on outcomes. Instincts and first-step quickness are important, as is closing speed, route efficiency, and initial positioning, and it's pretty easy to watch a replay and see all these elements.

This is also an area where computers can passably replace much of what scouts do, since scouts will often get a five-game look at a player and may only see one or two plays that actually show the best of these qualities per player. Statcast can quantify every element we just went over instantaneously for every MLB play in excruciating detail. It's almost impossible for technology to properly replace a scout's grade on a shortstop's "hands," as scouts define it, but replacing those handful of representative outfield plays per series is already happening.

The Shifting Spectrum and Components

We can illustrate this by looking at the average offensive performer at each position. The below table has the average wRC+ at each position dating back to 2012. wRC+ is a rate stat that attempts to credit a hitter for the value of each outcome (walk, double, home run, etc.) rather than treat all of hits/walks evenly, like OBP does. Baked in are controls for park effects and the current run environment. wRC+ is scaled so that league average across baseball is 100 each year, and every point above or below 100 is equal to one percentage point better or worse than league average.

Year	C	1B	2B	3B	SS	LF	CF	RF
2019	86	105	95	105	98	102	94	107
2018	84	105	93	102	95	102	96	106
2017	89	113	94	102	88	100	100	103
2016	87	108	101	106	93	97	96	101
2015	85	113	93	101	85	99	101	107
2014	93	109	88	100	87	103	103	101
2013	92	110	91	97	86	99	99	105
2012	95	107	88	100	86	103	101	104

For the most part, what was considered the defensive spectrum for the last few decades still holds true. Catching is hard to come by, and the offensive bars at the corner positions are much higher and harder to clear than those up the middle of the diamond.

But note the two significant shifts within catcher and shortstop during this stretch. Those years of more prolific offense among catchers might be explained by the presence of Buster Posey, Joe Mauer, and in-his-prime Yadier Molina as part of the sample. But that's also when there was a breakthrough regarding pitch framing (the catcher's ability to make pitches near the edge of the strike zone look like strikes to the umpire), and suddenly a skill everyone knew to exist was now quantifiable and the John Jasos of the world moved to new positions.

Upticks in wRC+ at the middle infield positions began to climb around the advent of ball-in-play location data and defensive shifts. Improved

defensive positioning de-emphasized lateral range as a defensive skill, and so bigger, stronger bodies have ended up playing those spots in recent years. Corey Seager, Carlos Correa, Paul DeJong, Xander Bogaerts, Max Muncy, and Mike Moustakas have all seen a lot of time at middle infield positions. This concept applies to the entire infield.

The movement is significant enough that the lines between some of these positions has blurred. Catcher is still the most valuable (though, who knows how much this will change if electronic strike zones are eventually implemented), but the up-the-middle positions have become more clumped together; left field is performing up to expectations, while third base is exceeding them. If we're going to extrapolate using these wRC+ trends (perhaps some teams haven't yet realized how to hide offensive-minded shortstops and second basemen with good defensive positioning but soon will), then the speculative defensive spectrum looks like this:

C - 2B - SS - CF - LF - 3B - RF - 1B - DH

We think quite this much change is unlikely, but there's clear evidence that things are shifting and teams have become more open-minded about the kinds of athletes who play the middle infield, perhaps the infield in general. Lateral range has become less important because that shortcoming can be better hidden by shifting and more precise defensive positioning, and so bigger, stronger bodies are playing shortstop and second base, and there's now more offense at that position.

This is, we think, one of the areas where teams are questioning old dogma and making different decisions. If you have the opportunity to acquire one of two players who are the same in every way, except one plays left field and the other plays third base, which are you going to choose? It's possible third base offensive performance is being skewed by a currently historic group of talent (Bregman, Chapman, Machado, Suárez, Devers, Moncada, Arenado, José Ramírez, Guerrero), and the best long-term bet is still to take the third baseman.

What if instead you're deciding between a second baseman and center fielder? Does shifting actually make second base harder to play because they have to make more throws from shallow right field and from deep behind the second base bag? Or will the Travis Shaw/Max Muncy stuff at that position become more common? It's an interesting area to think about when trying to predict what types of players might be undervalued, and there's some evidence for this kind of anticipation. Here are some contemporary

examples of all the component parts woven into some defensive grades. Opinions are ours.

Player	Pos	Feet	Hands	Actions	Range	Raw Arm	Arm Utility	Overall
Nolan Arenado	3B	80	55	50	60	70	80	80
Cody Bellinger	1B	60	70	70	70	60	60	80
Carlos Santana	1B	50	80	70	40	45	50	70
Scott Kingery	2B	50	45	50	80	55	45	60
Mike Moustakas	3B	60	60	60	45	60	60	55
Max Muncy	2B	50	55	60	40	50	50	50
Yoán Moncada	3B	40	40	40	70	60	50	45
Vlad Guerrero Jr.	3B	50	50	45	30	70	55	40
Josh Bell	1B	40	40	50	50	50	40	30