



# SPORTS, MOBILE DEVICES, AND THE NEW PLAYER MOBILITY

By Matthew Henson



Technology advances have revolutionized many parts of society in the last two decades, and professional sports have not been spared. Mobile devices and Moore's law have changed team formation, training, and even the composition of front offices. But each of the four major sports (basketball, hockey, football, and baseball) has had different rates of adoption and revolution.

#### **BASKETBALL**

In the National Basketball Association (NBA), the growth of mobile phones and attendant communication methods (texts, social media, and the like) have given rise to a new era of player mobility that has changed the way teams are constructed. Since its inception in the 1940s, the NBA has been dominated by "super teams"—teams with multiple all-time all-stars that have won multiple championships. For years, some of these teams were put together by front offices through

smart moves. For instance, the '50s-era Celtics acquired Bill Russell via a clever trade that sent veteran "Easy" Ed Macauley back to his hometown of St. Louis to end his career; the Celtics surrounded Russell with four other future Hall of Famers and won 11 of 13 NBA titles.<sup>1</sup> Other super teams were constructed through the player draft, sometimes with a big dose of dumb luck. For instance, the Lakers acquired the 1979 draft pick that ended up being Magic Johnson thanks to a trade three years earlier.<sup>2</sup> Los Angeles paired Magic with four other future Hall of Famers and won four NBA titles in the 1980s.<sup>3</sup>

In the smartphone era, super teams are no longer solely created by astute team officials—they are formed by the players themselves. Dwyane Wade (Miami), LeBron James (then with Cleveland), and Chris Bosh (Toronto) all enjoyed playing together on the USA Olympic Team in the summer of 2008;<sup>4</sup> after exchanging cell phone numbers, they remained in touch. Two summers later, when they all were free agents, the latter two migrated to Miami (where Wade re-signed), and the Heat went on to four straight appearances in the NBA Finals, winning twice.<sup>5</sup>

The rise of social media and the players' ability to manage their personal brands, coupled with the so-called "max contract" rule that caps the amount a team can spend on any one player—no matter how talented—means that the last decade has become known as the "player empowerment" era. Superstars know they will get a "max" deal (about \$40 million per year under the current salary cap) from any team, and therefore they can decide which team—and with whom—they wish to play. Accordingly, we have seen players teaming up to create super teams:

- Kevin Durant joined the Golden State Warriors after being texted by Warrior Draymond Green immediately following the Warriors' loss in the 2016 NBA Finals; the team won two titles in three years.<sup>6</sup>
- Durant and Kyrie Irving coordinated a move to both join the

New Jersey Nets in the summer of 2019.<sup>7</sup>

- Kawhi Leonard, after forcing a trade from San Antonio to Toronto, signed with the Los Angeles Clippers, but only after Leonard pushed for the trade to bring another All-Star (Paul George, with whom he was in regular contact) to L.A.<sup>8</sup>

But mobility is not just enabling the player empowerment era in basketball. For example, many of the cutting-edge franchises have begun to equip their players with wearable devices that track their movement, activity level, and sleep. The point of measuring these factors is not just to maximize activity, but also to help determine when these basketball players should rest, although finding the right ratio of hard-effort-to-active-recovery-to-sleep is still being determined.<sup>9</sup>

#### **HOCKEY**

Basketball is not the only sport that is being transformed by mobility. In the National Hockey League, the most advanced teams are combining both motion-based analytics and better nutrition. In Boston, for example, a Bruin player might "shed his wearable performance monitor and down a recovery smoothie of plant protein and antioxidant-laden berries."<sup>10</sup>

#### **FOOTBALL**

Likewise, in football, mobility is measured in ways not previously imagined. The National Football League's Next Gen Stats provide a wealth of information about how players are moving on the field, from the speed of acceleration of a running back<sup>11</sup> to the longest completed passes in the first week of the 2019 season.<sup>12</sup> While entertaining and interesting, this information has not yet easily been translated into player strategy.

#### **BASEBALL**

But the sport that has most embraced "mobility" is clearly baseball. The game has advanced well beyond the initial *Moneyball*/sabermetric-era of the early 2000s, when applying simple math (for

the likely outcomes of bunting or stealing, or coaxing walks, for example) to advance a team's chances of winning a particular game was "cutting edge." If you are a Major League Baseball (MLB) team that is just now embracing "sabermetrics" for strategy, the game has long passed you by.

The mobility revolution has now taken on multiple meanings in baseball. At some level, the mobile phone is the basis of some of these changes. The addition of the camera to smartphones allowed players to "film" themselves in both aspects of the game—hitting and pitching.

On the hitting side, J.D. Martinez has become a leading advocate of self-diagnosis. He was just a 20th round pick in the 2009 draft and fought his way to get a chance at the majors. But he quickly washed out with the Houston Astros, becoming a marginal major leaguer, spending time at AAA and the big leagues in 2013. During the winter of 2013–14, Martinez went to Southern California and rebuilt a swing that had got him to the cusp of the majors—but that was not good enough to keep him there. He began by studying the swings of the best players on video.<sup>13</sup> And he began trying to hit the ball up in the air rather than swinging down on it; this so-called "launch angle" has become the hitting mantra of this decade.<sup>14</sup> After making a series of adjustments with the help of hitting instructors there, Martinez began using three different iPads to record video of every swing in batting practice<sup>15</sup>—and to effectively become his own hitting coach. In the winter of 2017–18—four years after almost leaving baseball—he signed a contract worth \$68 million over four years.

Likewise, mobile phones can create opportunity. A viral video captured on a phone surfaced on Twitter this past summer of fan Nathan Patterson—in street clothes—throwing at a speed pitch contest under the concourse at a Colorado Rockies game.<sup>16</sup> In a handful of throws, he averaged 94 mph, and hit 96 mph on one.<sup>17</sup> Within a few weeks, the Oakland A's had signed him to a contract, and he pitched in three late season games for their rookie league team.<sup>18</sup>

Mobile technology has had the most effect with pitching. In the old days, scouts

traveled with handheld radar guns that allowed them to measure a pitcher's fastball. Velocity is still important, and pitchers who can't get above 90 mph are few and far between in the major leagues. But a whole series of measurement tools have been developed to help scouts and coaches see more nuance.

For example, for much of baseball history, the curveball was controversial. Did the ball actually "curve," or was it simply an optical illusion?<sup>19</sup> After a 1959 study by Lyman Briggs (former director of the National Institute of Standards and Technology), it was determined that the curve does indeed break, and it does so as a result of the high rate of spin put on the ball by the pitcher.<sup>20</sup> The seams on the ball create a "whirlpool" of air currents on different sides of the ball (now known as the Magnus effect), resulting in the curvature.

While Briggs published his study in 1959, not much was done with it—pitchers still learned the curve and other breaking pitches (e.g., the less drastic slider) by trial and error, often asking their bullpen catcher, "Did that one move?" But in the early 2010s, the MLB began installing TrackMan radar systems in every ballpark that allowed the measurement of not only speed, but also pitch movement; unfortunately, at \$30,000 or more per system, they were not very economic, and needed to be fixed in place.

But like everything else in technology, Moore's law came into play. Smaller and portable devices, like the optical tracker Rapsodo, began to appear on the market, at one-tenth of the cost. The Rapsodo not only could measure pitch movement, but also the spin rate that the pitcher put on the ball. Spin rate has a direct correlation to ball movement on all pitches, not just curveballs—a 92 mph fastball with 2,400 rotations per minute (rpm) of perfect backspin will drop less on its way to the plate than the same 92 mph with only 1,800 rpm, thanks to the Magnus effect.<sup>21</sup>

The amount of spin is not the only variable—the spin axis, or the degree to which the horseshoe-shaped seams of the baseball are delivered off center (assuming a straight, overhand, four-seam fastball to be the neutral control), also plays a role in side-to-side movement.<sup>22</sup> Thus, a slider with sidespin will "slide" away from the right-handed hitter on its way to the plate.<sup>23</sup>

The pitcher's fingers, as he releases the ball, control both the rate and direction of the spin.

Armed with two pieces of mobile technology, the modern pitcher can now engage in "pitch design." Setting up a Rapsodo just in front of the plate will capture spin rate and movement. Adding a high-speed camera like the Edgertonic behind him allows a pitcher in training to capture thousands (per second) of high-definition frames focused on his release point (i.e., the last fingertip to touch the ball).<sup>24</sup> Accordingly, a pitcher can now change grips, release angles, and contact points and get instantaneous feedback on pitch movement.

These new technologies are not only mobile in themselves (easily able to be broken down and moved), they are also enabling player mobility in skill level. Instead of grinding for years in the minor leagues, trying to learn the feel of a breaking ball, a pitcher can "design" his own curveball over the course of a winter. Hall of Famer Greg Maddux spent a career in the 1980s and 1990s perfecting a two-seam fastball that would start off the plate and move back over it; a few years ago, then Cleveland Indian Trevor Bauer taught himself the same curveball over the course of a winter using these tools.<sup>25</sup>

This technology also has implications for the economics of the game and formation of teams. Historically, major league teams have had "control" of their players' salaries for the first six years of their careers, starting when they reach the majors.<sup>26</sup> During the first three years, a player's salary is essentially fixed, and during the second three years, the player has the right to arbitrate his salary based on performance, but not become a free agent.<sup>27</sup> Free agency, by definition, is available only to experienced players with six or more years of service.

This has two effects: first, the teams that can rapidly develop minor league players—or identify players in other teams' organizations that can be developed if acquired—have an inherent advantage. The most forward-thinking organizations, like the Los Angeles Dodgers, look "for that value that might be picked up in a trade, in a released player, see[ing] a skill set that they like, that fits a model, that fits something they need, and see if they can develop that one skill set and break it free."<sup>28</sup> By way

of example, since August 2015, the Los Angeles Dodgers have made 60 trades for players, many of whom were in the minor leagues; in contrast, the old-school Boston Red Sox made just 22 trades over that period, most involving only major league players.

The second effect of the six-year period before free agency is that with the advent of pitch design, there is downward pressure on the free-agent market, at least for pitchers. Younger arms that also have effective breaking balls are cheaper for clubs. Two top-line pitchers—former Cy Young Award winner Dallas Keuchel (31 years old) and seven-time All-Star Craig Kimbrel (30 years old)—were free agents during the 2018–19 winter, but neither was signed until the 2019 season had commenced, and at salaries that were lower than many pundits expected. So while technology is driving upward mobility for young players, it may have different consequences for older ones.

Finally, technology has also enabled mobility into professional baseball. For more than a century, “organized baseball” (the American and National Leagues) has had a perceived monopoly on the training and development of players. Essentially the only way to get a job in developing players was to have been a player yourself with one of the MLB organizations. But in this new age, technology has democratized the training process.

The aforementioned Trevor Bauer taught himself “pitch design” at a private training center in Seattle called Driveline Baseball. Its owner is former Microsoft programmer Kyle Boddy, who pitched only in college (briefly, and before dropping out) and had never been employed by any organized club.<sup>29</sup> Starting in 2009, Boddy began to apply scientific analysis to baseball training: establishing a hypothesis, testing it against a control group, and studying the results. He started by using weighted baseballs (some lighter and some heavier than a regulation baseball) as a way to teach increased fastball velocity. He then moved on to “pitch design” as the Rapsodo and Edgertronic devices were developed and became available. The MLB teams that have consulted with Driveline, like the Houston Astros, have appeared in two of the last three World Series.

In the ultimate example of technology driving mobility, in October 2019, the Cincinnati Reds announced that Boddy—a complete outsider—had signed a two-year contract to serve as director of pitching initiatives and pitching coordinator, even while retaining his ownership in Driveline.<sup>30</sup> Organized baseball’s hiring processes are now being changed by the mobile revolution. In the 17 years since *Moneyball* was written, baseball has come a long way—but the teams that are not on the cutting edge of “Moneyball 2.0” (this player development era) are heading in the wrong direction.

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## ENDNOTES

1. *Boston Celtics*, BASKETBALL REFERENCE, <https://www.basketball-reference.com/teams/BOS> (last visited Nov. 5, 2019).

2. *Magic Johnson*, BASKETBALL REFERENCE, <https://www.basketball-reference.com/players/j/johnsma02.html> (last visited Nov. 5, 2019).

3. *1984–85 Los Angeles Lakers Roster and Stats*, BASKETBALL REFERENCE, <https://www.basketball-reference.com/teams/LAL/1985.html> (last visited Nov. 5, 2019).

4. *James Picks Heat; Cavs Owner Erupts*, ESPN (July 8, 2010), <https://www.espn.com/nba/news/story?id=5365165>.

5. *Miami Heat*, BASKETBALL REFERENCE, <https://www.basketball-reference.com/teams/MIA> (last visited Nov. 5, 2019).

6. Lee Jenkins, “I’m Ready”: *The Text That Started the Warriors’ Dynasty*, SPORTS ILLUSTRATED (June 12, 2017), <https://www.si.com/nba/2017/06/13/golden-state-warriors-kevin-durant-nba-championship-draymond-green-text>.

7. Quenton S. Alvertie, *Kyrie Irving and Kevin Durant Were Inseparable during All-Star Break*, CELTICS WIRE (Mar. 9, 2019), <https://celticswire.usatoday.com/2019/03/09/kyrie-irving-and-kevin-durant-were-inseparable-during-all-star-break>;

J.R. Moehringer, *Kevin Durant’s New Headspace*, WALL ST. J. MAG. (Sept. 10, 2019), <https://www.wsj.com/articles/kevin-durants-new-headspace-11568119028>.

8. Kurt Helin, *How Kawhi Leonard Signing, Paul George Trade Created Real Rivalry in Los Angeles*, NBC SPORTS (July 6, 2019), <https://nba.nbcsports.com/2019/07/06/how-kawhi-leonard-signing-paul-george-trade-created-real-rivalry-in-los-angeles>.

9. HC, *WHOOP: The Data-Driven Fitness Wearable LeBron James & Michael Phelps Use*, DIGITAL INITIATIVE (Apr. 9, 2018), <https://digital.hbs.edu/platform-digit/submission/whoop-the-data-driven-fitness-wearable-lebron-james-michael-phelps-use>.

10. Matt Porter, *Bruins’ Regimen Is Heavy on Vegetables*, BOS. GLOBE, Sept. 30, 2019, at D1.

11. *Next Gen Stats: Matt Breida’s 22.3 mph TD Run Fastest in Three Years*, NAT’L FOOTBALL LEAGUE, <http://www.nfl.com/videos/next-gen-stats/0ap3000001063615/Next-Gen-Stats-Matt-Breida-s-22-3-mph-TD-run-fastest-in-three-years> (last visited Nov. 5, 2019).

12. *Top Connections: Top 5 Longest Connections of Week 1 by Air Yards*, NAT’L FOOTBALL LEAGUE, <http://www.nfl.com/videos/nfl-top-connections/0ap3000001053746/Top-5-longest-connections-of-Week-1-by-air-yards-Next-Gen-Stats> (last visited Nov. 5, 2019).

13. Gabe Lacques, *Imitation Helped Save the Career of Tigers Slugger J.D. Martinez*, USA TODAY (Apr. 13, 2016), <https://www.usatoday.com/story/sports/mlb/2016/04/13/jd-martinez-tigers/82982822>.

14. Andy McCullough, *Dodgers Hitting Coach Revitalized J.D. Martinez’s Swing Despite Lack of MLB Credentials*, L.A. TIMES (Mar. 22, 2019), <https://www.latimes.com/sports/dodgers/la-sp-jd-martinez-robert-van-scoyoc-20190322-story.html>.

15. *J.D. Martinez and His BP iPad No Longer a Laughing Matter*, USA TODAY (July 14, 2018), <https://www.usatoday.com/story/sports/mlb/2018/07/14/jd-martinez-and-his-bp-ipad-no-longer-a-laughing-matter/36871871>.

16. Stephen Smith, *Fan Is Signed by Oakland As after Throwing 96 mph in Stadium Pitch Challenge*, CBS NEWS (Aug. 3, 2019), <https://www.cbsnews.com/news/nathan-patterson-baseball-fan-throws-96-mph-in-stadium-speed-pitch-signed-by-oakland-as>.

17. The average MLB fastball has increased 4 mph in the last 18 years. Dave Sheinin, “Velocity Is the Number One Thing”: *This High-Tech Biomechanics Lab Is Changing Baseball*,

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