Statcast

About Statcast

Statcast is a state-of-the-art tracking technology that allows for the collection and analysis of a massive amount of baseball data in ways that were never possible in the past. Statcast can be considered the next step in the evolution of how we consume and think about the sport of baseball that began over a decade ago, when Major League Baseball Advanced Media installed pitch tracking hardware in each Major League stadium. That was a step that unlocked a new age of baseball fandom, and Statcast built upon that innovation by adding the tracking of players and the batted ball to the initial pitch-tracking technology. The initial radar/camera system was installed in all 30 parks in 2015 after a partial trial run in 2014.

Since then, Statcast technology and terminology has changed the way that games are viewed and decisions are made, allowing allows front offices, broadcasters and fans alike to quantify the raw skills of players in ways that were previously available only to scouts or not available at all. Terms like "spin rate," "exit velocity," "launch angle" and more have become ubiquitous not just on broadcasts but from the players on the field as well, as players across the league used the data and the thinking behind it to elevate their game.

In 2020, MLB introduced upgraded technology to power Statcast, featuring optical tracking sensors from Hawk-Eye Innovations (https://www.hawkeyeinnovations.com/) and cloud infrastructure from Google Cloud (https://cloud.google.com/). Hawk-Eye first partnered with MLB through the 2014 launch of the video replay system (http://m.mlb.com/glossary/rules/replay-review), a successful partnership that has allowed MLB umpires to confirm or correct over 1,000 calls per season. The Hawk-Eye Statcast system utilizes a total of 12 cameras around the park for full-field optical pitch, hit and player tracking. Five cameras operating at 100 frames per second are primarily dedicated to pitch tracking, while an additional seven cameras are focused on tracking players and batted balls at 50 frames per second. Read more about the technology that powers Statcast here (https://technology.mlblogs.com/introducing-statcast-2020-hawk-eye-and-google-cloud-a5f5c20321b8).

Available Data

Statcast currently reports measurements (raw numbers from the on-field action) and metrics (combinations of raw measurements into useful numbers).

Measurements include:

• Arm Strength (http://m.mlb.com/glossary/statcast/arm-strength): How hard, in miles per hour, a fielder throws the ball.

• Base-to-base Time: How much time, in seconds, it takes a runner to get from one base to another, like Home To First (http://m.mlb.com/glossary/statcast/home-to-first).

• Distance Covered (http://m.mlb.com/glossary/statcast/distance-covered): How far, in feet, a fielder or runner has traveled on a play.

• Extension (http://m.mlb.com/glossary/statcast/extension): How far off the mound, in feet, a pitcher releases the pitch.

• Exit Velocity (http://m.mlb.com/glossary/statcast/exit-velocity): How fast, in miles per hour, a ball was hit by a batter.

• Launch Angle (http://m.mlb.com/glossary/statcast/launch-angle): How high, in degrees, a ball was hit by a batter.

• Lead Distance (http://m.mlb.com/glossary/statcast/lead-distance): How far, in feet, a runner is ranging off the bag at the time of a pitcher's first movement or pitch release.

• Pitch Velocity (http://m.mlb.com/glossary/statcast/velocity): How hard, in miles per hour, a pitch is thrown.

• Pop Time (http://m.mlb.com/glossary/statcast/pop-time): How quickly, in seconds, a catcher can get the ball out of his glove and to the base on a stolen base or pickoff attempt.

• Spin Rate (http://m.mlb.com/glossary/statcast/spin-rate): How much spin, in revolutions per minute, a pitch was thrown with.

Metrics include:

• Barrels (http://m.mlb.com/glossary/statcast/barrel): A batted ball with the perfect combination of exit velocity and launch angle, or the most high-value batted balls. (A barrel has a minimum Expected Batting Average of .500 and Expected Slugging Percentage of 1.500.)

• Catch Probability (http://m.mlb.com/glossary/statcast/catch-probability): The likelihood, in percent, that an outfielder will be able to make a catch on an individual batted ball. Catch Probability accounts for distance needed, time available, direction, and proximity to the wall, compared to how often the same opportunity is caught by Major League outfielders. This allows Statcast to get past the eye test and say "that ball gets caught 95 percent of the time," for example.

• Expected Batting Average (xBA) (http://m.mlb.com/glossary/statcast/expected-batting-average): xBA measures the likelihood that a batted ball will become a hit. Each batted ball is assigned an xBA based on how often comparable balls -- in terms of exit velocity, launch angle and, on certain types of batted balls, Sprint Speed -- have become hits since Statcast was implemented Major League wide in 2015. By comparing expected numbers to real-world outcomes over a period of time, it can be possible to identify which hitters (or pitchers) are over- or under-performing their demonstrated skill.

• Expected Weighted On-base Average (xwOBA) (http://m.mlb.com/glossary/statcast/expected-woba): xwOBA is formulated using exit velocity, launch angle and, on certain types of batted balls, Sprint Speed. In the same way that each batted ball is assigned an xBA, every batted ball is given a single, double, triple and home run probability based on the results of comparable batted balls since Statcast was implemented Major League wide in 2015. xwOBA also factors in real-world walk and strikeout numbers, and is reported on the wOBA (http://m.mlb.com/glossary/advanced-stats/weighted-on-base-average) scale. By comparing expected numbers to real-world outcomes over a period of time, it can be possible to identify which hitters (or pitchers) are over- or under-performing their demonstrated skill.

• Outs Above Average (OAA) (http://m.mlb.com/glossary/statcast/outs-above-average): A range-based metric of skill that shows how many outs a player has saved over his peers. Prior to 2020, OAA was an outfield-only metric. But it has been expanded to include infielders. OAA is calculated differently for outfielders and infielders.

• Sprint Speed (http://m.mlb.com/glossary/statcast/sprint-speed): A measurement of a player's top running speed, expressed in "feet per second in a player's fastest one-second window." This can be delivered on individual plays or as a season average, found by finding all qualified runs (currently defined as anything two bases or more, excluding homers) and averaging the top half of those. In 2017, Buxton led the Majors (https://baseballsavant.mlb.com/sprint_speed_leaderboard) with a Sprint Speed of 30.2 ft/sec, while the Major League average was 27 ft/sec.

Baseball Savant

BaseballSavant.MLB.com (https://baseballsavant.mlb.com/) is MLB.com's clearinghouse for Statcast data. That includes pre-made leaderboards for top level metrics like Sprint Speed (https://baseballsavant.mlb.com/sprint_speed_leaderboard), Outs Above Average (https://baseballsavant.mlb.com/outs_above_average) and Pop Time (https://baseballsavant.mlb.com/poptime), as well as a powerful search tool (https://baseballsavant.mlb.com/statcast_search) that allows users to create their own custom queries.

For example, a user could seek to find which batters had the highest average exit velocity against curveballs in 2017, with a minimum of 25 curveballs put in play. (The answer (https://baseballsavant.mlb.com/statcast_search?hfPT=CU|KC|&hfAB=&hfBBT=&hfPR=&hfZ=&stadium=&hfBBL=&hfNewZones=&hfGT=R|&hfC= is Aaron Judge, at 97.7 mph.) They could look to see which team's center fielders had the deepest average starting depth from home plate on the road, which in 2017 (https://baseballsavant.mlb.com/statcast_search?hfPT=&hfAB=&hfBBT=&hfPR=&hfZ=&stadium=&hfBBL=&hfNewZones=&hfGT=R|&hfC=&hfSea would have been the Red Sox, at 329 feet. They could wonder which pitchers got the most swinging strikes on sliders thrown above 90 mph, and find that in 2017 (https://baseballsavant.mlb.com/statcast_search?hfPT=SL%7C&hfAB=&hfBBT=&hfPR=missed%5C.%5C.bunt%7Cfoul%5C.%5C.tip%7Cswingin it was Chris Archer, with 99. There's a near-endless combination of questions that can be answered using Baseball Savant's public-facing search tool.

In addition, Baseball Savant provides a real-time game feed (https://baseballsavant.mlb.com/gamefeed?game_pk=526517&type=exit_velocity&chart_view=pitch&chart_type=sbp&inning=&count=&batt for any game played in a Statcast-enabled ballpark, and offers an interactive 3D pitch-tracking system (https://baseballsavant.mlb.com/visuals/pitch3d?player_id=477132).

The following are all of the terms defined within this section:

DEFENSE

Arm Strength (ARM) (/glossary/statcast/arm-strength)

Catcher Framing (/glossary/statcast/catcher-framing)

Catch Probability (/glossary/statcast/catch-probability)

Distance Covered (DCOV) (/glossary/statcast/distance-covered)

Jump (/glossary/statcast/jump)

Outs Above Average (OAA) (/glossary/statcast/outs-above-average)

Pop Time (POP) (/glossary/statcast/pop-time)

Shifts (/glossary/statcast/shifts)

OFFENSE

90-foot Running Splits (/glossary/statcast/90-foot-running-splits)

Barrel (/glossary/statcast/barrel)

Batted Ball Event (BBE) (/glossary/statcast/batted-ball-event)

Bolt (/glossary/statcast/bolt)

Exit Velocity (EV) (/glossary/statcast/exit-velocity)

Expected Batting Average (xBA) (/glossary/statcast/expected-batting-average)

Expected Slugging Percentage (xSLG) (/glossary/statcast/expected-slugging-percentage)

Expected Weighted On-base Average (xwOBA) (/glossary/statcast/expected-woba)

Hard-hit Rate (/glossary/statcast/hard-hit-rate)

Hit Distance (DST) (/glossary/statcast/hit-distance)

Home To First (/glossary/statcast/home-to-first)

Launch Angle (LA) (/glossary/statcast/launch-angle)

Lead Distance (LEAD) (/glossary/statcast/lead-distance)

Projected Home Run Distance (HR-DIS) (/glossary/statcast/projected-home-run-distance)

Sprint Speed (SS) (/glossary/statcast/sprint-speed)

Sweet Spot (/glossary/statcast/sweet-spot)

PITCHING

Active Spin (/glossary/statcast/active-spin)

Expected ERA (xERA) (/glossary/statcast/expected-era)

Extension (EXT) (/glossary/statcast/extension)

Perceived Velocity (PV) (/glossary/statcast/perceived-velocity)

Pitch Movement (/glossary/statcast/pitch-movement)

Putaway Percentage (/glossary/statcast/putaway-percentage)

Spin Rate (SR) (/glossary/statcast/spin-rate)

Velocity (VELO) (/glossary/statcast/velocity)

Inside Statcast (/glossary/statcast)

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- Active Spin (/glossary/statcast/active-spin)
- Arm Strength (ARM) (/glossary/statcast/arm-strength)
- Barrel (/glossary/statcast/barrel)
- Batted Ball Event (BBE) (/glossary/statcast/batted-ball-event)
- Bolt (/glossary/statcast/bolt)
- Catcher Framing (/glossary/statcast/catcher-framing)
- Catch Probability (/glossary/statcast/catch-probability)
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- Jump (/glossary/statcast/jump)
- Launch Angle (LA) (/glossary/statcast/launch-angle)
- Lead Distance (LEAD) (/glossary/statcast/lead-distance)
- Outs Above Average (OAA) (/glossary/statcast/outs-above-average)
- Perceived Velocity (PV) (/glossary/statcast/perceived-velocity)
- Pitch Movement (/glossary/statcast/pitch-movement)
- Pop Time (POP) (/glossary/statcast/pop-time)
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- Sweet Spot (/glossary/statcast/sweet-spot)
- Velocity (VELO) (/glossary/statcast/velocity)

Also in Glossary (/glossary)

- Standard Stats (/glossary/standard-stats)

Advanced Stats (/glossary/advanced-stats)
Statcast (/glossary/statcast)
Transactions (/glossary/transactions)
Pitch Types (/glossary/pitch-types)
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Positions (http://m.mlb.com/glossary/positions)
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