

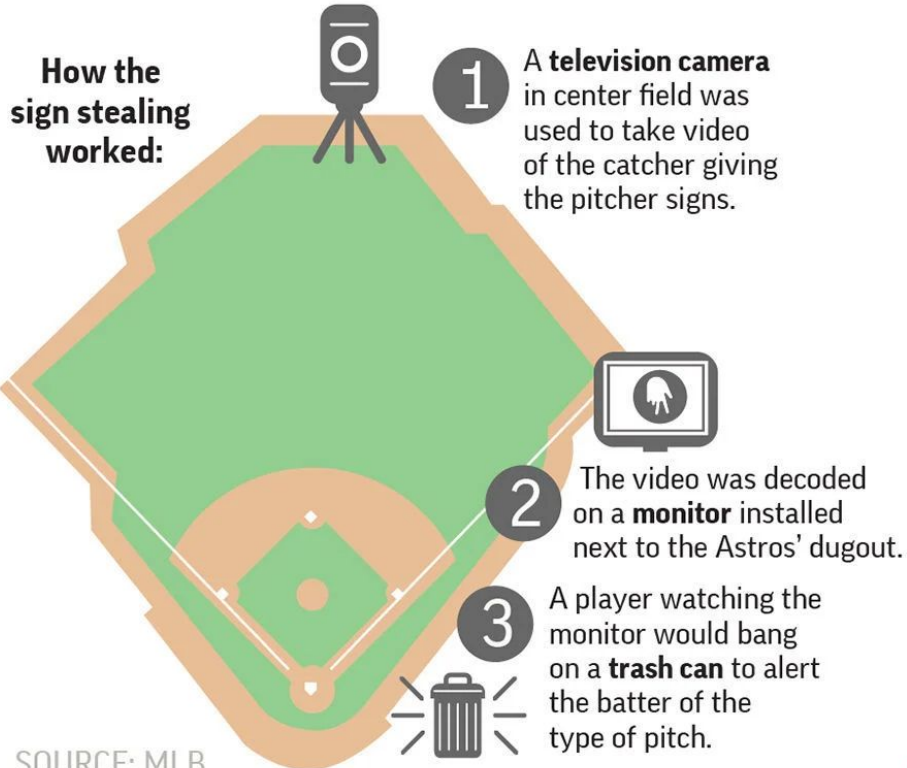
Predicting MLB Pitch Type

Louie Ligon



ASTROS GUILTY OF ELECTRONIC SIGN STEALING

Astros players devised a system to decode signs using a center field camera and a trash can during the 2017 season – the year Houston won its first World Series title.



SOURCE: MLB

AP

All-Star Game Plan

- ★ Leadoff Hitter - Why pitch type?
- ★ Early Innings - Pitch type knowledge
- ★ 7th Inning Stretch - Lessons learned
- ★ Extra Innings - What's next?

Why Pitch Type?

Inside the Mind of a Hitter

A look at how quickly a hitter must assess and react to a 90-mph fastball.



'In the blink of an eye'

A voluntary blink—such as one caused by the flash of a light—takes about 150 milliseconds. A 90-mile-per-hour fastball will cross the plate in under three blinks

The wind-up

Hitter attempts to get first insight on the type of pitch by watching the pitcher's hand as he releases the ball.

75-100 milliseconds

After the pitcher releases his pitch, the ball travels about 9 feet before the batter is able to process the entire image of the pitcher's wind-up and release.

175

Hitter assesses the type of pitch, extracting meaningful information about velocity, spin and trajectory.

225

Decision time—to swing or not to swing? It takes around 150 milliseconds from the start of a swing to the time it makes contact with the ball, but the decision must be made around 25 milliseconds earlier, to allow time for the brain signals to reach the various muscles involved.

350

At this point only exceptional hitters can make small adjustments. The bat is traveling at about three-fourths of its final velocity.

400

The ball crosses the front of home plate.

Experience helps the hitter **'pattern'** the type of throw the pitcher is known for to speed up his thought process. Is the pitcher a known fireballer? If yes, the fastball will be at the top of the list when the batter gets his first visual clue from the ball.

Having decided the character of pitch, the hitter selects a **swing pattern** that was established through countless hours of practice and experience. For this pitch he may choose 'upward swing to send the ball over the fence.'

If the **swing** is as little as seven milliseconds late, his squarely hit ball will go foul.

Pitch Types

Four-seam Fastball

Two-seam Fastball

Slider

Curveball

Changeup

Cutter

Splitter

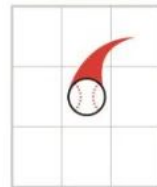
Forkball

Slurve

Screwball

Palmball

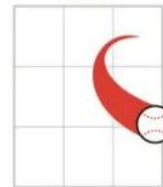
Four-seam Fastball



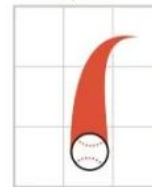
Two-seam Fastball



Cutter



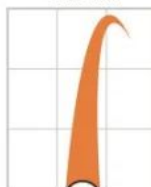
Splitter



Forkball



Curveball



Slider



Slurve



Screwball



Changeup



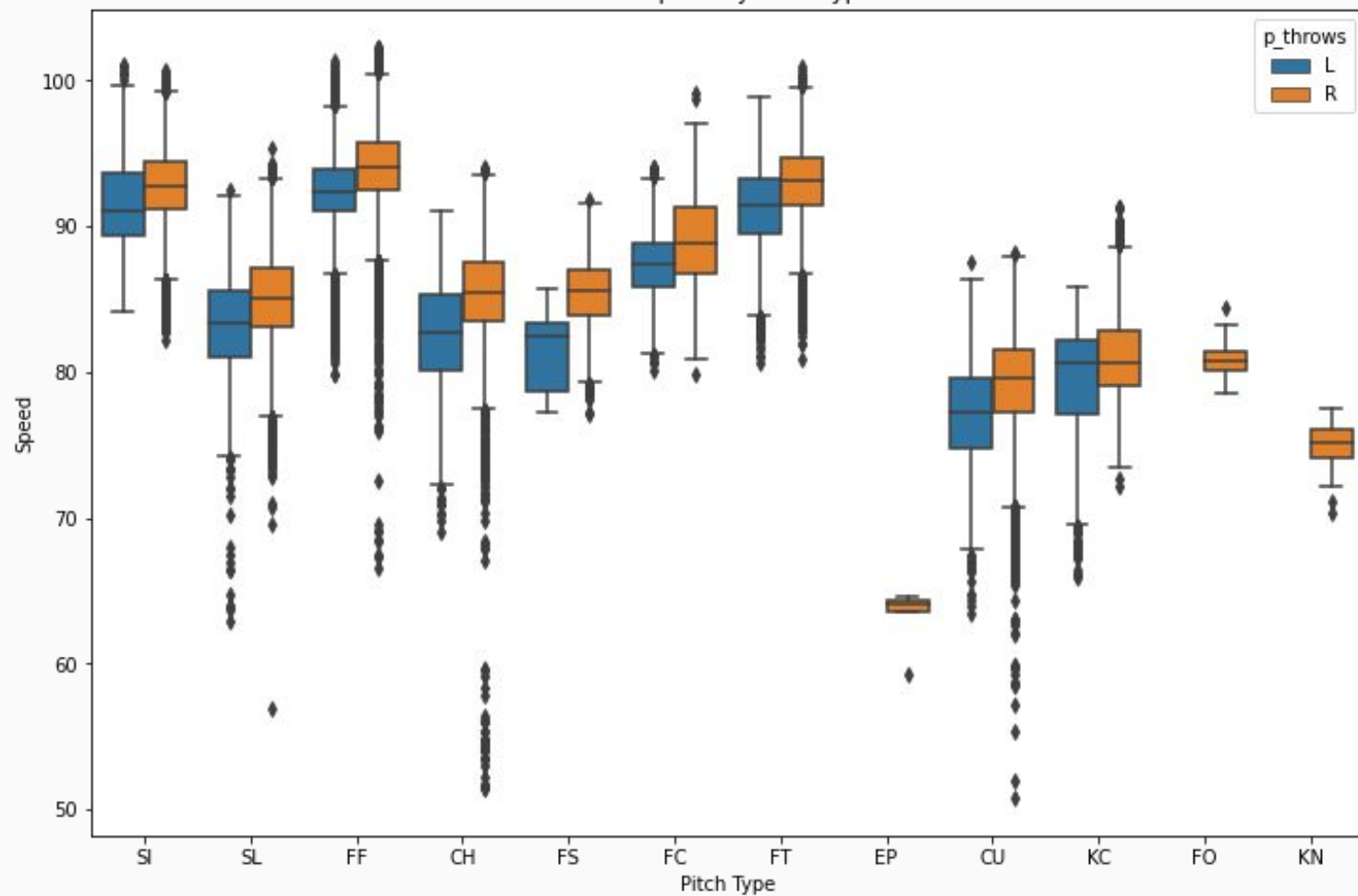
Palmball



Circle Changeup



Pitch Speed by Pitch Type



Lessons Learned

- Who is pitching?
 - Each pitcher has their own unique combination of pitch types
- Which hand does the pitcher throw with?
 - More likely to see a slider if batting stance aligns with pitcher's throwing hand
- What is the pitch count?
 - 80% chance of seeing a fastball with a 3-0 count
 - Slider becomes significantly more likely with a 0-2 count
- What inning is it?
 - Multiple models placed importance on inning and at-bat number

Only 3 pitch types
represent 74% of all
pitches thrown

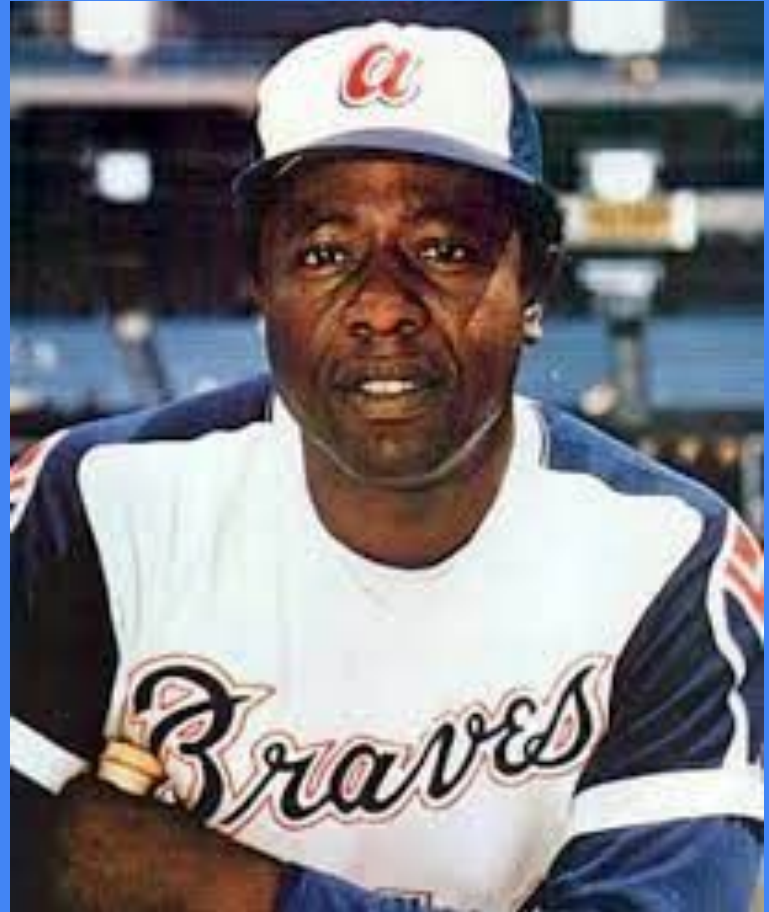
Fastballs, Sliders, Changeups

What's Next?

- Group pitch types into 3 categories
 - Fastballs, breaking balls, off-speed pitches
 - Allows for simplification and addresses the biggest challenge - timing
- Add predictions to pitch zone location
 - Considers the next challenge - location
- Focus on specific teams and individual pitchers
- Combine data from specific batter-pitcher matchups

“Guessing what the pitcher is going to throw is 80 percent of being a successful hitter. The other 20 percent is just execution.”

-Hank Aaron



Thanks!

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