Data Analytics in Diamond Sports

Chapter 1 - Introduction to the Course

Keishiro Hoshi

Introduction to the Course

Introduction to the Course - Course Outline

1. Introduction
2. Data analytics in baseball - how to coordinate
3. Pitching assessment
4. Hitting assessment
5. Summary test
6. Hands-on assignment

Introduction to the Course

Introduction about the curriculum developer

Keishiro Hoshi

- Have worked with the North Shore Twins of the British Columbia Premier Baseball League
- Independently analyze Major League Baseball data and share works on social media.
- Have supported the Twins through pitching and hitting assessments, pitch and swing design.
- Have supported multiple uncommitted player events.
- Used to work in international development as an IT consultant.
- Used to play baseball in Japan in childhood.

Introduction to the Course

Introduction to the Course

What is "data analytics"?

Data analytics is the act of examining datasets to extract value and find answers to specific questions.

Data science is an area of expertise that combines many disciplines such as mathematics, computer science, software engineering and statistics. It focuses on data collection and management of large-scale structured and unstructured data for various academic and business applications.

In other words,,,

Process
- Refer to numbers collected
- Code to generate plots
- Conclude your thoughts based on data science
- Share your thoughts and works with others
- Let others make decisions

Purpose
- Achieve outcomes

Introduction to the Course

What is "sports analytics"?

Definition

The process of using data analysis techniques to gain insights from sports-related data. Referred to AI but needs to be corrected by the professor

In baseball/softball, scorekeeping is known for one of most primitive and primary tool for sport analytics. In the Computer age, as you may know Moneyball, some pioneering teams have incorporated scientific ways including economics and statistics.

Also, as for player development, biomechanics have been paid more attention to.

Why is sport analytics important?

In the past when we relied on our insights, but based on analytics, we can

- Find basis for performance result and player evaluation
  e.g. why Player A should lead off because his OBP is the highest.

- Eliminate our prejudice and impression
  e.g. you felt slider was driven deep, but just few slugging and good strikeout percentage.

- Track player condition and development
  e.g. based on tracking tool, his velocity was basically over 85 mph, but this week just around 82 mph. He need some rest or error in his form?

Introduction to the Course

Oakland Athletics

As the book/film "Moneyball" depicts,
Small market team revolutionized with the SABR metrics, such as Run Expectancy, Run Value.
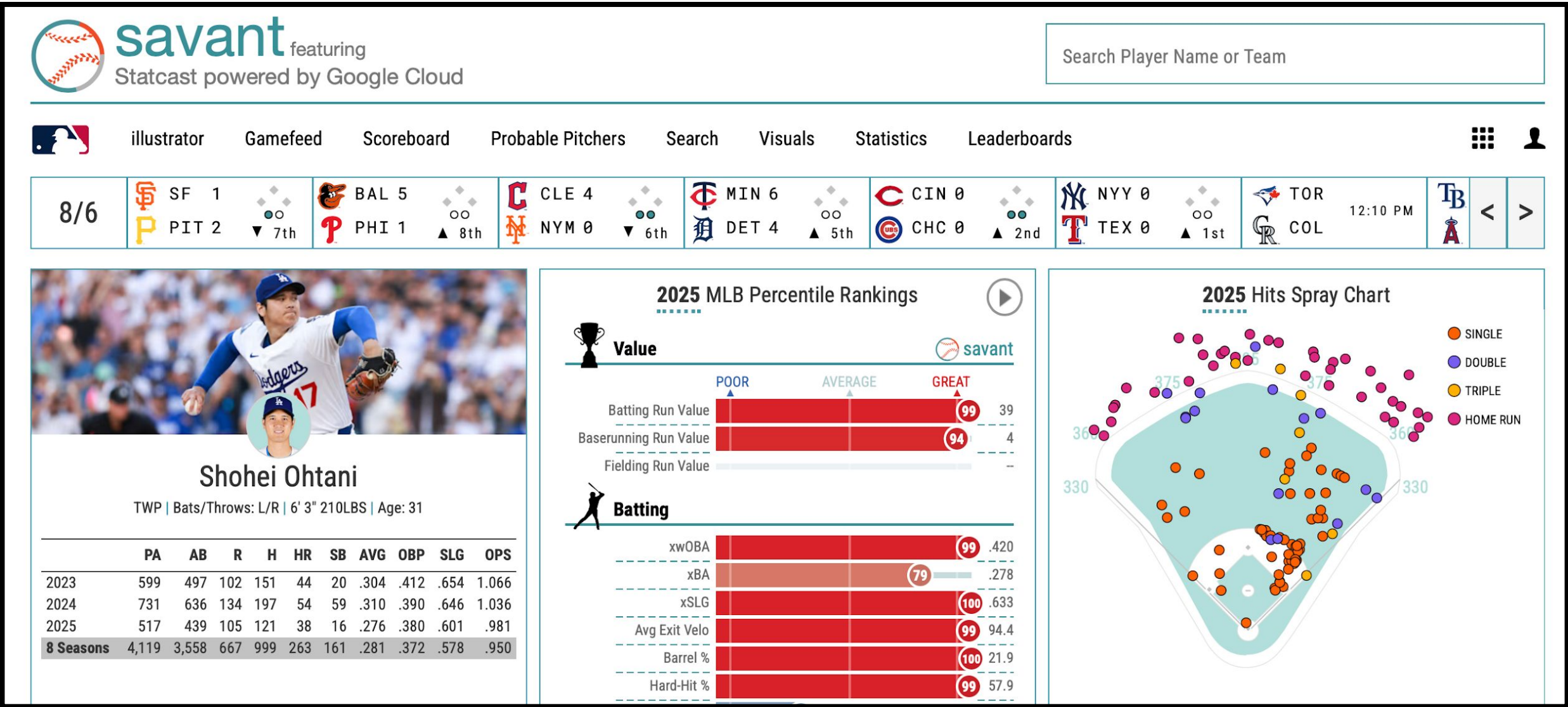
Pittsburgh Pirates

Based on big data, they incorporated extreme defensive infield shift.

* Restricted extreme defensive infield shifts starting in the 2023 season, not a complete ban.

Introduction to the Course

Stats data

Batting: batting average, home runs, stolen bases, RBI, OPS, etc.

Pitching: innings pitched, earned runs average, win-lose, save, BB%, K%, WHIP, etc.

Fielding: fielding percentage, errors committed, putouts, assists, etc.

Tracking data

Batting: exit velocity, launch angle, distance, etc.

Pitching: velocity, break, spin rate, spin axis, arm angle, VAA, etc.
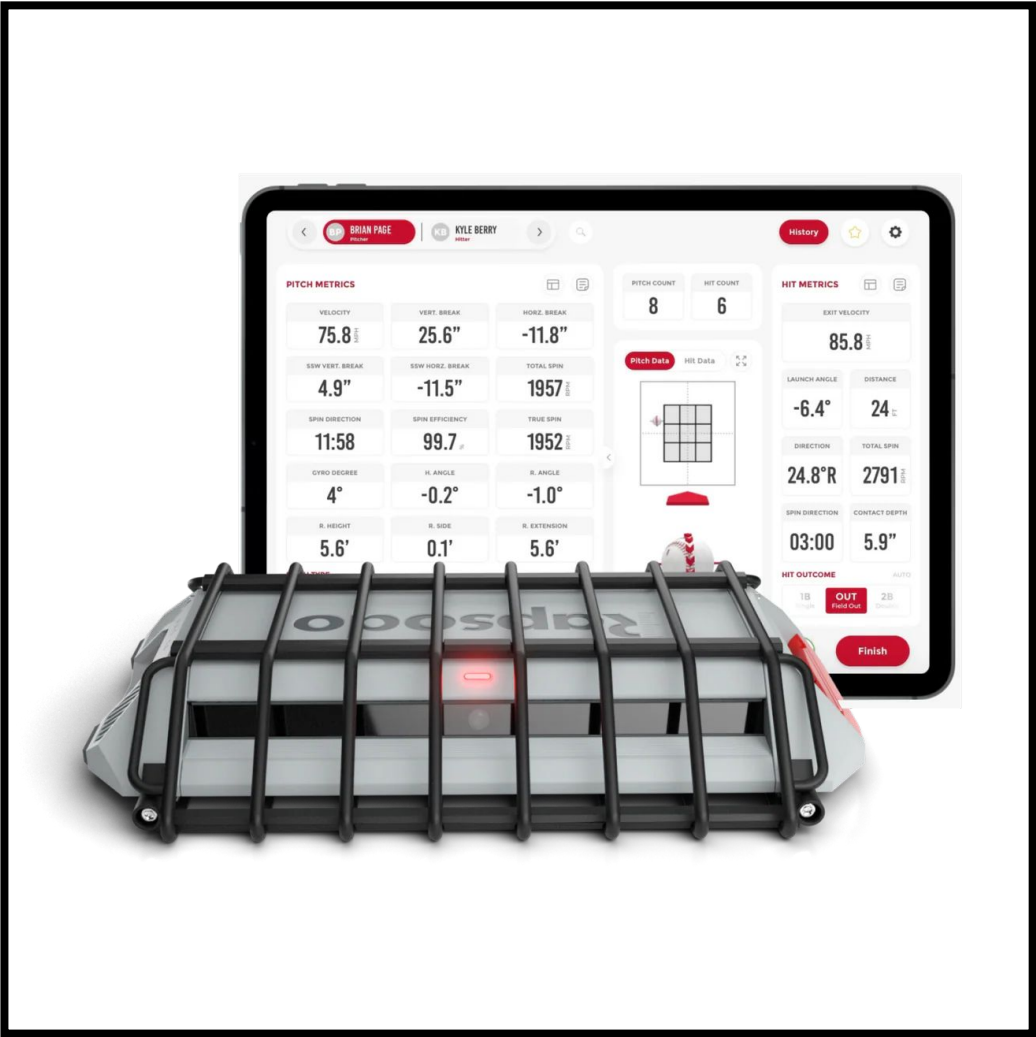
Fielding: UZR, DRS, etc.

Introduction to the Course

Hawk-Eye

Trackman

Rapsodo

HitTrax

Blast Motion

Motion capture

Introduction to the Course

Then how can analytical staffs support atheletes?
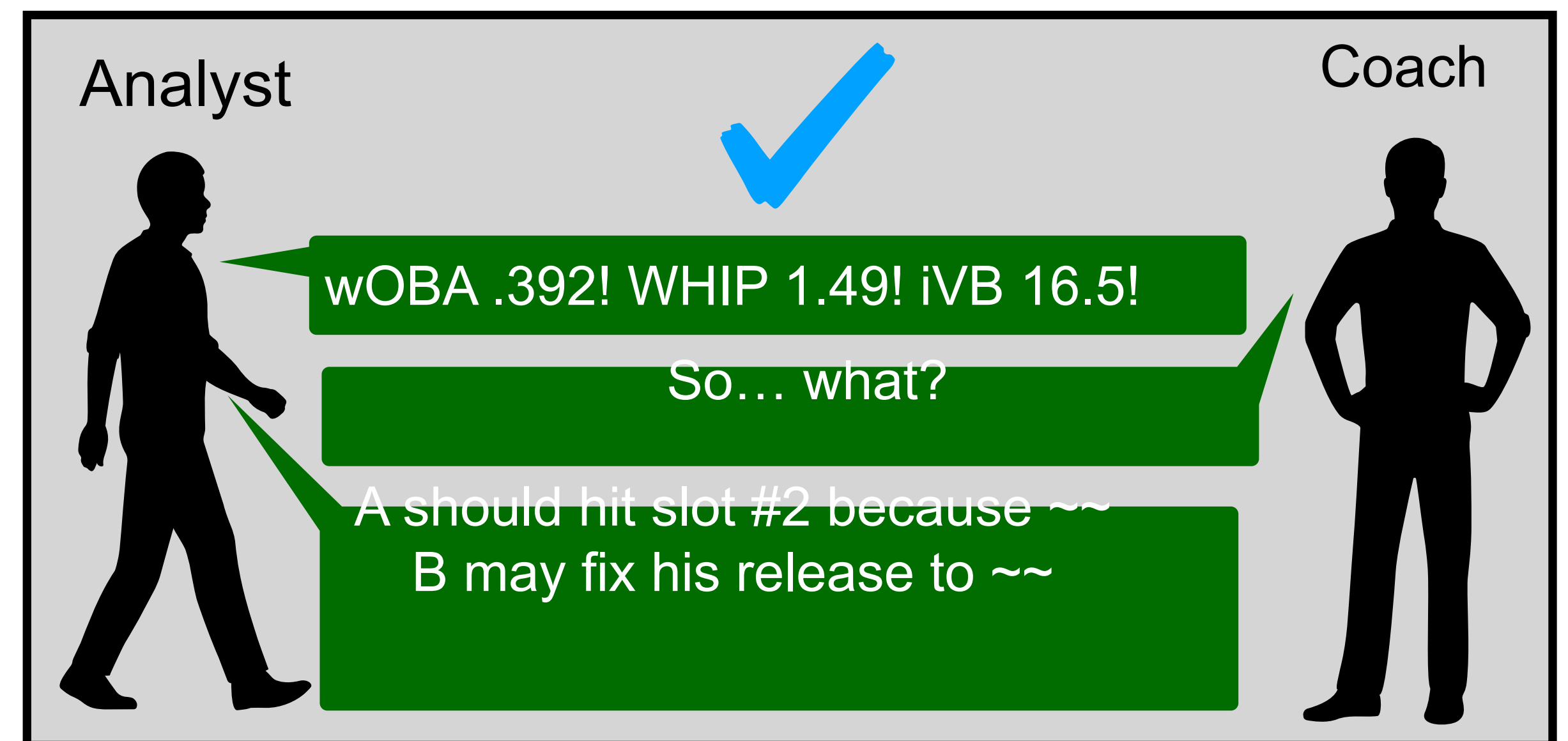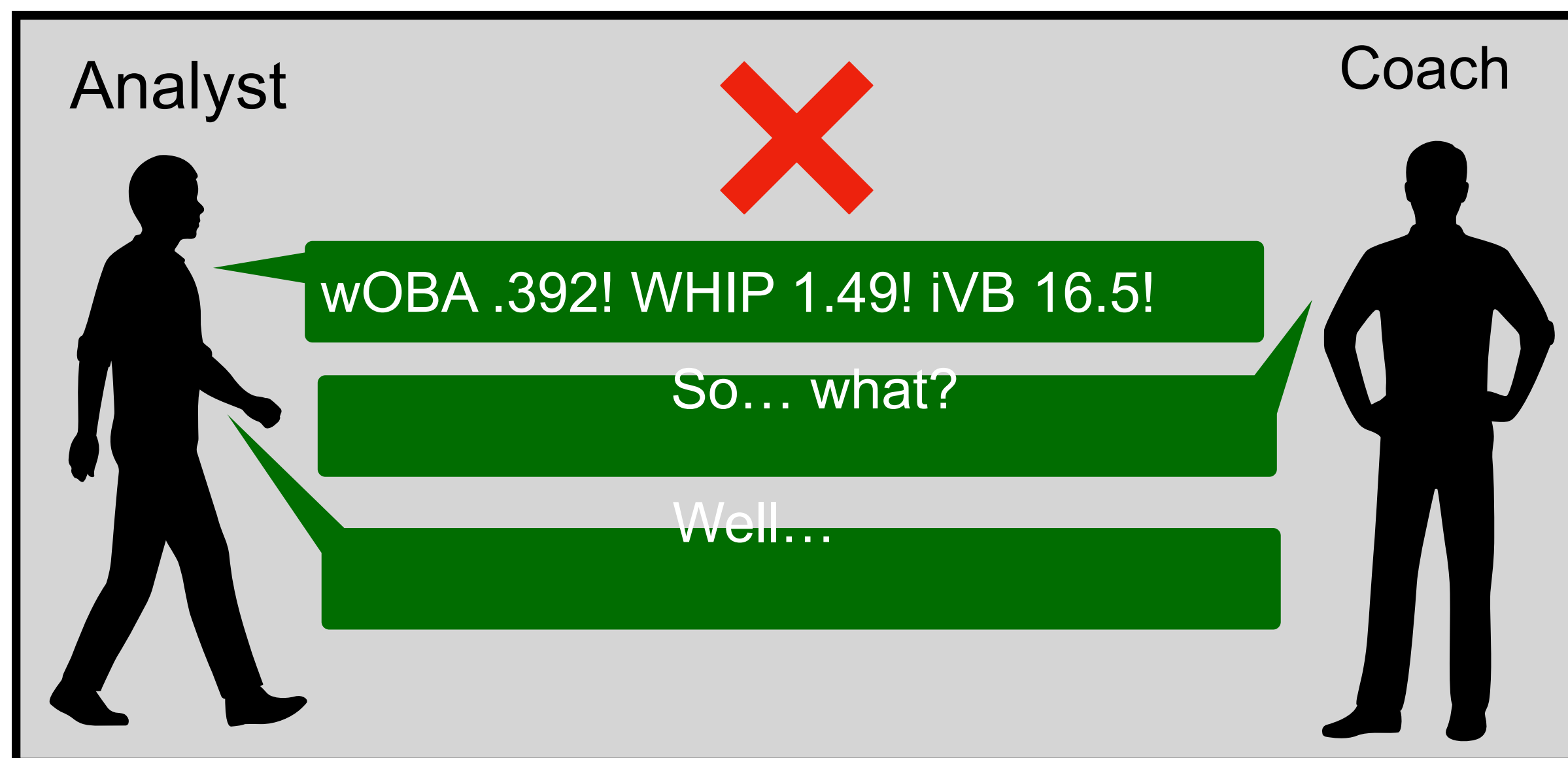
xxxxxx

What is "data translation"?

In baseball/softball,

Coaches/players do NOT want tons of numbers, BUT references to make decisions for game strategies and performance development. One of the biggest responsibility on you is to "translate" data for them considering what they finally need.
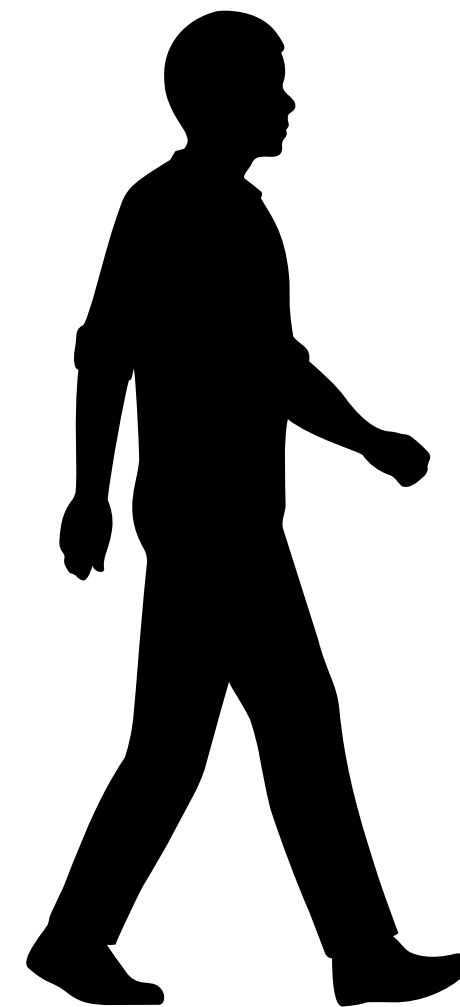
Introduction to the Course

What is "data translation"?

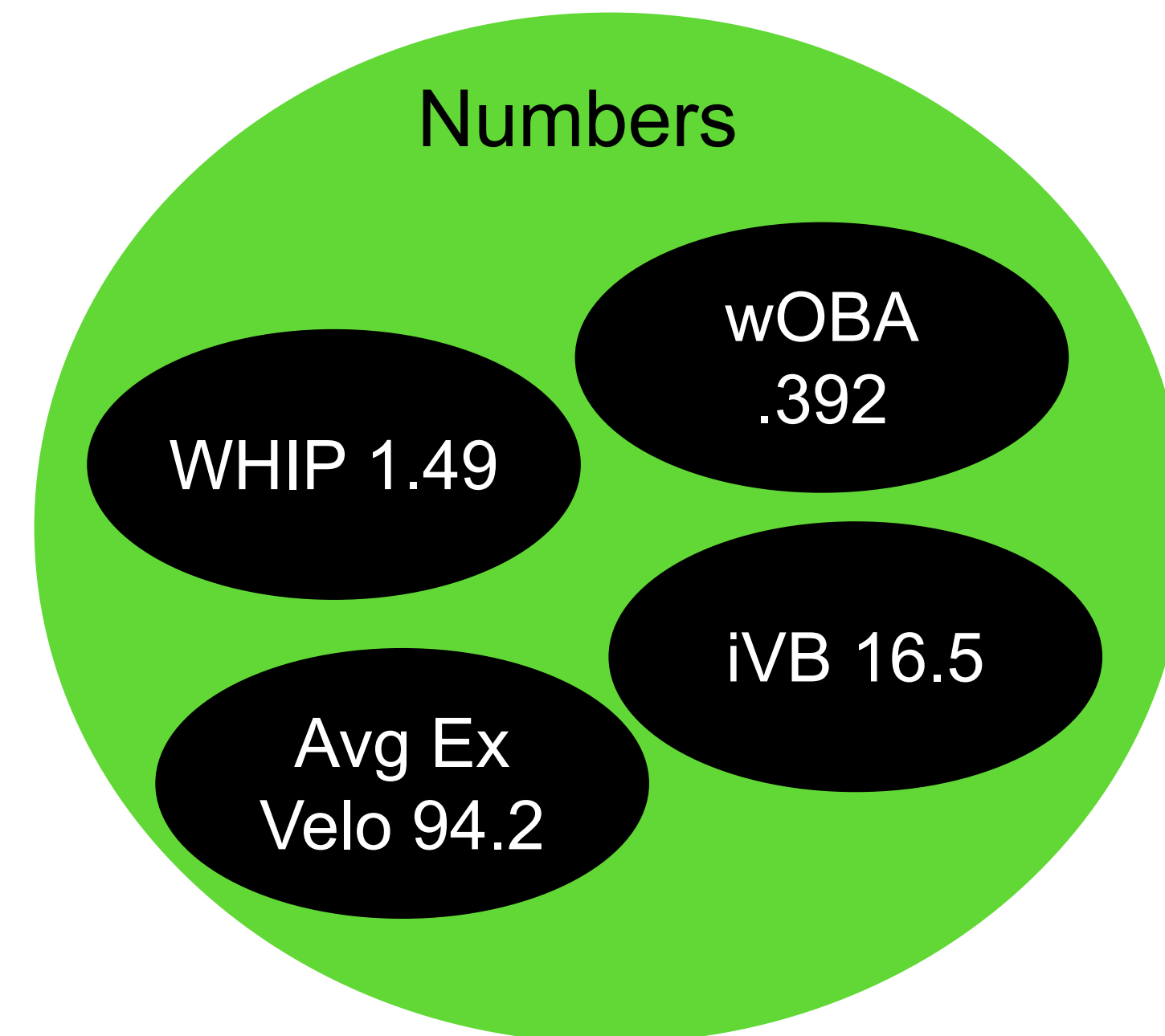As more positions have been open for analytical staffs in baseball industry, it has been more competitive.
Players and coaches have been more familiar with metrics.
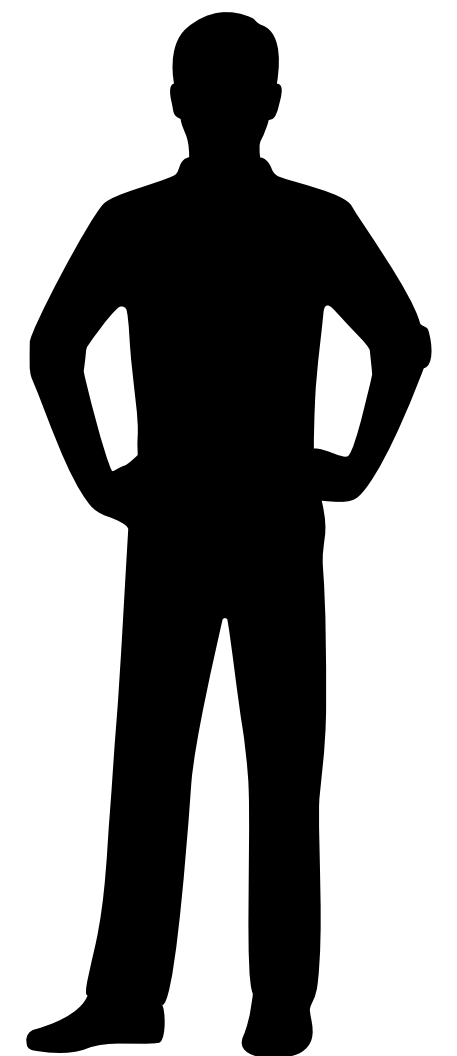If you want to launch the career, tracking tool operations are NOT enough as an analyst.

Analyst

Coach

Numbers

WHIP 1.49

wOBA .392

iVB 16.5

Avg Ex Velo 94.2

Introduction to the Course

Back to cuts of Moneyball…

At least the film depicts that

- the analytical staff actively explained metrics in detail to the GM and players.
- The GM/analyst and players finally concluded what plays are expected.

Again, as for baseball analytics…

Collect numbers = process

Code = process

Share analytics and thoughts = process

Achieve outcomes = objectives

Introduction to the Course

https://blogs.fangraphs.com/lets-watch-brayan-pena-try-to-beat-the-shift/

https://baseball-connect.com/learn/what-is-hawkeye/

https://number.bunshun.jp/articles/-/857834?page=1

https://rapsodo.ca/products/rapsodo-pro-3-ball-flight-monitor?shpxid=31ac5ca2-9217-41d6-9424-d6499158efd2

https://www.trackman.com/baseball/Portable-B1

https://www.pittwire.pitt.edu/features-articles/2025/07/29/baseball-biomechanics-pitt-ed-magazine

https://technology.mlblogs.com/introducing-statcast-2020-hawk-eye-and-google-cloud-a5f5c20321b8

https://www.hittrax.com/products/