THE WRONG STUFF

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GOAL: Identify trends in pitch-type effectiveness over the last 3 years

Background and Introduction

- Stuff+ defines the nastiest pitches by physical characteristics
- How well does Stuff+ evaluate pitch effectiveness?

Data

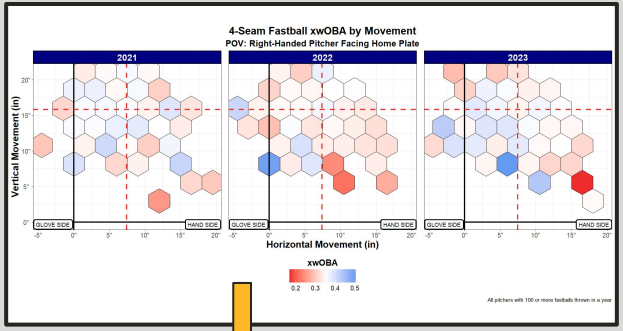
- Combine aggregated pitch-by-pitch data with season-by-season data

VELOCITY	EXTENSION	INDUCED VERTICAL BREAK	HORIZONTAL BREAK	SPIN	STUFF PLUS	WHIFF PCT	XWOBA
93.7	6.5	14.9	-2.8	2201	72.2	16.4	0.283
96.1	7.4	17.8	-6.4	2135	101.6	23.7	0.338
95.3	6.9	16.3	-7.7	2220	106.7	23.7	0.315
90.5	6.3	16.0	-11.2	2287	79.0	22.4	0.389

Methodology

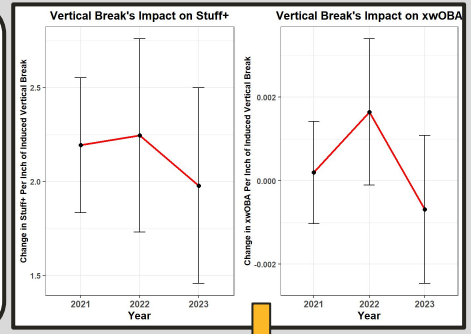
- Regression analysis of Stuff+, xwOBA and Whiff% comparing the slope change over time
- Modeled Stuff+ and xwOBA as multivariate functions of five ball-flight characteristics and used k-fold cross validation to compare model performance
- Random Forest beat GAM

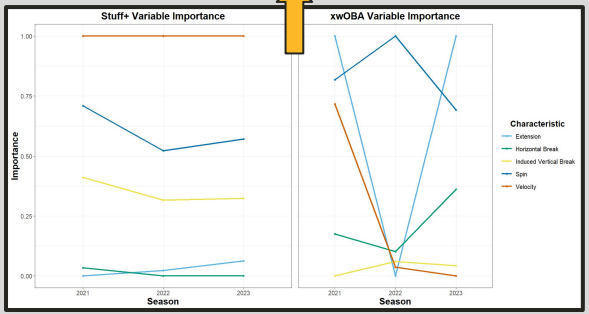
Results and Analysis



- Horizontal movement is more important than believed
- Vertical movement isn't everything
- Stuff+ has bias towards vertical movement

- Velocity is most important for Stuff+
- Velocity becomes least important for xwOBA





- Hitters tend to have better at-bat outcomes against pitches with additional vertical break

Conclusions / Future Work

- Stuff+ is not modeling the outcomes well
- There appears to be bias in Stuff+
- Apply our findings to all pitch types

Limitations

- Season-by-season Stuff+
- Limited Stuff+ pitch types

Mentors

- Sean Ahmed
- Quang Nguyen
- Ron Yurko