STUFF VS CONTROL

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Purpose & Motivation

- What is more important in developing a pitcher for the MLB?
  - Velocity or Control
  - Old school theory vs new school
- Is there a tradeoff between the two?
- If so how can we measure and visualize it?

Methods

- Using Statcast pitchF/X data to visualize the strike zone
  - Pitch-By-Pitch data
- Calculated the expected Run Values (xRV) for each pitch given the velocity and count
  - Used expected weighted on base average (xwOBA)
  - Converted xwOBA scores to xRV
- Used 92 mph fastballs (average) vs 95+ mph fastballs (top 20%)
- Mapped the strike zone accordingly

Results

- In terms of xRV and xwOBA there is an advantage to pitchers who throw harder
  - More room for error for harder throwers
  - No heart of zone for harder throwers

- To achieve the same xRV or xwOBA value as a certain 92mph pitch, a 95mph does not need to be located as well
  - 95mph does not need to be placed perfectly in the corner to have the same xRV as a perfectly placed 92mph pitch
  - 95 down the middle has a lower xRV than 92 down the middle

Literature Review

- Eno Sarris: What is more important for a Pitcher Command or Stuff?
  - Looked at more than fastballs
  - Used Command+ and Driveline's Stuff metrics
  - Includes fastball movement into Stuff
  - Looked at success on a by pitcher level
    - Used a pitchers arsenal and averages for each pitch to create variables and scores
    - Ex: Clayton Kershaw slider Command+ score = 113
  - Used ERA to quantify success

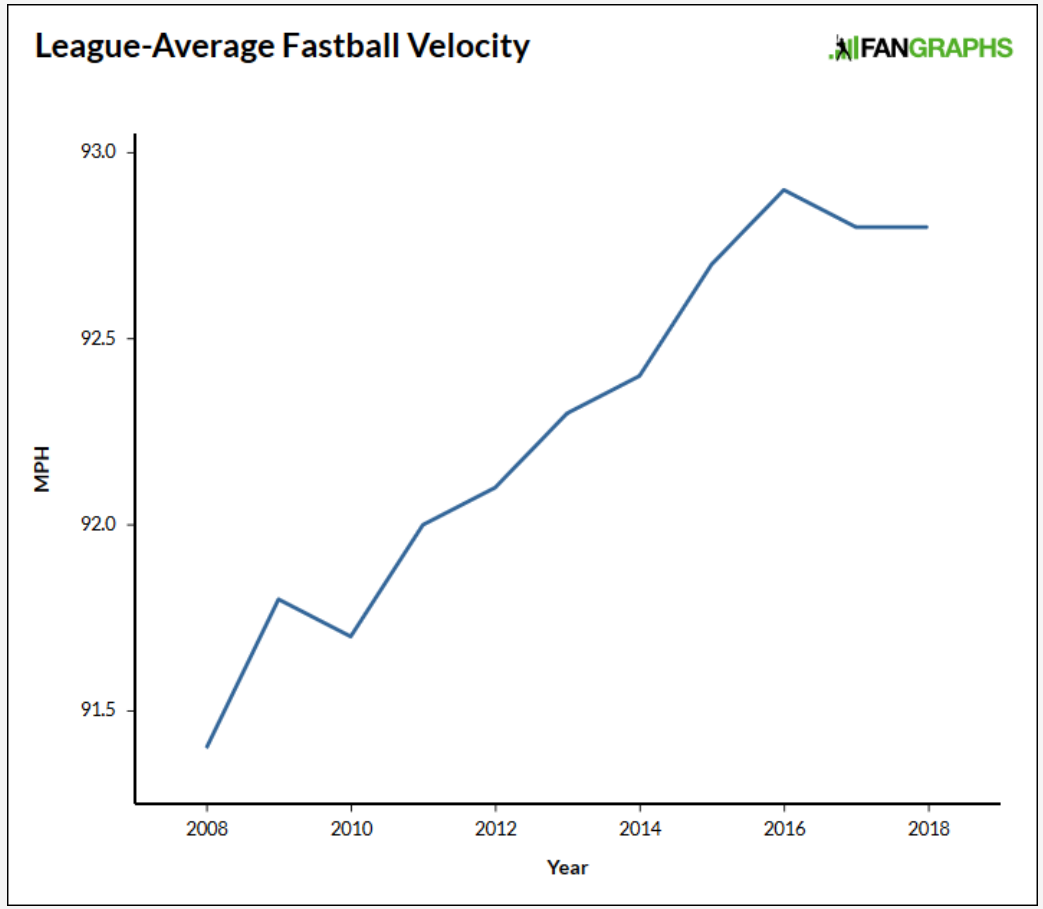
Literature Review (cont)

- Eli Ben-Porat: Quantifying Pitcher Command
  - Focus on Command
  - Used location of pitches given hitters abilities to value command
  - Used this valuation to predict Strike rate
    - Year-to-year expected swinging strike percentage (current year) vs Year-to-year expected swinging strike percentage (next year)
  - Used the results to determine what pitchers have elite command regardless of their stuff
    - A pitchers ability to exploit a batters weakness' given their pitch arsenal

Model

- Used a generalized additive model (GAM) to predict outcomes
  - GAM model provides flexibility for non-linear data
    - Allows us to plot the pitchF/X data accurately
  - Good at predicting non-linear data based upon existing results
    - We essentially created a mapping of expected xwOBA (exwOBA) and expected Run Values (xRV)
    - Allows us to fill in the gaps in the data
  - Gives a clean and accurate visual for all pitch predictions

Data

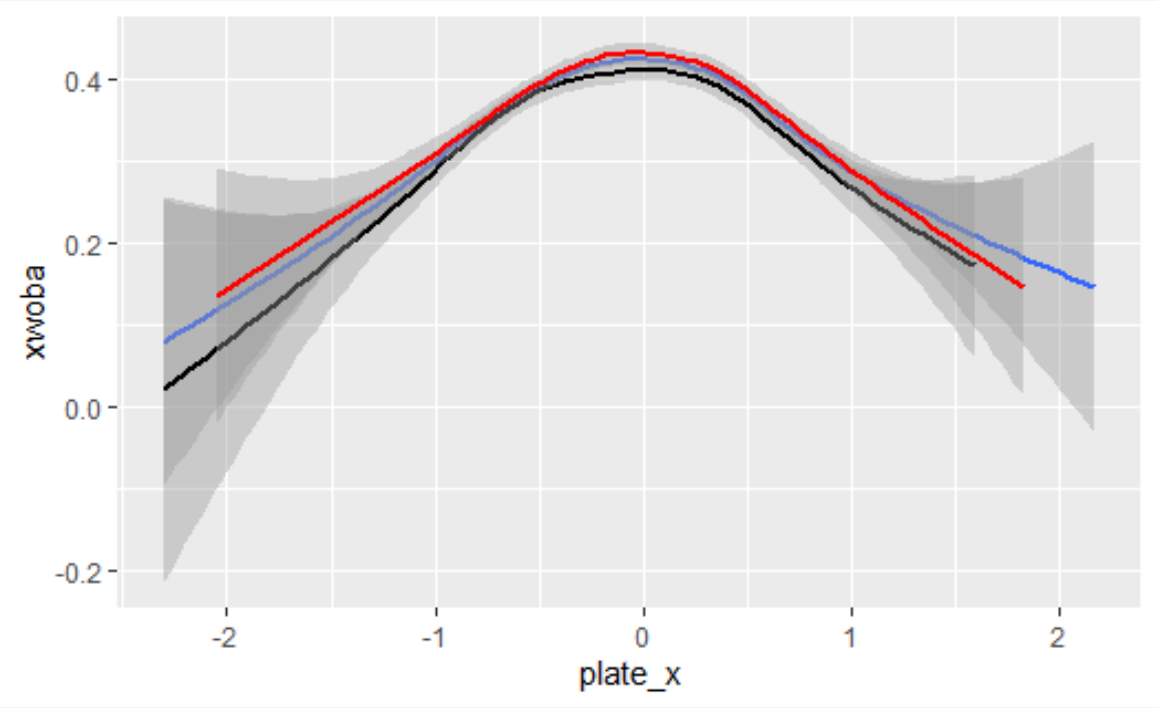


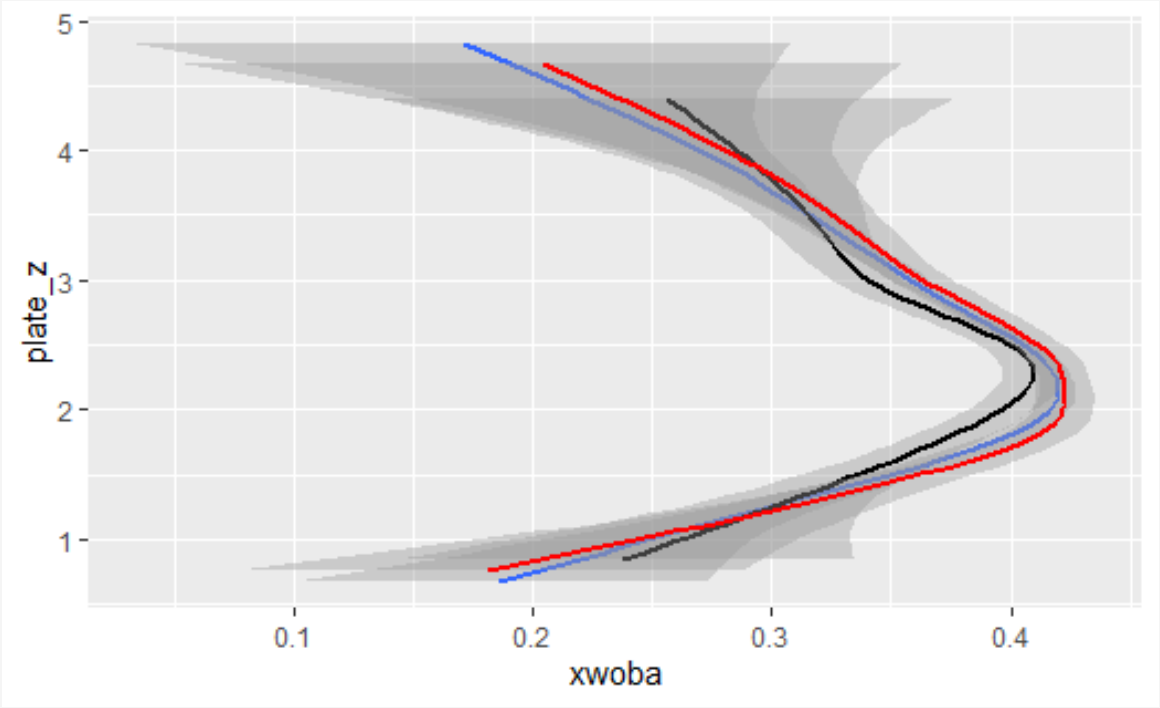
- Used data from 2016 and 2019
  - 2016 MLB was in a state of change
    - Average fastball velocity jumped from 2015-2016
  - 2019 most current year
    - Average fastball velo beginning to plateau
- Jeff Sullivan: The Velocity Surge Has Plateaued
  - Dives into velocity trends
  - Created graph on left
    - Helped decide which years were influential

2016 Data

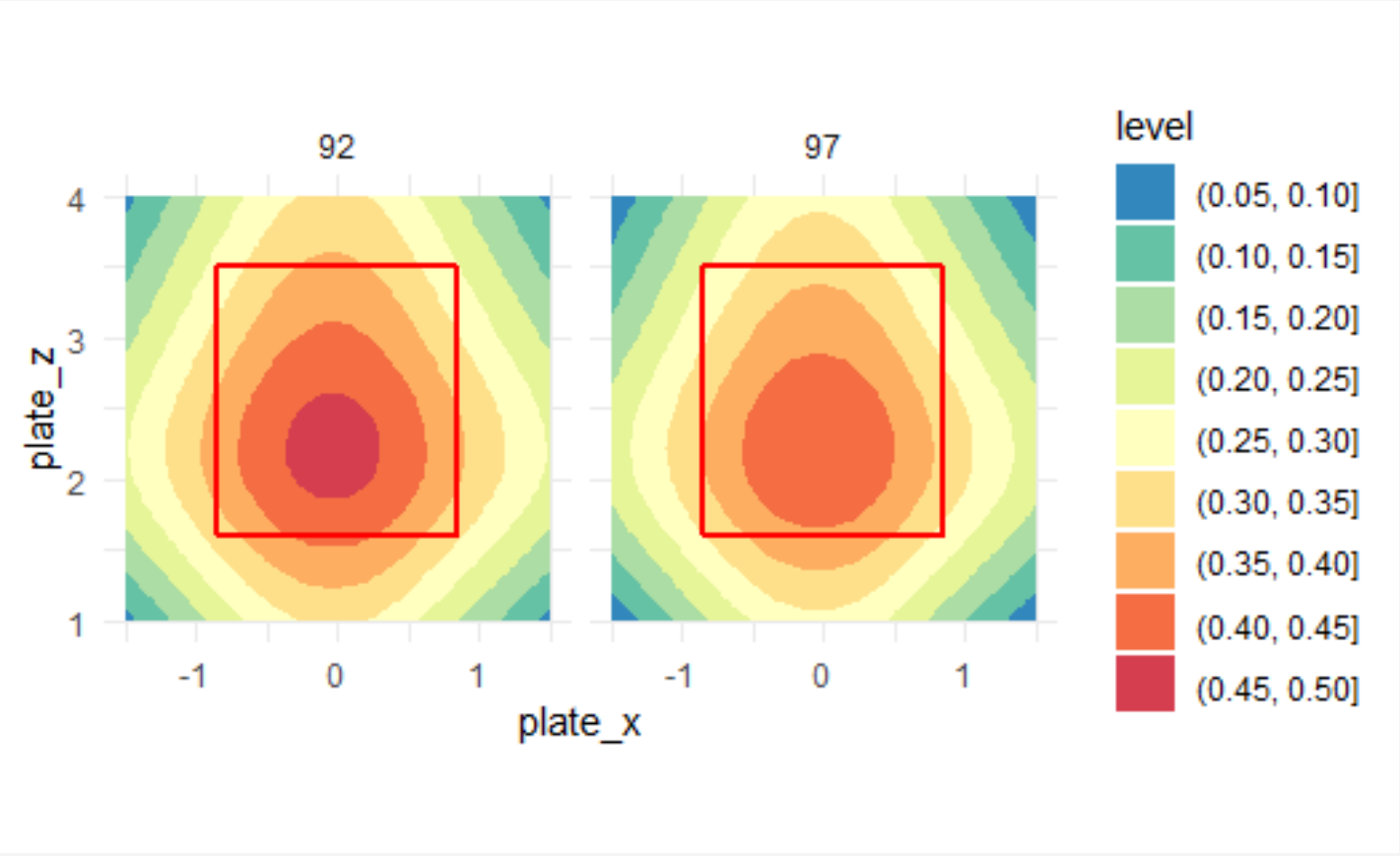
xwOBA vs Plate location

- Red – <92mph
- Blue – all fastballs
- Black – >95mph





2016 Data



92 mph (average FB) vs 97 mph (elite FB) xwOBA vs Plate location

No heart of zone in 97

- No deep red

Edge of zone

- Larger low xwOBA zones

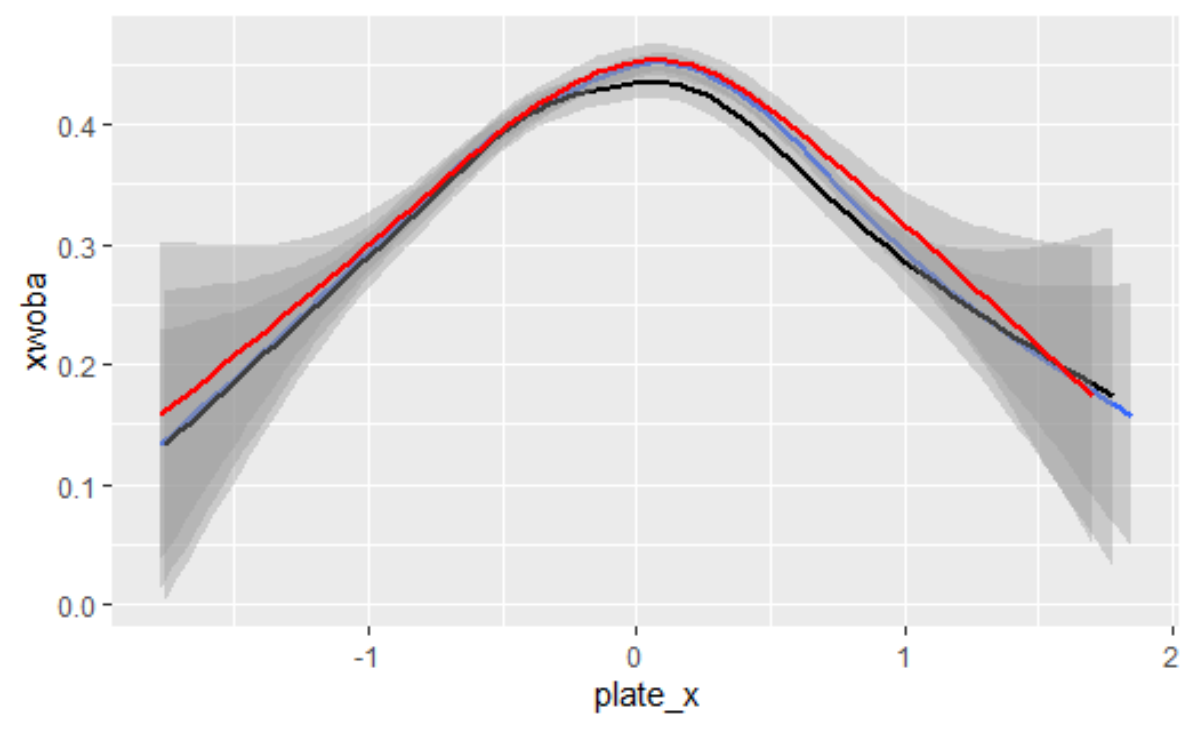
More forgiveness for harder throwers

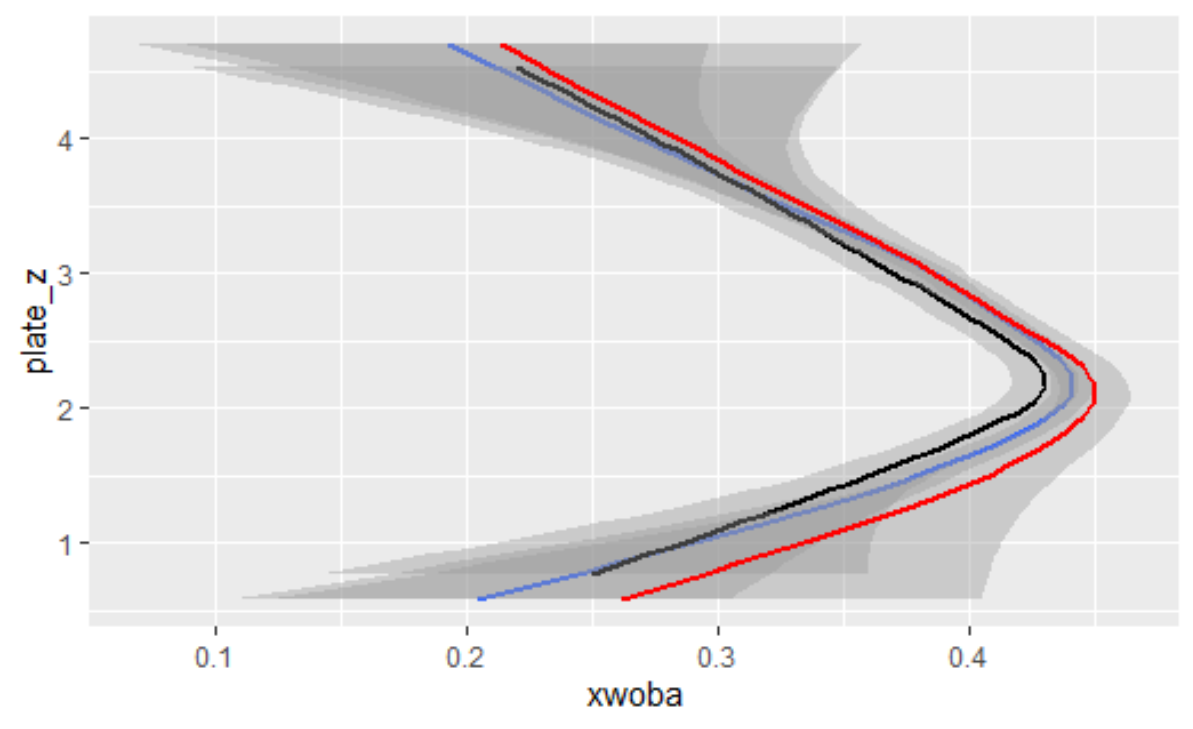
Harder a pitcher throws the less accurate they have to be to achieve certain xwOBA values (assuming they throw strikes)

2019 Data

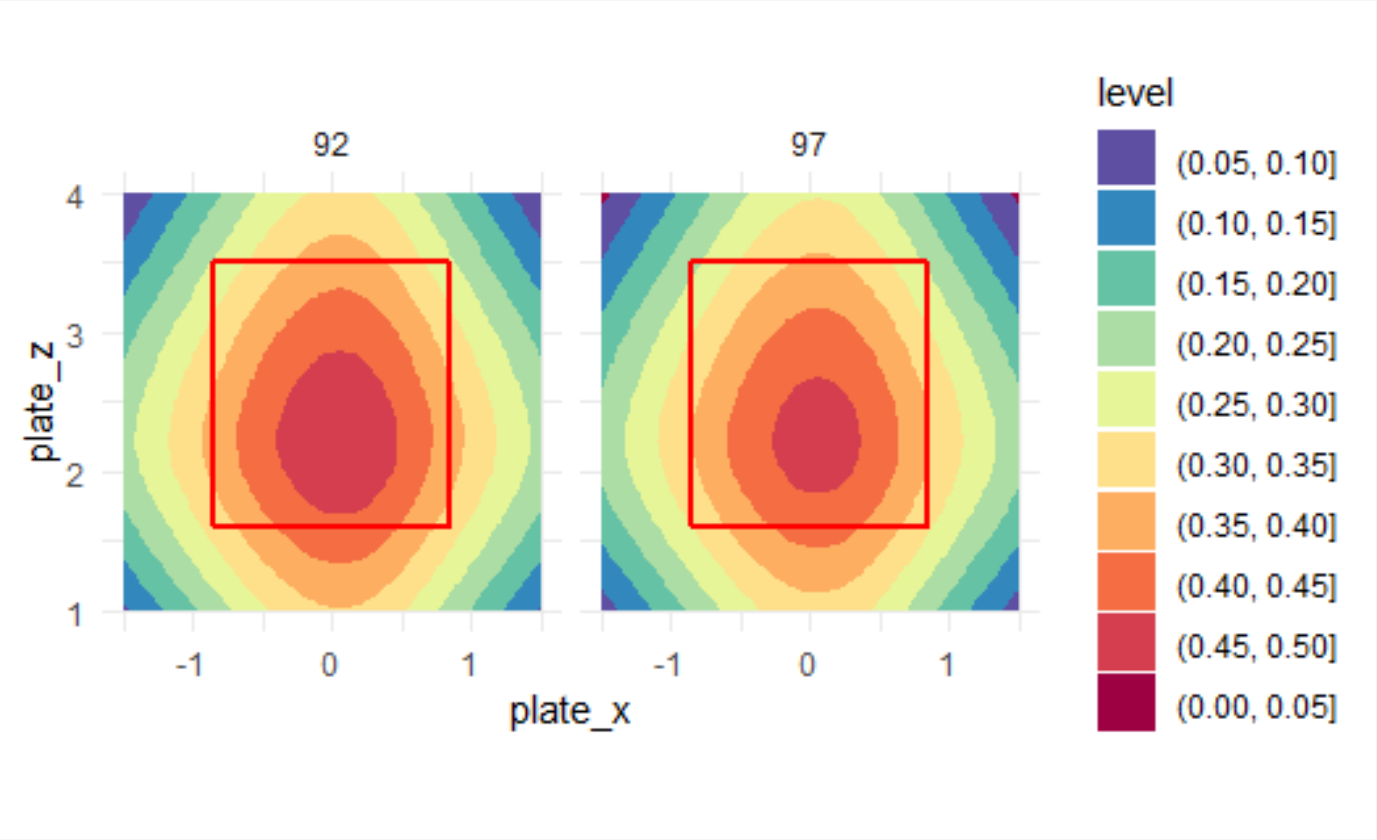
xwOBA vs Plate location

- Red – <92mph
- Blue – all fastballs
- Black – >95mph





2019 Data



92 mph vs 97 mph
xwOBA vs Plate location

97 beginning to be hit harder
- 3rd year prior to change
- Hitters adapt

92 huge heart
- Average fastballs are hammered
- Even edge has high xwOBA values
- High xwOBA values out of zone

Batters are adapting to harder throwers
- Leaves average fastballs behind
- Need to throw hard to be successful

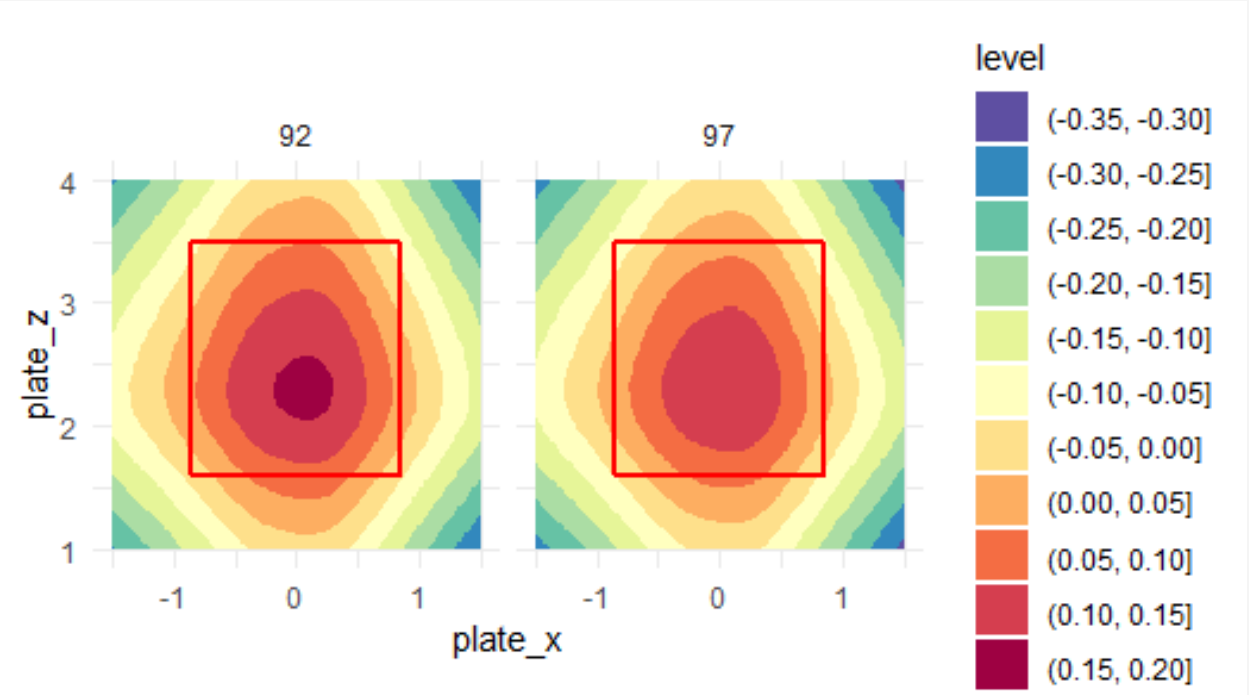
xRV

Converted xwOBA values to Expected Run Values (xRV)

Used pitchF/X data to find xRV for a given pitch in a given count

This lets us look at how much each individual pitch contributes to a run given the count and velocity.

0-0 Count 2019



Can use equation to compare strike values between velocities

xRV = (Percent_edge*xRV_edge)+ (Percent_heart*xRV_heart)

Average xRV for a strike in 2019 = .10

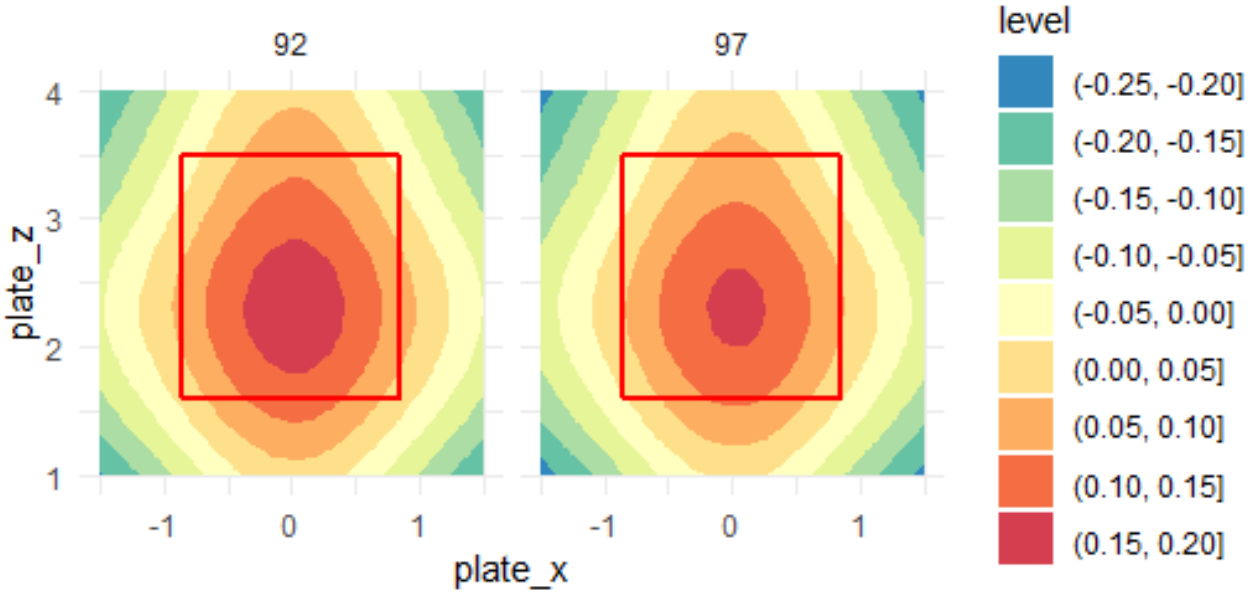
92mph FB xRV = .10

50% heart 50% edge

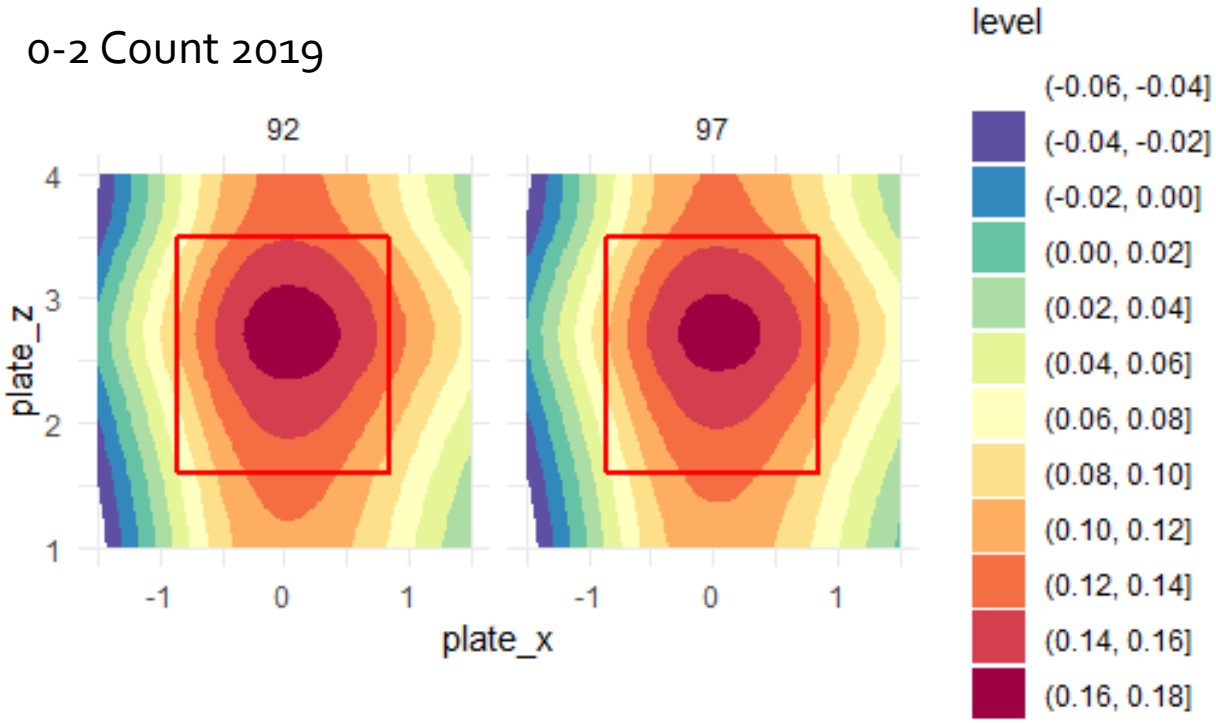
97mph FB xRV = .10

100% heart

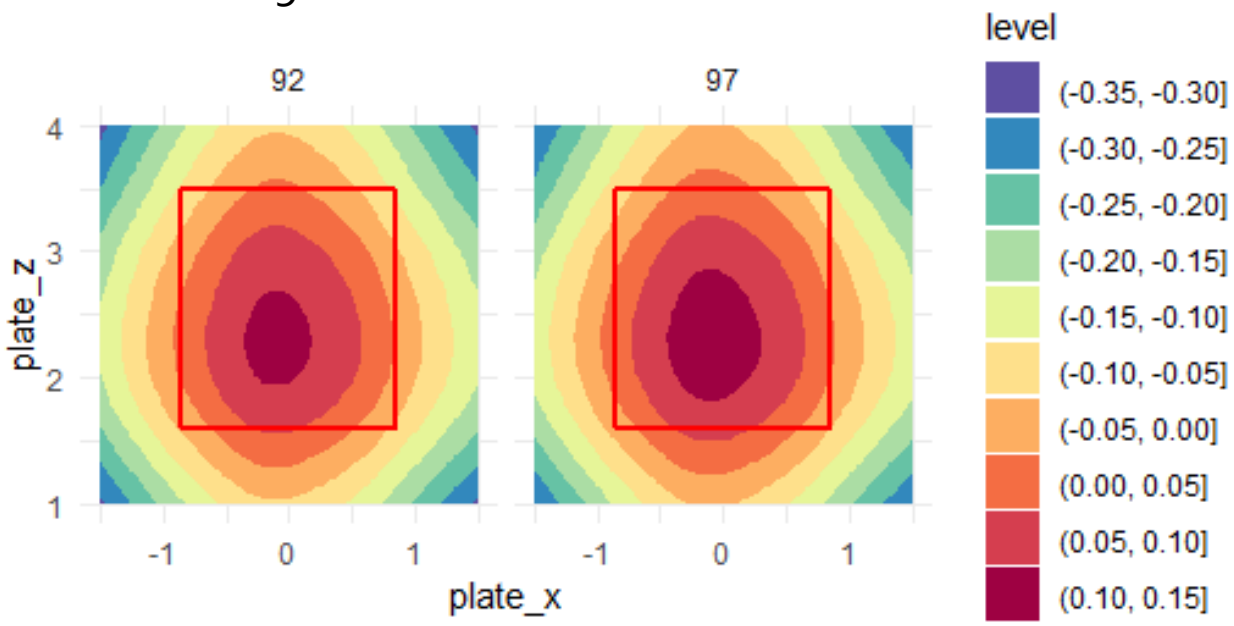
0-1 Count 2019



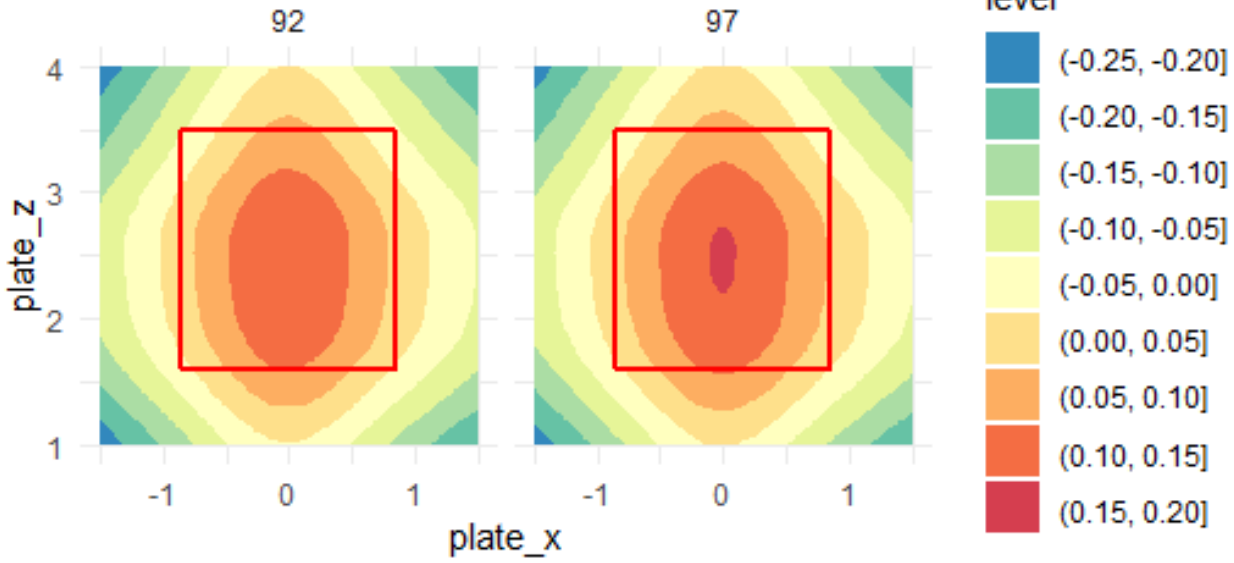
0-2 Count 2019



1-0 Count 2019



1-1 Count 2019



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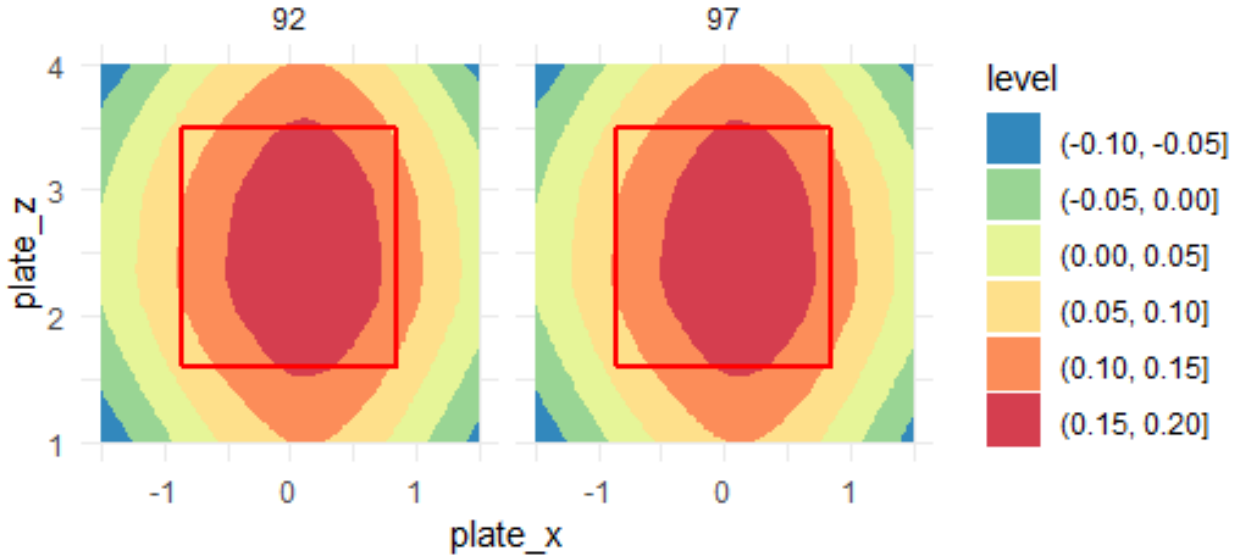
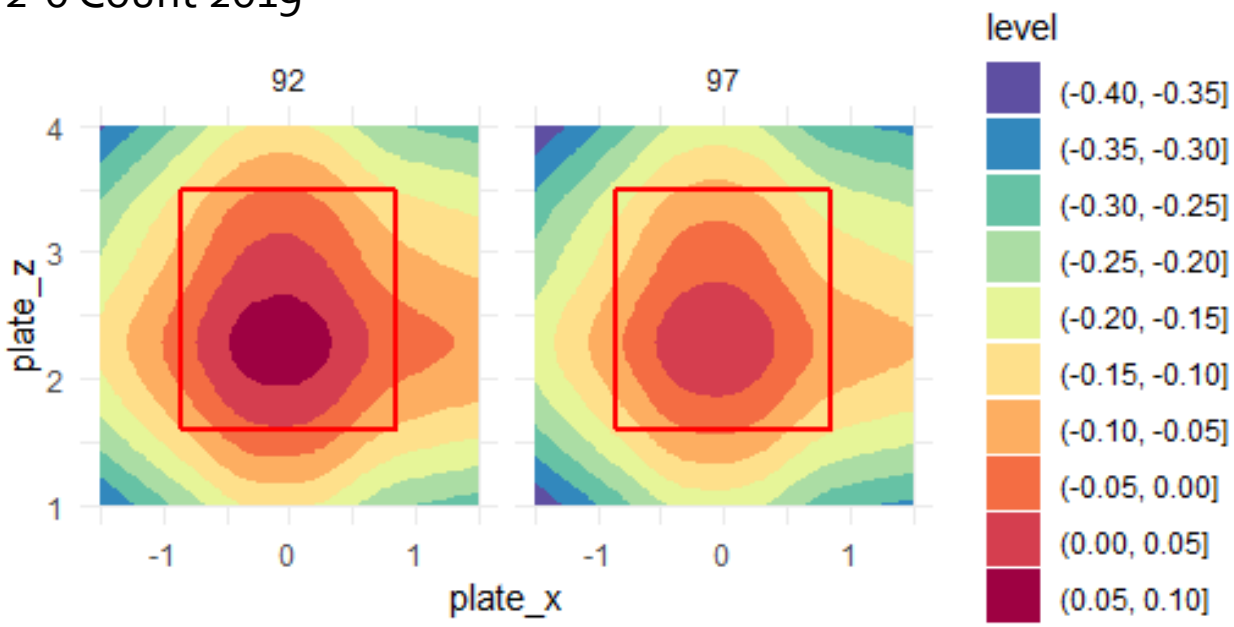
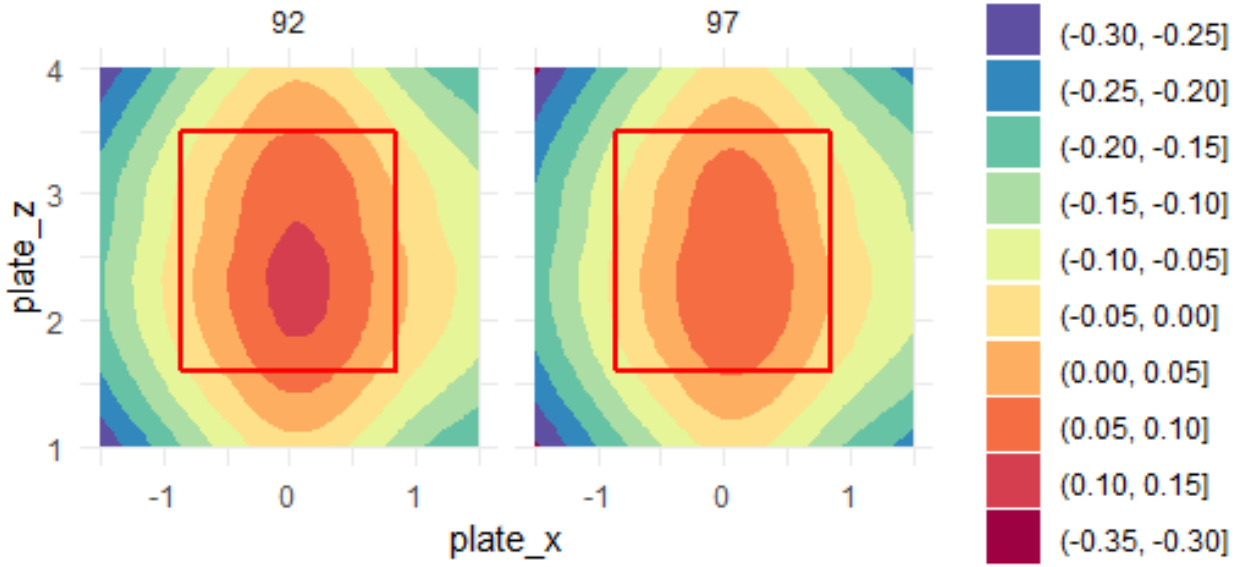


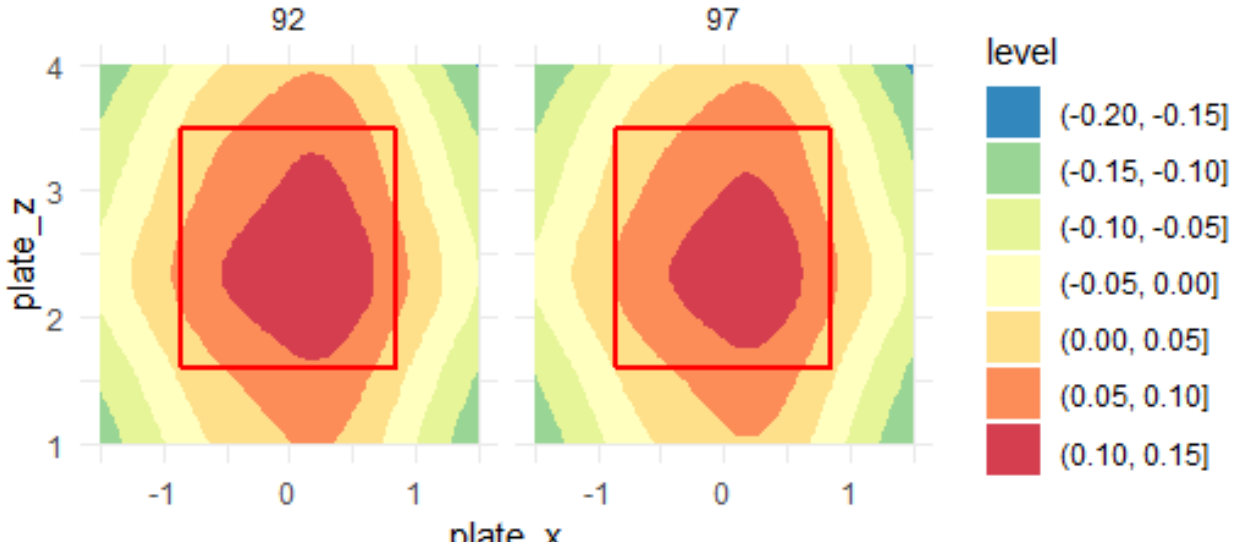
2-0 Count 2019



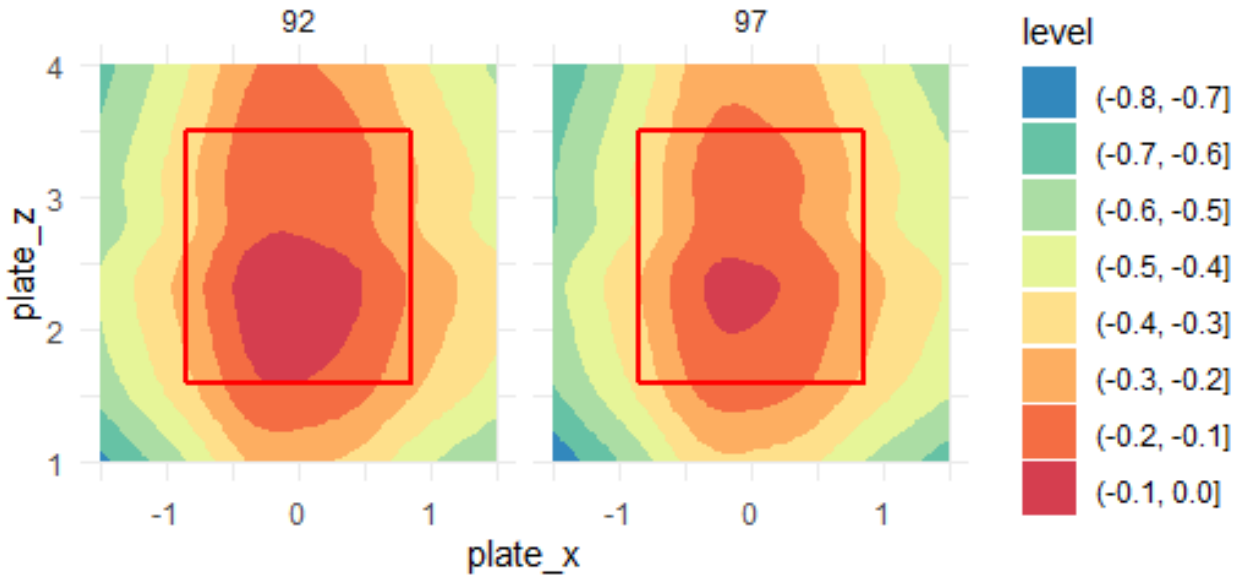
2-1 Count 2019



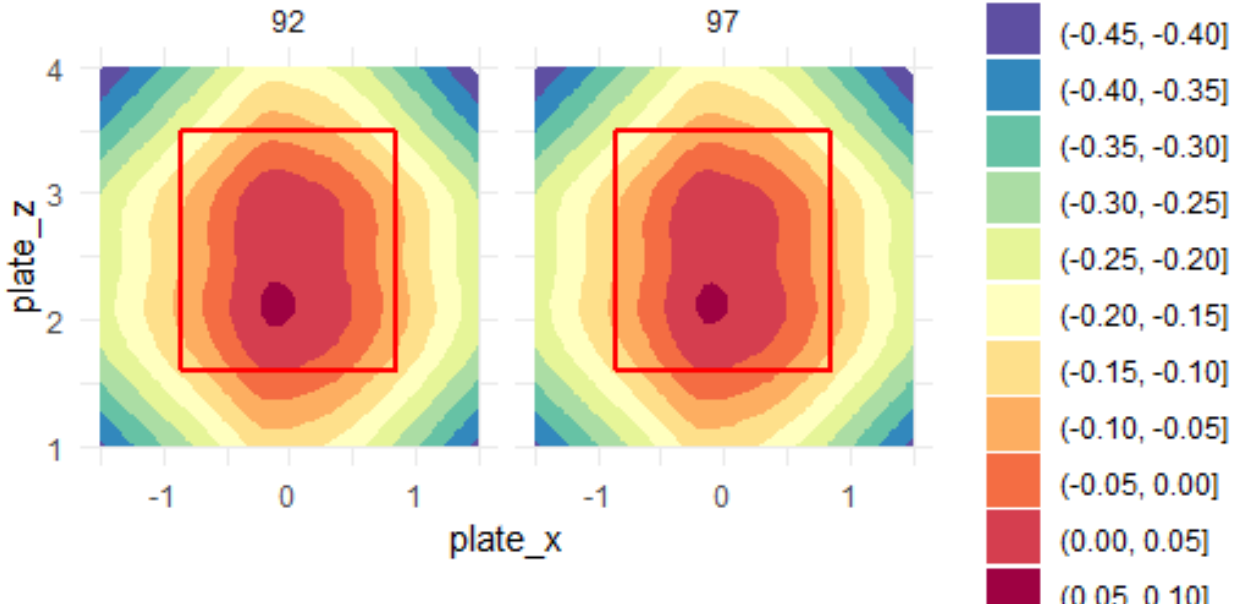
2-2 Count 2019



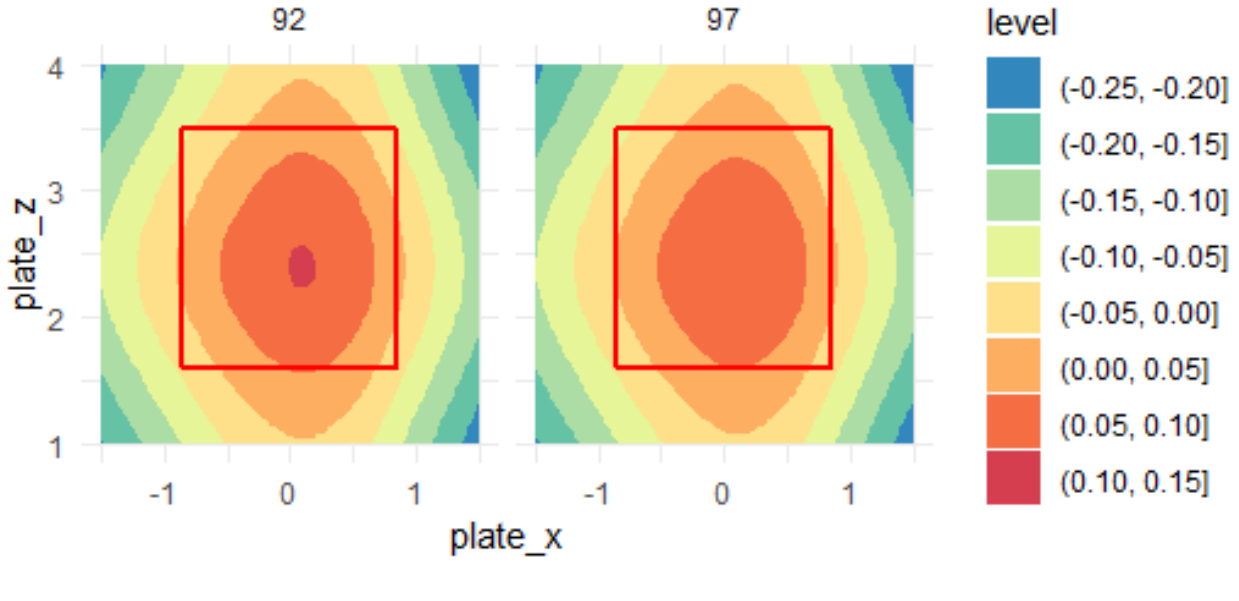
3-0 Count 2019



3-1 Count 2019



3-2 Count 2019



Conclusions

- Higher Velocities allow for more forgiveness in the strike zone
- In terms of xRV harder throwers typically have an advantage
  - Especially while behind in counts
    - 2 ball counts
    - 3 ball counts
- Harder throwers experience lower xwOBA in the zone as well
- These are all contingent on throwing strikes
  - Assuming pitchers of all velocities throw the same amount of strikes and balls