Misinterpretation of OPS in Major League Baseball

By: Parker Kuchulan

Data Source: Baseball Reference as of 8/4/2025

Intro to OPS

- OPS (On-Base Plus Slugging) is a popular metric used to assess offensive ability across all levels of baseball.
- OPS is a simple metric that combines On-Base Percentage (OBP) and Slugging Percentage (SLG) as a linear combination that captures both the ability to get on base as well as hit for power.
    - Formula: OPS = OBP + SLG
- Rather than looking at SLG and OBP individually, it is common to just look at OPS for a holistic picture.
    - Television broadcasts and jumbotrons at stadiums will often display a player's OPS to quickly shed insight on offensive ability.

Data Source: Baseball Reference as of 8/4/2025

Examples

- Aaron Judge
  - OBP = 0.449
  - SLG = 0.711
  - OPS = 1.160
- Riley Greene
  - OBP = 0.315
  - SLG = 0.509
  - OPS = 0.825
- TJ Friedl
  - OBP = 0.374
  - SLG = 0.399
  - OPS = 0.773

Data Source: Baseball Reference as of 8/4/2025

Problem

- OPS is straightforward, easy to calculate metric.
- It allows for a quick analysis of a hitter's offensive ability but can lead to misinterpretation about that hitters archetype and skill set.
- The weight given to OBP and SLG in the OPS formula is the same, yet the relative contribution of each is not the same in most cases.
- League Averages in the 2025 MLB season:
  - SLG: 0.402
  - OBP: 0.316
  - OPS: 0.718
  - Proportion of SLG in OPS: 0.56 —> SLG makes up 56% of OPS, on average
  - Proportion of OBP in OPS: 0.44 —> OBP makes up 44% of OPS, on average
    - The proportion of SLG and OBP in OPS is often not 50/50.

Data Source: Baseball Reference as of 8/4/2025

Example: Will Smith vs Cal Raleigh

- Catcher Will Smith (OPS = 0.964) and Catcher Cal Raleigh (OPS = 0.957)
  - Solely looking at OPS and position, it is easy to assume that Will Smith and Cal Raleigh have similar hitter archetypes.
- Expanded statistics
  - Will Smith
    - OBP: 0.422 (43.7% of OPS)
    - SLG: 0.541 (56.3% of OPS)
    - HR: 14
  - Cal Raleigh
    - OBP: 0.360 (37.6% of OPS)
    - SLG: 0.597 (63.4% of OPS)
    - HR: 42
- Despite having near identical OPS, Will Smith and Cal Raleigh have entirely different approaches at the plate.
  - Cal Raleigh sacrifices his on-base ability to utilize his HR power, while Will Smith takes advantage of his keen eye and understanding of the strike zone.

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Solution: OPS-Balance

- A potential solution would be to not look at OPS by itself and instead analyze SLG and OBP as individual components.
  - In this case however, the combined view of power and on-base ability is lost, which is truly what OPS attempts to accomplish.
- To remedy this issue, I created an OPS-Balance metric that measures the relative contribution of a player's OBP and SLG to OPS and compares it to the league average contributions, respectively.
  - Then, I classified hitters into archetypes for a better understanding of their combined power and on-base ability.

*Note: I filtered to hitters above league average OPS (0.718) and >50 plate appearances in all further visualizations and metrics from here onward.

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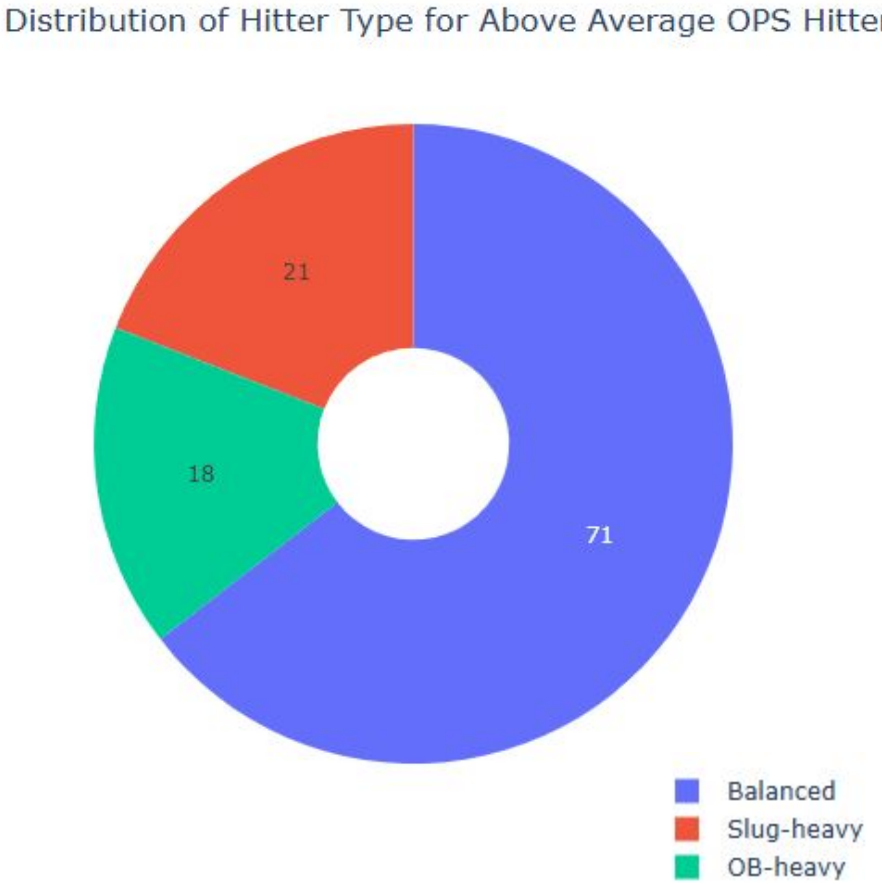
Metric Creation and Archetype Classification

- First, I created SLG_prop (as well as SLG_prop_z for z-scores) variable to measure each hitters proportion of SLG contributed to their OPS.
  - ie: SLG_prop = 0.59 would indicate that 59% of a hitters OPS is attributable to their SLG.
- Next, I created an OPS_balance metric where a large positive number indicates a SLG-heavy hitter, large negative number an OBP-heavy hitter, and anything near 0 a balanced hitter.
  - OPS_balance = (SLG_prop - league average SLG prop) x 100
  - mean = 0.2873, sd = 3, min = -6.79, max = 7.39
- Using SLG_prop_z, I was able to define parameters for hitter archetypes:
  - Within + or - 1 SD = Balanced
  - > +1 SD = Slug-heavy
  - < -1 SD = OBP-heavy

Data Source: Baseball Reference as of 8/4/2025



- The majority of above average OPS hitters were classified as balanced, which fits the distribution of OPS_balance.

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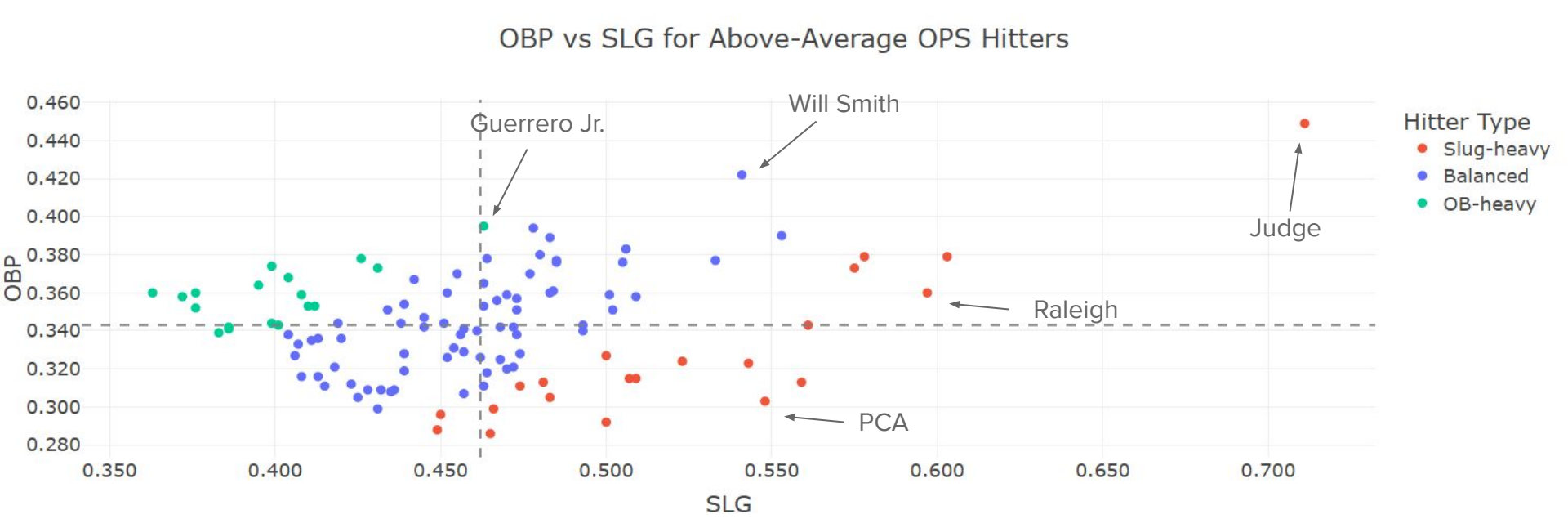

- Above is a plot of OBP vs SLG colored by hitter type, with axis averages as dotted lines.
- Earlier, I mentioned the distinction in approach between Will Smith and Cal Raleigh (labeled above) despite having almost identical OPS.
    - Similarly, Pete Crow-Armstrong (OPS 0.851) and Vladimir Guerrero Jr. (OPS 0.858), both labeled above, have polar opposite approaches at the plate with a similar OPS.
- Click the link in the bottom left corner for a fully interactive plot to see if you can find your favorite players!

[Interactive Plot]

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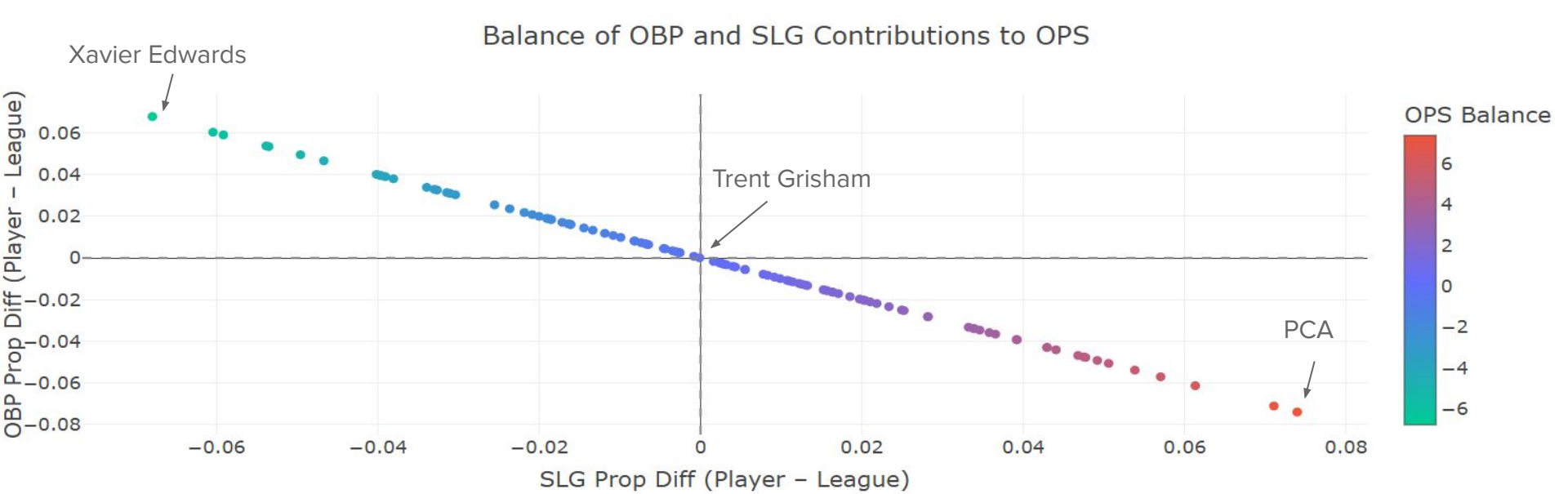

- To analyze exactly which above-average OPS players are the most SLG-Heavy or OBP-Heavy, we can use the plot above which compares relative proportional contributions of OBP and SLG to OPS.
    - Further right = Larger proportion of SLG in OPS compared to league average and vice-versa for OBP, and close to 0,0 is close to league average proportional contribution.
- Pete-Crow Armstrong has the largest proportion of SLG (64.4%) in OPS, Xavier Edwards has the largest proportion of OBP (49.8%), and Trent Grisham is the most “balanced” (57% prop SLG, 43% prop OBP) as it pertains to above-average OPS hitters.
- Click the link in the bottom left corner for a fully interactive plot to see if you can find your favorite players!

[Interactive Plot]

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Conclusion

- A single metric is never enough to fully profile a player in the MLB.
- In this case, I specifically looked at OPS, but there are many other metrics in baseball that need to be used in unison to fully profile a player.
    - Ie: ERA, FIP, WHIP, etc.. as it pertains to pitchers do not tell the full story on their own.
- While not creating any new analytical framework, this project was a fun way to explore how a relatively simple metric is often heavily misinterpreted by the common fan or general media.
- I hope the next time you're at a game and the jumbotron flashes a player's OPS at 0.850, you don't automatically assume you're about to see a balanced approach at the plate.

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