How to Calculate Consistency in Baseball?

By Allen Ho, Samson Waisanen

Over the years, baseball has focused more and more on advanced statistics. What if we take a different view this time, focusing on the variance of baseball? The baseball world has done an incredible job of translating on-field performance into numbers. One area my colleague Samson Waisanen and I believe could still use one improvement would be analyzing the consistency of a hitter. This article will focus solely on how consistent a hitter produces his results and boiling that down to a simple number. We will call this game-by-game, or GBG for short. The goal of this exercise is to see if a hitter's consistency impacts both his production and the team's chances of winning.

Below are the parameters of this study:

1. Gathering Data
   Using fangraphs.com, we gathered 2019 data on hitter last season. We focused on batting consistency initially as a focal point due to a much larger sample size and hitters typically playing every day. From there we selected the top 10 WAR contributors in each teams' batters for our research. To evaluate the players' game by game offensive production, we choose the below items:

   WPA/-WPA/+WPA/RE24/REW/pLI/phLI/PH/WPA/LI/Clutch/BB%/K%/BB/K/AVG/OBP/SLG/OPS/ISO/Spd/BABIP/wRC/wRAA/wOBA/wRC+

2. Shaping the data
   Using this information, we analyzed the above items with the concept of consistency. The way we found consistency was taking the standard deviation for a specific player, compared to their full season output. Using wRC+ for example, we gather the specific player's wRC+ each game and see how big the standard deviation is for the whole season. From here we found that players with higher wRC+ would typically have higher standard deviations, which makes sense as with a higher average there is a much greater opportunity to have a monster night while an occasional off night might harm his number more than average hitter. Thus we divided the standard deviation by the player's average wRC+ to not punish players for having a higher base standard deviation.

   Ex. 1
   As an example, let's look at Jeimer Candelario of the Detroit Tigers. Over the course of 94 games, Candelario accumulated a wRC+ of 72. This ranked 10th among Tigers hitters last season. However, taking the wRC+ from each of his games, he produced a standard deviation of 133.37. Dividing this by his average wRC+ performance you end up with a 1.96 GBG. When compared to other Tigers, this puts Candelario 5th on the team. So while he may have been only the 10th best hitter overall, he produced those results with the 5th best consistency on the team.

3. Analyze it
   With this information in mind, we want to see if there is a correlation between a player's consistency and overall team success. To do this we take the player's GBG number and compare it to their WAR output for 2019. To account for playing

time, we specifically used a player's WAR/game. We use the software SPSS to analyze the correlation between the (standard deviation/average) of

WPA/- WPA/+WPA/RE24/REW/
pLI/phLI/PH/WPA/LI/Clutch/BB%/K%/BB/K/AVG/OBP/
SLG/OPS/ISO/Spd/BABIP/wRC/wRAA/wOBA/wRC+

and (WAR/Game).

Result:

STATS	Corelation with WAR per game
wRC+	-0.640**
wRC	-0.592**
OBP	-0.508**
ISO	-0.496**
wOBA	-0.464**
OPS	-0.443**
AVG	-0.430**
SLG	-0.416**
Spd	-0.410**
-WPA	-0.355**
BB%	-0.369**
BB/K	-0.329**
phLI	-0.319**
BABIP	-0.314**
pLI	-0.280**
PH	0.196**
K%	-0.151*
-WPA	0.126*
REW	0.096
WPA	0.008
WPA/LI	0.064
RE24	0.064
wRAA	0.016
Clutch	0.004

**Indicates correlation is significant at the .01 level.

*Indicates correlation is significant at the .05 level.
Keep in mind that a minus correlation is not weaker than a plus correlation; they're the same strength, only in opposite directions. For example, in a +0.8 correlation, when one stat gets higher, the other also tends to; in -0.8, when one goes up, the other goes down. So it's the absolute value we care about the most. In a +1.00 correlation relationship, when one goes up, the other does go up, by a very predictable amount. But, unless you're correlating a stat with itself, you probably won't see anything like a +1.00 correlation.

We can see that from all the items we got, the consistency of wRC+ is most related to WAR per game. The correlation is quite solid at 0.639. With this in mind, we take a look at the top 50 players of our hypothesized term GBG(wRC+). It's possible that GBG(wRC+) might be a good indicator of WAR.

4. Rankings of GBG(wRC+)

Rank	Name	GBG	Rank	Name	GBG
1	Gio Urshela	1.013838053	26	Carlos Correa	1.288296072
2	Mike Trout	1.044732318	27	Nicholas Castellanos	1.289540146
3	Cesar Puello	1.048125375	28	Freddie Freeman	1.291018471
4	Alex Bregman	1.070488847	29	Josh Donaldson	1.292894586
5	Fernando Tatis Jr.	1.106120361	30	Carlos Santana	1.294567287
6	Cody Bellinger	1.14085389	31	Tommy Pham	1.296879613
7	Christian Yelich	1.140895199	32	Mark Canha	1.299672848
8	Anthony Rendon	1.154149636	33	George Springer	1.312682342
9	Byron Buxton	1.172048444	34	Miguel Sano	1.316825608
10	Ketel Marte	1.185391193	35	Xander Bogaerts	1.32201577
11	Aaron Judge	1.187344622	36	Jose Altuve	1.322509556
12	Bo Bichette	1.219025848	37	Max Muncy	1.327847771
13	Marcus Semien	1.221398482	38	Max Kepler	1.329520939
14	Austin Meadows	1.231454379	39	Yasmani Grandal	1.344453779
15	Trey Mancini	1.234350975	40	Ronald Acuña Jr.	1.347126709
16	Anthony Rizzo	1.236254033	41	Rafael Devers	1.348992093
17	DJ LeMahieu	1.246320997	42	Michael Brantley	1.351365479
18	Trea Turner	1.247042	43	Tim Anderson	1.362341266
19	Nick Solak	1.248332205	44	Yandy Diaz	1.365419879
20	Kris Bryant	1.256691602	45	Keston Hiura	1.371811328
21	Jeff McNeil	1.258781244	46	Yoan Moncada	1.376297148
22	J.D. Martinez	1.262681726	47	Hunter Dozier	1.378544796
23	Mookie Betts	1.262931117	48	Andrew McCutchen	1.381420659
24	Yordan Alvarez	1.272540412	49	Trevor Story	1.383577726
25	Juan Soto	1.287462586	50	Luke Voit	1.392520187

5. Findings:

From our findings there are a few noteworthy things to point out. The first is great players make up a majority of the members. This is a good sign as most great hitters should be relatively consistent compared to the average player. However, not every player is a current star of the MLB. Gio Urshela, the Yankees emergency option for 3rd base at the start of last season, put up the most constant numbers throughout the year. Despite ranking 115th in all of MLB with a 3.1 WAR, Urshela produced at a constant level similar to Mike Trout and Alex Bregman.

Overall we believe a players consistency does have an impact on their value along with team success. Given this was just a basic analysis, we will be looking at GBG statistics much more in-depth.