Trackman Data Analysis (Seattle Mariners)

Nolan McCafferty

INTRODUCTION

I've been asked to analyze the provided Trackman dataset, with pitch level data provided for five hitters over the course of three seasons (2015-2017) and produce and defend an order of preference. I am happy to do so and present this Trackman data analysis report ("Report").

Throughout this Report, for ease of reference, I will refer to these hitters as Batters One through Five based on the order they appeared in the data, instead of the batter ID provided in the dataset. In order to develop an order of preference for these hitters, I used R to manipulate the data into the following table:

	PA	AB	H.per.PA	BB.per.PA	K.per.PA	Avg	OBP	SLG	OPS	wOBA	BABIP	barrels.per.PA	avg.exit.velo	avg.launch.angle
1	1953	1774	26.37	8.45	17.67	0.29	0.35	0.453	0.803	0.345	0.328	5.38	91.36	6.84
2	1366	1222	23.65	9.74	16.25	0.264	0.338	0.413	0.751	0.326	0.295	3.81	89.03	10.9
3	1974	1676	21.07	13.98	15.86	0.248	0.356	0.447	0.804	0.347	0.262	6.53	90.21	11.83
4	1568	1366	23.21	10.46	21.3	0.266	0.353	0.422	0.774	0.336	0.321	2.81	89.55	14.13
5	1190	1036	20.5	10.59	25.97	0.236	0.327	0.487	0.814	0.345	0.267	7.39	91.4	17.98

ANALYSIS

a. Short Answer.

As discussed and explained below, from worst to first, I rank the hitters as follows: Batter Two, Batter Four, Batter One, Batter Five, and Batter Three.

b. Batters Two and Four, wOBA Woes.

I will start my order of the hitters from the bottom and work my way up. I believe the worst hitter from these five is Batter Two. Batter Two has a wOBA of .326, the lowest of the group and 0.01 less than the next lowest (Batter Four). The reason I value wOBA is because it combines every aspect of hitting into one metric and weights each aspect in proportion to their actual run value[1]. Statistics such as batting average and on-base percentage contain an inherent incorrect assumption that all hits are equal. However, all hits are not equal. Instead, a key component of this particular analysis must be: what is the run value that each hitter adds to a team. Batter Two also has the lowest average exit velocity and has the second lowest number of Barrels/PA. The "Barrels" metric, developed by Statcast, measures the number of "well-struck balls where the

[1] To calculate wOBA I used the constants available from FanGraphs Baseball for the 2017 season.

combination of exit velocity and launch angle generally leads to a minimum .500 batting average and 1.500 slugging percentage". Below is a table of stats for Batter Two based on the handedness of the pitcher:

Hand	PA	AB	H.per.PA	BB.per.PA	K.per.PA	Avg	OBP	SLG	OPS	wOBA	BABIP	barrels.per.PA	avg.exit.velo	avg.launch.angle
RHP	1147	1026	24.50	10.11	15.78	0.274	0.347	0.428	0.775	0.335	0.306	4.10	89.16	11.12
LHP	219	196	19.18	7.76	18.72	0.214	0.292	0.337	0.629	0.278	0.240	2.28	88.29	9.64

This table demonstrates that Batter Two performed much better verses right-handed pitchers, and thus we can infer that Batter Two bats left-handed; this hypothesis is confirmed by checking the "batter_hand" column. By comparing the number of plate appearances verses each type of pitching, it seems that Batter Two faced significantly more righties than lefties. This could be because the manager knew that Batter Two is less effective against left-handed pitching, so he platooned with a right-handed batter at the same position (or that the league this batter played in was dominated by righties, as there are generally more right-handed pitchers than left-handed).

The only other hitter with less Barrels/PA than Batter Two is Batter Four, who I have ranked fourth in my order. Although Batter Four has the lowest Barrels/PA, he has a higher wOBA than Batter Two which is why I have him ranked higher than Batter Two. However, Batter Four's wOBA is again about 0.01 less than the next lowest from the remaining three batters. Here are the splits for Batter Four based on the handedness of the pitcher:

Hand	PA	AB	H.per.PA	BB.per.PA	K.per.PA	Avg	OBP	SLG	OPS	wOBA	BABIP	barrels.per.PA	avg.exit.velo	avg.launch.angle
RHP	1108	969	22.11	10.02	21.84	0.253	0.340	0.377	0.717	0.316	0.310	2.08	88.80	13.04
LHP	460	397	25.87	11.52	20.00	0.300	0.383	0.531	0.914	0.385	0.347	4.57	91.27	16.60

Batter Four had much more success against left-handed pitchers than right-handed pitchers in every statistic in the table. This leads me to believe Batter Four is a righty, which is confirmed by the "batter_hand" column. The disparity in plate appearances for Batter Four is most likely because there are many more righties than lefties in their league.

c. Batter One, Speedy/Groundballer.

The remaining three batters are virtually identical in wOBA, so I will explore other metrics in order to rank them. The next batter in my order of preference is Batter One. Although Batter One has the highest batting average of the remaining three, his high H.per.PA and unimpressive SLG suggests that this is mostly from singles. Given that Batter One has the lowest walk rate, the lowest Barrels/PA, and a significantly low average launch angle, I theorize that he is most likely a speedy/groundball hitter. While Batter One possesses attractive qualities (at least historically) for a leadoff-type hitter, I do not overly prioritize these qualities in my order as the game is

shifting from speed to power. Although Batter One has a higher on-base percentage than Batter Five, Batter Five has the higher OPS which is a stat which is more indicative of runs contributed than OBP.

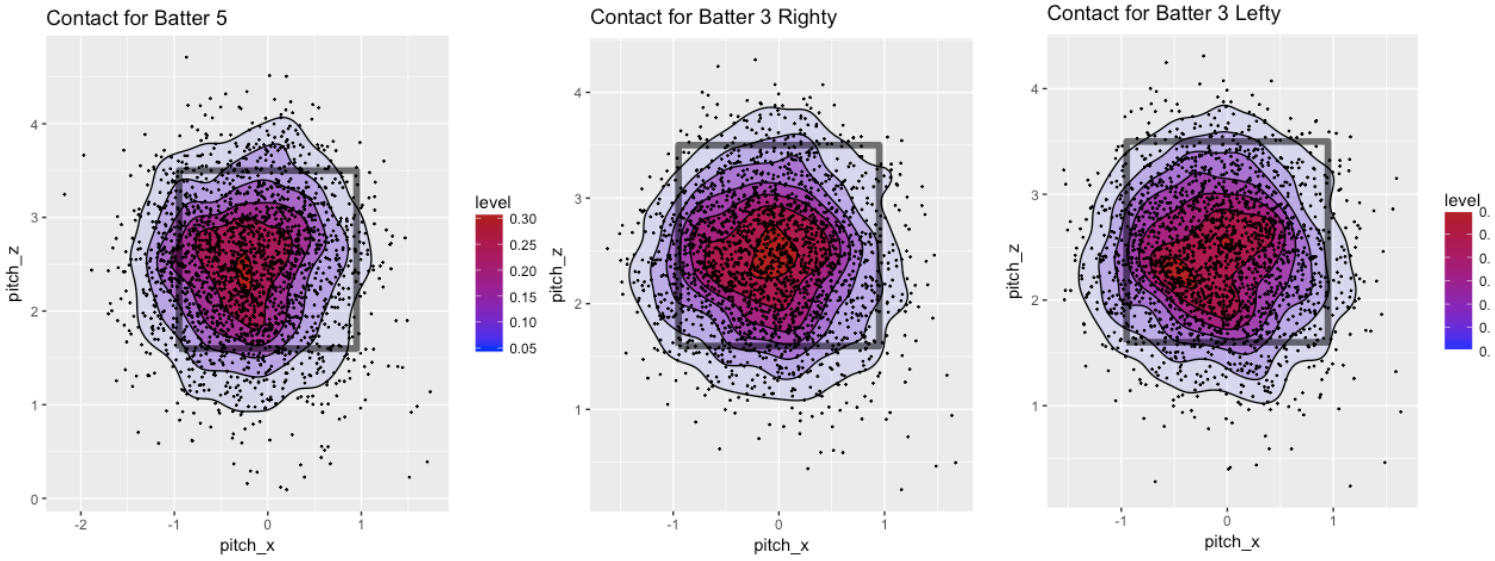
Another reason I rank Batter One below Batters Three and Five is illustrated in his splits based on the handedness of the pitcher:

Hand	PA	AB	H.per.PA	BB.per.PA	K.per.PA	Avg	OBP	SLG	OPS	wOBA	BABIP	barrels.per.PA	avg.exit.velo	avg.launch.angle
RHP	1270	1139	27.56	9.69	17.56	0.307	0.375	0.486	0.86	0.369	0.348	5.98	91.98	7.31
LHP	683	635	24.16	6.15	17.86	0.260	0.305	0.395	0.70	0.301	0.294	4.25	90.24	5.99

Per the above, Batter One is much less effective against left-handed pitching than right-handed pitching. While Batter One could be a very effective platoon hitter against righties, the other two remaining batters have less drastic platoon splits making them better suited to be everyday starters (and thus more valuable depending on a club's needs).

d. Batters Three and Five: The Top of the Class.

Finally, we are left with Batter Three and Batter Five. Batter Five is clearly the slugger of the two, with the most HR/PA, Barrels/PA, and (higher) average launch angle. Batter Five looks like the prototypical "new age" hitter, with a focus on launch angle, hitting for power, and high strikeout rate. However, I am going to select Batter Three as my top hitter in the group. Although Batter Five might have more power and possibly more potential, Batter Three is the more polished hitter at this point in time. The reason I say this is because Batter Three has the highest walk rate and the lowest strikeout rate of the group. Although Batter Three has the second lowest batting average, he has the highest on-base percentage of the group. Why? Walks. Batter Three simply swings at better pitches. I created a graphic of the pitches that each batter swung at to test this hypothesis.



The first notable thing to take away from these figures is that Batter Three is a switch hitter. Of course, switch hitting is useful because Batter Three will always have the platoon advantage, and it is no surprise that Batter Three has the best splits by pitcher handedness. Another important detail is that Batter Three is more patient from both sides of the plate than Batter Five. The variance for the pitch locations for Batter Five is larger than Batter Three on both sides of the plate, especially in the vertical directions. Another reason I rank Batter Three first is they have a BABIP of .262. Given that Batter Three has a relatively high Barrels/PA, a BABIP of .262 is surprisingly low. This could (but does not necessarily) suggest that Batter Three has experienced some "bad luck", Batter Three may be actually better than his stats are suggesting. Overall Batter Three is the more attractive hitter.

e. Quick Thought: How Does This Ranking Look If We Travel Back Twenty Years?

This ranking would have looked very different had it been done twenty years ago, before wOBA, BABIP, exit velocity, and Barrels. Before the creation of these advanced Sabermetric tools, batting average and slugging percentage were king. With the highest batting average and second highest slugging percentage, Batter One seems an easy choice to top this historical list. Based on Batter Three's on-base percentage I would have placed Batter Three next, but I'm sure many people would've had Batter Four and Batter Two next based on batting average alone. Unfortunately, in this ranking Batter Five's power would have likely been overlooked and he would have been ranked last because of his .236 batting average. Baseball analytics have transformed in the last few decades and the methods of evaluating players continue to advance today.

CONCLUSION

By analyzing the Trackman dataset in R, I established an order of preference for these hitters from first to last: Batter Three, Batter Five, Batter One, Batter Four, and Batter Two. Please follow up with me if you have any questions or would like additional explanation for my ranking. Thank you for your consideration.