
By the Numbers

Volume 24, Number 1

The Newsletter of the SABR Statistical Analysis Committee

February, 2014

Review

Review: "Sports Analytics"

Phil Birnbaum

Ben Alamar's new book on sports analytics doesn't talk much about the technical aspects of sabermetrics. Perhaps that provides a hint to what's really going on in front offices: that teams still have more to gain from the use of existing findings, and existing data, than from searching for breakthroughs.

In the past few years, a number of sabermetricians have been hired on by major-league sports teams ... including several who have written for this publication. That has led me to wonder: what kind of research do these guys actually do for their teams?

Are they mining Retrosheet databases for the next DIPS, the next great discovery that will show which players are overvalued and undervalued? Are there "Eureka!" moments, where the analyst finds certain types of players age more gracefully than others, which allows management to save millions of dollars in wasted salaries?

I've asked Bill James a similar question on the "Ask Bill" section of his website, and, not surprisingly, Bill's answer was that he's not at liberty to say. So, I figured maybe I could get some kind of idea from Benjamin Alamar's book, *"Sports Analytics: A Guide For Coaches, Managers, and Other Decision Makers."*

Alamar is a professor of sports management, who has consulted for various teams in the NFL and NBA. He was also long-time editor of the "Journal of Quantitative Analysis in Sports," an academic journal now edited by SABR member Jim Albert.

I always thought of "analytics" as the less nerdy term for "sabermetrics," with the added advantage that it applies to all sports, rather than just baseball. The largest sports statistics convention in the world is the "MIT Sloan Sports Analytics

Conference," and even SABR's own convention is the "SABR Analytics Conference." But, my impression, having attended a couple of the Sloan conventions (I met Ben Alamar there in 2013, when we were on a panel together), is that "Analytics" is something a bit different.

It seems to be a pre-existing business word. "Analytics" means "sabermetrics for business." It's where, for instance, you take the "play-by-play data" you have on, say, coffee sales, and you try to be Bill James and find patterns in it. For instance, you might

find that 20 percent of your customers represent 80 percent of your business, which, in theory, would suggest to management that they need to make sure those 20 percent are well taken care of. Or, you find that

inventory shortages are more likely to occur after certain weather patterns, so you might adjust your delivery schedule based on rain forecasts.

That means that in a business, you'd have the nerds working on the analytics, and the managers who make decisions based on the findings.

In his book, Alamar sticks mostly to the decision-maker side. The book is directed at managers, not researchers. Dean Oliver, who I'd describe as the Pete Palmer of basketball, appears in the index only once (and he wrote the forward to the book!). Bill James doesn't appear at all.

In this issue

Review: "Sports Analytics"	Phil Birnbaum	1
Giving Context to RBI	Tom Hanrahan.....	5

The previous issue of this publication was August, 2013 (Volume 23, Number 1).

In fact, I bet you could easily rework the book to lose its sports focus, and just be about analytics and business in general. The advice seems to be about smoothing the flow of information to managers, rather than how to find competitive advantages in the data. If it were based on, say, the pharmaceutical industry, instead of sports, it would be along the lines of ... how can managers use analytics to know what compounds are being worked on, which drugs have the greatest chance of financial success, and what advertisements work better than others? As opposed to the sabermetrics question: what can we learn about how cancer works, so we can be more successful in finding new drugs that treat it?

In that vein, the book talks a lot about structuring the organization, and getting the day-to-day details right. For instance:

- all the team's data should be kept in one place, instead of in "silos".
- a GM should be able to get all the data he needs instantly, instead of having to request medical data from the medical group, and performance data from the data guys, and scouting reports from the scouts, and then putting them all together on a magnet board.
- access to data shouldn't depend on one person; what if he gets hit by a bus?
- data should be checked for errors.
- sabermetricians need to learn how to communicate and market their findings to management, so that decision-makers will actually use their new metrics.
- teams should hire an academic panel to vet the analysts' research and make sure it's statistically valid.

**Sports Analytics: A Guide For Coaches,
Managers, and Other Decision Makers**

By Benjamin C. Alamar

Columbia University Press, 152 pages,
\$24.95 (US), ISBN 0231162928

amazon.com page: <http://tinyurl.com/qjby7by>

The book's emphasis suggests to me that NBA teams aren't really doing a whole lot of breakthrough research, that it's more a matter of getting some technical people involved to get the information flowing smoothly. This kind of confirms the impression I had from team job postings; they seem to ask for a lot of database proficiency, rather than for scientific genius.

That's not a bad thing: if teams are having trouble getting the proper information into the hands of the people who need it, fixing that has got to be high priority. But it does suggest that teams have a long way to go, if the GM has to pick up a phone to call for his team's own scouting report to be e-mailed to him.

As far as actual research goes ... Alamar talks about "metrics," which are those newfangled statistics like Runs Created and such. He says the analyst's job is, in part, to produce metrics that will help the managers evaluate players. But I always thought there's already enough decent metrics in every sport ... in baseball, there's WAR, and Runs Created, and DIPS, and so on. Perhaps by "new metrics," he means "new insights." And those are hard, in the sense that, like in any science, you can't necessarily generate valuable new discoveries on demand.

Alamar devotes Chapter 5 to a discussion on developing and using new metrics, but he doesn't say much about the process, or the flashes of insight required. Rather, he treats it somewhat mechanically. First, you realize there's a need for a new metric; then, you do some analysis to logically figure out how to create the metric to fill the need. Then, you test it to make sure it works, and figure out the best way to communicate it to the decision makers so they'll actually use it instead of ignoring it.

He cites the example is John Hollinger's "Player Efficiency Rating" for basketball. "Hollinger saw that there was no clear way to compare the contributions of an excellent perimeter shooter with a high-level rebounder. The opportunity for a new and useful metric was clear, and the need that emerged was for a tool or set of tools that allowed for fair comparison of players."

That's fair enough. But, at least in baseball, most established sabermetric findings have come from "random" research, just interest and curiosity, rather than a specific need. Voros McCracken's "DIPS" finding, which showed that pitchers have little influence on the outcome of balls in play, would probably not have been an answer to any question a GM would have thought to ask, except in the broadest sense ("How can you help us better estimate a pitcher's true talent?").

All of this tends to lead me to suspect -- as I said, from reading between the lines rather than from anything explicit in the book -- that teams are well behind cutting edge in terms of their initiative to discover and embrace new sabermetric findings. If Ben Alamar, who has spent so many years in real-life front offices, is choosing to write about how data needs to be centralized so that the general manager can have it in his hands quicker ... well, that suggests that teams are still trying to get the basics together.

Of course, the book is based on Alamar's experience, over the past decade, in the NBA and NFL. Baseball, several years later, might be different. I'd be willing to bet the most sabermetrically-inclined teams, like the Red Sox, are way ahead of the adoption curve that Alamar describes.

Maybe someday, Bill James will be able to tell us if that's true.

Phil Birnbaum, birnbaum@sympatico.ca ♦

"The Sabermetric Revolution" now available

Ben Baumer

It's been a full decade since the publication of *Moneyball* brought sabermetrics out of the dark and into the national consciousness. The release of the film of the same name in 2011 made Billy Beane a household name, and brought the notion of a full-time sabermetrician working in baseball into the mainstream. It seems clear that the profession of baseball analytics has changed dramatically since then, but how? How can we quantitatively assess the changes that we have taken place in the baseball industry over the past ten years?

More provocatively, is there any evidence that sabermetrics has actually worked? How can we be sure that it isn't just a fad?

These are a few of the questions that Andrew Zimbalist and I set out to answer in *The Sabermetric Revolution: Assessing the Growth of Analytics in Baseball*, a new publication from the University of Pennsylvania Press. In the book, we review the veracity of the claims made in *Moneyball*, chart the changes that have taken place in the baseball industry, illuminate the basics of sabermetrics and why sabermetricians think the way they do, and examine the spread of analytics into sports other than baseball. Finally, we propose a metric for assessing the extent to which teams are practicing sabermetrics, and address the question of whether we can determine if it is helping them. With Andrew's expertise as a leading sports economist, and my experience working as a statistical analyst for the New York Mets, readers of BTN can expect a closer connection to the inner workings of the baseball industry than many baseball books evince. I hope that you will find it informative and enjoyable to read.

The book can be found at amazon.com at this link: <http://tinyurl.com/q4e5ufe>

Follow me (@BaumerBen) on Twitter for further updates and conversation!

Submissions

Phil Birnbaum, Editor

Submissions to *By the Numbers* are, of course, encouraged. Articles should be concise (though not necessarily short), and pertain to statistical analysis of baseball. Letters to the Editor, original research, opinions, summaries of existing research, criticism, and reviews of other work are all welcome.

Articles should be submitted in electronic form, preferably by e-mail. I can read most word processor formats. If you send charts, please send them in word processor form rather than in spreadsheet. Unless you specify otherwise, I may send your work to others for comment (i.e., informal peer review).

I usually edit for spelling and grammar. If you can (and I understand it isn't always possible), try to format your article roughly the same way BTN does.

I will acknowledge all articles upon receipt, and will try, within a reasonable time, to let you know if your submission is accepted.

Send submissions to Phil Birnbaum, at birnbaum@sympatico.ca.

"By the Numbers" mailing list

SABR members who have joined the Statistical Analysis Committee will receive e-mail notification of new issues of BTN, as well as other news concerning this publication.

The easiest way to join the committee is to visit <http://members.sabr.org>, click on "my SABR," then "committees and regionals," then "add new" committee. Add the Statistical Analysis Committee, and you're done. You will be informed when new issues are available for downloading from the internet.

If you would like more information, send an e-mail to Phil Birnbaum, at birnbaum@sympatico.ca. If you don't have internet access, we will send you BTN by mail; write to Phil at 88 Westpointe Cres., Ottawa, ON, K2G 5Y8.

Back issues

Back issues of "By the Numbers" are available at the SABR website, at <http://sabr.org/research/statistical-analysis-research-committee-newsletters>, and at editor Phil Birnbaum's website, www.philbirnbaum.com.

The SABR website also features back issues of "Baseball Analyst", the sabermetric publication produced by Bill James from 1981 to 1989. Those issues can be found at <http://sabr.org/research/baseball-analyst-archives>.

Giving Context to RBI

Tom Hanrahan

RBI has a reputation as one of the favorite stats of the “old-school sportswriter,” despite its various flaws, while being largely absent from the sabermetric toolkit. Here, the author tries to improve on the base RBI stat, by providing a context -- adjusting both for the number of opportunities to drive in runs, and also for outs lost in the attempt to score runners.

As summer of 2013 turned to fall, there were many words uttered, and much electronic ink spilled, over the relative merits of the hitters on the pennant-contending Cincinnati Reds. Shin-Soo Choo led off and reached base a lot. Jay Bruce, batting in the middle of the order, hit a good many dingers and drove in runs. Joey Votto was having a typical Votto year, with a league-leading OBP and power, but was criticized for not driving in many runs for a guy who hit third in the order. Meanwhile, Brandon Phillips was having a “down” year, compared to his career batting average and home run totals ... and yet he was knocking in runs like crazy.

And so the debate was framed; Phillips drove in far more runs! Votto made fewer outs! Old stats, new stats (red stats, blue stats) – which man was contributing more to the Reds’ success?

Let’s pretend we have a conversation between two opposing camps.

Old-School Sportswriter (OSS): Looking at the National League RBI leaders (Table 1), we see six men who drove in 100 this season. Goldschmidt was clearly the best, so he would be my MVP. But we should also see that most RBI guys were merely good bats, while one was a good defender at a key position. Surely Brandon Phillips was the key to the Reds success, and one of the best players in the league this year.

Thoughtful SaberMan (TSM): Well, OldSchool, I agree Phillips had a fine clutch year. But RBI isn’t the only measure of batting ability, is it?

OSS: Here we go again, you guys with your arcane numbers of weighted adjusted average sumthin. Runs win games; there ain’t no team that ever got a win for having the most people on base.

TSM: You have a point, OSS. Driving in a run is a key event in a ballgame.

OSS: Wow, Saber. You DO understand the game. Gee, a thoughtful stat guy!

TSM: Well, I’m not going to merely crown the RBI king as necessarily the best at bringing in runs for his team. I mean, a pitcher who wins 17 and only loses 7 might be more valuable to his team than one who goes 20-13. How about we discuss a way to differentiate between guys with lots of RBI, maybe by who had less of the “bad” outcomes along the way?

OSS: I’m suspicious. You aren’t gonna suggest I need to buy into “RBI per TPR or linear weights or loss shares,” are you?

TSM: Nah. You tell me; among two guys who drove in 100 runs, what makes one of their years better?

OSS: The fella who hit .225 sure didn’t help his team as much as the guy who hit .320, other things being equal.

TSM: Sure. The man who hit .225 made more outs. Outs, like “losses” for pitchers, are bad for hitters. The more you make, the fewer times your teammates get to the plate to try to score more runs. And some batters tend to ground into double plays, which is twice as bad, right?

Table 1 – NL RBI leaders, 2013

P Goldschmidt	125
F Freeman	109
J Bruce	109
B Phillips	103
P Alvarez	100
A Gonzalez	100
H Pence	99
A Craig	97
J Votto	94
M Holliday	94

OSS: Whoa; we're actually agreeing here, Saber. Sure, how about this; you guys like your charts. How about if we make a graph, with RBI on one axis, and outs on the other? You could see just by looking at it which men not only drove in lots of runs, but also did it without whiffing all of the time.

TSM: Not a bad idea, OSS ... but let me go one step further. Let's say a guy made lots of outs with men on; that's even worse than popping up with the bases empty, right? I propose we count an out with no one on base as one out, since a man is only batting for himself, but if he grounds out with the bases loaded, that would be effectively like making four outs; one for himself and three for the men he failed.

OSS: I see your point, but it sounds a bit harsh.

TSM: Well, if you hit a grand slam, you get credit for four RBI. If a hitter bats with men on a lot, he's gonna drive more in. I don't want to penalize him for that by counting the runs less, because the runs actually did score. But it's only fair, isn't it, when he messes up with guys on, to also count proportionately more against him?

OSS: Hmm ... all right, good point. Harold Reynolds showed that my man Brandon Phillips' batting average was one hundred and twenty five points higher with men in scoring position than when the bases were empty last year. Your suggestion won't penalize him because in those cases, he was hitting well. But what will you call this somewhat-convoluted measure of outs?

TSM: You tell me. It's how many outs were made, prorated by men on when the outs were made.

OSS: How about we call it "effective outs"; it's how many guys he effectively didn't bring in. This is scary; I feel like I'm becoming a stat guy.

TSM: And I feel like I came over to the Dark Side, using RBI.... kidding! Let's see if we agree on the method, using an example: Batter comes to the plate, men on first and third, and hits a sac fly. One RBI for him. But he also made an out, and in the context of his appearance, three effective outs; he was batting for himself and the two baserunners. He gets both positive credit for driving one in, As He Should, and also gets negative credit.

OSS: Pretty sneaky there, making like a sac fly is bad, when it scores a run. But I get it. One RBI for 3 outs still sounds really good.

TSM: Yes. In fact, in 2013 NL, there were 9,243 total RBI and 102,993 effective outs. The average batter drove in .09 runs per effective out made. A guy who made 400 outs in a year, with an average of half-a-man on base when he made them, would be responsible for 600 effective outs. If he drove in 54 runs, he would have been "average."

OSS: Okay Saber, you go get your big fancy databases out, and I'll wait here until you come back with the answers. I'll bet Phillips comes out looking sweet.

Okay then, some qualifiers: I do *not* intend the method the two fictional debaters outlined above to be an all-encompassing measure to answer questions like who should win the MVP award. There is more to winning than driving in runners; reaching base for others to drive you in, playing defense, etc. What I have really done here is come up with a "net" RBI measure ... something like what they do the NBA, where, instead of just counting who scored the most points, they also look at how many shots were missed.

To answer the broad question of who the best RBI men were in the NL this year, I looked up hitting data for each of the top ten RBI men in the league. To that list, I added three more hitters: Marlon Byrd, Andrew McCutchen, and Matt Carpenter. Each of the three finished in the top ten in total bases, even though they were not among the RBI leaders.

Let's start with the RBI leader, Goldschmidt, and work through the numbers as an example of how many effective outs Goldy was responsible for.

Here's his basic stat line (* denotes league-leading figure):

AB	R	H	HR	RBI	BB	HBP	AVG	OPS	GIDP	SF
602	103	182	36*	125*	99	3	.302	.952*	25	5

Goldschmidt made a total of 450 outs; 420 official outs (at bats minus hits), plus 5 sac flies, plus he grounded into twin killings 25 times. But we can track his outs by how many baserunners were on. It turns out he made 738 “effective outs,” as can be seen in Table 2.

For perspective, what does 738 effective outs mean? Well, if a hitter comes to the plate 690 times in a season, and reaches base one-third of the time (slightly above average), he would make 460 outs. There was an overall average of .60 baserunners last year, so the typical number of effective outs would be 1.6 times 460, or 736; just about how many Goldschmidt made. There were about 12 percent more effective outs in the NL in 2013 than there were plate appearances.

Goldschmidt batted often with men on, but he sure helped himself (and his team) when he did, hitting for a much higher average than with the bases empty. And for much more power too; his SLG with men on was .692, compared to .435 with the no one on (!). His ratio of RBI to effective outs was 125/738, or .169.

Table 2 – Goldschmidt batting by situation, with effective outs calculation

	AB	H	GIDP	SF	total outs	outs * {runners + batter}	AVG	HR	RBI
bases empty	329	87	0	0	242	242	.264	12	12
one man on	191	67	13	2	139	278	.351	18	59
two men on	68	23	11	2	58	174	.338	3	36
sacks full	14	5	1	1	11	44	.357	3	18
total	602	182	25	5	450	738	.302	36	125

Since this is an unfamiliar number, we must ask “so how good is that?”. As mentioned previously, the average for the the 2013 National League (including pitchers hitting) was .090¹, so Goldschmidt’s mark was substantially better.

Table 3 shows the effective outs made by the fourteen hitters I’ve chosen, compared to their RBI. I added other descriptive information, too: how many PA the batters had in 2013; their batting average with runners in scoring position (RISP); their slugging percentage with men on base; and lastly, bb-ref’s “adjusted batting runs,” a linear-weights-based overall metric of offense (including home park factors), for those who finished in among the NL leaderboard (top ten) in that statistic.

Table 3 – RBIs vs. effective outs

Player	RBI	effective outs	ratio*	PA	AVG w/ RISP	SLG w/ men on	Batting Runs
P Goldschmidt	125	738	.169	710	.338	.692	52
F Freeman	109	611	.176	629	.443	.591	35
J Bruce	109	793	.137	697	.262	.439	--
B Phillips	103	804	.128	666	.338	.441	--
P Alvarez	100	766	.131	614	.243	.434	--
A Gonzalez	100	700	.143	641	.323	.491	--
H Pence	99	816	.121	687	.293	.464	--
A Craig	97	582	.167	563	.454	.532	--
J Votto	94	717	.131	726	.291	.434	52
M Holliday	94	653	.144	602	.390	.582	34
M Byrd	88	671	.131	579	.301	.473	--
A McCutchen	84	680	.124	674	.282	.443	49
M Carpenter	78	609	.128	717	.388	.558	40

* ratio = RBI divided by effective outs.

Notes: Cincinnati Reds players in bold. Dashes (“--”) indicate player was not top-ten in league.

Some observations from Table 3:

1. Jay Bruce had a lot of RBI, but he made a bunch of outs, and he had a lot of runners on when he made them.
2. Hunter Pence had the most effective outs in this sample of RBI men. He was fortunate to hit behind guys like Scutaro, Belt, and Posey much of the year. His 99 RBI were not anything special compared to how many times he made an out with ducks on the pond.
3. Goldschmidt, Freeman, and Craig were crazy good when runners were on. The differences in their totals were primarily driven by playing time; Craig missed a lot of games, Freddie missed some, and Goldschmidt was on the field all year.

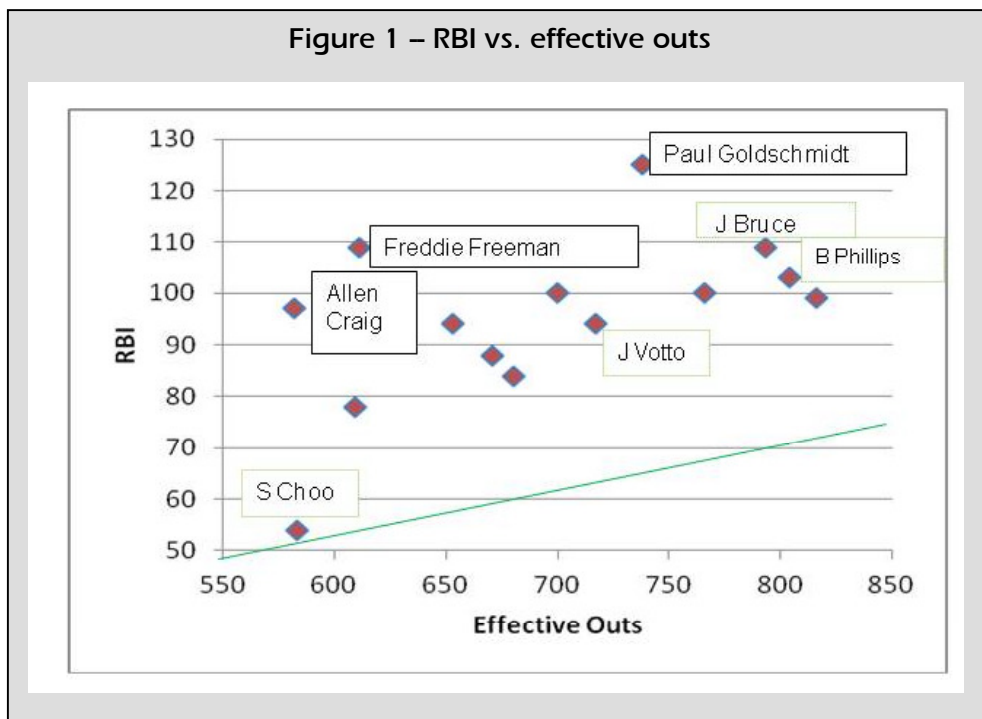
¹ This can be seen by compiling the data found at the link at the wonderful web site of baseball-reference.com: <http://www.baseball-reference.com/leagues/split.cgi?t=b&lg=NL&year=2013>.

Why did Joey Votto not drive in as many runs as Brandon Phillips? One reason was that Phillips hit better with RISP. But the *primary* reason is that Phillips had more runners on, and so even though Phillips helped the team by not making outs with runners on *very often*, he still made *more* effective outs because he had so many opportunities.

My answer to the question “who was the best of the Reds hitters at driving in runners?” is, “Jay Bruce by a nose over Votto and Phillips.” Of course, Votto did other things well that aren’t captured by RBI; walks rarely drive in runs, and so they get no credit here, but there is value in putting yourself on.

Figure 1 is the graph suggested in the fictional conversation between TSM and OSS. It depicts the results shown in Table 4 visually, with the positive outcomes (RBI) on the Y axis, and negatives (missed opportunities) on the X axis.

I have also included Shin-Soo Choo in the figure. He had a fine year overall, but 17 of his 21 home runs on the year came with the bases empty; he was a great run-scorer, but *not* an RBI man.



The line on the graph is roughly equivalent to the NL average of RBI per effective out. If we wished to measure RBI/EO above average, this would simply be the height of each diamond above the line. Table 4 shows the same list of batters, ordered by RBI/EO above average, by the formula

$$(RBI/EO - 0.09) * EO$$

This formula can be rewritten as

$$RBI - (EO * 0.09)$$

to emphasize once again that:

1. The currency is runs
2. The positive measure is runs batted in
3. The subtraction is a function of making more outs in key situations than the average batter would, but is calibrated to runs.

While Allen Craig had a phenomenal clutch-hitting year, Table 4 shows that the best RBI men in the NL were Freeman and Goldschmidt; Freeman had the best ratio (the rate stat), but Goldschmidt came through in more opportunities.

Player	RBI	effective outs	ratio*	EO * .090	RBI above average
P Goldschmidt	125	738	.169	66	59
F Freeman	109	611	.176	55	54
A Craig	97	582	.167	52	45
J Bruce	109	793	.137	71	38
A Gonzalez	100	700	.143	63	37
M Holliday	94	653	.144	59	35
P Alvarez	100	766	.131	69	31
B Phillips	103	804	.128	72	31
J Votto	94	717	.131	65	29
M Byrd	88	671	.131	60	28
H Pence	99	816	.121	73	26
A McCutchen	84	680	.124	61	23
M Carpenter	78	609	.128	55	23

Table 5 shows the breakdown of Freeman’s opportunities (I showed Goldschmidt’s in Table 2).

Freeman was incredible with two or more men on base, hitting .514 (36-for-70) in those situations. That’s why his ratio of RBI to effective outs was the highest among all RBI or total base leaders. Goldschmidt had more RBI partly because he had more playing time, and partly because he drove himself in more often (36 home runs to Freeman’s 23).

	AB	H	GIDP	SF	total outs	outs * {runners + batter}	AVG	HR	RBI
bases empty	297	82	0	0	215	215	.276	9	9
one man on	184	58	6	2	134	268	.315	9	40
two men on	60	29	3	2	36	108	.483	5	43
sacks full	10	7	1	1	5	15	.700	0	17
total	551	176	10	5	390	611	.319	23	109

You can make a good case for either man being the best at driving in runners in the NL last year.

I hope even OSS would acknowledge these results. What we did here, was take some old school guys’ favorite stat, RBI, but put it in a more solid context. I would propose that this is an effective way to acknowledge the currency of the game of baseball is indeed runs, while getting old-schoolers to admit that there could be reasonable ways to account for the advantages of hitting cleanup on a good team.

Tom Hanrahan, han60man@aol.com ♦