

BY THE NUMBERS

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GREETINGS AND WELCOME

This is the first issue of the SABR Statistical Analysis Committee's Newsletter. It's YOUR committee and YOUR newsletter--if you have anything to say, write it up and send it to me. If you disagree with anything in the newsletter, write it up and send it to me. If you're working on something and need assistance (data, ideas, whatever), write it up and send it to me. If you have a nominee for the best or worst piece of statistical analysis of the year, write it up and send it to me. Without your help, the Newsletter will not survive.

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THE GOOD, THE BAD, AND THE UGLY

This is the first installment of what I hope will be an on-going feature on the use of statistical analysis of baseball, in which we will discuss candidates for the best and the worst analyses of the year. I want to discuss two of the best and two of the worst.

Two of the Best. Craig Wright, in Chapters 7 through 9 of his book (with Tom House) The Diamond Appraised, and Bill James, in an essay in The 1989 Baseball Abstract, have published this spring two of the best analyses I have seen so far this year.

Wright discusses the effect of the number and stress of innings pitched on pitcher performance over his career, and makes a number of intelligent suggestions about what to do about it. He concludes that the number of high-stress innings a

pitcher pitches early in his career--particularly before age 20--is a strongly determining factor in longevity. High-stress innings occur when a pitcher has to throw a large number of pitches in a single outing.

He charts changes in pitcher workloads and finds that they have declined in response to concerns about "blowing pitchers' arms out." However, his suggestions do not necessarily involve fewer innings pitched (which has been the response to date, through the increased use of relief pitchers and the five-man rotation). Rather, he suggests (1) re-introducing the four-man rotation; (2) using fairly strict pitch limits for young pitchers; and (3) considering using young pitchers in middle or long relief.

Bill James set up an ran a simulation of 1000 seasons of teams with pre-determined "quality" levels--a a priori probabilities of winning--to determine how often the "best" team would win a division title, league championship, or World Series. He found that the "best" team in a division can be expected to win a division title about 55% of the time, and the "best" team in baseball can be expected to win the World Series about 29% of the time.

I would like to have seen two things in the study which are not there. First, I think James could have presented a table listing the distribution of a a priori winning percentages and of achieved winning percentages. Second, I wish he had run a number of seasons (say, 100 or so) with a set of teams with fixed a a priori winning percentages, to see how many seasons it took before the teams tended to converge to their expected winning percentages. This is important, because if they do not converge, then there is something about the study which needs re-definition.

Two of the Worst. I wish all analyses were good. Unfortunately, that is not the case. The 1989 Elias Baseball Analyst contains a case of bad analysis, as does Bill Welch's The Tenth Man.

The problems in The Tenth Man are easy enough to describe and hard to suggest corrections for. Welch presents an analysis of hitter performance on pitches (which terminated an at-bat) of different types in different locations. He also makes suggestions about defensive positioning and pitch selection based on this analysis. The first problem is that a lot of the analysis is based on very small--less than 10 observations--samples. As a result, the results he observes could occur largely by chance.

The second problem is that the observed cases of pitch selection--and the resulting strategic recommendations--may largely be pitchers trying to work to their own strengths, rather than to a batter's weakness. Another way of putting this is that a hitter may be vulnerable to a low, outside curveball thrown by a pitcher with a good-to-outstanding curveball; this does not mean that a pitcher with a mediocre curveball would have the same success.

What Welch does is to apply statistical tools unthinkingly, ignoring issues of sample size and ignoring the very real differences in the abilities of major league pitchers to deliver pitches of different types. The result is to try to substitute a purely statistical analysis for a decision-making process which is informed by qualitative as well as quantitative factors.

The Elias case is something which has been, over the years, typical of the Elias Analysts. They discuss the 1988 season of the California Angels, which splits into, admittedly, distinctly odd thirds--19-35, 37-17, and 19-35. They note, correctly, that this has never happened before; they conclude, incorrectly, that we should be terribly surprised that it did happen. What's typical of Elias here is the "gee, whiz" attitude toward an event.

The problem is that this event is not all that unlikely. The question (which Elias does not even mention) is, how often

46.3% of its games have a 54-game stretch in which it wins 68.5% of its games? This formulation of the question assumes that the Angels were an a priori .463 team, which they may not have been (see Bill James's analysis, referred to above)--the Angels might have been a substantially better team than that, making their chances of a .685 stretch better. Or they might have been a substantially worse team, making their chances of a .685 stretch worse.

Assuming that the Angels were, however, a .463 team, and assuming that they played against a league of teams averaging .503 (the league minus the Angels), we can calculate the probability that the Angels would win 37 games out of a specific stretch of 54. It is 0.0005, or roughly 1-in-2000. In each 162-game season, there are 109 stretches of 54 games (games 1 through 54; games 2 through 55; games 3 through 56; etc.), so the probability of this happening in a single season is 0.056, or slightly more than 1-in-20.

Since 1945, there have been 43 seasons, totalling about 850 team-seasons, or about 90,000 stretches of 54 games. Of these team-seasons, 21 were of teams with an "exact" match in winning percentage (71 wins during a 154-game schedule; 75 during a 162-game schedule), while 48 were within one win of an "exact" match. So we have to expect this event--winning 37 out of 54 games, even though you have an overall .463 winning percentage--to have occurred 1 to 3 times since World War II.

But what about that precise split of the season into thirds? Again, the probability that any specific 54-game stretch would yield 37 wins is 0.0005. Then, in the 69 team-seasons comparable to the 1988 California Angels, we would expect the probability of their season occurring to be about 0.035. This is unlikely, but clearly not impossible.

What Elias did was to fail to ask the correct question, and fail to try to answer it using the correct set of tools. As a result, they concluded, "Gee, whiz, isn't this the most unlikely thing you've ever seen?" Well, no, it's not.

Don Coffin

would a team which we can expect to win

**ONE MORE PROOF THAT
CLUTCH HITTERS DO NOT EXIST**

**DOES PHIL RIZZUTO BELONG IN
THE HALL OF FAME?**

The 25 hitters listed below rank in the top two-tenths of one percent of all the hitters who have ever played major league baseball. It should be safe to assume that for most of their careers they were among the dominant hitters in their leagues. Is it possible that they could only get their hits when there was nothing on the line? Did these guys all do an el fold when the pressure was on them? Or were they sent up to pinch-hit in meaningless situations, where they did not give it their all? It is interesting to note that the word "pinch" was originally used for "clutch", thus "pinch hitting" and Matty's book, Pitching in a Pinch.

The "Hall of Fame" debate is one of the most fun, and least solvable, in baseball. And the Phil Rizzuto debate comes up every year, usually in the form, "Well, PeeWee Reese is in the Hall of Fame, so Phil Rizzuto should be too, since they were such comparable players."

Because players are being, somehow, evaluated for the Hall of Fame on the basis of their careers, their career statistics become important in that evaluation. What we can do, therefore, is to address specific questions analytically. So let's address the Phil Rizzuto question. How do his career (offensive) statistics compare?

The first question is the relevant comparison group. Let's compare Rizzuto to all shortstops who retired after 1925 and who had played in 1500 or more games (as of the end of the 1987 season). Then, let's compare him to all shortstops who are in the HOF.

Rizzuto Versus All Shortstops. I have developed a method of evaluating career offensive performance which allows comparisons between players who performed at about the same time; it does not readily allow comparisons across periods. This method essentially measures how far above the average a player is, using two specific measures. The first (Type I) is a measure based on the number of hits, doubles, triples, home runs, runs scored, runs batted in, walks and stolen bases a player achieved. The second (Type II) compares players on the bases of batting average, isolated power (SA - BA) and walks per plate appearance [W/(W + AB)]. For both measures, "average" is zero; scores above or below zero measure how many standard deviations a player is above or below the "average".

I calculated these measures using what I call "retirement cohorts"--all players appearing in 1500 or more games who retire in the same five-year period (beginning with 1925-30 and proceeding with 1931-35, etc.). Once these two measures are calculated, we can compare shortstops to other players in their retirement cohorts.

Player	Career As A Pinch Hitter			
	BA	AB	H	BA
Ty Cobb	.368	69	15	.217
Rogers Hornsby	.359	86	26	.302
Joe Jackson	.356	11	4	.364
Ted Williams	.345	111	33	.297
Tris Speaker	.344	60	20	.333
Babe Ruth	.343	67	13	.194
Harry Heilmann	.342	75	23	.307
Bill Terry	.342	113	34	.301
George Sisler	.340	22	6	.273
Lou Gehrig	.340	16	4	.250
Nap Lajoie	.339	35	9	.257
Riggs Stephenson	.338	139	37	.266
Al Simmons	.335	66	17	.258
Paul Waner	.335	164	40	.244
Eddie Collins	.334	104	27	.260
Stan Musial	.332	126	35	.247
Heinie Manush	.331	146	36	.247
Honus Wagner	.330	31	5	.161
Rod Carew	.328	124	40	.323
Jimmy Foxx	.326	112	30	.268
Babe Herman	.326	120	32	.267
Earl Combs	.325	56	17	.304
Ducky Medwick	.325	107	22	.206
Edd Roush	.324	94	24	.255
Joe DiMaggio	.323	12	6	.500

Career batting average listed excludes pinch hitting appearances.

Cappy Gagnon

Table 1

Player	Type I	Type II
Aparicio	5.6	-2.5
Appling	8.3	1.2
Bancroft	-2.5	-1.1
Banks	6.7	0.8
Bartell	-2.9	-2.7
Belanger	-5.8	-4.4
Boudreau	0.7	0.2
Bowa	1.1	-3.7
Brinkman	-6.8	-4.3
Campaneris	4.9	-2.9
Cardenas	-3.7	-2.1
Concepcion	2.5	-2.5
Cronin	2.9	0.4
Crosetti	-1.2	-1.7
Dark	0.2	-1.7
Durocher	-10.7	-4.7
Foli	-6.7	-4.6
Fregosi	-1.5	-0.6
Gerber	-8.1	-3.2
Groat	1.0	-1.8
Hamner	-4.4	-2.8
Jackson	-4.4	-1.7
Joost	-0.4	-0.7
Jurges	-5.9	-2.9
Kessinger	-2.3	-3.4
Logan	-6.0	-2.4
Maranville	3.3	-3.7
Marion	-4.8	-3.6
McMillan	-3.4	-3.6
Menke	-5.2	-0.5
Miller	-7.1	-3.8
Patek	-2.7	-3.2
Petrocelli	-4.8	-0.3
Reese	6.5	-0.7
Rizzuto	-2.5	-1.7
Russell	-3.1	-3.7
Smalley	-5.3	-0.5
Scott	-7.7	-5.1
Sewell	-0.7	-0.3
Speier	-3.3	-2.4
Stephens	1.0	-0.3
Templeton	-3.0	-2.9
Vaughan	4.7	2.3
Wills	0.3	-2.2
Yount	4.0	-0.2

Table 2

Cat.	Ave., Dark, Hamner, Reese, Rizzuto				
	Dark	Hamner	Reese	Reese	Rizzuto
AB	7129	5839	8058	7039	5816
H	2089	1529	2170	1929	1588
2B	358	272	330	320	239
3B	72	62	80	71	62
HR	126	104	126	119	38
Runs	1064	711	1338	1038	877
RBI	757	708	885	783	562
BB	430	351	1210	664	650
SB	59	32	239	109	149
BA	.289	.262	.269	.274	.273
ISOP	.122	.121	.108	.116	.082
WPA	.056	.057	.131	.086	.101

Table 3

Category	Rizzuto	45 Shortstops
AB	5816	6814
H	1588	1823
2B	239	294
3B	62	66
HR	38	91
Runs	877	887
RBI	562	728
BB	650	643
SB	149	137
BA	.273	.268
ISOP	.082	.102
WPA	.101	.086

Table 1 presents each shortstop's score within his retirement cohort on both measures (for active players, through the 1987 season).

In this context, Rizzuto ranks 23rd out of the 45 shortstops on Type I and tied for 16th on Type II. This is a respectable offensive performance. We should keep in mind that this evaluation only includes players appearing in 1500 or more games, so Rizzuto is being compared only to excellent players here.

Within his own retirement cohort, there were four shortstops (Dark, Hamner, Reese, and Rizzuto; in boldface in the table). In this ranking, Reese and Dark would seem to be clearly superior offensive shortstops, while Rizzuto seems very comparable to Hamner--Rizzuto hit for less power, but

walked almost twice as often. One thing that shows up in this comparison is that Reese was a clearly superior offensive player; he was in almost no way comparable to Rizzuto. The career records for these four players are presented in Table 2.

Although comparisons across periods are not always useful, since offensive contexts change, Table 3 compares Rizzuto to the 45 shortstops retiring since 1925 after appearing in 1500 or more games.

Table 3 suggests that Rizzuto was about an average offensive shortstop (in a group of excellent shortstops), but that he sustained his performance for roughly two full seasons less than the average of this group.

Rizzuto Versus Hall of Fame Shortstops.

There are 17 shortstops in the Hall of Fame; at least one of these (Hugh Jennings) is apparently there mostly as a manager. Twelve of them retired after 1925 and are ranked as above. (Table 4.)

Only three of these twelve HOF shortstops were below the average offensive player using a Type I measure, and six of the twelve were below average using a Type II measure (since 1/3 of the Type II measure is extra-base power, this is not surprising). In this company, Rizzuto's offensive performance looks distinctly sub-par, better than Travis Jackson and comparable to Davy Bancroft, but probably worse than everyone else.

Table 4

Player	Type I	Type II
Aparicio	5.6	-2.5
Appling	8.3	1.2
Bancroft	-2.5	-1.1
Banks	6.7	0.8
Boudreau	0.7	0.2
Cronin	2.9	0.4
Jackson	-4.4	-1.7
Maranville	3.3	-3.7
Reese	6.5	-0.7
Rizzuto	-2.5	-1.7
Sewell	-0.7	-0.3
Vaughan	4.7	2.3

Table 5

Category	Rizzuto	HOF Shortstops
AB	5816	7705
H	1588	2227
2B	239	386
3B	62	99
HR	38	126
Runs	877	1151
RBI	562	1023
BB	650	899
SB	149	130
BA	.273	.289
ISOP	.082	.125
WPA	.101	.104

Again, comparisons across periods are hazardous, so take them with a grain of salt. Table 5 compares Rizzuto's career statistics with the average of the twelve HOF shortstops retiring since 1925.

Rizzuto is not as good an offensive player as these shortstops; furthermore, he played the equivalent of nearly four full seasons less (1889 fewer at-bats than the average).

Conclusion. Phil Rizzuto was an average offensive player for a shortstop with an extended career, about on a par with (say) Davy Bancroft, Al Dark, or Dick Groat. If he is a serious candidate for the Hall of Fame, it must be on the basis of his defensive play or of his leadership characteristics.

I have not considered here such things as Rizzuto's defense, or his importance on a team which was consistently in the World Series and was almost always in pennant races even when they didn't win, with him at shortstop. These are issues someone might like to look at.

Does Phil Rizzuto belong in the Hall of Fame? I don't know; you decide.

Don Coffin
