By the Numbers

The Newsletter of the Statistical Analysis Committee of the Society for American Baseball Research
Volume 4, Number 1 April, 1992

Committee News

SABR XXII. As you know, the 22nd annual SABR national convention is coming up soon. It will be held at the Adam's Mark Hotel in St. Louis, June 25 through June 28. The current schedule for committee meetings is shown in the following table; note that we are scheduled to meet from **9:00 AM to 10:00 AM on Sunday morning**; the rooms for the meetings have not yet been assigned. I hope to see many of you at our committee meeting.

Time	Committees Scheduled
Friday:	
9:00 AM	Records; Bibliography
11:30 AM	Biographical; Computers
Saturday:	
8:00 AM	Negro Leagues; Oral; Ballparks
10:00 AM	19th Cent; Minors
Sunday:	
8:00 AM	Women; Latin American
9:00 AM	**Stat. Analysis;** Umpires&Rules

Upcoming Issues. I try every year to have a special convention issue that I mail to the committee members before the convention and that I make available to interested readers at the convention. I also try to make it a very interesting issue. ***Right now, I have nothing to put in it.*** If I don't get some interesting material soon, there will not be a next issue, let alone a convention issue. Remember that the survival of this committee and more especially the survival of the newsletter as a publications outlet depends on you. If you stop contributing, we stop publishing. So get back to your computers, calculators, and typewriters, and get me some interesting stuff.

Things You Should Know About. **Murray Browne** has published Volume 3 of the ***Game Score Report***, his annual compilation of starting pitcher game scores (using the formula Bill James introduced some years ago). The current issue is the best yet; if you are interested in game scores, Murray would be happy to send you his report for $2.00; write him at

Murray Browne
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Holland, MI 49423

Dan Heisman is back with Vol. III, No. 1 of his ***Baseball's Active Leader Newsletter***, which charts who's leading in what among active players and how they stack up against the all-time leaders. This is an extremely interesting newsletter and it can be your four time a year for only $15. Write Dan at

Dan Heisman
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Jon McEntyre has sent me a copy of his ***Mac Stats Final Report*** for the 1991 season. This is a compilation of player totals for runs scored + runs batted in, which tracks well who is likely to win the MVP awards. If you want a copy of this newsletter, write or call Jon for more information (including the cost) at

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Errata and So Forth. The final page of the newsletter is an errata sheet from David Bloom's article in Vol. 3, No. 4 of ***BTN***. It's this sort of thing that leads me to urge you to

submit your articles, if you can, on a microcomputer diskette. I use Microsoft Word, V. 5.0, but I can also read ASCII files, and we finally got some translation software here, so I can read almost any DOS-based word processor. I have to re-type any submissions that aren't on diskette (and I've never been hired for my typing skills). Also, I have to proofread all this stuff, and I've never been hired for ***those*** skills either. So to prevent my doing to you what I did to David, use your computer.

Let me re-empahsize that I need material. Without it, you can say good-bye to ***BTN***. Let me hear from you all soon. And I hope to see as many of you as possible in St. Louis.

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A Commentary on the 1991 Most Valuable Player Selections of the BBWA

By Bill French

The selections by the Baseball Writers Association of America (BBWA) of Terry Pendleton and Cal Ripken as the Most Valuable Players of 1991 were, in my opinion, inappropriate as far as honoring the player in each league who was individually responsible for producing the most wins for his team--through batting, baserunning, pitching, fielding, and/or intangibles. Barry Bonds in the NL and Frank Thomas in the AL had more *valuable* years, based on the above criteria.

The selections of Pendleton and Ripken are two more in a long line of questionable selections (Hall of Fame; MVP; Rookie of the Year; Manager of the Year) that indicate that *most of the members of the BBWA don't understand baseball statistics very well*, although many are excellent writers who are well worth reading for their insights on the national pastime.

PRO [Production = On-Base Average (OBA) plus Slugging Average (SA)] is a much better indicator of offensive contribution through batting than is Batting Average--which doesn't assign any offensive value to walks or hit-by-pitch; and which counts all hits equally.

Aside from solo home runs, runs are scored by a combination of players (a) getting on base and (b) advancing themselves and other baserunners around the bases. Getting on base is measured by OBA and advancing baserunners is measured primarily by SA. But BA measures only part of getting on base and only part of advancing baserunners. And this is why PRO (OBA + SA) is a much better measure of offense than is BA.

Barry Bonds's 1991 PRO was 0.924 (0.410 OBA + 0.514 SA), #1 in the NL, 34% above the NL PRO of 0.689 (0.316 OBA + 0.373 SA).[1] Terry Pendleton's 1991 PRO was 0.880 (0.363 OBA + 0.517 SA), #6 in the NL and only 28% above the NL average. Both players appeared in 153 games with about 620 plate appearances, so there was essentially no difference in playing time. Bonds's PRO exceeded the NL average by 21% more than Pendleton's did. This is a very large differential in offensive performance, and offensive performance is probably more important than fielding.[2]

The difference in value between Bonds and Pendleton increases when you look at their rankings in such secondary statistics as OBA (Bonds, #1; Pendleton, #9), SA (Bonds, #4; Pendleton, #3), Runs Scored (Bonds, #8; Pendleton, #9), RBI (Bonds, #2; Pendleton, #17), and net Stolen Bases (SB - 2*CS)

1. I do not have home-road statistics for 1991, so none of the individual player statistics are adjusted for park factors.
2. Pitching appears to be about 90% of defense, so fielding is no more than about 10% of defense. Batting is about 90% of offense (the remaining 10% is baserunning).

(Bonds, #3, Pendleton, #20). Furthermore, at least in 1991, Bonds had even better fielding statistics than did Pendleton. Bonds led all left-fielders in put-outs, and led *all* outfielders in assists (with 14). He was #2 in fielding average among left-fielders (with 200 or more total chances) and eighth in errors (with 8). Pendleton was excellent as usual, but not quite as good at his position as Bonds was in left--he was #4 in the NL in PO and FA, #1 in assists, but committed the most errors of any regular third baseman (24). Only in BA did Pendleton lead Bonds (0.319 to 0.292).

The choice of Cal Ripken in the AL was also debatable--even though Ripken is probably one of the six best all-around shortstops in major league history, behind Honus Wagner and Arky Vaughan, and slightly ahead of Ernie Banks, Joe Cronin and Lou Boudreau.

The top four AL batters in PRO in 1991 were Frank Thomas (1.006, 40% above the AL average of 0.720), Danny Tartabull (0.990, 38% above average)), Cal Ripken (0.940, 31% above average)), and Ken Griffey Jr. (0.926, 29% above average). If we adjust for the fact that a player's contribution is more valuable if he appears in a greater percentage of his team's games (the adjustment is % of games played times % above the average PRO), we find the following: Thomas, +39%; Ripken, +31%; Griffey, +28%; and Tartabull, +27%. This is *normalized* PRO.

Thomas's normalized PRO is 26% larger than is Ripken's. Even taking into account Ripken's excellent defense, and Thomas's primary role as a DH, this is too large an offensive differential for Ripken to overcome.

Cecil Fielder, who felt that he *should* have won the MVP award because of his league-leading 44 HR and 133 RBI while playing for a contender, had a much better year in 1990 when he was about as valuable, all around, as was Rickey Henderson, whose contributions to the A's were reduced because he played in only 136 of the A's 162 games.

Fielder's normalized PRO was #1 in the AL in 1990, but only #9 in 1991. His 133 RBI in 1991 were deceptive, because they were achieved within a context of many more RBI opportunities than he had in 1990.

Fielder's #2 finish behind Ripken in 1991 was even more debatable than Ripken's win. Thomas, Ripken, Griffey, Tartabull, Rafael Palmeiro, Jose Canseco, Chili Davis, and Wade Boggs all had higher normalized PRO than did Fielder. Of course there are always a few batters (such as Al Simmons, Joe DiMaggio, Roy Campanella, Dave Parker) who seem to have higher RBI counts than their PROs would suggest, even factoring in the OBAs of the hitters preceding them in the batting order, and this can indicate that they hit well in clutch situations. But the exhaustive studies of John Thorn and Pete Palmer[3] indicate that in virtually all cases a batter who has an above-average performance in clutch situations in one year will be below average in the next year, and that a consistently above-average clutch performer is extremely rare.

So far, Fielder seems to be a good clutch hitter. When you combine his #9 normalized PRO in 1991 with his good fielding, good attitude, and slow baserunnning, it would be hard for me to rationalize voting him any higher than fifth in the MVP vote, and even that would be a stretch. Yet 27 of the 28 voters in the MVP balloting put Fielder in the top three on their ballots--nine firsts and 12 seconds.

Based on their offensive performances, and making due allowance for fielding, baserunning, leadership, attitude, and all the other intangibles, the BBWA missed the mark again in 1991. The true MVPs--the players contributing the most to their team's ability to win games--were Barry Bonds and Frank Thomas.

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3. *The Hidden Game of Baseball*, Doubleday, 1984.

How to Build a Winning Team

By Nowick Gray

As with most baseball practices, building a team means choosing among a number of competing, but time-honored traditions: build a team with starting pitching; build around speed; defense up the middle; begin with a bullpen stopper; and so on. An expansion team's general manager faces exactly this dilemma, sifting through the competing claims for foundation stones. At the other end of the spectrum of popular wisdom are the data banks of researchers calculating run values, seasonal winning percentages, and so on, of various players. I wanted to come up with a reliable rank order of the values, the traditional along with the sabermetric.

Method. I used as a basic player pool all twenty-four major league teams from the year 1970. That season provided a good mix of batting and pitching performance, with twenty players hitting 30 or more home runs and with 11 20-game winners. My basic operating tool was the Strat-O-Matic computer game, which gave me access to an additional season's worth of statistics for these same players, by way of a computer replay. Using the statistics from the actual and replayed season, I was able to selece players to stock 12 draft teams, each building around its own core attribute, as shown in the Table 1 (see the next column).

If the primary statistic was a batting statistic, I drafted the starting batters first, then chose pitchers for that team with complementary skills. For example, in team 1, I drafted pitchers with ***low*** OPS allowed. If the primary statistic was a pitching statistic, I drafted pitchers fitting that description first, then drafted hitters with complementary skills (for example, for team 2, I drafted hitters with low strikeouts and high batting averages).

I drafted in the order listed on round 1 (team 1 through team 12) and then in inverse order in round 2 (team 12 through team 1), and continued reversing the order on successive rounds. After the 1970 player pool was exhausted, I introduced a number of quality players from the 1989 and 1990 seasons in a second phase of the draft. each team ended up with 28 or 29 players, enough to allow for injuries. The teams were arbitrarily divided into two divisions and played a 1970-type season (18 games against teams in division and 12 agains out-of-division teams). The computer manager had similar instructions for all teams, with a few obvious instructions (more aggressive stealing for the speed team).

Table 1: Team Attributes

Team #	Attribute(s)
1	OPS = OBA + SA
2	SP/K: Starting pitchers with high strikeouts and low hits per nine innings
3	SP/W: Starting pitchers with high wins
4	SP/ERA/SHO: Starting pitchers with low ERAs and high shutouts
5	RP/SV: Relief pitchers with high saves
6	RP/K/R/H: Relief pitchers with high strikeouts and low hits and runs
7	SPD: Speed
8	DEF: Defense
9	RC/TA: High runs created and total average
10	PLAT: Good platoon stats
11	POS: Positional importance (non-pitchers)
12	BEST: "Best" available player (any position) on a given draft round

The result? Both division winners won by 12-game margins, with the winners being team #1 (OBA + SA) and team #12 (best athlete). These results should not surprise any

follower of Thorn and Palmer, with their plug for OPS. Nor would readers of Bill James be surprised, with his skeptical attitude about spped and defense. It does support the idea that general managers should draft the best athlete regardles of position. Thus, team #12, with McCovey at DH and Santo at third, with Granger and Perranoski in the bullpen, did not hesitate to draft Cecil Fielder and Dennis Eckersley in the second phase of the draft. Composite final standings are shown in Table 2.

Table 2: Composite Final Standings

Team	Win	Loss	Pct
12	105	57	0.648
1	96	66	0.593
10	93	69	0.574
3	92	70	0.568
9	84	78	0.519
4	79	83	0.488
2	79	83	0.488
11	76	86	0.469
8	72	90	0.444
7	68	94	0.420
6	67	95	0.414
5	60	102	0.370

A number of conclusions surface from these results. Team #12 (BEST) benefitted from its freedom of choice, unrestricted to any narrow focus. The OPS team showed the superiority of that statistic over others. Platooning was valuable, but the player quality had to be diluted over a larger number of players. Starting pitchers are valuable, but they are apparently *not* worth the legendary 75% (or even 60%) of a team's value. The players on team #8 (defense) could *hit*--Ripken, Rose, Bo Jackson. But they couldn't compete with the Yastrzemskis and Aarons, the McCoveys and Cansecos of the stronger hitting teams.

Speedsters, too, included Sanguillen, Joe Morgan, Rickey Henderson, and Bobby Bonds, but, again, they were second class in this league. Or maybe it was the pitching of these two teams that wasn't up to scratch?

One of the clearest conclusions concerns the role of relief stoppers--they can't be of much value if the games are always out of reach.

The message here might not be all that clear for the Colorado and Miami expansion teams, but there are some pointers. Look for athletes; don't adopt too narrow a concept of what kind of player will help. But, also, don't expect Rickey Henderson or Jose Canseco to be in the draft pool.

[Ed. note: It might be useful to re-run this sort of study, not with the best players, but with the sort of players *likely* to be available in the expansion draft. Then perhaps it would be possible to make some suggestions that would improve the quality of the expansion draft. Anyone up to the challenge, before it's too late?]

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The Statistical Analysis Committee Hall of Fame Vote

Seventeen of us returned HOF ballots. The results are shown below. Interestingly enough, Bobby Grich got more votes from the 17 of us than he did from the 400 BBWA voters. What does that tell us? We elected Tom Seaver and Rollie Fingers, and no one else. And what does ***that*** tell us?

Among the oddities of the BBWA voting, of course, was the strong support for Steve Yeager (2 votes). One of the oddities, as far as I was concerned, was the lack of support, in the BBWA and among us, for Thurman Munson. I would have thought he would get substantial support--and I think he deserves substantial support (I will have an article in the next issue about HOF candidacy).

Based on *our* vote, Orlando Cepeda, Bobby Grich, Bill Mazeroski, and Ron Santo are the strongest candidates for the StatComm Veterans Committee. According to the

BBWA, Grich is an also-ran, a non-candidate for the HOF. It seems that sabermetric notions have not penetrated very far.

Player	Votes
Dick Allen	5
Dusty Baker	0
Vida Blue	1
Bobby Bonds	4
Ken Boyer	2
Cesar Cedeno	0
Orlando Cepeda	8
John Denny	0
Rollie Fingers	13
Curt Flood	1
Ken Forsch	0
George Foster	1
Bobby Grich	9
Toby Harrah	0
Jim Kaat	7
Dave Kingman	0
Dennis Leonard	0
Mickey Lolich	1
Garry Maddox	0
Bill Mazeroski	8
Minnie Minoso	5
Thurman Munson	1
Ben Olgivie	0
Tony Oliva	7
Tony Perez	8
Vada Pinson	2
Bill Russell	0
Ron Santo	10
Tom Seaver	17
Rusty Staub	2
Gorman Thomas	0
Luis Tiant	0
Joe Torre	1
Pete Vukovich	0
Maury Wills	0
Steve Yeager	0
13 required for "selection".	

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A Comment and a Challenge

In the March, 1992, *Inside Sports*, William Darby presents "evidence" that stealing bases is a potent offensive tool. He compiles won-lost records for the 1991 season, based on whether a team had more stolen bases in a game than its opponent, the same number, or fewer. In games in which teams each had the same number of stolen bases, the overall winning percentage was, of course, 0.500. In games in which a team stole *more* bases than its opponent, the team with more stolen bases had a 0.644 winning percentage in the AL (411-227) and a 0.642 winning percentage in the NL (392-219).

What this probably demonstrates is that teams win more games in which their offense out-performs the opposition. I say this because teams are likely to out-hit (etc.) their opponents in games in which they out-steal them.

What Darby *does not* do is compare this to how well a team does when it out-hits, out-walks, out-doubles, out-homers its opponents. Only if team records in these instances are not as good as in games in which they out-steal their opponents can we regard his conclusions as particularly strong. Anyone want to look at this?

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Does "Save Distribution" Affect Winning Percentage?

By Bob Davis

As the 1991 season wound down, it was interesting to note that of the division winners and teams still in the chase, only one (Minnesota, with Rick Aguilera) has a reliever with a huge number of saves. The Pirates have employed a bullpen by committee all season long. The Dodgers had 37 saves, but team leader Jay Howell had only 15. The Braves have relied primarily on Juan Berenguer, but have also used Mike Stanton, Kent Mercker,

Mark Wohlers, and (after his acquisition from the Mets) Alejandro Pena. Pena emerged as the closer late in the season, but is not a sure bet to be a sole closer in 1992. In the AL East, the Blue Jays shuffled their bullpen rather than relying solely on Tom Henke or Duane Ward.

When broadcasters discuss the Pirates, Braves, and Dodgers, the common weakness cited is this lack of a bullpen "hammer" who can nail down the close games. One broadcaster mentioned that if the Pirates had a reliever like Lee Smith, they would be virtually unbeatable. Certainly Lee Smith is a great pitcher, but is it generally true that teams with one dominant closer perform significantly better than teams employing a variety of relievers? Is there a measurable advantage for a team that has the comfort of knowing that someone like Smith or Dennis Eckersley is in the pen for the late innings? Or could it be that relying on several pitchers to close out games is an indication of depth in the pitching staff? These are the questions I will address in this paper.

A Two-Way Classification of Teams. For this study, all teams from the years 1986 to 1990 were classified according to two criteria. First, they were sorted into four groups according to winning percentage. The four groups are:

1) Winning percentage below 0.450;
2) Winning percentage from 0.450 to 0.499;
3) Winning percentage from 0.500 to 0.549; and
4) Winning percentage 0.550 and above.

The teams were then classified based on how their saves were distributed among bullpen members. I defined three groups:

A) Bullpen by Committee: No pitcher has more than 50% of the team's saves.
B) Committee with a Chief: Top reliever has 50% to 75% of the team's saves.
C) One Man Show: Top reliever has more than 75% of the team's saves.

The resulting classification is shown in Table 1 at the top of the next column.

Table 1: Classification of Teams

Winning Percentage	Bullpen Classification Comm	Chief	OMS
< 0.450	9	11	3
0.450-0.499	12	16	13
0.500-0.549	11	23	6
> 0.550	10	10	6

Analysis. We can treat this table as a *contingency table*. If winning percentage is independent of save distribution we would have expected the distribution of teams to be as shown in Table 2. We calculate the expected number of teams with each bullpen type by assuming that 32.3% (42/130) of all teams would have a bullpen-by-committee; that 46.2% (60/130) would have a committee-with-a-chief; and that 21.5% (28/130) would have a one-man-show, regardless of winning percentage. There were 130 teams, with 42 committees, 60 committees-with-a-chief, and 28 one-man-shows.

Table 2: Expected Distribution of Teams

Winning Percentage	Bullpen Classification Comm	Chief	OMS
< 0.450	7.43	10.62	4.95
0.450-0.499	13.25	18.92	8.83
0.500-0.549	12.92	18.46	8.62
> 0.550	8.40	12.00	5.60

There are no *large* discrepancies between the expected distribution of teams and the actual distribution of teams. Are the small observed differences between our expectations and our observations statistically significant, or are they due to natural variability? We can determine this by computing a Chi-squared statistic and comparing the value of the Chi-squared statistic to the critical value for this size contingency table. If the computed Chi-squared statistic exceeds the critical value, we would conclude that the differences are not a

result of chance, but are rather related to differences in winning percentage.

The computed Chi-sqared statistic is 6.517, and the critical value is 12.6. Based on this data, there is no reason to believe that lack of an ace closer dooms a team to a poor winning percentage. Teams with several competent relief pitchers seem to do just as well as teams with one dominant closer.

Conclusions. While many baseball experts point to the bullpens of the Dodgers, Braves, and Pirates as chinks in their armor, there is not sufficient evidence to support the claim that teams with ace closers are any better than teams that rely n several different relievers in save situations. There is no reason to believe that three capable relievers are any less valuable than one stud reliever and two guys of questionable ability. A team's performance obviously depends to some extent on the quality of its bullpen, but there is *no* evidence that it also depends on the structure of the bullpen.

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Lifetime Relative ERA

By David Bloom

Earned run average is generally regarded as a significant pitching statistic. However, if one wishes to compare pitchers from different baseball eras (no pun intended), the usefulness of ERA is limited by (among other things) the fact that standards change considerably from decade to decade, and sometimes even from year to year. (For instance, the average major league ERA was *under* 3.00 in 1968 but was *over* 4.00 in 1987.) Thus, it would be useful to have a statistic that measures a pitcher's performance, not in absolute terms, but relative to that of his own comtemporaries. Relative Earned Run Average (RERA) and Lifetime Relative Earned Run Average (LRERA) are designed for this purpose.

To compute a ptcher's RERA for a given year, just divide his ERA by his league's ERA. For example, in 1990, Roger Clemens had an ERA of 1.931, while the overall average for the American League was 3.907. Clemens' RERA was 0.494 (= 1.931/3.907). By this standard, "better than average" corresponds to "below 1", the lower the better. A pitcher's LRERA is the *weighted average* of his individual season RERAs, with each season weighted in proportion to innings pitched. This if he pitches n_i innings in his i^{th} season with an RERA of r_i ($1 = 1, 2, 3, \ldots$), then his LRERA is

(1) $\quad LRERA = (\Sigma r_i n_i)/(\Sigma n_i).$

This formula agrees with that for the center of mass of a system of particle masses in physics, with the numbers r_i corresponding to the positions of the particles and the numbers n_i corresponding to their masses. Again using Clemens as an example, we compute his LRERA (through 1990) as shown in Table 1.

Table 1: LRERA for Roger Clemens

Year	RC ERA	League ERA	RERA	IP	IP*RERA
1984	4.320	3.994	1.082	133.1	144.2
1985	3.295	4.151	0.794	98.1	78.2
1986	2.480	4.175	0.594	254.0	150.9
1987	2.972	4.456	0.667	281.2	187.8
1988	2.932	3.968	0.739	264.0	195.1
1989	3.126	3.883	0.805	253.1	203.9
1990	1.931	3.907	0.494	228.1	112.9
		Totals		1513.0	1072.9

Clemens' LRERA throug 1990 was, therefore, 0.709 (=1072.9/1513). (Decimals in the IP column represent thirds of an inning pitched)

A minor flaw in this computation is the low precision of the league ERAs, which have been computed by averaging the published team ERAs for each season. Since team ERAs are published only to two decimal places, errors of 1 or 2 in the third digit of the league average could easily occur. In addition, the average is skewed slightly by differences in IP totals from team to team. However, these errors are probably minor and

could not be corrected without obtaining access to more detailed team data.

Modern pitching records begin with 1893, when the pitching distance was lengthened from 50 feet to 60 feet, 6 inches. During the 1893-1990 period, a total of 74 pitchers achieved LRERAs of under 0.850 while pitching at least 1500 innings (excluding the Federal League). The top 50 such pitchers are listed in Table 2, the "LRERA Honor Roll." Especially impressive are those pitchers who not only rank high on the LRERA list but also have an unusually high total of innings pitched, such as Walter Johnson and Cy Young. In order to factor in longevity, I recommend what I call Earned Run/Longevity Index (ERLI), which is

(2) ERLI = [(1-LRERA)*(IP)]/100.

Division by 100 does not affect comparisons between pitchers, but it recognizes that these ERLIs are correct only to two significant digits, by and large.

By comparison, Table 3 presents data for some other stars of the past and present whose statistics you might be curious about.

In general, the ERLI cutoff for the Hall of Fame appears to lie somewhere betwen 5.5 and 6 (with some notable exceptions!). Among all eligible pitchers since 1893, with over 1500 IP and an ERLI above 5.75, only Hal Newhouser (LRERA of 0.787, ERI of 6.4) and Dutch Leonard (LRERA of 0.817, ERLI of 5.9) have to date been denied admission to the Hall of Fame. I can't help feeling that Newhouser, especially, has been overlooked.

It would be interesting, and useful, to refine this analysis to take into account dfferences between ballparks. Might anyone out there want to pick up on this?

If I have omitted anyone from the LRERA Honor Role, or if there are comments or sggestions for improving the analysis, I would like to know. Please send my your comments at 112 Division Ave., #2D, Levittown, NY 11756.

Table 3: LRERA Honor Roll

Pitcher	LRERA	ERLI	W - L
E. Walsh*	0.656	10.2	195-126
W. Johnson*	0.659	20.2	416-279
M. Brown*	0.665	9.1	208-110
H. Wilhelm*R	0.667	7.5	143-122
A. Joss*	0.687	7.3	160-97
L. Grove*	0.695	12.0	300-141
A. Rusie*	0.698	5.9	136-72
R. Clemens	0.709	4.4	116-51
W. Ford*	0.716	9.0	236-106
S. Koufax*	0.735	6.2	165-87
C. M'th'ws'n*	0.736	12.6	373-188
G. Alexander*	0.740	13.5	373-208
C. Young*	0.745	16.1	439-275
L Gomez*	0.745	6.4	189-102
C. Hubbell*	0.753	8.9	253-154
W. Waddell*	0.753	7.3	191-145
H. Breecheen	0.759	4.6	132-92
K. Nichols*	0.766	8.8	268-150
D. Gooden	0.768	3.5	119-46
J. Palmer*	0.769	9.1	268-152
N. Hahn	0.781	4.4	129-92
T. Seaver*	0.782	10.4	311-205
B. Feller*	0.785	8.2	266-162
H. Newhouser	0.787	6.4	207-150
D. Dean*	0.787	4.2	150-83
R. Fingers*R	0.792	3.7	114-118
S. Coveleski*	0.793	6.4	215-142
S. Maglie	0.794	3.5	119-62
G. Gossage-R	0.795	3.4	113-98
W. Spahn*	0.799	10.5	363-245
D. Vance*	0.801	5.9	197-140
E. Ruelbach	0.803	4.7	170-87
A. M'ss'rsmith	0.803	4.4	130-99
D. Drysdale*	0.805	6.7	209-166
B. Lemon*	0.805	5.6	207-128
M. Lanier	0.805	3.2	108-82
J. Marichal*	0.807	6.8	243-142
B. Gibson*	0.808	6.2	251-174
E. Cicotte	0.809	6.2	208-149
R. Guidry	0.811	4.5	170-91
C. Mays	0.813	5.6	208-126
M. Cooper	0.813	3.4	128-75
T. Bridges	0.814	5.3	194-138
D. Leonard	0.817	5.9	191-181
S. Leever	0.817	4.9	193-101
J. Tudor	0.818	3.3	117-72
C. Bender*	0.819	5.1	210-127
M. Garcia	0.819	3.9	142-97
U. Shocker	0.820	5.3	187-117
E. Plank*	0.823	7.5	327-193

*Elected to Hall of Fame. R-Pitched mostly in relief. Includes only performance after 1893 and through 1990.

Table 3: LRERA Honor Roll			
Pitcher	LRERA	ERLI	W - L
N. Ryan	0.861	6.9	302-272
B. Blyleven	0.860	6.8	279-238
S. Carlton	0.881	6.2	329-224
P. Neikro	0.905	5.1	318-274
D. Sutton	0.877	6.5	324-256
G. Perry*	0.852	7.9	314-265
T. John	0.887	5.3	288-231
E. Wynn*	0.919	3.7	300-244
C. Hunter*	0.917	2.9	224-166
B. Ruth*	0.785	2.6	94-46

*Elected to Hall of Fame. Includes only performance after 1893 and through 1990.

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Strikeout-to-Walk Ratios in Context

By Don Coffin

Somewhere[4] in *The Baseball Book 1992*, Bill James comments that one of the most useful things you can know in assessing a pitcher's potential is his strikeout-to-walk (KtoW) ratio. I don't doubt that this is true, but I do believe any information used for assessing anything in baseball must be put in context. In this case, the relevant context is what is happening to strikeouts and walks in the major leagues.

I started thinking about this late last year, and wrote a short piece for ***BTN***, V. 3, N. 4, comparing KtoW ratios for starting pitchers in 1950 and 1990. Here, I am extending that by looking at strikeouts per nine innings, walks per nine innings, and KtoW ratios in both leagues, annually, from 1950 to 1990. These are charted in the diagrams on the next three pages.

Strikeouts per nine innings rose steadily and dramatically through the 1950s, until the late 1960s, peaking at about 6; a decline followed until the mid-1970s, with another recovery to a level of about 6 strikeouts per game again by the late 1980s. In 1950, the average number of strikeouts per game was about 4, with a standard deviation on about 1--if you struck out 6 per game, you were a real strikeout artist. By 1990, the average was about 5.75, with a standard deviation of about 1.5. Now, you need to strike out about a batter per inning to be a strikeout pitcher.

Walks per nine innings fell through the 1950s and early 1960s, from over 4 [standard deviation (σ) of about 1] per game to around 2.9 (σ = 0.6) per game. Following a re-definition of the strike zone (and expansion) in the late 1960s, walks increased to about 3.3 (σ = 0.75) per game, where they have remained, with some year-to-year fluctuation. A pitcher like Bobby Witt would have been unusual, but not strikingly abnormal in 1950. Now, however, he has what is acknowledged as a severe control problem.

The KtoW ratio was about 1 in 1950 (σ = 0.5); it rose steadily to about 2 (σ = 0.75) by the mid-1960s. Following the re-definition of the strike zone (and expansion), it fell until (to about 1.4) about 1975, and has since recovered to about 1.75 (σ = 0.65). In 1950, a KtoW ratio of 2.0 or better was *extremely* uncommon; by 1990, it was nearly average.

What accounts for the changes we have observed? I performed a regression analysis and found the following (complete regression results are available on request--send a SASE):

1) Strikeouts per game increase when the strike zone is expanded and decrease when the strike zone shrinks. Walks per game move in the opposite direction. This is hardly a surprise, and it means that the KtoW ratio will rise when the strike zone expands and fall when it shrinks.
2) Both strikeouts per game and walks per game rise following expansion; however, strikeouts per game rise more rapidly. So the KtoW ratio can be expected to rise following expansion.
3) In addition, there is a persistent time-trend on strikeouts per game, but not on

4. This means I remember reading it, but I can't find the specific reference now that I need it.

walks per game. Strikeouts per game apparently rises about 2% per year, even after controlling for changes in the definition of the strike zone and for expansion. By itself, this suggests that we can expect the KtoW ratio to rise over time. Even if nothing else changes, we might expect the KtoW ratio to rise from about 1.75 in 1990 to about 2.14 by the year 2000, simply as a result of this persistent time trend. Note that there is no time trend in walks per game remaining in the data at this time.

If we use a pitcher's KtoW ratio, for any purpose, we must recognize how performance changes over time, and that what was average (or outstanding) performance at one time may now mean something very different.

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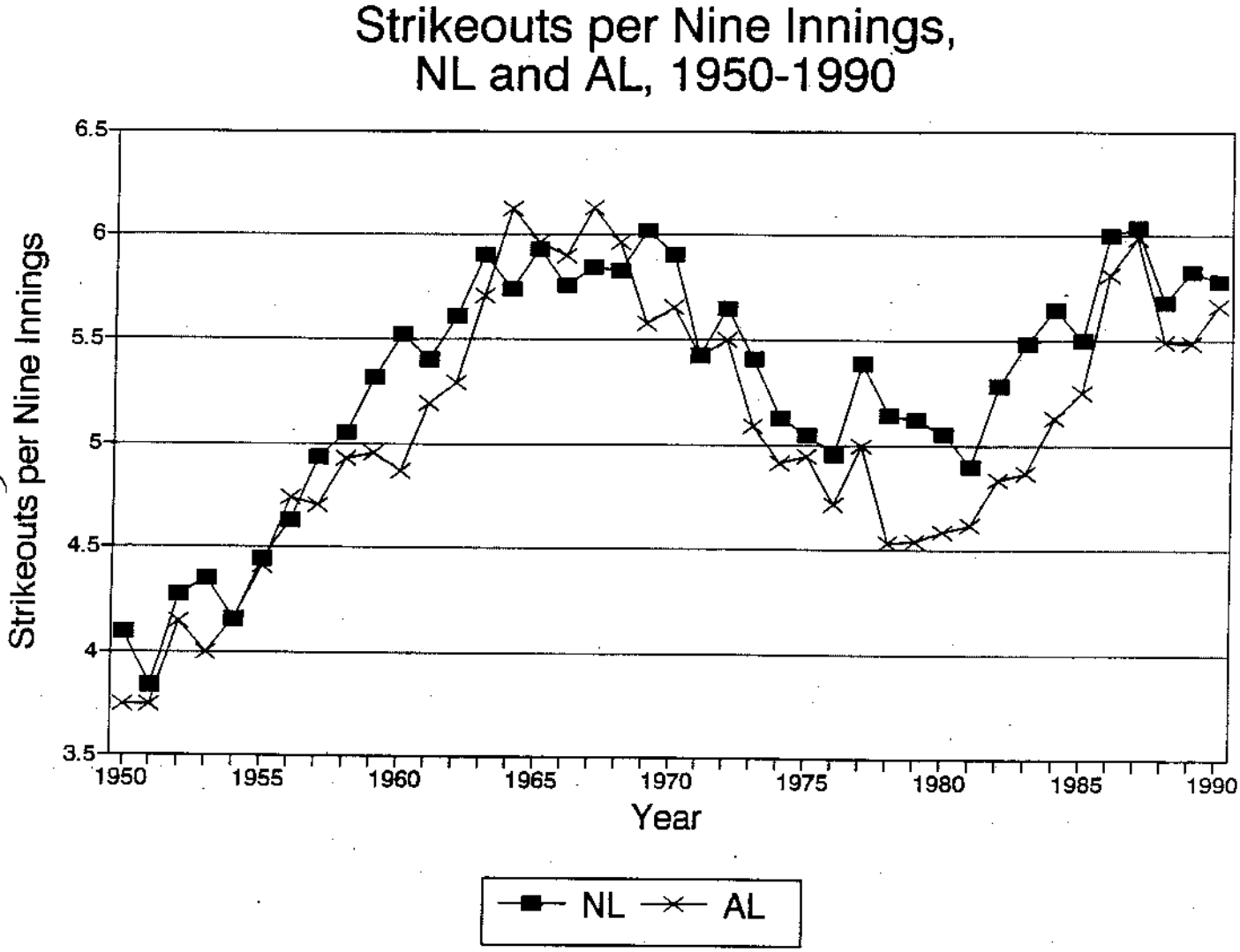
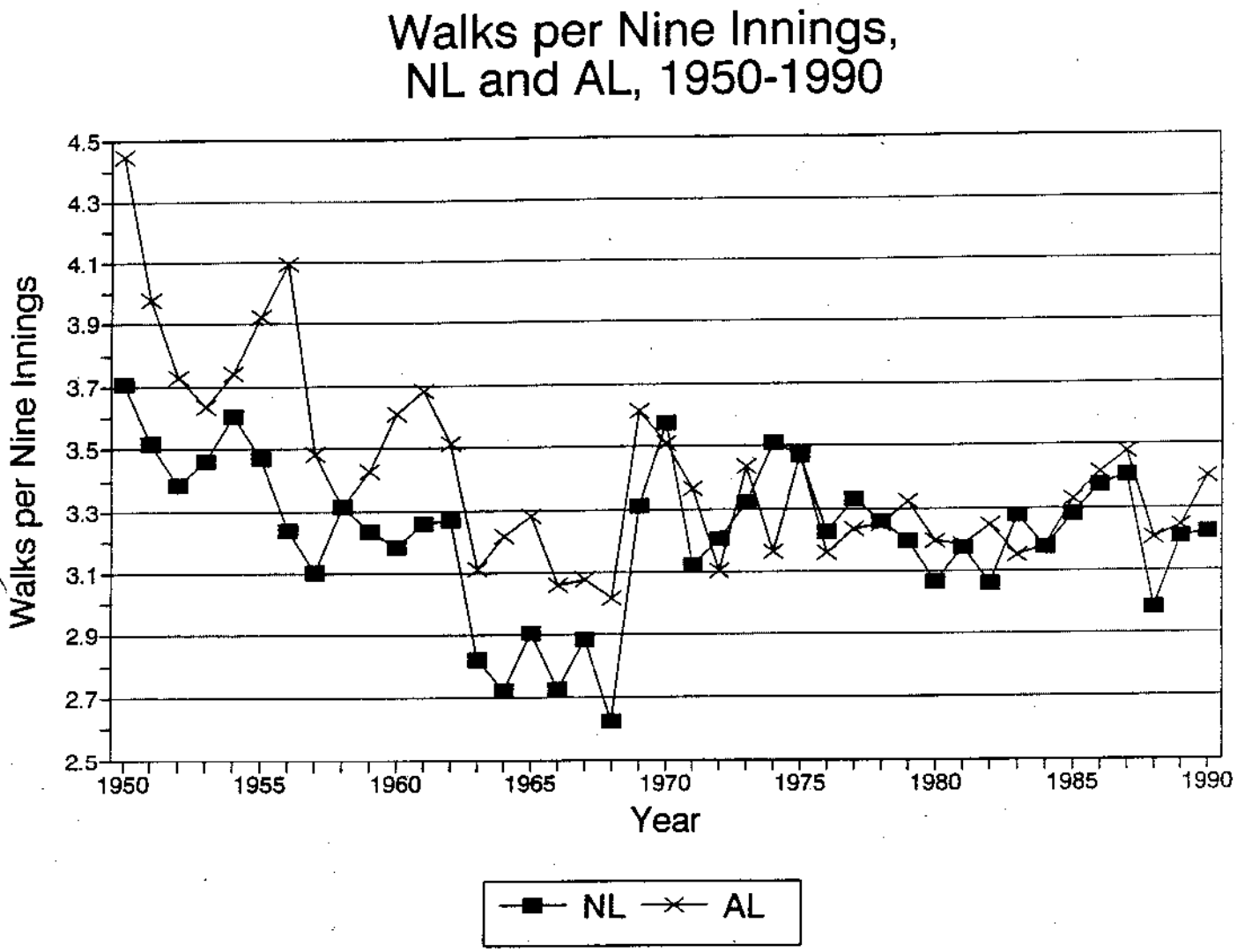
A Final Comment

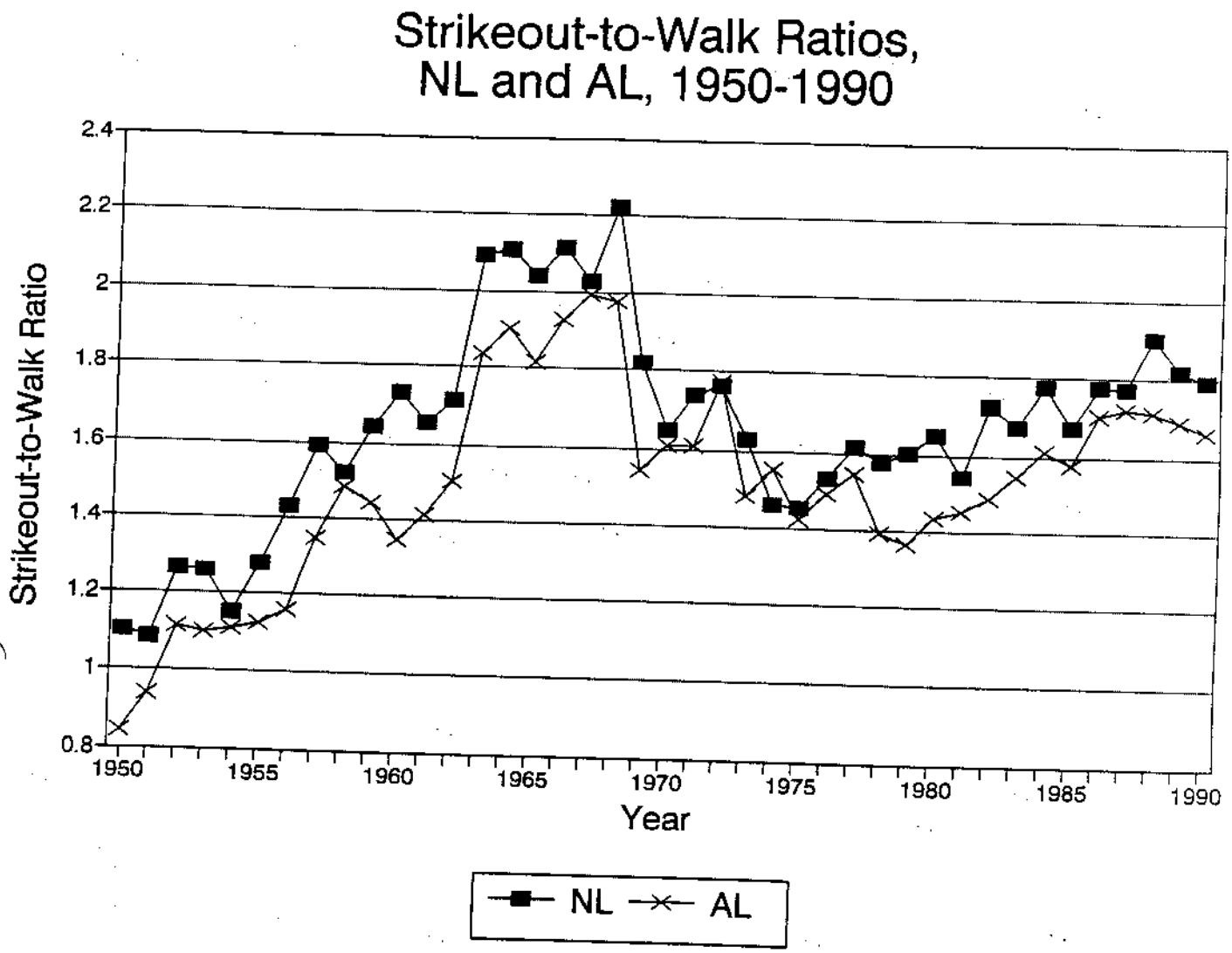
The ballot for the election of SABR officers and Board of director members arrived with the April *SABR Newsletter*. Please take the half-hour or so that you will need to read the qualifications of the candidates and vote. Last year, only about 8% of the SABR membership voted for the officers and board members who were elected. I hope the vote will be substantially larger this year.

I would also encourage you to vote ***for*** the proposed constitutional amendments. These appear to me to represent an improvement in the governance structure of the organization.

But in any event, please vote.


Strikeouts per Nine Innings,
NL and AL, 1950-1990
Strikeouts per Nine Innings
6.5
6
5.5
5
4.5
4
3.5
1950
1955
1960
1965
1970
1975
1980
1985
1990
Year
NL
AL


Walks per Nine Innings, NL and AL, 1950-1990
Walks per Nine Innings
4.5
4.3
4.1
3.9
3.7
3.5
3.3
3.1
2.9
2.7
2.5
1950
1955
1960
1965
1970
1975
1980
1985
1990
Year
NL
AL


Strikeout-to-Walk Ratios,
NL and AL, 1950-1990
Strikeout-to-Walk Ratio
2.4
2.2
2
1.8
1.6
1.4
1.2
1
0.8
1950
1955
1960
1965
1970
1975
1980
1985
1990
Year
NL
AL

List of serious Errata in "Ranking Teams in a 2-Division League" by David Bloom (By The Numbers, November 1991).

(These errors all occurred in the printing process; they were not in the original manuscript.)

Page	Column	Location within column	Change or addition
7	1	Table 2	No comparisons were attempted for 1981 or for the AL in 1972, because of major strike disruptions (see first paragraph of page 7)
7	1	display (2a)	Insert = before 2.25
7	2	display (3)	second β should be B
7	2	8 lines below display (3)	∂ should be Σ (twice)
7	2	display (4)	sum excludes k = i
7	2	display (5)	sum excludes k = j; switch subscripts δ, β
8	1	displays (7),(9)	k = should be $k \neq$
8	1	displays (8),(9)	all five centered dots should be $\geq$
8	1	display (11)	f(1) should be f(i)
8	1	last clause	should read, "for $i \in \delta$ and $j \in \beta$"
8	2	display (12)	switch w_i, w_j
8	2	line 4	change "positive if $T_i \gg T_j$" to "positive if $T_i \ll T_j$ and negative if $T_i \gg T_j$"
8	2	display (15)	change s/2, t/2 to $\binom{s}{2}$, $\binom{t}{2}$
9	1	display (16ab)	all four centered dots should be $\geq$
9	1	2 lines above display (17)	change "Clarke" to "Bloom"
9	1	immed. above display (17)	insert missing material: "$q(i,j) \leq (x_1 - x_{2n})/2nc_2$ for all i, j; and that if $q = q(i,k)$ with $i < j < k$ then"
9	1	line after display (17)	change f(1) to f(i)