By the Numbers

Newsletter of the Statistical Analysis Committee of The Society for American Baseball Research

Volume 6, Number 2 June, 1994

Greetings

Just about SABR National Convention time! I hope that this issue reaches you before the convention. The time of the Statistical Analysis Committee meeting is 7-8 p.m. on Friday, June 17. The meeting will be sufficiently unstructured to allow any items of interest to be discussed, so bring your ideas with you. Hope to see you all in Arlington.

We have just about used up our backlog of material for the newsletter, so I ardently encourage members to submit their research for publication. Short articles work best in this format, with appendices or more detailed material made available to interested readers. If possible, please send an electronic version of material to accompany the hard copy. I use Word for Windows, though can handle other word processors or Macintosh.

This issue of the newsletter contains five interesting articles:

Dan Rappoport comments on an earlier article by Don Coffin investigating whether good pitching stops good hitting.

Mat Olkin describes the calculation of park factors, taking into account the new ballparks in Colorado and Florida, in "A Fresh Look at Park Factors".

Tony Blengino shares his views on baseball's new realignment in "The Realignment From Hell".

Willie Runquist continues his analysis of variability in baseball in "Seasonal Variability in Batting Performance".

Bruce Stone summarizes the impact of unearned runs in "1993 Games Won and Lost by Unearned Runs".

Please send material, comments, etc., to my address: **Rob Wood**, 2101 California St. #224, Mountain View, CA 94040. My home number is (415) 961-6574, and my daytime number is (415) 854-7101.

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Notes from committee members

In this section of the newsletter, I will pass along news/ideas/information I receive from committee members.

John Matthew IV, a non-believer in Cito Gaston's managerial abilities, wonders if anyone knows of any objective, statistical methods to analyze the abilities of major league managers. Contact John at 167 Church Street, Suite 400, Toronto, Ontario, Canada M5B 1Y4.

Don Coffin sends word that STATS 1994 Baseball Scoreboard expands Don's earlier analysis on good pitching vs. good hitting, reaching the same conclusion that there is no tendency for good pitching to stop good hitting in a short series. STATS' annual publication is one of the best examples of solid statistical analysis.

Todd Aron has sent me a copy of the 1992 Proceedings of the American Statistical Association Section on Statistics in Sports. The publication has a few interesting articles on baseball statistical analysis. The 1994 ASA meetings will again have a track on statistics in sports.

Pete Kuchnicki has volunteered to serve as the committee's representative on PBS's Baseball On-Link Online Service (see the last issue of BTN for a description). Thanks Pete.

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COMMENT ON "DOES GOOD PITCHING STOP GOOD HITTING?"

by Dan Rappoport

I would like to comment on Don Coffin's article, "Does Good Pitching Stop Good Hitting?" which appeared in the Dec. 1993 issue of By The Numbers. When I added up the W-L Records for the four tables, they added up to 67-69. Forgetting about the '87 Twins. I found out that the '76 Royals and '83 White Sox were omitted from the table. (The '76 Royals were 109.8% R/G and 109% ERA for a 0-1 W-L Record. The '83 White Sox were 110% R/G and 110.6% ERA for a 0-1 W-L Record.) The W-L Record of "Stronger Hitting" teams was 24-27, not 24-28. The '92 Braves were listed as 0-1 instead of 1-1. However, the W-L Record of the "Stronger Pitching" teams remained at 33-27.

The question he addresses should be rephrased. The question should be how did the respective division winners do versus the individual pitchers of the teams they played against compared to the non-division champions? Also, how did the individual pitchers do versus different levels of hitting teams?

What is evident from his data is that when it is rearranged according to series opponent, teams with either lower scores in Relative ERA or R/G or both have won the series. Nine times a team with both a lower Relative ERA and R/G has come out victorious. This includes a dead-heat tie for the '89 Giants-Cubs in Relative ERA and a virtual tie between them in Relative R/G. The '69 Miracle Mets and '87 Twins have been much publicized. What about the '85 Royals? Their Relative R/G was 9.5% below the Blue Jays and their pitching was 23.6% worse. On the other hand, the 1979 Oriole pitching was 32.2% better than the Angels pitching, or 14.8% higher than any of the other seven factors and they still lost the World Series.

In fact, in only seven instances did the team with the highest relative score of the division winners make it to be World Champions. Four of these were pitching-rich teams ('70 Orioles, '74 A's, '86 Mets, and '89 A's). The three hitting teams were the '71 Pirates, '75 Reds, and '76 Reds. The '92 Blue Jays could also be counted if the margin of error is allowed for.

Out of 69 series played, only 19 times was both the winner's Relative R/G and ERA better than the loser's. There were two instances where the difference was less than 0.5% for Relative ERA.

Of the remaining 50 series, at least one of the two factors was better for the loser than the winner. This includes the nine series referred to above where the loser was dominant on both variables. Since 21 of the remaining series' were won by teams whose Relative ERA was lower than the loser and 20 of the series' were won by teams whose Relative R/G was lower than the loser, we have no basis to believe that good pitching stops good hitting. On only 39 occasions was the winner's Relative ERA greater than the loser's. On only 40 times was the winner's Relative R/G greater than the loser's.

If one looks at whether it was a higher Relative ERA or R/G that determined the outcome of the Series, 28 times the difference in Relative ERA was *larger* for the winner than the difference in Relative R/G for the winner. Based on the 60 series, with positive differences, and the fact that some differences between the difference in Relative ERA and R/G are less than 0.5%, these observations do not provide conclusive evidence either.

The only evidence found supporting Coffin's hypothesis was that out of 28 times in which Relative ERA was better than Relative R/G, 16 times it was 10% or more better (57%). Out of 32 times Relative R/G was better than Relative ERA, it was 10% or more better only 13 times (41%)

When each of Coffin's categories are broken down into intervals for Relative R/G and ERA, based on the factors most important to the category in question, one can observe that it is not whether a team has stronger pitching that determines the outcome of the series. It is how high the relative score is regardless of whether it represents pitching or hitting. There is no clear distinction for any level of "stronger pitching" or "dominant pitching" shown. The pattern reveals itself for "stronger" and "dominant" hitting.

In summary, a division champion's best chance of winning will occur if they have a Relative R/G of 110% or higher. Further, one must look at team records versus individual pitchers, vice versa, due to the shortness of each series.

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A FRESH LOOK AT PARK FACTORS

by Mat Olkin

Park factors are painstakingly difficult to calculate, and trying to explain them is even harder. But I seem to have little choice. You see, I really needed to have these park factors, and no one else was going to do them for me - right now, the correct way, for free - so I did them myself. Now, after having calculated the damn things, I need to explain them if they are to be any use to anybody. So hang on. I'll try to take you on a brisk walk-through.

Why did I *need* these stats? Well, it's not because I'm a horn-rimmed accountant with a decimal fetish. I needed them because I use them in a lot of the work I do in sabermetrics: Major League Equivalencies; that type of stuff. And the park factors that we get everywhere else just don't cut it. The STATS Major League Handbook purports to give them to us. But they only carry them out to three digits. (Don't look at me like that! I try to be a good scientist and my standards of accuracy are higher than that.)

But there's another, more significant problem with the STATS numbers: they forget about the road parks. Let's say that it's now about two years ago, we just heard Bonds was going to San Fran, and we want to adjust his stats for the new park. Let's do his triples, just for example. To make it simple, we'll assume that Bonds would hit 6 triples in an average season in a neutral park. Now - the calculation should be easy - just look up the "triples" park factor for Candlestick, which STATS tells us is 0.88. Common sense tells us we should just multiply his triples (6) by 0.88, right? Wrong.

You see, when STATS calculated that park factor, they considered only one fact: that Candlestick allows 88% of the number of triples which are hit in a "neutral" park. This 0.88 figure is the "raw" park factor for Candlestick, and it would be useful only if Bonds played all of his games there. But Bonds plays half of them on the road, and this should come as no surprise to anyone who has any business thinking about it. STATS didn't think of that. The "triples" park factor for the road games was probably about 1.00. If you want to get a realistic idea of how Bonds' triples total would be affected by playing half of his games at Candlestick, here's what you need to do. Take the average of .88 and 1.00 (actually, it's more complicated than that, but you get the idea). Multiply that number by Bonds' triples (6), and that's a realistic projection of how playing for the Giants should affect Bonds' triples totals. But STATS doesn't give us that. It gives us numbers that fail to account for something as obvious as the road games, numbers which are, at best, distressingly misleading.

I'm not done being distressed. Have you seen the park factors in Brock Hanke's Baseball Sabermetric? At first glance, I swore that he must have been just making them up. They were dead wrong; all of them. You can't tell me the Astrodome is a good home run park, but eventually I figured them out: for Hanke, up is down. The more favorable the park, the lower the park factor. For the San Francisco triples park factor above, Hanke would express it, not as 0.88 but as the inverse, 1.14. I've never seen park factors done this way, and you'd think that Hanke would at least bother to tell us that all his numbers mean exactly the opposite of what we'd expect. He also failed to tell us what data he used in calculating the factors. The last six years? The last three? Last year only? I suspect that he did use only one year's worth of data, and that's not good enough for me.

Anyway, all of those numbers went out the window when Colorado entered the league. Park factors are relative; they compare a park to all of the league's "road" parks. The basic method of calculating a park factor involves comparing, over a period of years, the total offense (by both teams) in the home park to the total offense when that team is on the road. The method works only as long as the "road" parks remain essentially unchanged. Mile High Stadium proved to be such a happy home for hitters that it significantly shifted all of the league norms.

Now we have to have new numbers for all of the N.L. parks, calculated to reflect Denver's inflated effects. Which brings up problem #1. Like I said above, you need to use several years' worth of data to get a good read on a park. We have only one year's worth of data for the Colorado and Florida parks, so for those parks, all we can do is just keep in mind that their park factors are not going to be particularly reliable. But here's the real problem: for all the other parks, we have only one year's worth of "road" data which includes the new parks. For example, if I want to compare Atlanta's home games to its road games over the past six years, I can't because they didn't play any road games in Florida or Colorado from '88 to '92. Of course, this sort of thing happens all

PARK FACTORS

A.L.	R	1B	2B	3B	HR	yrs
East						
Blue Jays	1.0097	.9818	1.0328	1.1510	1.0911	'89-'93
Orioles	1.0202	1.0023	.9714	.9777	1.0718	'92-'93
Red Sox	1.0591	1.0334	1.1535	.9699	1.0067	
Tigers	.9997	.9703	.9474	.9505	1.0912	
Yankees	.9946	.9997	.9602	.8315	1.0376	
Central						
Brewers	.9820	.9939	.9242	.9165	.9343	
Indians	.9936	1.0008	.9550	.9573	1.0107	'92-'93
Royals	1.0059	1.0153	1.0888	1.3336	.8375	
Twins	1.0477	1.0129	1.0866	1.1897	.9918	
White Sox	.9797	1.0046	.9370	.9530	1.0301	'91-'93
West						
Angels	.9901	1.0015	.9423	.8689	1.0661	
Athletics	.9453	.9833	.9099	.8654	.9528	
Mariners	1.0071	.9883	1.0846	.9944	1.0022	'91-'93
Rangers	.9915	1.0019	.9694	1.0683	1.0238	
N.L.						
East						
Braves	1.0319	1.0320	1.0227	.8664	1.0519	
Expos	.9702	.9657	1.0491	.9604	.9253	'91-'93
Marlins	1.0225	1.0246	1.0184	.9720	1.0123	'93
Mets	.9561	.9817	.9463	.9301	.9676	
Phillies	.9993	.9801	1.0432	.9973	1.0111	
Central						
Astros	.9519	.9881	1.0110	1.0326	.8562	
Cardinals	.9623	.9960	.9880	.9803	.9382	'92-'93
Cubs	1.0409	1.0262	.9938	1.0176	1.1030	
Pirates	.9672	.9703	1.0220	.9727	.9454	
Reds	1.0147	.9801	1.0270	.8766	1.1276	
West						
Dodgers	.9612	1.0251	.9108	.8363	.9352	
Giants	.9484	.9760	.9801	.8780	.9814	
Padres	.9944	.9900	.9414	.9209	1.1077	
Rockies	1.2392	1.0857	1.0751	1.9396	1.1494	'93

the time - new parks, shifting fences - but the effects are usually insignificant enough to overlook. Not this time. Mile High Stadium impacted the park factors like they were Galarraga's batting average. So I thought about it for a while and came up with a solution.

Again, I wanted to use the road stats from '88-'92, but I couldn't, because they didn't have any Florida or Colorado games. So I simply decided to inject some "Colorado" and "Florida" into those stats, trying to simulate what would have happened had those teams been in the league. For the N.L. "road" stats for '88-'92 for each team, here's what I did.

I first subtracted 2/13 of the road stats for '88-'92 (during that time, a team would have played 2/13 of its road games at the new parks). Next I calculated "road" stats for Colorado and Florida which we could then add back in. Easier said than done. I had to take the 1993 home park stats for the new teams, project that into the appropriate number of games, and adjust for the fact that offense was up in '93. To adjust for the offense, I subtracted out the new parks from the '93 N.L. totals. Then, I saw how much offense increased in the existing parks, comparing '93 to '88-'92. For example, if homers were up 21%, I knocked that much off the Colorado and Florida stats. After making these adjustments, I added them back into the road stats for '88-'92. (Obviously, I did this only for the N.L. parks; I did not subject the A.L. data to such nefarious machinations.)

Next I added in the '93 road stats which, thankfully, needed no bending, folding, or mutilation. Then, after adjusting the home stats for any difference in the number of games played at home and on the road, I simply divided the home by the road. This gives you the "raw" park factor, the kind STATS likes to present as the finished product. But there's no rest for the wicked. We still need to adjust for the road games.

Now, I'm gonna hit you with some theoretical stuff, so go put on your abstract hat. OK, listen. So far, we've got the raw number for the home park. We need to calculate the average raw park factor for the road parks. Stay with me here; we can reason this through. There's fourteen total parks. The average raw park factor for all fourteen must be 1.00, so if you add up all the park factors, you get 14.00. Let's take the one park factor that we already have and subtract it from fourteen. What do we have now? The total of the remaining 13 park factors. If we divide this total by thirteen, we've gotten what we wanted: the average park factor for the thirteen road parks. Now, it's simple: just average that number with the raw park factor we originally had, and we've got the finished product: a park factor which recognizes that Bonds plays half of his games on the road. Whew! Feel better?

So that's how I got the park factors on the previous page. I should tell you that while I used '88-'93 data for most parks, I used smaller samples for new parks or parks with new fences. Look under the "years" column to find what years I used (if it's blank, I used all six years). Again, I need to warn you that you should put less faith in the factors that rely on less data. And I'll tell you one more time: if a park's HR factor is 1.05, it does not mean that 5% more HRs are hit in that park. It *does* mean that that team's players should hit 5% more HRs, and that's what we want to know, isn't it? Thanks for sticking with me this long.

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THE REALIGNMENT FROM HELL

by Tony Blengino

The word "purist" has been closely associated with baseball, more so than with any other sport. This is because, in comparison with other sports, there has always been some purity in the way baseball has crowned its champions. Baseball has not seen wild cards or wacky formats which hand a free pass to the postseason to more than half of a league's teams, rendering the regular season virtually meaningless. However, a gradual change from the relative sanity of baseball's bygone days began with the 1977 American League expansion, and continues in 1994 with league and playoff structures which will arguably make baseball's postseason the most harebrained of any major sport.

The Good Old Days: Ah, yes -- many long-time baseball fans love to reminisce about the days when there were eight teams in each league, with only the league champions reaching the postseason. These fans proclaim that era to be baseball's "Golden Age". Never mind that the talent level was diluted by the absence of black players, that major league baseball was only played in ten cities until the early fifties and that a chosen few

franchises hoarded all of the talent. What did make baseball pure in those days, all the way through 1960 in the AL and 1961 in the NL, was the schedule. There were eight teams in each league, and all teams within a league played each other 22 times. On this level playing field, there could be no complaint at season's end -- each league would be represented by its best in the World Series.

Baseball's landscape began to change in the early 1950's. The Boston Braves moved to Milwaukee in 1953, the St. Louis Browns became the Baltimore Orioles in 1954, and the Philadelphia A's moved to Kansas City in 1955, exposing three more cities to major league baseball. The impact of these moves, however, was dwarfed by the seismic shift created in 1958 by the movement of two of baseball's most storied franchises, the Brooklyn Dodgers and New York Giants, to the West Coast, to Los Angeles and San Francisco, respectively. Baseball was now truly a national pastime. Despite its growth in popularity and geographic scope, by 1961 baseball had not expanded in 60 years.

The AL added two clubs in 1961, the Washington Senators (with the existing Senators becoming the Minnesota Twins) and the Los Angeles Angels, and extended the season from 154 to 162 games. The NL followed suit in 1962, adding the New York Mets and the Houston Colt 45's. Both leagues adjusted their schedules very simply -- each team within a league played each other 18 times. There still could be no complaint at season's end, as each team was still on a level playing field. Still, baseball's runaway appeal made another round of expansion inevitable, and the concept of a 12-team league seemed quite cumbersome, unless a new approach was tried.

Two-Division Leagues with Intradivisional Weighting: In 1969, baseball expanded by four teams in the same season for the first time. The Montreal Expos and San Diego Padres were added to the National League, while the Seattle Pilots and Kansas City Royals were added to the American League. It was decided that the leagues had grown too large for the traditional single division format, so both leagues were split into six-team Eastern and Western Divisions. The purists howled, but there was an important intricacy to the schedule. Each team played 18 games against the other teams in its division and 12 against each of the teams in the other division, for a total of 90 intradivisional and 72 interdivisional games. This weighting of the schedule allowed for "true" divisional champions. By playing 25% more games within a team's division, the relative strength or weakness of that division will be reflected in the won-lost records of all of the teams in the division.

Even with the intradivisional weighting, there was now a significant impurity in the determination of postseason qualifiers -- it was now possible for the second best team in a league to not qualify for the playoffs. This happened in only one of the eight years in which this schedule was used in the AL. In 1972, the 2nd place White Sox had a .565 winning percentage, while the Eastern Division champion Tigers had a .551 winning percentage. Divisional weightings were not a significant factor, as the East had a mere two game edge in interdivisional play in 1972. This happened eight times in the 24 years this schedule was used in the NL -- in 1973, 1974, 1978, 1979, 1980, 1981, 1985 and 1987. In all eight cases, the division with the two best teams had the edge in overall interdivisional play. The best of the teams not to make the playoffs were the 1974 Reds and the 1985 Mets, both of which went 98-64 (.605). Thus, the first imperfection was in place.

Trends in baseball and other sports made the future clear -- there was more expansion ahead, and the dawn of free agency had raised baseball's economics to another level. New revenues were needed, and extra rounds of playoffs filled the bill for the sports leagues. The NFL restructured in 1970, forming three divisions in each conference and adding a "wild-card" team to the playoff mix. The NBA and NHL went even further, adopting playoff structures in which the majority of teams reached the playoffs. Despite the sometimes ridiculously low standards for playoff inclusion in these sports, at least the teams' schedules remained logical. For instance, in the NFL, teams play up to 50% of their games within their division, and at least 75% of their games within their conference. Even as their playoff systems changed many times in the last 20 years, NBA and NHL team schedules have always been weighted within divisions and conferences. Until 1977, baseball's similarly weighted schedules made its playoff system, while imperfect, still preferable to those of other sports since only 16.7% of teams earned the right to advance to the postseason. The 1977 expansion changed everything.

Turning Point--The Balanced Schedule: The AL expanded again in 1977, adding the Toronto Blue Jays to the Eastern Division and the Seattle Mariners to the Western Division. In previous expansions, the math was easy -- in 10 and 12 team leagues, it was simple to figure out how many times teams were to play each other (while maintaining intradivisional weighting, in the case of the 12-team league). After several options were bounced around, it was decided that AL teams would play teams within their division 13 times apiece, and teams in the other division 12 times apiece. In other words, teams would actually play more games outside their division (84), than inside their division (78).

Playing more games outside of the division simply makes a mockery of divisional play. Since teams play virtually the same number of games against all teams, it would have been much fairer to put all 14 teams into one division and let the top two advance to the playoffs. In an amazing 10 of the 17 years (58.8% of the time) the balanced schedule was used in two-divisional AL play, the 2nd best AL team did NOT advance to the playoffs. In 1993, the only year in which the NL used the balanced schedule, the 103-59 San Francisco Giants became the best team to miss the playoffs since the start of divisional play. Well, at least there are still only four of 28 teams qualifying for postseason, ensuring a representative champion. Not for long.

The New Frontier: After the owners' extermination of Commissioner Fay Vincent, baseball began to drift rudderless through the early to mid-1990's. The lure of the cash to be generated by additional rounds of playoffs became too great, and a three-divisional setup, much like the NFL's, was approved for 1994. This development in itself is not the end of the world, though it doubles the number of postseason competitors. Still, with 28.6% of its teams in the playoffs, baseball remains the most exclusive of the four major sports. In fact, adoption of an NFL-like schedule, with intradivisional *and* intraleague weightings, and limited interleague play, would enhance competition, uphold the integrity of the game, and excite the fans. But hey, it's too darn logical. So what we have are two three-divisional leagues playing balanced schedules. What kind of havoc will this wreak?

To test this format, I randomly placed teams (numbered one through 14) into two five-team divisions and one four-team division. Team #1 represents the team with the league's best record, #2 the second best, etc., all the way through #14. (Since all teams play virtually the same schedule, it is fair to randomly assign the teams to divisions. Also, free agency and other player-management issues, such as a salary cap, will also make it difficult for dynasties to develop, also building the case for random selection.) My aim was to determine approximately how often this new league and schedule format would place the four best teams in the playoffs, and identify any ridiculous occurrences they make possible.

In 41% of the randomly drawn leagues, the four best teams did not make the playoffs. The 5th best team qualified 19% of the time, the 6th best team qualified 15% of the time, the 7th best team qualified 5% of the time, and the 8th best team qualified 2% of the time. That's right, a team in the bottom half of the league -- most likely with a losing record -- will eventually make the playoffs if this system is kept in place. In 5% of the randomly drawn seasons, a given division was composed solely of teams on the same side of .500. The team with the 8th best record actually won their division 2% of the time. The team with the 3rd best record missed the playoffs 4% of the time. Supporters of the new format contend that more playoff spots will create more pennant races, and excitement in more cities. On the contrary, it will eliminate pennant races between great teams, such as last year's epic struggle between the Braves and Giants. New-wave pennant races will take place between 85-win teams battling for the wild-card spot.

As usual, at least half of the teams in the league will enter the last month of the season with no realistic shot at a playoff spot. In the NFL, it is acceptable when a 9-7 team wins its division and makes the playoffs; the intradivisional weighting makes it quite possible for a very good team to have a subpar won-loss record, but emerge as the best team in a highly competitive division. This will not be the case in 1994-style baseball. The aforementioned possibilities are *wholly* unacceptable, and illustrate the idiocy of the new setup. And this is before you consider the concept of the team with home "advantage" in the first round playing the first two games of a best-of-five series on the road.

Baseball's schedule and playoff system once befitted the greatest sport on earth. Now, diminished postseason exclusivity and a downright illogical regular season setup has brought major league baseball down closer to the level of the other major sports leagues. As we approach

the 21st century, competition, integrity and logic are out, while television money, marketing, shortsightedness and ignorance are in.

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SEASONAL VARIABILITY IN BATTING PERFORMANCE

by Willie Runquist

The variability in a player's performance from year to year may be easily determined by examining the difference in some statistical measure from one year to the next. Such differences are surprisingly large for most players. In an earlier essay, we presented the average deviation from a player's overall average for a five year period. These ranged from 7 to 28 points for batting average and from 6 to 45 points for isolated power. The mean for batting average was 16.13 points and for isolated power was 24.57 points. In this article we will examine the difference in performance for two seasons. The data for our example was obtained from 103 players who were listed on National League rosters for both 1979 and 1980 in the *Baseball Encyclopedia.* Three measures, batting average, isolated power, and batting runs (Palmer's linear weights measure of total offense) were obtained for each player.

The 1979 means (and standard deviations) for each statistic were .276 (.027), .138 (.061) and 4.3 (17), for batting average, isolated power, and batting runs respectively. For 1980 the comparable values were .268 (.029), .127 (.061) and 3.0 (16.4). This group of players showed somewhat less overall offense in 1980 than they did in 1979. For individual players, the average *absolute* change in batting average was 26.5 points. For isolated power it was 31.5 points and for batting runs it was 10.7 runs.

The table below indicates the number of players that showed different amounts of absolute change. On the whole players are not very consistent. Less than 20% of the players had 1980 batting averages within ten points of their 1979 average. Consistency for isolated power is somewhat better with 23% of the players being within ten points.

A direct indication of the consistency from year to year is provided by the correlation coefficient between years. Batting average correlated only .345 , but isolated power and batting runs were .78 and .68 respectively. Despite the fact that the average amount of change was greater for isolated power, players appear to be more consistent because isolated power varies more from player to player than does batting average. A given change in isolated power from one year to the next does not have as much effect on a player's relative rank in the group as does an equivalent change in batting average.

It is generally not possible to predict the amount and direction of change from the player's age and/or experience. Correlations between the three measures and age or number of years in the league were near zero with one exception. There was a slight tendency for older players to show a greater loss in hitting for extra bases (r = .20 between age and isolated power). The mean loss for 38 players born before 1950 was 18 points. The mean loss for the remainder was 8 points. When absolute change is considered, however, the correlations were all between -.02 and .06.

There is considerable evidence for statistical regression. For all three measures those players that had higher values in 1979 tend to go down in 1980, and vice versa. The correlation between 1979 batting average and drop in batting average was .54. For isolated power, the correlation was .34 and for batting runs it was .44. There

Range	BA	Power	Range	BA	Power	Range	Weights	Range	Weights
<5	8	14	**41-50**	11	11	**1-2**	13	**11-12**	7
6-10	11	10	**51-60**	5	7	**3-4**	13	**13-14**	10
11-20	22	20	**61-70**	0	4	**5-6**	11	**15-16**	7
21-30	25	20	**71-80**	3	3	**7-8**	13	**17-18**	5
31-40	16	8	**over 80**	2	6	**9-10**	7	**>18**	16

was also a tendency for players with fewer at bats to show larger changes, but this is an obvious consequence of the fact that more random variation occurs with fewer at bats.

Although at this point we are not interested in improving predictions from one year to the next, these results have obvious implications for the success of such predictions (or projections, as they are sometimes euphemistically called). Unless, annual changes can be found to be related to identifiable variables, such predictions are bound to be limited. While a player's career record is generally a better predictor in the face of changes of this magnitude, even that quantity cannot produce a high level of accuracy.

We did make some limited comparisons on another sample of data that may be illuminating in this respect. There were 50 players that had over 490 at bats in 1989 and 1990. We compared the predictive success of three quantities, 1989 statistics, career statistics, and Bill James projections as provided in *Stats Inc. Major League Handbook.* James procedure is not given in detail, but he indicates that it is based on "past record " (career?) plus adjustments for stage of career (age?). We compared the three predictors for batting average and isolated power. The results are given below in terms of the correlation between the predictor and the actual 1990 value, and the standard error of estimate which provides an indication of the distance from the actual value within which about 2/3 of the predicted values will fall.

	1989	Career	James
B.Ave	.256	.435	.506
	(.029)	(.019)	(.024)
Iso.Power	.779	.754	.757
	(.033)	(.034)	(.034)

The correlations between 1989 and 1990 are within reasonable range of those obtained with the 1979-1980 data. For batting average, a player's career average and James' secret formula provided a somewhat better prediction, while no such benefit was obtained for isolated power. James' method produced a higher correlation, but predictability in terms of the standard error of estimate is actually slightly poorer than for career average alone because his predictions have a larger variance. Note, however, that the standard errors of estimate for batting average are about equivalent to the standard error of the batting average itself, i.e. the amount of sampling variation that should be obtained with a sample of about 500 at bats. Again we would point out that the exact accuracy of predictions of isolated power are not very good, but relative to the differences between players, they are much better than those for batting average.

While players may seem highly variable from season to season, in truth they are not. The *measures* are highly variable relative to the differences between players. Major league players are in fact a fairly homogeneous lot and the traditional measures of performance are simply not sensitive to the relatively small differences that exist even over large numbers of at bats. After all, a difference in batting average of 20 points over 500 at bats translates to 10 hits. When you think of all of the "chance" factors (scoring decisions, bad hops, balls hit just out of reach, great fielding plays) that affect the obtained number of hits, that is not much of a difference at all.

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1993 GAMES WON & LOST BY UNEARNED RUNS

by Bruce Stone

Unlike 1990-1992, when about 11%-12% of major league baseball games were won on unearned runs, in 1993 the figures were 10% for the American League and 13% for the National League, for reasons unknown to me. Whatever, the median shows teams to win (or lose) about 16 (AL) to 21 (NL) games per season due to unearned runs.

The best records in 1993 were:

A.L.		N.L.	
Kansas City	15-2	Atlanta	21-6
Texas	11-5	Chi Cubs	11-3
Minnesota	8-3	Cincinnati	12-7

The worst records were:

A.L.		N.L.	
Boston	5-14	Montreal	12-17
California	5-12	St. Louis	7-12
Cleveland	8-16	NY Mets	7-20

The table below displays the breakdown by median of how runs were scored in the major leagues in 1993. About 0.4 runs per game per team were unearned.

	All Runs	Earned Runs	Unearned Runs
A.L.	4.7	4.3	0.4
N.L.	4.5	4.1	0.4

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