



Cactus Cravath, a tremendous slugger who, according to the present inaccurate system of keeping batting averages, isn't even a three-hundred hitter. Note how Cravath's record appears in its true light in the following sketch

Why the System of Batting Averages Should Be Changed

Statistics Lie at the Foundation of Baseball Popularity—
Batting Records Are the Favorite—And Yet Bat-
ting Records Are Unnecessarily Inaccurate

BY F. C. LANE

SUPPOSE you asked a close personal friend how much change he had in his pocket and he replied, "Twelve coins," would you think you had learned much about the precise state of his exchequer?

Would a system that placed nickels, dimes, quarters and fifty cent pieces on

the same basis be much of a system whereby to compute a man's financial resources? Anyone who offered such a system would deserve to be examined as to his mental condition. And yet it is precisely such a loose, inaccurate system which obtains in baseball and lies at the root of the most popular branch of baseball statistics.

Fans and figures have a mutual attraction. The real bugs of the diamond like to pour over facts gleaned from the records, to compare Ty Cobb's batting average with Hans Wagner's. Statistics are the most important part of baseball, the one permanent, indestructible heritage of each passing season. And batting records are the particular gem of all collections of figures, the one most to be desired.

Fielding records are known to be grossly inaccurate. Few well informed fans pay much attention to them except to find out how many putouts and assists a player is credited with and whether or not he is a good ground coverer. Pitching records are nearer accuracy, and since Secretary Heydler has inaugurated his admirable system of earned runs, they are more accurate than ever. But batting records are the most easily kept and readily interpreted of them all. Which is fortunate, since batting is the particular hobby of nine fans in ten who are persistent visitors at the games.

And yet, with all their value and their comparative accuracy, the system which underlies all batting averages is precisely that indicated above. It is a system where dimes are considered equal to half dollars, where the man who has a half dollar, a quarter, three dimes, four nickels and three pennies lumps them together and instead of saying he has \$1.28 says "Twelve coins." Pretty poor system, isn't it, to govern the most popular department of the most popular of games?

How do batting averages follow this absurd system? Very simply. Batting records as at present conducted give merely the number of safe hits a player makes in comparison to the number of times he had a chance to make a safe hit. For instance, if he were at bat five hundred times during a season and made one hundred and fifty hits, he would be cred-

ited with a batting average of an even .300. That is to say, he would have hit safely three out of ten times.

This is all right enough, according to first glance, but on second glance it is easy to see it is merely the story of the twelve coins over again. Now the man we had in mind had a dollar and twenty-eight cents in his pocket, but some other man who lives beyond the Mississippi river where cart wheel currency is in order might have had twelve silver dollars in his pocket and still have had twelve coins, to say nothing of the fellow who might have had twelve double eagles.

The batter who makes twelve hits out of fifty times at bat is given just as much credit as any other who makes twelve hits out of fifty times at bat. But are twelve hits always of the same denomination any more than quarters and dimes and nickels?

One batter, we may say, made twelve singles, three or four of them of the scratchiest possible variety. The other also made twelve hits, but all of them were good ringing drives, clean cut and decisive, three of them were doubles, one a triple, and one a home run. Is the work of the two batters on a parallel? The figures say so. In other words, it is the case of the coins without paying any attention to the denomination.

I once talked with a player who happened to have a bad leg and was sitting in the grandstand watching his teammates battle on the diamond. It was a critical time in the game and a runner was on second. The batter at the plate was the only three hundred hitter on the club. Apparently the situation was well primed for action. "Lucky M—is at bat," I said to the player, who was chewing his lip with subdued excitement. "No, no," he retorted. "Too bad, H—isn't up. He's a good batter." And the man he spoke of had an average at least twenty points lower than the one who was facing the pitcher.

And yet this was merely an illustration of a commonly accepted situation among ball players. They know who are the good batters on the club regardless of what the records may say. They know that the figures grossly mislead and that players with a showy average are often far less formidable with the stick

PRESENT SYSTEM OF BATTING RECORDS GROSSLY MISLEADING

The system of keeping batting averages needs a complete overhauling. At present this system merely gives the comparative number of times a player makes a hit without paying any attention to the importance of that hit. Home runs and scratch singles are all bulged together on the same footing, when everybody knows that one is vastly more important than the other. The result is that the records are grossly misleading.

than others who perhaps lurk unappreciated in the shade of .270. Why do players have this usually accepted appreciation of batters apart from what the records tell? Because among themselves they are not willing to admit that a cent is equal to a quarter, that the scratchiest of singles is worth a ringing two-bagger, or that the grandstand hitter is equal to the grim-faced fellow with set teeth who battles best in the pinch. In short, players recognize the loopholes in the system of keeping the records and mentally make reservations in sizing up a fellow player's strong points and weaknesses.

Now, the sole purpose of batting averages is to give a correct idea of the comparative ability of baseball players with the stick. If these averages mislead or give mistaken ideas of batting ability they forfeit their only excuse in being. There is but one exception. Where records, in spite of errors, are as accurate as possible, they should be accepted as better than none at all. Fielding records, with all their inaccuracies, may be as nearly correct as circumstances permit. But does the same rule apply to batting? Is there no way to separate the dimes from the nickels and give each its proper value? Let us see.

I took up the matter with Secretary Heydler, who knows more about statistics than any other man actively connected with the game. "I admit," said Mr. Heydler, "that the system of giving as much credit to singles as to home runs is inaccurate to that extent. But it has never seemed practicable to use any other system. How, for instance, are you going to give the comparative values of home runs and singles?"

Mr. Heydler, with his usual clear perception of the facts, went straight to the heart of the matter. For, admitting that you can approximate the comparative

values of home runs and singles, you admit that a system much more accurate than the present one might be installed. In short, the batting system of the present has wound its halting way down the history of baseball because the record makers tacitly admitted that there was no way of giving comparative values to the various hits, that there was no way to tell a dime from a nickel.

Now, the BASEBALL MAGAZINE is not willing to admit this. And before we are through we believe our readers will agree with us. We do not claim that an absolutely accurate system could be devised, but we do believe that one approximately correct, certainly far more nearly correct than the present system, is among the current possibilities.

In the first place, what constitutes the value of a hit. There is but one logical answer. A hit is valuable in so far as it results in a score. The entire aim of a baseball team at bat is to score runs. Hits, stolen bases, taking advantage of errors—in short, all the departments of play—are but details in the process of scoring runs. The one aim of every man on the team is to cross the plate with a tally or to assist some team mate in so doing.

Hits are not made as mere spectacular displays of batting ability; they are made for a purpose, namely, to assist in the all-important labor of scoring runs. Their entire value lies in their value as run producers. Obviously, many hits are made that are for all practical purposes wasted. Games are not uncommon in which one side failed to register a run and yet that side may have made several good hits. On the other hand there are games in which a considerable number of runs are scored, though there were comparatively few hits.

It would be grossly inaccurate to

claim that a hit should be rated in value solely upon its direct and immediate effect in producing runs. The only rule to be applied is the average value of a hit in terms of runs produced under average conditions throughout a season.

Obviously, many singles coming when two men are out do not result in a score. Almost every game witnesses a time when a single means a run. The sole method whereby the value of a single may be obtained is to judge of its average value.

We have no figures at hand to show this average value, but we will outline a way whereby that value could be found and even hazard an estimate, doubtless an inaccurate one.

A single has two distinct values. First,

a single advances a runner one-third of the time at least one base and that three times out of four in such cases the runner advances two sacks. In other words, the total value of a single in terms of runs sums up as follows:

To the man who made the hit, one base, or 25 per cent. of a run.

To the man on bases one-third of the time, who advances two bases three times in four, 14 per cent. of a run.

Ignoring fractions, then, we see that a single nets the team that makes it, in terms of runs, approximately 40 per cent. of a run.

There is a general shrinkage to be allowed for, which we will take up later.

Pursuing the same system and apply-

IF IT WERE POSSIBLE TO TELL THE COMPARATIVE VALUE OF HITS THE PRESENT SYSTEM WOULD BE CHANGED

The only excuse for the inaccurate nature of the present batting records seems to be this: The men who compile averages have tacitly admitted that no system exists whereby the comparative values of singles and home runs could be obtained. Were such a system devised, they freely admit that it could be installed with little effort and would furnish a much clearer insight into comparative batting ability of the players than exists at present.

its value as regards the man who makes it. Second, its value as regards the runner who may already be upon the bases. Now we have no figures available which would show the average number of times that a runner occupies the bases when a single is made. But we will assume, for argument's sake, that there is a runner already on base about one-third of the time. The exact facts can be determined only by keeping careful records of a series of games, say fifty or more.

Now, a single then, not only means that the batter advances one-quarter of the distance toward home, but that one-third of the time he advances another runner as well. Usually when a man is on first he goes to third on a clean single. Usually when on second he scores. Again, we have no figures to show the averages, but we will say offhand that the base runner advances two bases on a single three out of four times. Occasionally Cobb will advance three bases. But Cobb is an exception. Employing the values we have arbitrarily assigned, we learn that

ing it to doubles we find this to be the case. Ordinarily doubles are made much more rarely than are singles. But the same rule should seemingly apply in the case of men on bases. Comparatively, a runner is just as apt to be on base when a two-bagger is made as when a single is made. In absence of evidence to the contrary, let us assume that this is true and follow out the value of a double in terms of runs scored.

The batter who makes the two-base hit gets one-half way around the bases; he is obviously entitled to 50 per cent. of a run. The value of the hit to the base runner who is on bases one-third of the time is not so clear, however. Obviously, he cannot usually advance an extra base, *i. e.*, three bases, as there are not ordinarily three bases separating him from home plate. Assuming the runner is sometimes on first, sometimes on second and sometimes on third when the hit is made, and that, as a matter of general averages, he may be assumed to be on second, he could obviously advance but

two bases. Two bases then, one-third of the time, nets the base runner on a two-bagger 16 per cent. of a run. A double, ignoring fractions, is worth 65 per cent. of a run.

A triple carries the batter three-quarters of the way around the bases. It is worth to him 75 per cent. of a run. It sweeps the bases of all runners, advancing them on an average, according to the above figures, of two bases each, 16 per cent. In other words, a triple is worth nearly a run, 90 per cent., according to our somewhat inaccurate system.

Lastly, a home run scores a clean hundred per cent. for the man who makes it and advances a runner one-third of the time an average of two bases, safely

In the case of a double there is a complication in that a runner already on base does not necessarily advance two bases. He might be on third, for instance. Hence, there is less comparative value to the base runner in the case of doubles than in singles, and this also applies to the runner on bases when triples and home runs are batted out.

The shrinkage noted in the case of singles is not so great in doubles—if there is a man on base when a double is made he is almost sure to score, while such is not the case when a single is hit.

Where a triple is made the man on bases is absolutely certain to score, for even Chief Meyers could go from first to home on a triple. There is some shrink-

THE BASEBALL MAGAZINE CONTENTS THAT THIS IS POSSIBLE AND OUTLINES WHAT SHOULD BE DONE

The Baseball Magazine contends that the comparative values of singles, doubles, triples and home runs could readily be found by examining the records from a season's games, and once found, these comparative values could thereafter always be used in compiling statistics of batting averages. By employing the system outlined in the accompanying article, a much more accurate light would be thrown on the respective batting ability of the players.

across the plate. In other words a home run is worth 1.16 per cent. of a run.

We spoke above of a shrinkage in comparative values. Let us illustrate. A runner may be on first, advance according to rule to third on a single, and yet not score because the next man up grounds out. Obviously, in the case of singles, more fractions of runs will be netted to a club than appear in the final score. In other words a batter might make four singles in a contest and himself be entitled to four quarters of a run, or an entire run, and yet fail to score. These excess fractions of runs are accounted for by the men who are left on bases. These men have got part way around, but didn't negotiate the entire distance. So far as their efforts for the day are concerned those efforts were wasted. The shrinkage in fractional parts of runs scored as against actual runs scored could be checked up at the end of the season and the allowance to be made in the value of a single approximated to practical accuracy.

age in the case of the batter himself, for a player occasionally dies on third even after a three-ply wallop.

In the case of a home run there is no shrinkage at all. Everybody scores, the batter as well as the man on the bases, and the slate is wiped clean.

We speak of this shrinkage because it must be taken into account and still further emphasizes the fact that there is a great difference in the value of hits.

Let us see. We have allowed nothing for errors, passes or stolen bases. Obviously, these can be accounted for easily enough and their total subtracted from the result. Let us give a concrete illustration. In a practice game one side made 6 singles, two doubles, 1 triple and 1 home run. They stole two bases. The opposing pitcher allowed two passes to first and two errors were made by their opponents. One of these errors netted a runner two bases. The team scored five runs. Applying our system and checking up the comparative value of hits:

6 singles @ 40% of a run	2.40 runs
2 doubles @ 65% of a run	1.30 "
1 triple @ 90% of a run	.90 "
1 home run @ 1.15 of a run	1.15 "
3 passes @ 25% of a run	.75 "
2 errors	.75 "
2 stolen bases @ 25%	.50 "

7.75 runs

Apparently the offensive attack of the club in question should have netted at least seven runs, instead of the five recorded. The discrepancy results from two factors; one, the excess value allowed to hits, particularly singles, and second, to men left on bases. Since the latter figures are most easily obtainable, let us glance at them first. We find that five men were left on bases. Of these one had advanced as far as third base, two as far as second, while two perished miserably on first. Adding these fractional runs we find the total as follows:

One man on third @ 75%....	.75% of a run
Two men on second @ 50%	1.00 run
Two men on first @ 25%....	.50% of a run

2.25 runs

We see, then, that more than a total of two runs were accounted for by men left on bases. Subtracting from the total offensive effort of 7.75 runs we get 5.50 runs. Now, the club actually scored five runs, so, assuming the contest was a nearly average one, 50 per cent. or half a run must be checked off as excess valuation allowed to certain hits.

Obviously, none of this excess value should be charged against the home run. The player who made that hit scored four bases and any one who was on base at the time also scored. The home run rings true every time. In the case of the triple any one on bases also scored. The triple, like the home run, sweeps clean. But the man who made the triple need not necessarily have scored. In perhaps nine out of ten times he would do so, but on the tenth he might die on third. A certain slight shrinkage is apparent in the case of the triple. It isn't worth exactly what we claimed for it.

In the case of the double the shrinkage is even more apparent. The double does not necessarily sweep the bases, though it usually does. A runner might be on first when the double was made and advance no farther than third. Incidentally, the man who makes the double

frequently fails himself to score. The shrinkage of actual value in terms of runs is apparent in the double.

But most of this shrinkage must be charged to the account of the single. Two or three successive singles may be made and no one score. In fact, the single is often barren of immediate results, save to leave men to die on the bases. The shrinkage to be charged against the single is considerable. We must obviously revise our assigned values somewhat. Instead, then, of allowing to a single the value of 40 per cent. of a run, let us cut this value down to 30 per cent., which would appear fairer. Instead of allowing that a double is worth 65 per cent. of a run let us assume it is worth 60 per cent. Let us, to avoid fractions, leave the triple at 90, while the home run will stay at 1.15. Now let us apply these figures to a concrete case.

Jake Daubert twice led the National League in batting. This season he slumped, but he was still a great hitter, as his record of .301 will show. Cravath was not a three hundred hitter. His average was .285. According to the system in vogue Daubert was a better hitter than Cravath by a considerable margin. It is the old story of the twelve coins once more.

Now, the National League last season made 10,054 hits.

These hits were grouped according to denomination in the following ratio: Singles, 7,786; doubles, 1,488; triples, 554; home runs, 226.

Grouping these figures according to percentage we find these facts. Of all the hits made in the National League a little over three-quarters were singles. We will give the percentages accurately: Singles, 77.44 per cent.; doubles, 14.80 per cent.; triples, 5.51 per cent.; home runs, 2.24 per cent.

Now, in the comparative table of hits made by Jake Daubert last season, the following percentages are true: Singles, 79.47 per cent.; doubles, 13.90 per cent.; triples, 5.29 per cent.; home runs, 1.33 per cent.

In other words, Jake made more singles and fewer extra base hits than the general average right down the line. Jake had a lot of coins in his pockets, but many of them were nickels and dimes.

The same percentages in the case of Cactus Cravath show the following extraordinary deviations: Singles, 59.38 per cent.; doubles, 20.80 per cent.; triples, 4.69 per cent.; home runs, 16.12 per cent.

In other words, nearly half Cravath's hits were for extra bases, and, roughly, one-sixth of them were home runs.

Let us assign to these two cases the comparative value for hits derived from the above estimates.

Jake Daubert made 120 singles. The value of a single is 30 per cent. of a run; the value of the 120 singles is 36 runs. He made 21 doubles at 60 per cent., equalling 12 runs. He made 8 triples at 90 per cent., 7 runs. He made two home runs at 1.15 per cent., 3 runs. Jake batted, according to revised figures, for a total of 58 runs. He actually scored, oddly enough, 62 runs. Assuming that his work as base runner was affected as much by the batting of his team mates as he affected theirs, the result is approximately correct, bearing in mind that Jake is a very fast man and a good run getter.

Cravath made 87 singles for a value of 26 runs. He made 31 doubles, valued at 19 runs. He made 7 triples, worth 7 runs. He made 24 home runs, worth 27 runs. His total is 79 runs. He actually scored 89, which is another striking confirmation of the approximate correctness of values assigned to the various hits. For 24 times Cravath scored on his own home runs.

Now, for the method of computing averages. Instead of dividing times at bat by the number of hits made, as at present, divide them by the total value of hits, as outlined above. To illustrate. Daubert was at bat 544 times. His batting, assigning to each hit its proper worth, was approximately 58 runs; his batting average, therefore, according to this suggested new system, would be (dividing times at bat by total value of hits), .106. Cravath's record, according to the same system, would be .151.

New figures are always a bit startling. The system inaugurated by Sec. Heydler of rating pitchers by earned runs was novel on first sight. A system in which a three hundred batting average is reduced to .106 seems radical at first sight. The BASEBALL MAGAZINE would advocate the retention of the present system as the only method whereby the records of the

The National League 1915 Batting Record		
Singles	7,786	77.44%
Doubles	1,488	14.80%
Triples	554	5.51%
Home Runs	226	2.24%
Total	10,054	99.99%
Jake Daubert's 1915 Batting Record		
Singles	120	79.47%
Doubles	21	13.90%
Triples	8	5.29%
Home Runs	2	1.33%
Total	151	99.99%
Cactus Cravath's 1915 Batting Record		
Singles	87	58.38%
Doubles	31	20.80%
Triples	7	4.69%
Home Runs	24	16.12%
Total	149	99.99%

present may be compared with the records of the past. But it would also advocate the inauguration of a system such as roughly outlined above, whereby the proper value might be assigned to each hit and the comparative batting ability of players thus more accurately shown.

As it appears above, the batting average of Jake Daubert, reckoned on any sane basis, is not equal to that of Cactus Cravath by a very wide margin. In fact, the two are not in the same class. And yet, according to the present system, Daubert is the better batter of the two. It is grotesqueries such as this that bring the whole foundation of baseball statistics into disrepute.

Neither is the argument that hits must be rated on a common basis any longer sound, as the above system clearly indicates how the comparative value of the various hits may be readily ascertained by keeping careful tabs on a season's showing. Let it be hoped that 1916, the dawn of a new day in baseball affairs, will witness as well the dawn of a new day in the outworn method of keeping batting averages. The time has passed when the public will any longer swallow the palpable falsehood that a home run is no better than a scratch single. It knows better, instinctively feels better, and should be told the truth by a presentation of the season's statistics founded upon a sane, workmanlike basis.