A refinement to Par by Scoring Distribution

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November 23, 2024

History

Par is the score that an expert disc golfer would be expected to make on a given hole with errorless play under ordinary weather conditions.

Par by Scoring Distribution is one of several methods for setting par. It was designed to create pars that are consistent with the definition while being automatically calculable from available scoring data. The underlying theory is that a certain minimum percentage of throws are errorless.

The method sets par to be the lowest score that has been achieved without requiring any throws which are less likely than the minimum percentage parameter. Under this method, the quality of throws it would take to achieve par is consistent across a spectrum of equally difficult holes with different pars.

The higher the par, the more throws in a row need to be executed errorlessly to get par. Thus, the percentage of *scores* that are equal to par is smaller for higher par holes.

The assumption used in the existing method is that at least 76.67% of all throws are errorless. To implement the method, find the scoring distribution of an expert. When more than .7667 raised to the nth power of the scores are n or better, par is n. Which works out to: More than 59% 2s means par 2, 45% 3s for par 3, 35% par 4, 25% par 5, etc.

One simplification made for this method was to assume that the percent of errorless throws is the same across all types of throws: Tee throws are as likely to be errorless as putts, for example.

And that is where refinement is possible.

Refinement

Theoretical Basis for Making a Refinement

The theoretical justification for refinement is that the percent of throws that are errorless likely depends on the type of throw. For example, drives off the tee might be executed errorlessly more often than lay-ups. (Or maybe the other way around?) Someday, we may have the data to track this. Until then, we have no way of knowing which throws are more likely to be errorless, so we have no basis for assigning different chances of success to different throws. With one exception.

The last throw on every hole is 100% errorless. This is the throw that goes in the basket to complete the hole.

So, the accomplishment of getting a score of three on a par 3 hole is actually a matter of making two throws that are good enough to result in the next throw being a made putt. Or: Errorless play means getting close enough to get “up and down in two”, and “getting up and down in two” means laying up close enough to make the putt.

Treating the last throw differently is reflected in another method of setting par: Close Range Par. CRP assumes a specific distance for each type of throw, expect that Close Range is where the expert is expected to throw to a place where they expect to make the putt.

In golf, one method of setting par assumes two putts at the end of the hole. This could be thought of as making an errorless lag putt which implies that the only way to make the next putt errorlessly is to get it into the hole.

In other words, because the last throw is common to all scores it adds no information and should not figure into calculating par.

Practical Reasons for Making a Refinement

For pars of 3 and 4, the existing Par by Scoring Distribution parameters have worked extremely well under many ways to check the usefulness of par.

However, the existing Par by Scoring Distribution method would assign par 2 to 4.4% of holes played by MPO. TDs hardly ever assign par of 2 to a hole.

At the other end, there are a few holes where the existing method would assign a par of 6, but the TD assigned a par of 5.

New Method

The refinement is to treat one throw per hole as 100% errorless. The question then is what percentage of other throws are errorless. More specifically, what is the minimum percentage of throws - other than the last putt - which are errorless on the most difficult-to-par holes.

Since the existing method works so well for par 3 and 4, I chose a new percentage which best matched the existing method holes that were par 3 or par 4.

The new method is to assume at least 67.95% of throws *other than the final putts* are errorless, and the final putt is 100% errorless. Thus, the threshold for par 3 is that at least (.6795 x .6795 x 1.000) = 46% of scores are three or better.

The new calculated scoring frequency thresholds are:
68% for par 2,
46% for par 3,
31% for par 4,
21% for par 5, and
14% for par 6.

Impact on Pars for All Skill Levels

Using these thresholds, the refined method would result in the same pars for 3,603,350 of 3,685,406 (or 97.8%) of the player-holes for which I had scoring data. These represent all the players at virtually all the A-tiers and up plus the largest B-tiers over the last couple of years. Each skill level gets their own pars per these methods.

The break down for holes that would be different is as follows:

> 68% of par 2s under the existing method would be par 3 under the refined method. One out of 151 player-holes would be affected.
>
> 1% of par 3s would be par 4. One out of 140 player-holes would be affected.
>
> None of par 4s would change.
>
> 13% of par 5s would be par 4. One out of 146 player-holes would be affected.
>
> 37% of par 6s would be par 5. One out of 655 player-holes would be affected.
>
> 53% of par 7s would be par 6. One out of 10,500 player-holes would be affected.

The scoring distribution under the existing method is |18.54% under|54.54% at|26.92% over|.

For the new method |19.01% under|54.22% at|26.77% over|.

Gold Par 2

One impetus for looking at refinement was that the existing method suggested par of 2 more often and for longer holes than seemed appropriate.

The following table shows the percentage of holes that are assigned MPO/Gold/1000-rated par of 2, by length range.

Feet	Existing	Refined
100-149	33%	33%
150-199	28%	15%
200-249	18%	9%
250-299	9%	3%
300-349	5%	1%
350-399	1%	0%
400-449	0%	0%

For MPO/Gold/1000-rated the existing method sets par at 2 for about one out of 21 holes. The new method sets par at 2 for MPO for about one out of 53 holes. Many tournaments are held on courses that were designed for lower skill levels than MPO. Recognition that there are *some* holes where 1000-rated players expect a score of two with errorless play is closer to reality than pretending 1000-rated players would be happy with a score of three on the easiest 158 out of the 8,428 holes used for MPO.

Summary

The existing method worked so well *for most holes* that the extra complication of discarding one throw per hole (using n-1 instead of n) was thought not to be worth the extra complication. Even though it may have been more theoretically correct.

Two facts masked the importance of accurately determining which holes are par 2. First, TDs would almost never assign a par of 2 anyway, no matter how easy the hole; so why bother? Second, the method was tested primarily on the better-run bigger tournaments. These tournaments don't use many holes short enough to be par 2.

However, as the existing method was applied to more A- and B-tier events which were being held on regular courses, it became apparent that the number and length of holes being assigned par 2 was significant enough to justify the refinement to generate appropriate pars for these holes. Even if the primary use for the information was to identify holes that are too short for the competition, and not to actually assign par of 2 to these holes.

Also, producing some reduced pars for high-par holes seems to be a better representation of what par should be, based on the few high-par holes where TDs have set thoughtful pars.