Does Changing Par Change the Scoring Distribution?

By Steve West Disc Golf, LLC

August 10, 2022

Method

I searched for event/course combinations where a par had changed on a hole but the length had not. For most of these, there were only two events. For courses that were used in many events, I paired them up. This left 26 pairs of courses, which included 33 holes where par had changed but length did not. For the control group, there were 391 holes where neither par nor length changed.

To measure the change from event to event, I used Bhattacharyya distance. Here is why.

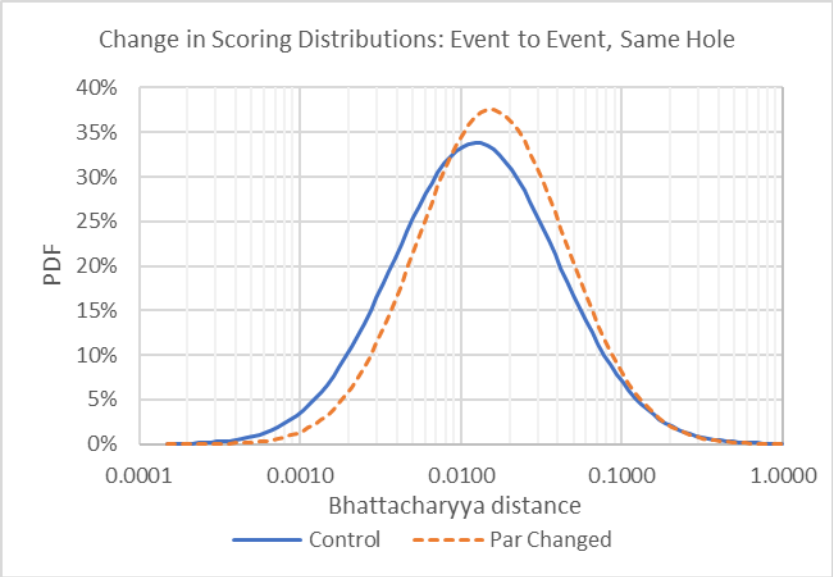
The question at hand is whether players change how they play because of par. Using the distance between the scoring distributions gets at that question without regard to whether the change was higher scores, lower scores, less scoring spread, or more scoring spread.

We need a control group because even if the hole does not change, the distribution of scores will change from event to event. Call it random fluctuation. So, the test is not whether the distribution *changed* after par changed, it is whether it *changed more* than if par had not been reset.

To eliminate the effect of a different mix of players between events, I calculated the scoring distribution for a particular player rating. To maximize the amount of data, I chose the player rating where the number of player-rounds in both events was maximized. This was usually in the range of 960 to 1005.

Results

The following graph shows the fitted lognormal distributions of the Bhattacharyya distance between one event's scoring distribution and the paired event's distribution.



The average for holes where par did not change was 0.0124, for holes where par changed, 0.0155. So, holes where par was changed had a larger transformation of the scoring distribution from event to event on the same hole.

Is that a lot?

To get an idea of how big the transformations are from event to event, let's look at how much a theoretical distribution of |33%x2|33%x3|33%x4| would need to be transformed to move a Bhattacharyya distance equal to .0124 (for the control group) and .0155 (for the holes where par was changed).

Increase (or reduce) the average score by 0.07 and 0.09, or

Increase the scoring spread by changing 3.7% and 4.6% of the 2s and 4s to 1s and 5s, or

Decrease the scoring spread by changing 23% and 26% of the 2s and 4s to 3s.

Confidence

I used the average and standard deviation of the Bhattacharyya distance on the control holes to simulate what would happen if the 33 holes of interest were not any different than the control. There is about a 13.6% chance the holes where par changed would have had this much change if they were not any different than the controls.

So, scores *probably* change more from event to event on holes where par has been changed - but not certainly - as this would fail most statistical tests for significance.

Even if the results were significant, it would not necessarily mean the change in par was the actual *cause* of a bigger change in the scoring distribution. Often, holes where par is changed undergo other changes which don't change the length of the hole. For example, OB areas might be added or removed.

Hey, What about Average?

If you only want to think about the average change in average score, you could say raising par by one increases the average score by 0.01 throws.

For the holes where par and length did not change, the absolute value of the change in average score from event to event ranged from 0.0005 to 2.35. Presumably, that big change involved some sort of error. The median change was 0.09.

For the holes where par changed, the absolute value of the change in average score ranged from 0.02 to 0.47. The median absolute value of the change in average score was 0.12.

When par was higher, the scoring averages ranged from 0.47 lower to .43 higher. The median was .001 lower.