

A Measure of the Effectiveness of Disc Golf Courses

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How to design a disc golf course to be the most effective test of skill?

If there was a way to measure effectiveness, we could look at the characteristics of better-performing courses and replicate and improve on them.

This paper discusses a not-fully formed idea toward that goal.

Ratings as Skill

Most methods of measuring effectiveness of courses will use PDGA player ratings as a proxy for skill. A better course will be better at generating scores that are a strict function of player rating. While there are some problems with doing that, this method will also use player rating as a substitute for skill.

Standardized Synthetic Players

Only when two courses host the same set of players at the same time under the same conditions can direct comparisons be made. This would allow us to choose the better of two (or perhaps three or four) courses, but the number of rounds that fit this criteria is small.

To overcome this difficulty, the current method uses a set of synthetic players. For a given hole, we can compute the expected scoring distribution of a player of any given rating by using the actual scores of players at that rating and near that rating. For example, we can compute the probability of a 1000-rated player getting a 2 on a particular hole by taking the weighted average of the probabilities of players near 1000-rated getting a 2. And so forth for all possible scores.

Using the scoring distributions from all holes allows us to predict how an idealized player of a given rating will score. We can select a score at random from each distribution, add them up and get the total score for a round.

Using these synthetic players, we can select any group of players we want for all courses to be measured.

Method

The method counts how often a course gets the ranking correctly among six synthetic players of ratings 970, 980, 990, 1000, 1010, and 1020.

These ratings provide enough separation that a perfect course could distinguish between all these players with only a one throw increment between them. This also represents the range of players for which big tournaments should be best at measuring skill as these usually represent the bulk of all the players who are in contention. One could make a case for using synthetic players of higher ratings to measure the ability to pick winners among the best in the world, but those player are so few that it is not practical at this point to apply data-based techniques to them. Many courses and events do not have multiple players rated above 1020.

A round with these six synthetic players is simulated. A point is given for each player whose score is below or above another synthetic player with a lower or higher rating.

For example, if the scores (in order of increasing ratings) were 64 63 54 61 59 58, then the 64 is correctly higher than the other five scores, the 63 is correctly lower than the 64 and correctly higher than the other four scores. The 54 is correctly lower than the 64 and 63, but not lower than the 61 59 and 58 as it “should” be.

There are 30 points possible as each score can be correct in relation to five other scores. This has some double-counting, but that’s OK. The number of correct relationships are divided by 30 to get a percentage. The average percentage over 10,000 simulations is the course’s score.

Data Limits

Using clones of the same synthetic players would seem to take care of the problem of not having the same players at each event, it does not fully solve the problem of lack of data. Probably nothing can.

A course’s score will suffer from lack of data. To see why, take a hole that really wants to give out aces to 10% of the 1020-rated players and a score of five to 10% of the 970-rated players. If there are only one or two rounds of data, and only a few real players near those ratings, that hole may not get the chance to give out those exceptional scores.

Fortunately, this can be resolved by throwing more and more rounds of data into the mix, even if the actual players are rated somewhat below 970 or above 1020. If a course is used for several events, its true effectiveness will come into sharper focus.

Baseline

If a course had the same expected scoring distributions for the whole range of synthetic players, it would get a score of about 45%. That would indicate zero effectiveness at sorting players by skill. (I don’t know the exact figure. It may depend on the actual distributions. I also don’t know why the exact figure matters.)

Results

Using all the rounds of data from the following events, I calculated the effectiveness of the following courses. Because some of these events did not have much data, these results should be thought of as scoring a particular performance, not as actual measures of the course. Just like Meryl Streep would not have won an Oscar for playing the Sherriff in “Plan 9 from Outer Space”, some of these courses did not get a chance to prove themselves in their best light.

The Tyyni courses, in particular, seem to be hampered by lack of data because their results are so low and close to each other.

For the heavily attended events, these scores may be coming close to an actual measurement.

Score	Event/Course/Layout
76.1%	2018 USDGC/Winthrop/Gold A
74.3%	2018 Delaware Disc Golf Challenge presented by Innova - National Tour FPO Layout/Iron Hill/Gold
74.1%	PDGA Professional Disc Golf World Championships 2018/Fox Run/Gold
73.7%	2018 USDGC/Winthrop/Gold B
73.6%	Konopište Open 2018/Franz Ferdinand/PDGA Major
73.2%	DGPT - Jonesboro Open 2018/Disc Side of Heaven/Gold The Ed Headrick Disc Golf Hall of Fame Classic presented by REC TEC Grills - National Tour
72.4%	Finale/Jackson/Long
71.8%	DGPT - Memorial Championship presented by Discraft 2018/Vista Del Camino/MPO
71.7%	DGPT - MVP Open at Maple Hill 2018/Maple Hill/Golds
71.6%	European Disc Golf Championships 2018/Resort Terme Sveti Martin/Layout 1
71.6%	Santa Cruz Masters Cup presented by Innova - National Tour/Delaveaga DGC/Only
71.5%	Beaver State Fling presented by KEEN - National Tour 2018/Milo McIver West/
71.4%	Beaver State Fling presented by KEEN - National Tour 2018/Milo McIver East/
71.3%	San Francisco Open 2018/Gleneagles Golf Course/MPO
70.5%	The Open - EPT#4/Ale Discgolfcenter/White
70.4%	DGPT - Great Lakes Open presented by Discraft 2018/Toboggan /Gold
69.7%	PDGA Professional Disc Golf World Championships 2018/Brewster Ridge/Gold
69.6%	Skellefteå Open - EPT#3/Discgolf Terminalen /
69.4%	Dynamic Discs Glass Blown Open 2018/Emporia Country Club/MPO Arby's DFW presents the Nick Hyde Memorial - Pro Weekend - powered by Innova driven by
69.4%	Hyzerbomb/Harry Myers Park/Short on #9
68.9%	DGPT - Idlewild Open Driven by Innova Discs & The Nati 2018/Idlewild/MPO
68.8%	DGPT - Waco Annual Charity Open presented by Dynamic Discs 2018/Brazos Park East/MPO
68.3%	DGPT - Discraft LedgeStone Insurance Open 2018/Eureka Temp/A
66.8%	Prodigy Disc Pro Tour Lahti 2018/Sunnuntain lähtöajat/
66.5%	Santa Cruz Masters Cup presented by Innova - National Tour/Delaveaga Golf Course/MPO
65.9%	Prodigy Disc Pro Tour - Lahti 2018/Lahti/Prodigy Disc Pro Tour
64.6%	Nokia Open - ET#7 2018/The Beast/with some small changes
64.1%	DGPT - Discraft LedgeStone Insurance Open 2018/Eureka Temp/B
64.1%	Canadian Disc Golf Championships Presented by Dynamic Discs 2018/Hillcrest Farm DGC/
63.2%	DGPT - Utah Open Presented by Prodigy Disc, 2018/Mulligan's Creekside/
62.4%	DGPT - Memorial Championship presented by Discraft 2018/Fountain Hills/MPO
61.6%	The Open - EPT#4/Ale Discgolfcenter/Yellow
60.9%	Sula Open 2018 presented by Discmania - EPT#2/Vasset Discgolfpark/Championship
59.4%	Two Days in May/Darkside/MPO
59.1%	Canadian Disc Golf Championships Presented by Dynamic Discs 2018/Huck It Disc Golf/
58.7%	Latitude 64 Tyyni Sponsored by Dynamic Discs/Sibbe Disc Golf/
58.2%	Latitude 64 Tyyni Sponsored by Dynamic Discs/Nevas Golf/
58.0%	Latitude 64 Tyyni Sponsored by Dynamic Discs/Keinukallio, Kerava/