Distribution of Effective Length of Disc Golf Holes as a Function of Actual Length

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Various characteristics of disc golf holes can make the effective length different than the actual length. For example, if the target is at a higher elevation than the tee, the hole has a longer effective length. Doglegs or other limitations on how far the disc can fly unimpeded also increase the effective length.

In this paper we will define effective length of a hole as the length for which the score for a typical hole would be equal to the score for the hole in question. A typical hole will be defined as the type of hole that gets the average score of all holes of that length.

The source of data is 60,679 scoring distributions, with at least 32 player-rounds of data, for various holes and PDGA Player Ratings. For each scoring distribution, the average score was calculated and paired with the length of the hole in feet. For each player rating, the scores were fit to lengths. This linear fit served as the "typical" score for each length.

For example, the typical average score for 900-rated players on a 300 foot long hole is (300/253+1.97) = 3.16.

Player Rating	Feet per Throw	Throws per Hole Constant
700	171	2.19
750	186	2.14
800	204	2.08
850	226	2.03
900	253	1.97
930	273	1.94
950	288	1.92
1000	333	1.87
1020	356	1.84

(*Throws per feet* is linearly related to ratings, but *feet per throw* is shown because it is more intuitively understood. Thus, the linear fit is to *divide* the hole length by feet per throw and add the Throws per Hole Constant.)

The effective length of each hole was computed using this linear formula in reverse. For example, a hole that averaged 4.00 for 900-rated players would have an effective length of (4.00-1.97)*253 = 513 ft.

The ratio of effective length to actual length was calculated for all distributions. The linear fit of effective length to actual length was calculated to be .99962 * length + 1.3147. Or, the computed average effective length of 120 foot holes is 120 feet 10 inches, and the computed average effective length of 1000-foot holes is 997 feet 6 inches. In other words, this is pretty good confirmation that the average effective length is the average actual length. Any further complications (besides using the ratio) could not improve the results by enough to be worth the trouble.

Thus, we can look at the distribution of the ratio of effective length to actual length. To adjust for the different lengths implied by X% shorter vs X% longer, we first take the log of the ratio. We find that the distribution of the log of the ratio is symmetrical and fits a normal distribution with a mean of zero and a standard deviation of .225.

The flowing chart shows the effective lengths that are outside of specific percentiles. For example, the easiest 10% of holes have effective lengths shorter than 75% of the actual length or shorter, while the hardest 10% of holes have effective lengths longer than 133% of actual length.

% of Holes	Easiest	Hardest
1%	59%	169%
5%	69%	145%
10%	75%	133%
25%	86%	116%
33%	91%	110%
50%	100%	100%