

Distribution of Round Scores from Distributions of Hole Scores

By Steve West Disc Golf, LLC

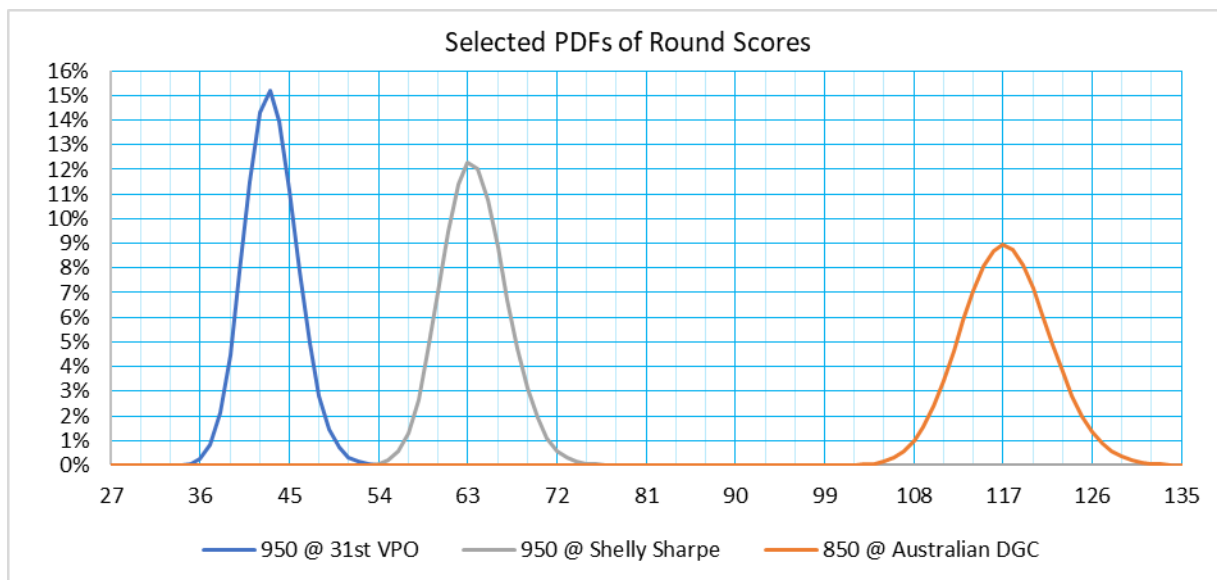
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I already had a way to derive the scoring distribution for each hole for all the players of a target PDGA Player Rating. From these, I used basic probability formulas to compute the exact (not a simulation) distribution of total round scores.

Distributions

I computed 924 distributions of round score by course and rating, from 622 courses.

The following shows the distribution of the round scores from the player rating/course combinations with the lowest, median, and highest average scores.



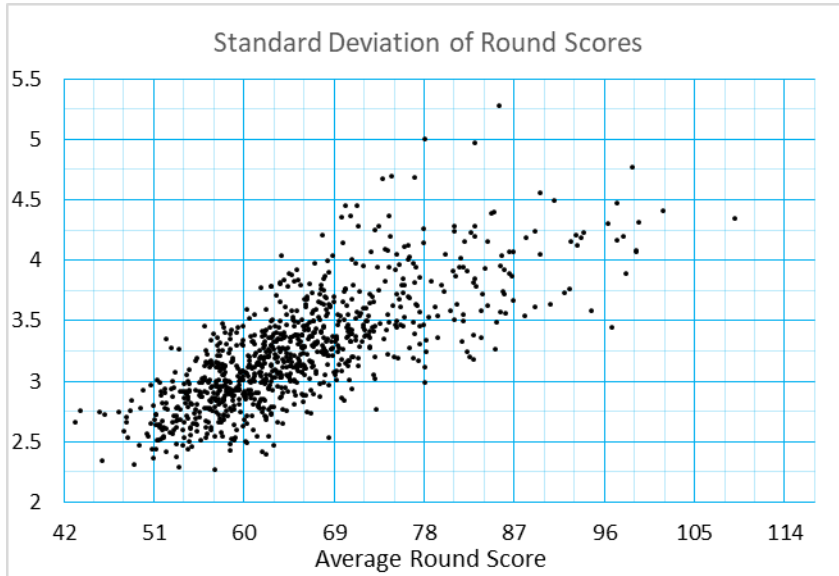
A 950-rated player on the 2021 KR8om presents 31st Veterans Park Open (Pro weekend) powered by MINT Discs/Veteran's Park - 31st VPO Rounds 2 & 3.

A 950-rated player on the 2021 Shelly Sharpe Memorial presented by SpinnersontheGreen.com/Vista del Camino Park/Vista XL - Pro Men; 18 holes; Par 60; 8,606 ft.

An 850-rated player on The Choices Flooring 2018 Australian Disc Golf Championships Presented By Nature 2 Nourish/Weston Park.

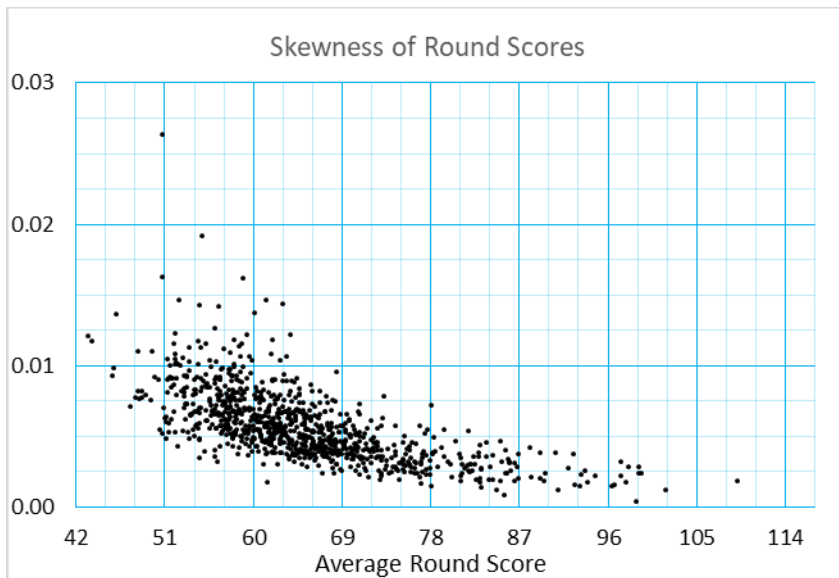
Characteristics

The following shows the standard deviations as function of the average score. As expected, the standard deviation generally gets larger as the mean round score gets larger.



While the round scores in the first chart produced nice-looking bell curves, they aren't exactly normally distributed. The following shows the Skewness.

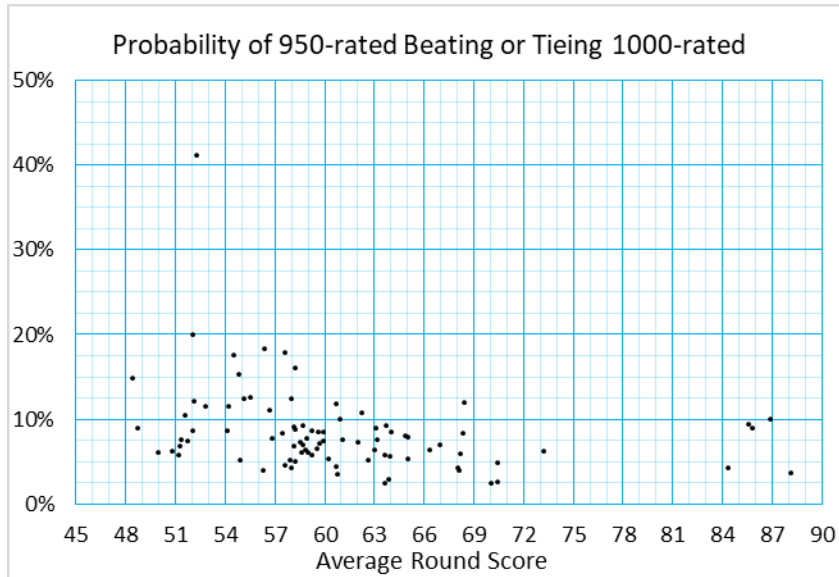
Hole scores are, of necessity, skewed right because no one can score lower than 1. Higher-scoring holes are less skewed, but still skewed. All distributions of the sum of the hole scores retain some of this skewness.



Probability of a Lower-rated Player Beating a Higher-Rated Player

In the past, this has been calculated based on a normal distribution model. However, the skewness that is evident in directly computed distributions affects the results. For computing the probability that a player will beat someone who is rated 50 points higher, the assumption of normality overstates the probability by about 20%.

For those courses where scoring distributions for both 950-rated and 1000-rated players are available, we can directly compute the probability of the 950-rated player beating the 1000-rated player. Here are the probabilities by average score of the 1000-rated player.



If it is the job of a disc golf course to separate players by skill, and if skill is measured by player rating, then a course that gives the lower-rated player *less* chance of beating the higher-rated player is doing a better job. Generally, higher scoring courses do a better job. However, this might be a case of some of the lowest-scoring courses failing to provide enough separation between players of different ratings.

The following events/courses were on the efficient frontier; only higher-scoring courses provided more separation than these courses.

Course	1000-rated Average	Pr 1000>=950
2020 Cedar Creek Open/Cedar Creek East/18 holes; 4,805 ft.	48.4	14.9%
2021 Jonesville Park - CHOX Jonesville Long Pad; 5,907 ft.	48.7	8.9%
2021 Arizona States/Pusch Course; 6,430 ft.	50.0	6.0%
Hiestand Park 2021 Mad City Open Long Layout; 6,300 ft.	51.2	5.8%
2020 Riverside Park/River City Open, 8633 ft	54.9	5.2%
Memorial Championship 2018/Vista Del Camino/MPO	56.3	4.0%
DGPT - Jonesboro Open 2018/Disc Side of Heaven/Gold	60.8	3.4%
PDGA Professional Disc Golf World Championships 2018/Fox Run/Gold	63.6	2.4%
2017 Masters Cup - Pro/DeLaveaga DGC/24 Hole	70.1	2.4%

Amalgamation

The following chart shows the average frequency of round scores for the rounds that were included in this sample, by player rating and for all player ratings combined.

This shows that most courses were designed for the most common type of player, while 1000-rated players are playing courses that are relatively too easy for them, and lower rated players are playing courses that are too hard for them.

