Title

Names

July 20, 2021

Abstract

This manuscript... The main results are...

1 Introduction

2 Data and Methods

3 Results

3.1 Simulations: Uniform Ranks

We conducted a simulation study to examine the rankings and scoring for climbers in both qualification and final rounds. For each round, we performed 10000 simulations, and this was accomplished by randomly assigning the ranks of each event to every participant, with the assumption that the ranks are uniformly distributed. After the completion of the simulations, we calculated the final scores for every simulated round, as well as the final standings for the climbing athletes. This data would then enable us to answer questions about various topics, including the distributions of scores for qualifying and final rounds, and the probabilities of advancing to the finals or winning a medal, given certain conditions.

Conditional probability

From our simulations, the probability of advancing given winning the first event is 0.9951, and the probability of advancing to the final round for an athlete, given that they were the winner of at least one event, is 0.9947.

Table 1 shows the average score of climbers that finished in the top 8 of the qualifying round and hence advanced to the final round.

Table 1: Average score for each qualifying rank

qual_rank	avg_adv_score
1	36.0187

qual_rank	avg_adv_score
2	73.6111
3	115.3954
4	162.2263
5	216.0041
6	278.1649
7	350.3272
8	434.5932
9	532.1383
10	642.3298
11	771.0376
12	919.1239
13	1091.2140
14	1291.9224
15	1536.2010
16	1834.3433
17	2211.7246
18	2695.6190
19	3399.5684
20	4585.3123

3.2 Correlations

We collected data on major climbing competitions from 2018 to 2020, including the 2020 Continental Championships of Europe, Africa, Oceania, Pan-America; 2019 and 2018 World Championships; 2018 Asian Games; and 2018 Asian Games. We are interested in looking at the relationships between the ranks of the individual events and the final standings, and we computed Kendall's Tau (Kendall Rank Correlation Coefficient).

Table is a correlation matrix between the ranks for the 2018 Youth Olympics Women's Qualification.

It is evidently clear that there is a strong and positive correlation between the ranks of bouldering and lead climbing, and as a results, the standings of these two events are highly correlated with the final rankings. On the other hand, the relationship is not as strong for speed climbing. Thus, speed climbers are facing a huge disadvantage in this scoring system, compared to those that are specialized in the other two concentrations.

	rank	speed	bould	lead
rank	1.0000000	0.3619048	0.6666667	0.6000000
speed	0.3619048	1.0000000	0.1238095	0.0952381
bould	0.6666667	0.1238095	1.0000000	0.5333333
lead	0.6000000	0.0952381	0.5333333	1.0000000

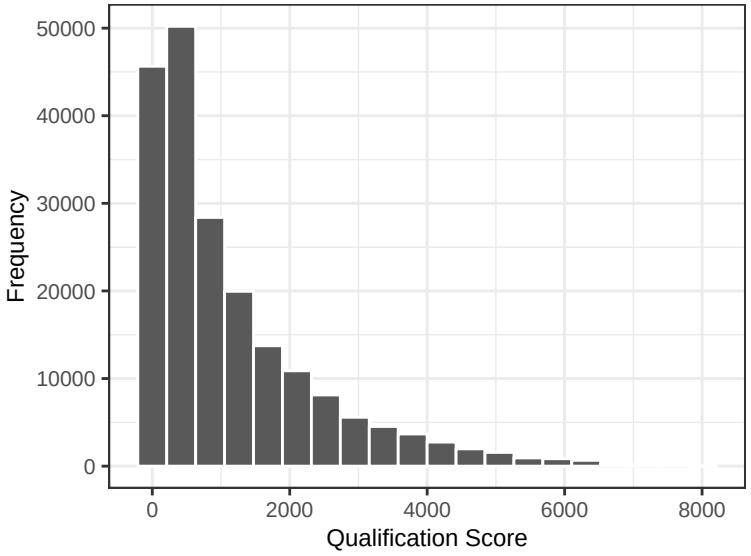

Figure 1: Distribution of qualification scores

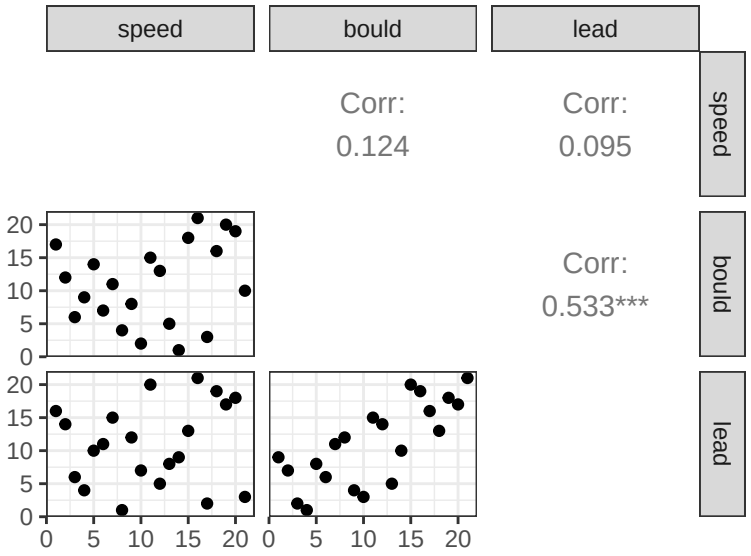

Figure 2: Kendall's rank correlations - 2018 World Championship, Women's Qualification