Nene Diallo

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Question 2: Lab 1 Outputs

Rules: 1) if the dice rolls 3 or more sixes out of 20 rolls, it is fair

2) If the dice rolls less than 3 sixes out of 20, it is unfair.

Based on the dice Experiment I did, both the control group and experimental (Broken dice) are fair. In the Control Group I got 6s, 5/20. However, In the experimental Group, I managed to get 6s 4/20.

Control Group analysis:

Mode = 6, Mean = 3.7, Median = 4, Range = 6-1 = 5

Experimental Group analysis:

Mode = 3, Mean = 3.95 , Median = 3.5, Range = 6-1 = 5

The thing I find interesting here is that although both dice are fair, the control group rolled more 6s than the experimental, which could be a result of the part of the dice that was damaged more.

Another interesting observation is that in my control group, each number from 1-6 occurs at least twice in the data set while in my experiment, the number 2 does not occur and 1 only occurs once while all the other numbers 3-6 occur three or more times.

3) The playlist contains 20 songs, giving each song a 1 in 20 (or 5%) chance of being selected. However, two bands—Falling in Reverse and Mago de Oz—each have 4 songs in the playlist. This means songs by these bands have a combined 20% chance of being played. All the other songs come from different artists, with each of these artists contributing only one song.

Null Hypothesis: All 20 songs should have an equal chance of being selected, meaning a 5% chance for each song.

Alternative Hypothesis: The shuffle function shows favoritism toward songs from the same artists.

Null hypothesis: $p = 1/20$

Alternative hypothesis: $p \neq 1/20$

Synopsis: For the experiment, only 5 songs will be played. Since the shuffle automatically resets, no song will repeat until all the songs in the playlist have been played. Ideally, the 5 randomly selected songs should come from 5 different artists, with just one song from each of the two bands. To test whether Shuffle is truly randomized, we used three different modes, Spotify Free, Spotify Premium, and Apple Music, to reduce the risk of favoritism and also to test whether or not one app was more randomized than the other.

Playlist Link:
https://open.spotify.com/playlist/4mOJdqckZXxJTFlXR8vkoE?si=YpOZHEsoQ9-JTvEOG7Gngw&pi=D0YgPzKwT9K2o

Shuffle#1 (Spotify – Free)	**Shuffle#2 (Apple Music- Premium)**	**Shuffle#3 (Spotify - Premium)**
"We Own the Night" by Dance Gavin Dance	“False Pretense” by The Red Jumpsuit Apparatus	"Carry On" - Falling In Reverse
"Unannounced" by Picturesque	“Congratulations” by Post Malone	"Talk to a Friend" - Rain City Drive
"No More Heroes" by The Stranglers	“Toxicity” by System of a Down	"We Own the Night" - Dance Gavin Dance
"Toxicity" by System of a Down	“No More Heroes” by the Stranglers	"San Diego" - blink-182
"Voyager" by Angels and Airwaves	“Unannounced” by Pictureques	"La cantata del diablo (Missit me...)" - Mägo de Oz

We fail to reject the null hypothesis, as each shuffle from the experiment played 5 different from 5 different artists, showing a lack of favoritism. Although throughout the 3 shuffles, some songs repeat, they never repeat in the same order and aren't followed by songs from the same artists. However, more testing is needed to fully assess the fairness of the shuffle. A future experiment with 50 songs, where 40% of the songs come from just two bands, might provide better insight into whether the shuffles truly don’t favor specific artists.