

Lab Notes for Prelab 0: Reaction Times

Part 1: Does Music Affect Reaction Time?

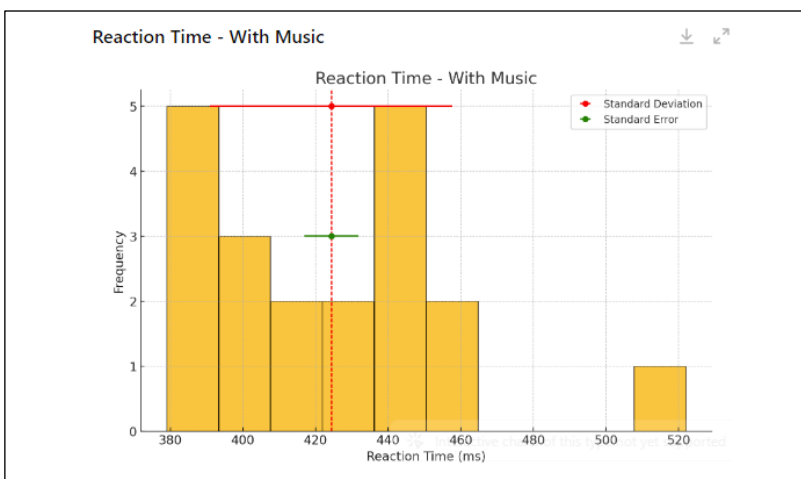
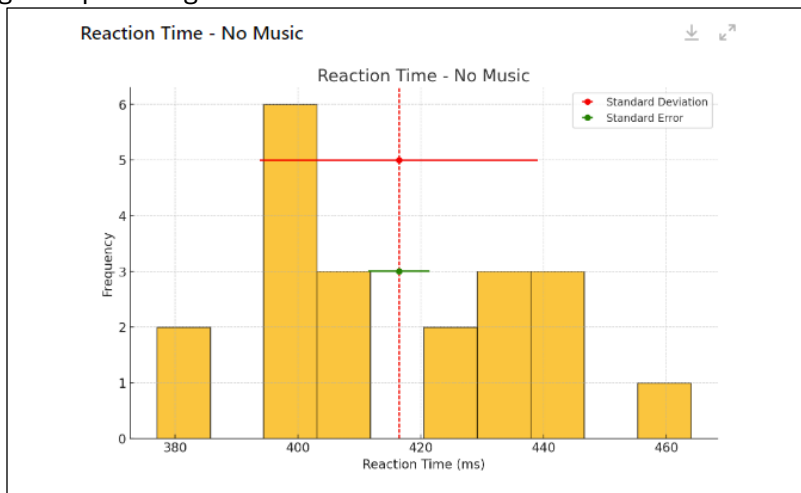
Method:

Our goal in this experiment is to determine if music affects reaction time. Since music attracts our attention, which may distract us from other tasks, we predict that it will increase reaction time. To measure reaction time, we will use the online driving simulator (<https://www.justpark.com/creative/reaction-time-test/>) which we will perform ourselves and which reports reaction times in milliseconds. We will complete 20 trials without music, and 20 trials while listening to Strobe by deadmau5 with headphones. We choose 20 trials as a starting point, and can increase it in future experiments if necessary. We will compute a mean value for the reaction time in both cases, and compare them using the standard deviation of the mean as the uncertainty (unless the systematic uncertainty is larger). If the uncertainty bars overlap, we will treat the experiment as not demonstrating any difference. If they do not, then we will conclude there is a difference.

Data:

Here is a table of our data and histograms providing a visualization.

Trial	Reaction time (ms)	
	No Music	With Music
1	438	422
2	377	460
3	403	442
4	397	444
5	377	447
6	427	427
7	399	443
8	403	522
9	431	407
10	445	402
11	464	456
12	446	379
13	432	405
14	399	445
15	411	412
16	422	385
17	403	386
18	411	392
19	437	393
20	407	418
Mean	416.5	424.4
STD	23.2	34.2
STDm	5.2	7.7



The systematic uncertainty was 1ms because it was a digital measurement. This is less than the random uncertainty in both cases.

So our reaction time without music was $416.5 \pm 5.2\text{ ms}$ while with music it was $424.4 \pm 7.7\text{ ms}$.
[Sample calculation of mean and STDV may be necessary if your TA requests it]

Conclusions:

Our results found that although the mean reaction time with music was larger than without (424.4 ms vs. 416.5 ms) this difference is smaller than the range covered by the uncertainty ($5.2+7.7 = 12.9\text{ ms}$ is greater than $424.4-416.5=8.1\text{ ms}$). So by the criteria we adopted in methods we conclude our prediction is not supported by the data. However it should be noted that the random uncertainty is much larger than the systematic uncertainty, and so the precision of our experiment could be increased through significantly more trials. If the mean values remained the same, while the random uncertainty were reduced to the size of the systematic uncertainties, this would be consistent with our prediction, so the large random uncertainty should be considered a serious limitation of this experiment. Besides increasing the number of trials, it would be interesting to vary the kind of music listened to (it could be that some musical styles enhance reaction times, while others diminish it, while others have a neutral effect as found here). It would also be interesting to reverse the order of the no music/with music conditions, since either fatigue or improvement at the task by the subject as more trials were completed may have affected results. It'd also be interesting to try out different subjects, or to compare different summary statistics (for example we could test if the standard deviations changed even if the means did not).