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AP Statistic Project Proposal

Statistical Question: Does listening to Lo-Fi Music actually help people focus?

Parameter: μ_{diff} = True mean difference in average typing speed (characters/second) while transcribing a paper document (with music - without music).

Statistic (\bar{x}_{diff}): Sample mean difference in average typing speed (characters/second) while transcribing a paper document (with music - without music).

Hypotheses:

- Null Hypothesis: Listening to Lo-Fi music has no effect on focus (no effect on typing speed).
- Alternate Hypothesis: Listening to Lo-Fi music improves focus (increases typing speed).

$H_o: \mu_{\text{diff}} = 0$

$H_a: \mu_{\text{diff}} > 0$

Experiment or observational study? Why?

This is an experiment because we are assigning treatments to subjects whereas an observational study would only involve observing the effect as it occurs naturally.

Variables:

- Explanatory: Listening to Lo-Fi music or not listening to Lo-Fi music (yes/no)
- Response: Difference in average typing speed (characters/seconds) (with music - without music)

Test Used: Paired t-test for μ_{diff}

Collection Method for Inference Conditions:

Random: Randomly assign each volunteer to determine the order of whether to listen to music first or complete the task without music first. We will likely not be allowed to randomly select students as teachers will not allow us to, but we can do our best to ensure the assignment is as random as possible.

Independent: The speed at which one person types has no effect on another person's average typing speed. We are also using random assignments so the results are independent.

Normal: We will select a total of 30 people so that the Normal condition is satisfied by the Central Limit Theorem.

What steps will you take to reduce bias?

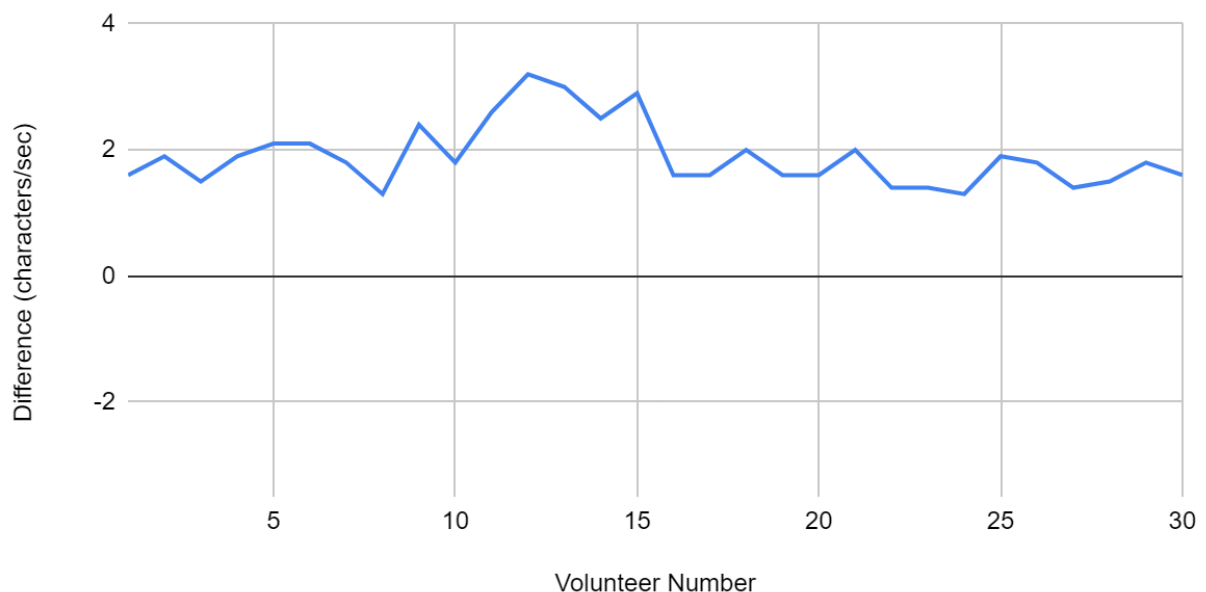
One of the steps we are taking to reduce bias is that the Lo-Fi song we choose will be from a smaller producer so that it is unlikely that any volunteer is familiar with the song.

Although we are not random sampling - teachers will likely not allow us to use their class to experiment because of the time consumption - we will go to multiple classrooms during office hours in order to reduce possible bias that there is a chance that certain classes use computers more and therefore could have a faster average typing speed. Additionally, we are using a paired t-test to ensure that typing speed discrepancies are roughly the same and we are not comparing a student who has inherently faster typing speed with a student with slower typing. Finally, the two passages we chose are relatively obscure, reducing the chance that students are already familiar with the passage and could type it faster based on familiarity.

Graphs:

Showing convincing evidence that listening to Lo-Fi increases focus:

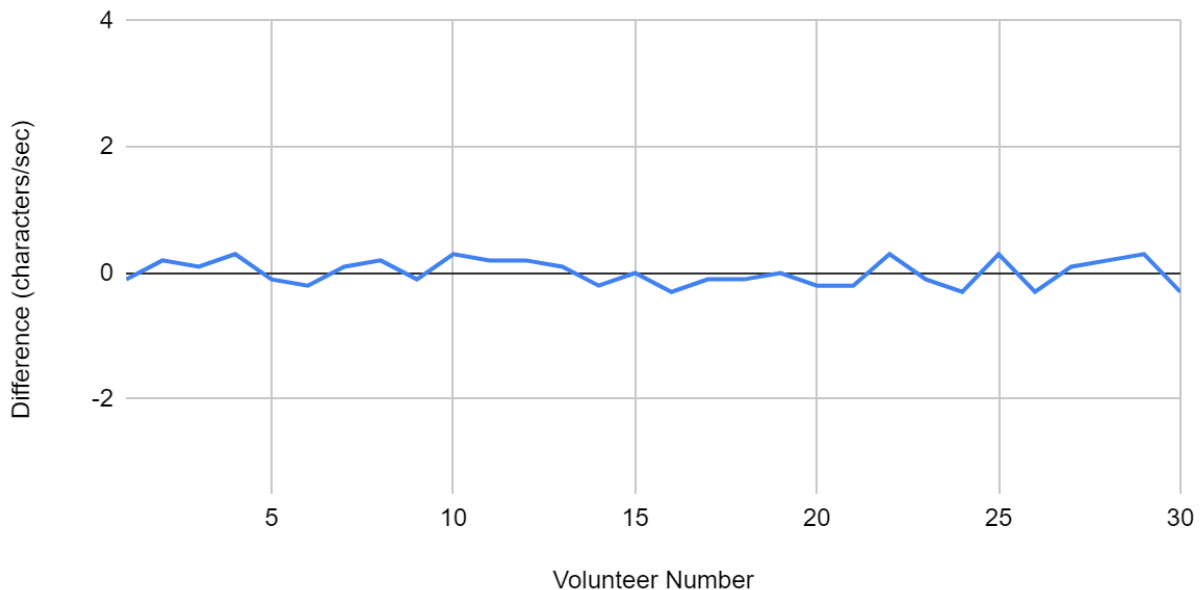
Difference in Average Typing Speed Without Music vs With Music



In this graph, we can see that, for every participant, listening to Lo-Fi music displayed an increase in average typing speed, thus providing possible evidence that listening to Lo-Fi can actually cause students to be more focused.

Not showing convincing evidence that listening to Lo-Fi increases focus:

Difference in Average Typing Speed Without Music vs With Music



In this graph, we can see that, for every participant, listening to Lo-Fi music displayed very little to no difference in average typing speed, thus the graph does not provide us with clear evidence that listening to Lo-Fi music actually causes students to be more focused.

Passage A:

Sanjaya, the king's aid and confidant, sat in the royal palace at Hastinapura by his side. Though Sanjaya's gaze was drawn within, he looked far beyond the city's streets and walls. With Vyasa's gift of mystic vision, he beheld the valley of Kurukshetra over a hundred miles away. There, as the two armies prepared for battle, Sanjaya could observe every aspect and scan every detail. He could hear any conversation and even know someone's thoughts.

"This is quite unusual," Sanjaya continued, and he paused in disbelief.

Dhritarastra impatiently stamped his jeweled cane for attention. "What is it?" He insisted on knowing.

"Yudhishthira has stepped off his chariot. He proceeds across the valley on foot and unarmed toward your sons."

Passage B:

“Unarmed? Does he mean to seek a truce or to surrender?” Dhritarastra inquired. His mind hoped against hope. Could there still be time for reconciliation, for peace?

The morning air was crisp. Yudhisthira, the eldest of the Pandavas, walked toward the expanse of Kaurava warriors and their allies. The army Yudhisthira beheld far outnumbered his own. In the distant ranks, amid his sworn enemies, he spied Bhismadev’s splendid chariot, decorated with many weapons. He headed straight for it. Bhismadev was the respected Grandsire of the dynasty, the eldest and wisest. He was also Yudhisthira’s ever well-wisher and like a father to him. Even now Bhismadev observed the solitary figure with pride. Yudhisthira took each step with such ease and grace.