**Title:** There is no significant difference between typing on a laptop with and without distractions

**Abstract:**

For my project, I tested whether people who were distracted (listening to music) were more or less prone to error (specifically when typing). My hypothesis was that while distracted, we are more prone to error. My null hypothesis was that there is no correlation between being distracted and errors made while typing. I used an independent sample t-test. My p value was 0.13, which did not allow me to reject my null hypothesis.

1. **Introduction.**

One of my favorite things to do is to code. This involves a lot of typing, along with a lot of backtracking and redoing. Oftentimes when I am programming, I listen to music. When the SHEWASSA project started, I decided that I wanted to test to see whether listening to music impacted my ability to write. Additionally, in school, I am often told to not listen to music, because it can impact my writing. My hypothesis was that while distracted, we are more prone to error.

Hypothesis testing is a form of testing where we are trying to figure out to what degree a hypothesis is true. For my SHEWASSA, my alternative hypothesis was that there would be some correlation between the listening to music group, and the control group. My null hypothesis of no correlation is roughly the opposite of my hypothesis.

1. **Methods.**

I had participants sit down in front of my laptop (MSI Modern A10M), which had code running (Python 3.9) (fig. 2) that gave them a paragraph to write (fig. 1), but secretly recorded keypresses. Additionally, the laptop had a plugin (Microsoft Powertoys) to disable the backspace key. The participants wore headphones, and I would either play or not play music (Beethoven's symphonies 1 through 10). Once they started, I would start a timer on my phone to record how long it took for the participant to realize that you could not press the backspace key; once they did, I stopped the program and collected the data, and put it into a table.

In order for people to press the backspace key, they need to notice that they made a mistake. Initially, I had planned to hide whatever they wrote, but I decided to veto that idea so they could see the mistakes they made. Because I wanted to have a distracted and not distracted group, I had half of the participants listen to music. This ties into my hypothesis, by seeing if the music caused them to mess up more, making them try to press the backspace key.

1. **Results.**

The null hypothesis involved comparing the scores of two different groups, the correct t test to do was a two independent sample means t-test. The result of this was a t value of roughly 1.595, and a df of roughly 15.25. The P-value of these numbers is 0.13. Because this is a relatively massive p-value, the null hypothesis can not be rejected.

1. **Discussions**

I ended up recording the amount of backspaces they made, whether they figured out you can’t press the backspace key, the time it took them to figure it out, and whether they were listening to music or not. A p-value that could reject the null hypothesis would be one that is less than 0.05. Mine is over double, almost triple of that. However, it is possible that there is some correlation between the two, because the p-value is close to but not over the significance threshold of 0.05. Not rejecting the null hypothesis means that there may be a relationship between distraction and typing, but I was unable to demonstrate it with my experiment..

I ended up testing 20 people. However, two of them did not figure out the trick. This posed a problem. I could either represent them as the time they took to complete it, zero, or exclude them. I ended up excluding them, because no matter what they would have made huge outliers. Luckily, they were both in the different groups, so I treated it like I only took 18 data points.

Something weird I found while taking the data is that my hypothesis might have been backwards. The amount of time for people to realize they cannot press the backspace key significantly went up when listening to music, sometimes upwards of 30-40 seconds. Checking the averages of the two groups backs this up, where the average for the experimental group is up by roughly 15 seconds.

One thing that could have been a source of error was the music I chose. I had participants listen to Beethoven, which could mean that there is a difference between listening to music with lyrics or without lyrics. One of the biggest problems with my experiment was the fact that I was in a room with someone else. I was initially going to have speakers to play audio, but in order to not cause audio overlap with the other person in the room, I decided to use headphones instead. Additionally, for the timer, I had one running on my laptop and my phone to make sure they were working at roughly the same time. Additionally, for consistency, I always had the same paragraph (fig. 1) and music for every participant. One other problem I had was people not being used to my keyboard. My laptop’s keyboard does not have normal spacing of keys, meaning that it may have changed how people typed, causing more mistakes, and making them press the backspace key sooner than they would have.

However, the biggest problem I had was the possibility of people sharing the trick. If it got out, it would have completely ruined my data. To attempt to circumvent this, I made participants promise to not tell others, but that still may not have worked. Along with that, there were other people in the room, who also wanted to do my test. I turned them down because I wanted to mitigate the risk of them having heard the secret, and skewing my data. Two things that would have made this better are: having people run the code on their own keyboard, and being in a room by myself. These would mitigate my two biggest problems. Additionally, my script may have caused people to get the wrong idea about the test. I said “I am measuring WPM and error count…”, which may have made people focus more on the errors they made. One other thing I said was “Also, there is a gimmick…”. This may have made people focus more on finding the gimmick, than actually typing.

1. **Conclusion.**

At the beginning of this project, I had the idea to do my SHEWASSA on errors we make with distractions. I took participants to my laptop, had them put on headphones, and write a paragraph until they realized they could not press the backspace key. For my experiment, I ended up with a p-value of 0.13. This did not allow me to reject my null hypothesis. My results for this show that listening to music does not make us more prone to distractions, and in fact may make us less prone to errors. This could show that the myth of listening to music during work is false.