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The Effects of Audio Distractions on Typing Speed

Ashley Silverberg¹

The purpose of this study was to find whether or not background music/other audio served as a distraction or a valuable tool to get work done faster. The hypothesis stated that hearing upbeat music or background conversations while typing will result in participants typing slower because it will act as a distraction. Furthermore, hearing soothing music (or no music at all) while typing will make the participant type faster because he/she will be more comfortable with the environment. To pursue the hypothesis, the present study required a within-participant design in order to compare both the control and experimental variables within the experiment. Each participant was recruited from the Lindenwood Participant Pool and was asked to type four five-sentence paragraphs, each in a different audio condition: Upbeat music, soothing music, men talking, and no audio. A stopwatch was used to time the amount of time it took each participant to type an individual paragraph. After the participants left the study, their times were compared to determine if and what audio served as the most distracting. The results showed that although there was a significant difference in the times between paragraphs, there were no significant differences in typing speed between the audio distractions being played. This could possibly be because each audio may not have been unique enough from each other or that there were too many variables throughout the experiment. Although there was no significant differences in times, there was a significant difference in what condition each participant found distracting. This could possibly be the basis for more research to come.

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The purpose of this study was to determine whether auditory background enhanced or weakened an individual's typing speed. Individuals may not realize that music and other audio distractions could be disrupting and that there could be either a positive or negative effect on the skills they may need to perform for their careers.

Macken, Phelps, and Jones (2009) stated that background sound creates a constant disruption in a person's performance. This is true when the participants are listening to the upbeat music as well as conversations. Music will produce an environment that will make it harder to concentrate; therefore other activities will be hindered. Macken et al. (2009) also have done research that has produced the idea that each musical (audio) element must differ from the one that precedes it in order to cause a distraction. Sounds changing in frequency cause disruption; however, sounds with a repeated frequency do not. With soothing music, for example, the constant droning and smooth melody relaxes an individual so there is minimal or no distraction. Therefore, other activities can be done faster because there is no other stimulus present.

Further research on distractions from Bennett (2004) suggests that audio with native-language lyrics are most likely to have the greatest negative effect on a participant's performance. This is because it is largely filled with information and has great relevance to the participant (he/she can understand it). This could be found true in the condition with conversation. Since participants will be trying to understand what each person is saying in the conversation, they will be more concentrated on the audio than on the task at hand.

It is also possible that each participant will vary with their reactions to each audio stimulus. According to Degregoris's (1986) audio distraction research, there were so many differences among participants' reaction to sound that it was difficult for experimenters to

explain why. Contrary to this belief, Wolfe and Noguchi (2009) explain that after the initial stimulus, participants will become almost immune to the background noise and it will not affect their concentration.

Music and other audio distractions have in some cases proven to be extremely beneficial. However, according to Noguchi (2006), when studying children's reactions to music distractions while going through medical procedures, she noticed that there was no discernable benefit from background music. However, this is not to say that distractions cannot be beneficial in other situations.

In the present study, Lindenwood participants were asked to type four different paragraphs, one in each of the four conditions: upbeat music, soothing music, conversation, and silence. Upbeat and soothing music were both used because they accounted for opposite ends of the stimuli spectrum. One is highly energetic and has a fast tempo and the other is slow and relaxing. A condition with a conversation as audio was also used to see if there were any differences between music and talking. The control group consisted of no background noise at all. Counterbalancing took place to make sure that the results would not be bias on order effects. Participants were timed in each condition and then asked to fill out a demographic survey. The survey also included questions regarding how much of a distraction each stimulus was. The hypothesis stated that hearing upbeat music or background conversations while typing will result in participants typing slower because it will act as a distraction. It was also hypothesized that hearing soothing music while typing will make the participant type faster because he/she will be more comfortable with the environment.

Method

Participants

For this study, 32 people were recruited from the Lindenwood Participant Pool (LPP) found on the Lindenwood University Campus. All participants were undergraduate students at Lindenwood University and were at least 18 years of age. No participant was excluded from this study. By following all of the general procedures entailed in the LPP rules and regulations handout, the participants were recruited ethically and with no coercion. After completion of the study all of the participants received extra credit for designated classes.

All participants were from the Lindenwood Participant Pool. Twenty-five women signed up for the experiment while only seven men participated. The age of the participants ranged from 18-27 years old. Only eight participants reported that they were not born in the United States. Four reported that they were from Canada and the others from various places including China, Italy, Panama, and Turkey. All the participants said they were familiar with a standard keyboard. When asked if they wore glasses or contacts to aid in their sight, 11 of the 32 said yes. Only one participant stated they used an aid for their hearing and two stated they had trouble with their fine motor skills. Even under these conditions, the students' data was not omitted from the results. When asked how many hours each participant spent typing on a computer in a week, answers varied greatly. Hours ranged from 0-25 hours with an average of 7.9 hours and a standard deviation of 6.7. Participants were asked how much music influenced their mood. Thirteen out of 32 participants reported that music definitely influences their mood. Only one participant stated that music did not influence him/her at all and one participant chose not to answer.

Materials

Each participant was asked to fill out two consent forms (one for the experimenter and a copy for the participant). The consent form was given to participants to ensure that they fully understood what is being asked of them in the study (see Appendix A). Each participant also received an ID number to ensure anonymity and to help the experimenter keep each participant's data together. After the study, a demographic survey was given. This asked participants to give their sex and age. They were also asked whether or not they use contact lenses/glasses or any type of assistance with hearing. These questions are important to ask because the results could have been skewed if someone has these disabilities. Participants were also asked if they are an international student. This is to ensure that they are from an English speaking country and were familiar with computers, even though those questions would be asked later. The last questions asked how greatly music influences their mood and how distracted they were by each set of audio (see Appendix B). A feedback letter was given after the study. This was given to debrief the participants on what the study was really about and provided participants with a way to contact the experimenter if they had any questions (see Appendix C). The participants also received extra credit receipts for partaking in the study.

All the rooms the LPP assigned contained a desk and chair for each participant to use. A Dell Inspiron laptop was available for each participant to type their information. Paragraphs were given to each participant on a piece of paper and they were asked to type the five sentences into the Notepad Program on the laptop. The first paragraph was about the Olympic Games describing the events and layout of the sports event (see Appendix D). The second paragraph was about the Super Bowl and where it was originated (see Appendix E). Paragraph three was about ballet and again where it originated (see Appendix F), and finally paragraph four was about

musical theater and how it has become a worldwide phenomenon (see Appendix G). All of these paragraphs were excerpts taken from Wikipedia. Music/audio was played via the iTunes program on the laptop. The laptop was set to an appropriate noise level so the participants were able to hear the music/audio clearly. Condition A contained no music or audio at all. This acted as a control variable. Condition B was the upbeat music condition. The song that was used was “Sandstorm” by Darude. The next condition, condition C, was the soothing music condition. The audio used was “Mozart’s Lullaby” by The Little Series. For the men talking in the fourth condition, a section of Martin Luther King’s famous “I Have a Dream” speech was used. A Sportline water resistant stopwatch was also used to accurately time each participant.

Procedure

The experimenter started by posting sign up sheets as well as a description form on the bulletin board outside the LPP office. Once participants signed up, they went to their directed location. The study began by giving participants two consent forms. They then were given an ID number in order to keep anonymity throughout the study. Each participant was asked to sit at the desk with the laptop in the room. The audio was then turned on by the experimenter. Counterbalancing was used to make sure that the sequence of the audio conditions was being alternated among participants. Then the experimenter gave the participant a paragraph to type. Again, the order in which the paragraphs were given was counterbalanced so not every participant typed Paragraph A first, Paragraph B second, and so on. (See Appendix H for counterbalancing). Each participant was told, “Please type the following paragraph into the Notepad Program. If you make any mistakes or errors, simply go back and correct them. If at any time you feel uncomfortable, you may leave the study without any penalties. If you have any questions, please let me know.” Each participant was asked to type four paragraphs, one in each

condition. Once the participant began typing, the experimenter started the stopwatch. The stopwatch was stopped once the last period of the last sentence was typed. Once the participant had completed four paragraphs, he/she was given a demographic survey to fill out. It was important that the participants completed the demographic survey after the study because there were important questions about distractions on the survey. Once the survey was completed, the participant was debriefed and given their receipt for extra credit. They were also given a feedback letter which contained the experimenter's information for any further questions or concerns they may have.

Results

The hypothesis stated that hearing upbeat music or background conversations while typing will result in participants typing slower because it will act as a distraction. Furthermore, hearing soothing music (or no music at all) while typing will make the participant type faster because he/she will be more comfortable with the environment. After collecting the data and conducting the appropriate ANOVA and paired sample t-tests, the calculations are as follows.

A one way repeated measures ANOVA was conducted to see if there were any significant differences in typing speed between the four audio conditions. The results showed that there were no statistical significance with $F(1,31) = 2.259$, $p = .143$. This could potentially be because people deal with distractions in their daily life regularly. Therefore, having music in the background didn't affect a person as much as maybe something more startling might.

Another one way repeated measures ANOVA was conducted to see if there were any significant differences in typing speed between the four passages. There was a significant difference here with $F(1,31) = 36.288$, $p < .001$. Paragraph three seemed to take participants a lot less time to type ($M=162.75$ sec) and paragraph four took participants a lot longer ($M=195.09$ sec). The

reasoning for this could be that paragraph four had a lot more punctuation and capitalized letters throughout the passage. This could have taken participants longer because it takes an extra finger to capitalize or you have to move your hands from the standard position to use different punctuation marks. Paragraph three may have taken less time because there were fewer proper nouns that needed to be capitalized. With these differences in mind, a paired sample t-test was conducted to compare paragraphs one and two (since they were the passages that were most closely related). The findings showed that although paragraphs one and two were similar in length and times, they did not have a significant correlation with any of the audio conditions in typing speed; $t(30) = -.896, p=.377$.

It was clear that each participant viewed the upbeat music as more of a distraction than the soothing music based on the ratings they gave each condition. A within-subjects repeated measures ANOVA was conducted to see if there were in fact any significance. The results show that there was in fact a significant difference in how participants rated each audio condition in terms of distraction. The upbeat music ($M=6.13$) and talking ($M=5.78$) conditions seemed to be more distracting than the soothing ($M=4.03$) and no audio ($M=2.56$) conditions. A t-test was conducted to show which variables were indeed significant. It was found that there was no significant difference in distraction between the upbeat and talking conditions $t(31) = .637, p > .05$. However, there were significant differences between all other conditions. $t(31) < .05$.

Even though some of the results do not support the current study's hypothesis, it is possible that with a larger sample size and less variables, more accurate results could be found. This study was not a loss cause. It found that participants did indeed find the upbeat and talking conditions a lot more distracting than the soothing and no audio conditions. Further research may be in order to get a more positive outcome.

Discussion

After collecting all achievable data, the hypothesis about audio distractions and typing speed was not supported. However, participants recorded that the upbeat and talking conditions were in fact more distracting than the soothing and no audio conditions. Also, with past findings in article reviews showing that distractions do indeed influence a person, I believe more research can be done. If this study was carried out with more participants there would be more accurate findings. Also, if the study focused on fewer variables, there could have been more significant results.

Throughout the study there were a few limitations. The largest limitation was who was allowed to participate. The participants, although never limited in any way by the experimenter, were limited by the LPP. The Lindenwood Participant Pool only allows students from the Lindenwood campus to participate in these studies. Another limitation was the people who chose to participate in the study. Most of the participants were females who were born in the United States. Since the participants seem to be of a common group of people, it is hard to say whether or not the results are truly accurate over a wide spectrum. Therefore, it is hard to tell how the study would differ if participants of a different sex or nationality had contributed.

Many modifications can be done in the future regarding this study. First, the location of the study needed to be more consistent. Sometimes participants were asked to go into a room where there were very few distractions. At other times they were asked to go to a room that had a lot of windows, so it was difficult to control the environment outside. Therefore, each environment was not consistent. Another improvement in the experiment would be the volume of the music being played. Sometimes the laptop would be turned up to a higher level which could have posed for a greater distraction than when it was lower. It would also be beneficial to get a

more accurate time keeper. The stop watch that was being used would sometimes get stuck and therefore not provide a very accurate time among participants. It would also be beneficial to control for any other outside distractions. Although it would be very difficult to control, maybe making a sign that said “do not disturb” would help the experiment go on uninterrupted. Although a within-participants design was the most precise way to evaluate this information, possibly only using two conditions instead of four would have made the participants feel more relaxed. It was apparent that they were getting tired and maybe the study was too long or intense. This could have played a role in the results especially since they were being timed. Therefore, it would have been helpful to control for fatigue effects as well.

Even though the results did not support the hypothesis in question, with further research more accurate results could be found. Past findings do indeed show that there is an influence of distractions on a person and their actions. This study could be a beginning of more research to come and I believe with a larger sample size and fewer variables, this study could be more beneficial.

References

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Appendix B

Demographic Survey:

1. Sex (circle one): Male Female
2. Age: _____ years
3. Were you born in the United States? Yes No
If answered no, which country were you born in? _____
4. Are you familiar with a standard keyboard for a computer? Yes No
5. Do you wear glasses and/or contact lenses? Yes No
6. Do you wear hearing aids or any device to assist your hearing? Yes No
7. Do you have trouble with fine motor skills (using your hands in particular)? Yes No
8. About how many hours a week do you spend typing on a computer? _____ Hours

9. On a scale from 1-5, how much does music influence your mood? (Circle one)

1 2 3 4 5

Does not
influence
me at all

Somewhat
influences
me

Definitely
influences
me

10. On a scale from 1-10, how much of a distraction was the **upbeat background music** being played?

1 2 3 4 5 6 7 8 9 10
Least Disruptive *Somewhat Disruptive* *Most Disruptive*

11. On a scale from 1-10, how much of a distraction was the **soothing background music** being played?

1 2 3 4 5 6 7 8 9 10
Least Disruptive *Somewhat Disruptive* *Most Disruptive*

12. On a scale from 1-10, how much of a distraction were the **men talking in the background**?

1 2 3 4 5 6 7 8 9 10
Least Disruptive *Somewhat Disruptive* *Most Disruptive*

13. On a scale from 1-10, how much of a distraction was it when there was **no music/audio playing**?

1 2 3 4 5 6 7 8 9 10
Least Disruptive *Somewhat Disruptive* *Most Disruptive*

Appendix C

Feedback Letter

Thank you for participating in this study. The goal was to find out whether upbeat music, soothing music, conversations, or no music/audio provided people with better tools to type faster. My hypothesis states that hearing upbeat music or background conversations while typing will result in the participants typing slower because it will act as a distraction. Furthermore, hearing soothing music while typing will make the participant type faster because they will be more comfortable with the environment. This information is a very beneficial tool for those in specific situations such as office work, secretary work, or bookkeeping. It would allow them to use music as a positive thing, to not only listen to in the background, but to help them get their work done faster.

Please note that I am not interested in your individual results; rather, I am only interested in the results of a large group of consumers, of which you are now a part of. No identifying information about you will be associated with any of the findings.

If you have any questions or concerns regarding any portion of this study, please do not hesitate to bring them up now or in the future. My contact information is found at the bottom of this letter. If you are interested in obtaining a summary of the findings of this study at a later date, please contact me and I will make it available to you at the completion of this project.

Thank you again for your valuable contribution to this study.

Sincerely,

Principal Investigator:

Ashley Silverberg as751@lionmail.lindenwood.edu

Supervisor:

Dr. Michiko Nohara-LeClair 636-949-4371 (mnohara-leclair@lindenwood.edu)

Appendix D

Paragraph 1:

“The Olympic Games are a major international event of summer and winter sports, in which thousands of athletes compete in a wide variety of events. The Games are currently held every two years, with Summer and Winter Olympic Games alternating. The Games have grown in scale to the point that nearly every nation is represented. The Olympic symbol, better known as the Olympic rings, consists of five intertwined rings and represents the unity of the five inhabited continents. A medal ceremony is held after each Olympic event is concluded.” - Wikipedia

Appendix E

Paragraph 2:

“The Super Bowl has been the championship game of the NFL, the premier association of professional American football, since the twentieth century. The Pittsburgh Steelers have won six Super Bowls, while the Dallas Cowboys have only won five. In most years, the Super Bowl is the most-watched American television broadcast. Because of its high viewership, commercial airtime for the Super Bowl broadcast is the most expensive of the year. The Super Bowl location is chosen by the NFL well in advance, usually three to five years before the game.” –

Wikipedia

Appendix F

Paragraph 3:

“Ballet is a type of dance, which originated in sixteenth- and seventeenth-century French courts, and was further developed in England, Italy, and Russia as a concert dance form. Early ballet dancers were not as skilled as they are now. Ballet has become a technical form of dance with its own vocabulary. It is primarily performed with the accompaniment of classical music. It has been influential as a form of dance globally and is taught in ballet schools around the world, which use their own cultures to inform the art.” – Wikipedia

Appendix G

Paragraph 4:

“Musical theatre is a form of theatre combining music, songs, spoken dialogue and dance. The emotional content of the piece - humor, love, anger – as well as the story itself, is communicated through the words, music, movement and technical aspects of the entertainment as an integrated whole. Since the early twentieth century, musical theatre stage works have generally been called simply, "musicals". Musicals are performed all around the world. Some famous musicals include Show Boat, Oklahoma!, West Side Story, The Fantasticks, Hair, A Chorus Line, The Producers, and Rent.” – Wikipedia

Appendix H

Timed Data: For Experimenter to Counterbalance Situations and Record Data

A= no music 1 = Paragraph 1

B= upbeat 2 = Paragraph 2

C=soothing 3 = Paragraph 3

D= talking 4 = Paragraph 4

	Trial 1	Trial 2	Trial 3	Trial 4
Participant 1	A1	B2	C3	D4
Participant 2	A2	B4	C1	D3
Participant 3	A3	B1	C4	D2
Participant 4	A4	B3	C2	D1
Participant 5	B1	D2	A3	C4
Participant 6	B2	D4	A1	C3
Participant 7	B3	D1	A4	C2
Participant 8	B4	D3	A2	C1
Participant 9	C1	A2	D3	B4
Participant 10	C2	A4	D1	B3
Participant 11	C3	A1	D4	B2
Participant 12	C4	A3	D2	B1
Participant 13	D1	C2	B3	A4
Participant 14	D2	C4	B1	A3
Participant 15	D3	C1	B4	A2
Participant 16	D4	C3	B2	A1