What impact does the presence of background sound have on task performance and concentration?

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Abstract

The project investigated the impact of background sound on task performance and concentration. A pilot study indicated that task performance would reduce in the presence of noise. The main study reflected these results, with meaningful noise; office noise and participants own music causing more disruption to task performance. However, white noise was shown to facilitate task performance.

Introduction

Previous research has found that environmental noise can produce damaging effects to public health and well-being, especially to those in urban areas (Jakab, 2018).

Given the increase in the use of open-plan offices since their advent in the 1960's (Duffy, 1997), there have been a number of issues associated with noise distractions which have the potential to have a negative impact on the productivity and well-being of people in those environments (Sykes, 2004).
Not all sound is considered as detrimental toward employee productivity. Some studies suggest that music can have a positive impact on cognitive performance (Dalton & Behm, 2007). Nevertheless, there are conflicting views in this literature.

Therefore, this project investigates what impact does the presence of background sound have on task performance and concentration? What are the types of sound that can cause a change?

Aims & objectives

The aims and objectives for this research project are as follows:

- Devise a method for experimentation
- Trial and test method (pilot study)
- Evaluation and reflection
- Final experiment

Pilot Study

- A pilot study was undertaken to gather data on the most appropriate method for the final experiment and to form a hypothesis.

Method

- 9 Participants underwent a serial recall task in cafeteria noise and silence. Recording, playback and data collection techniques followed standardised procedures in accordance to ISO 12913 (ISO, 2014).

Results

- Participants were more accurate and efficient in the quiet condition than in cafeteria noise.

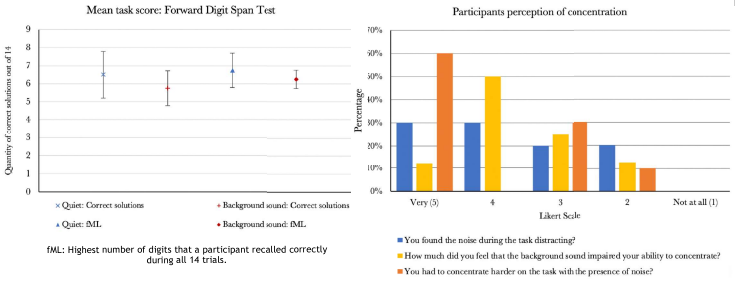

Figure 1. Pilot study, task and questionnaire results.

Conclusion

- Results indicated that task performance reduced in the presence of background noise. It is hypothesised that this effect would be seen with a larger sample size.

Methodology

- Online repeated measures design
- Experimental instruction guide distributed to 33 participants via email and social media.
- Participants asked to repeat the experiment the following day.

Participants completed 4 variations of a working memory task in the presence of 4 typical sound conditions perceived in an open-plan office:

- White noise,
- Office noise,
- Participants own music,
- No sound.

Sound conditions were played back over headphones via Spotify - "medium level background sound - audible but not too loud". A post experiment questionnaire implemented Google Forms to determine the participants perception of noise.

References

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Results

- Overall, participants were less accurate and efficient in noise than in silence, but were more accurate in white noise.
- Participants were more accurate and efficient in the repeated experiment than in the initial experiment.

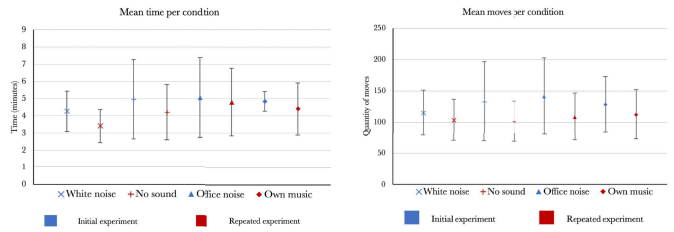

Figure 2. Mean scores per sound condition.

- The Easter egg and smiley face task took considerably longer and more moves to complete.

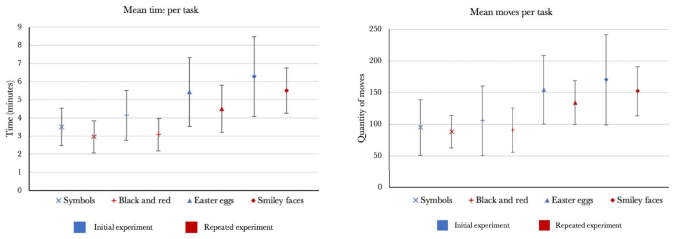

Figure 3. Mean scores per task.

- Participants felt most distracted by office noise and their own music.
- Participants felt that they had to concentrate hardest in white noise, no sound and their own music.

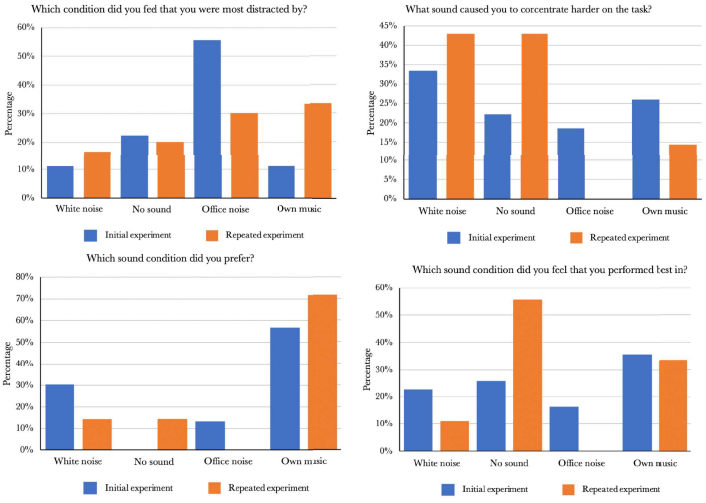

Figure 4. Questionnaire results

Conclusion

- The results were reflected from the pilot study into the main study.
- It would appear that the more meaningful the noise is, the more distracting it is. However, white noise which is considered as non-meaningful was shown to facilitate task performance.
- It is suggested that white noise could have provided sound masking whilst not perceived as a new source of distraction.
- The participants own music which was the condition at which subjects felt that they performed best in, resulted in the condition they performed worst in.
- The results also indicated that not all tasks were equal in difficulty, neither were they undertaken in a randomised order as instructed to do so. This would suggest that task performance in this study is a function of task difficulty rather than the impact of background sound.

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