Literature Review

Introduction

The full project proposal that was previously submitted outlined the justification to investigate the current knowledge of video games’ (VG) effects on the human response time. The project will aim to discover the existing understanding of these effects and develop it by monitoring how different types of stimuli (visual, tactile and auditory) can individually affect the response time. Since the approval of the proposal, a literature survey has been undertaken and this summary of the literature review details all of the critical findings. This summary describes the effects of varying stimuli as well as VG’s importance in these discoveries, and how these two factors are implemented together.

Method of Testing

A VG requires reactive inputs from the user in order to play. In the case of most modern VG platforms, 3 different types of stimuli are used to initiate these reactions: visual, auditory and tactile. For testing purposes, the time between the stimulus occurring and the user reacting can be recorded. It was discovered by Ng et al. (2012) that each stimulus generates different speeds of reaction, the fastest reaction being caused by tactile stimuli, followed by auditory and visual respectively. Video game players have already been proven to have faster reactions than people who don’t by Castel et al. (2005). Orosy-Fildes et al. (1989) also observed that reaction times dropped after the usage of VGs, along with no decrease in reaction times in users that did not participate in any VGs. Combining these findings along with the knowledge that 74% of the UK population owned a smartphone in 2016 in a growing trend (Statista, 2019), alludes to the credibility of using mobile phones for testing the hypothesis. This credibility is extended by the fact that mobile phones have the ability to generate all 3 types of stimuli.

Effectiveness and Accuracy

Dye et al. (2009) said playing action VGs ‘requires rapid processing of sensory information’, requiring the player to make quick and accurate decisions, faster than any typical daily activity. Playing First Person Shooter (FPS) VGs, a type of action VG, have also been ‘associated with increased cognitive flexibility’ by Colzato et al. (2012), thus corroborating the use of action games as the most effective VG type to improve human response time. Accuracy is also important alongside the speed of a reaction, and must be considered during testing. Greenfield (1984) discussed the importance VGs ability to improve ‘sensorimotor skills such as eye-hand coordination’, which Green et al. (2006) went on to confirm, along with ‘decreased reaction times’ and ‘augmented manual dexterity’. These claims describe the importance of the role that VGs play on these reactions and imply the significance of measuring accuracy during the testing procedure, as it will most likely be improved over the course of the testing period. It will also be crucial during the testing period to have repetitive testing, as Greenfield et al. (1994) found that VG experience ‘produced a significant decrease in response time’, especially when repeated over a period of time.

Conclusion

This summary literature review has covered all the key elements of VGs and response time testing that will be required to be analysed by the project. From the evaluation it can be understood that the 3 stimuli types must be considered and implemented into the VGs created, and repetition should take place during the testing period in order to understand the gradual improvement VGs can have. Both response time and accuracy must also be considered when measuring during the testing procedure, in order to generate an accurate representation of the response quality from the user. This project should be able to discover the potential that VGs could have over the human response, and elaborate on the previous findings to gain a further understanding.

References

Ng, A. and Chan, A. 2012. Finger response times to visual, auditory and tactile modality stimuli. *Proceedings of the international multiconference of engineers and computer scientists*, 2.

Castel, A. D., Pratt, J., & Drummond, E., 2005. The effects of action video game experience on the time course of inhibition of return and the efficiency of visual search. *Acta psychologica*, 119(2), 217–230.

Orosy-Fildes, C., & Allan, R. W., 1989. Psychology of computer use: XII. videogame play: human reaction time to visual stimuli. *Perceptual and motor skills,* 69(1), 243–247.

## Statista, 2018. ***Share of smartphone users in the United Kingdom (UK) from 2012 to 2016, by age [online].* Google. Available from:** https://www.statista.com/statistics/732535/united-kingdom-smartphone-users-by-age/ **[Accessed 1 November 2018]**

Dye, M. W. G., Green, C. S., & Bavelier, D., 2009. Increasing speed of processing with action video games. *Current directions in psychological science,* 18(6), 321–326.

Colzato, L. S., van den Wildenberg, W. P. M., Zmigrod, S., & Hommel, B., 2012. Action video gaming and cognitive control: playing first person shooter games is associated with improvement in working memory but not action inhibition. *Psychological research*, 77(2), 234–239.

Greenfield, P. M., 1984. *Mind and media: the effects of television, video games and computers.* Cambridge: Harvard University Press.

Green, C. S., Bavelier, D., 2004. The cognitive neuroscience of video games. *Digital media: transformations in human communication.*

Greenfield, P. M., DeWinstanley, P., Kilpatrick, H., & Kaye, D., 1994. Action video games and informal education: effects on strategies for dividing visual attention. *Journal of applied developmental psychology*, 15(1), 105–123.

Progress Report

During November/December 2018, the work on the project consisted of the initial concept design, ethical consideration, and the literature review summarised in the preceding section. The content of the literature review was discovered during a search conducted that considered work discussing the topics relevant to the project. The two generalised topics discussed were how different types of stimuli used in a repetitive manner could improve the human response time, and how video games can improve the cognitive ability of the player. The search was conducted with these questions in mind in order to find the most effective solutions to these topics, and then to consider how they can be utilised for the production of this project. The search found that there will be 3 possible types of stimuli to be used, with varying effects on reaction time: tactile, auditory, and visual stimuli gaining the fastest to slowest reaction time respectively. It was also shown that video games do have an effect on response times, therefore this project will combine these two findings to discover a more detailed understanding on the effects of video games and their involvement in the human response. The initial design concept has also been discussed, with the conclusion of 3 mobile games within one app to be created. These games will consist of simple reaction-based gameplay that can test and record the player’s response times, outputting an average at the end of the game session. This can then be used to compare results over a set testing period. The 3 games will have a different game style, one being a driving game, another being a shooting game, and the last being a dodging game. These are all action games, as it has been found that this particular game type yields the greatest reaction in reducing response times. Finally, the ethics related to this project were considered and are currently being evaluated, with the assumption that the project will be approved and allowed to progress.

