THE EFFECT OF MUSIC ON MEMORY FOR FACTS LEARNED IN A VIRTUAL ENVIRONMENT

By

Eric Fassbender

Dissertation

Presented to

Department of Computing,

Macquarie University

in partial fulfillment of the requirements for the degree of

Doctor of Philosophy

Macquarie University

October 2009
Statement of Candidate

I certify that the work in this thesis entitled “VirSchool – The Effect of Music on Memory for Facts learned in a Virtual Environment” has not previously been submitted for a degree nor has it been submitted as part of requirements for a degree to any other university or institution other than Macquarie University.

I also certify that the thesis is an original piece of research and it has been written by me. Any help and assistance that I have received in my research work and the preparation of the thesis itself have been appropriately acknowledged.

In addition, I certify that all information sources and literature used are indicated in the thesis. The research presented in this thesis was approved by Macquarie University Ethics Review Committee, reference number: HE23FEB2007-D05027 on 09.03.2007

Eric Fassbender - 40858839

Darwin, 6th of October 2009
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For my family

I love you
I would like to thank my supervisors for their invaluable guidance and support. Debbie Richards for her incredible patience and for giving me the time when I needed it and reminding me of the priorities when necessary. For her openness to new ideas, her planning and organisational skills and for her guidance in technical and editorial questions. Her motivational and inspirational nature is a glowing example for every supervisor. She has always been there for me, no matter the circumstances. I thank you wholeheartedly for all you have helped me with, especially the things that I will probably never know.

Ayse Bilgin for her help with statistical analysis and her outstanding patience to put up with my continuous questions. She walked many extra miles to help me with the analysis of the experiment data. I have learned that statistics can be a very powerful tool, however, something tells me that I might never love statistics as you hoped I would by the end of this study. Bill Thompson for his incredible amount of knowledge and willingness to share his expertise about music and cognition. It was a real strike of luck that we met each other. Alan Taylor for his kindness and help with SPSS and statistical analysis.

I especially would like to thank the reviewers of my thesis, Scott D. Lipscomb, Michael J. Jacobson and Tapio Lokki for their extremely valuable and detailed comments. I very much appreciate that you with your busy calendars took so many hours of your time to read and make suggestions for a thesis of someone who you have never met before. This is outstanding and one of the amazing aspects of the academic community! You helped me tremendously to improve the quality of this thesis. Thank you.
John Porte for his technical support and for asking the right questions at the right time. Iwan Kartiko for lending me his license of Fraps and for sharing his knowledge. The wizards from Computing Technical Support (CTS) for making the impossible possible and for helping out in any way possible. They are the heart and soul of the Computing Department at Macquarie University.

Wolfgang Heiden and Stephen Barrass for believing in me and for showing me the way. Genevieve McArthur and Chris Sewell for their help with experiment design, Sarah Keith, Bojan Neskovich and Mark Evans for musical advice. Henry Gardner for advice on questionnaire design. Macquarie University for supporting me with a scholarship. Erik Champion for the always interesting and inspiring conversations, the resulting tips and his objective view on the situation. Manolya Kavakli for her help in the first phase of the project.

My friends Gaurav Gupta and Gunjan Chamania for help when I needed it the most, many enjoyable evenings and weekends and simply for their friendship. Naomi Lacey for letting me use her Internet when I was "the only computer scientist in Australia without an Internet connection" for three weeks. Leah Boucher for opening my mind to the power of music to bring people together. Simon O'Hanlon for creating the 'Mini-CAVE' at home and thus sparking the idea for this research. Martin Nachtsheim and Julia Kalkbrenner for their deep friendship and the moral support over the many years.

And most importantly, my family for their love and support to help me live my dream. Ich liebe euch, auch wenn ich weit weg bin.

Thank you,

Eric Fassbender
Video games are becoming increasingly popular and their level of sophistication comes close to that of professional movie productions. Educational institutions and corporations are beginning to use video games for teaching purposes, however, not much is known about the use and effectiveness of video games for such purposes. One even less explored factor in video games is the music that is played throughout the course of the games. Little is known about the role that this music plays in cognitive processes and what effect background music has on players' memory. It is this question that the present thesis explores by asking which effect background music has on participants' memory for facts that are learned from a virtual environment.

To answer the research question, a computer-animated history lesson, called VirSchool, was created which used the history of the Macquarie Lighthouse in Sydney as a basis for two experiments. Different musical stimuli accompanied the audio-visual presentation of the history topic. These stimuli were tested for their effectiveness to support participants' memory. The VirSchool history lesson was first presented in a Reality Center (a highly immersive, semi-cylindrical 3 projector display system) and one soundtrack was identified which showed a statistically significant improvement in the number of facts that participants remembered correctly from the VirSchool history lesson. Furthermore, Experiment 1 investigated how variations of tempo and pitch of the musical stimuli affected memory performance. It was found that slow tempo and low pitch were beneficial for remembrance of facts from the VirSchool history lesson.

The beneficial soundtrack that was identified in Experiment 1 was reduced in tempo and lowered in pitch and was subsequently used as the sole musical stimulus in Experiment 2. Furthermore, because of equipment failure,
Experiment 2 offered the opportunity to compare memory performance of participants in the Reality Center and a 3-monitor display system, which was used as a replacement for the defect Reality Center. Results showed that, against expectation, the memory for facts from the VirSchool history lesson was significantly better in the less immersive 3-monitor display system. Moreover, manipulated background music played in the second five and a half minutes of the VirSchool history lesson in the Reality Center resulted in a statistically significant improvement of participants’ remembrance of facts from the second five and a half minutes of the VirSchool history lesson. The opposite effect was observed in the 3-monitor display system where participants remembered less information from the second five and a half minutes of the VirSchool history lesson if music was played in the second five and a half minutes of the VirSchool history lesson.

The results from the present study reveal that in some circumstances music has a significant influence on memory in a virtual environment and in others it does not. These findings contribute towards and encourage further investigation of our understanding of the role that music plays in virtual learning environments so that they may be utilised to advance learning of future generations of students.