



University
of Victoria

Graduate Studies

Notice of the Final Oral Examination
for the Degree of Master of Science

of

ERIKA SHAW

BSc (University of Washington, 2011)

**“A Comparison of Two-Dimensional and Three-Dimensional
Perceptual-Cognitive Training in Concussed Populations”**

Department of Exercise Science, Physical and Health Education

Friday, April 26, 2019
9:00am
McKinnon Building
Room 155

Supervisory Committee:

Dr. Brian Christie, Department of Exercise Science, Physical and Health Education,
University of Victoria (Supervisor)

Dr. Lynne Stuart Hill, Department of Exercise Science, Physical and Health Education,
UVic (Member)

External Examiner:

Dr. Jodie Gawryluk, Department of Psychology, UVic

Chair of Oral Examination:

Dr. Gary MacGillivray, Department of Mathematics and Statistics, UVic

Dr. David Capson, Dean, Faculty of Graduate Studies

Abstract

The NeuroTracker (NT), a computerized three-dimensional multiple object tracking (3D-MOT) training device, has potential benefits for concussion assessment and management, as well as maintenance of cognitive function. Accessing 3D technology is a limiting factor for 3D-MOT, so we assessed the performance of MOT training in 2D and 3D environments in both healthy and concussed individuals (8-91 years of age). The participants (n=86) who completed all ten training sessions over the three-month period, were assigned to one of three different studies: (1) an environment comparison (2D versus 3D), (2) an age comparison (youth, young adult, and older adult), or (3) a concussed population comparison (non-concussed, recently concussed, and prolonged concussed). In all studies, performance increased with training, indicating all individuals could increase perceptual cognitive function in all environments. Significant differences were apparent when 2D and 3D environments were compared, with participants in the 3D environment out performing participants in the 2D environment. Furthermore, switching from the 3D to the 2D environment was detrimental to learning performance. When comparing learning performance between different aged individuals, a linear regression demonstrated learning performance increased at a lesser rate with age ($p<0.05$). Concussed populations also demonstrated correlative trends when comparing learning performance, as well as initial NT scores. The longer an individual was suffering from concussion symptoms, the lower the initial NT score was, but the higher the rate of learning performance was throughout training. Further investigation into attention, memory, and visual processing speeds in each population may help to better resolve the relationship between these domains and clarify if NT can serve as a means for concussion assessment and rehabilitation for individuals at any age in the future.