



University
of Victoria

Graduate Studies

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

of

ANTHONY PLUTA

BSc (University of Phoenix, 2013)

“Using Background EEG to Predict Baseball Batting Performance”

School of Exercise Science, Physical and Health Education

Thursday, August 10, 2017

10:00 a.m.

McKinnon Building

Room 155

Supervisory Committee:

Dr. Olave Krigolson, School of Exercise Science, Physical and Health Education, University of Victoria (Supervisor)

Dr. John Meldrum, School of Exercise Science, Physical and Health Education, UVic (Member)

External Examiner:

Dr. Gordon Binsted, Department of Health & Social Development, University of British Columbia

Chair of Oral Examination:

Dr. Pan Agathoklis, Department of Electrical and Computer Engineering, UVic

Dr. David Capson, Dean, Faculty of Graduate Studies

Abstract

In this thesis, I sought to determine whether frequency bands in the human electroencephalogram could be used to predict baseball batting performance. Past electroencephalographic (EEG) studies have found that alpha power in the human electroencephalogram predicts subsequent performance. Specifically, Mathewson and colleagues (2012) found that background brain activity, in particular, frontal alpha, had a direct correlation with one's ability to learn a video game. Here, we decided to see if a similar result would hold true for baseball batting performance. We used a portable electroencephalographic (EEG) data collection system to record EEG data prior to batting practice. Participants sat quietly in a room with the portable EEG unit affixed to their head. Participants then stared in silence at a fixation cross in the center of a computer screen for 30 seconds and then counted backwards from 1000 by 7's for 30 seconds as a masking task while background EEG was recorded. Player's were then immediately given live batting practice and with performance judged by three different coaches on four different criteria. The four criteria were: batting mechanics, power, contact, and the batter's ability to recognize good and bad pitches. Post-hoc, a frequency decomposition was performed on each participants' EEG data to obtain power in all frequency bands. A correlation analysis of EEG power and batting performance showed that beta power and not alpha power predicted the subsequent performance of the batter. Importantly, a high correlation and significance show that predicting a batter's performance with a portable EEG system, specifically the MUSE Headband, is highly plausible.