ABSTRACT

The overarching aim of this thesis was to further understand the processes and internal representations involved in predicting action outcomes, by manipulating information sources during learning and prediction.

Growing evidence suggests that the human motor system is activated during action observation, such that motor representations are invoked, through simulative processes that help facilitate an understanding of the unfolding action. In this work, we employed a design that manipulated visual and motor influences during learning and prediction, to try to understand; a) the types of internal representations acquired during practice, and b) how, and under what conditions, these representations are activated during prediction, and, more specifically, the conditions under which action prediction can come about through either visual- or motor-based mechanisms.

In Experiment 1 we found that a group that learned to throw darts without vision of the action performed as well, on a post-practice prediction task, as a group that practiced with full vision. These results suggested that motor practice was key to learning the skill, and vision appeared not to be important. However, it was unclear whether motor representations were formed during practice, and then simulated during action prediction, or that visual representations were formed during practice and later compared to the visual input through a perceptual matching process. In Experiment 2 we showed that an incongruent secondary motor task interfered with the prediction process, reducing prediction accuracy of experts to the level of a novice with no motor experience with the task. These results implied that motor system activation was responsible for prediction accuracy, by simulating established motor representations within the observer. In Experiment 3, results showed that a group that trained physically, significantly improved their prediction accuracy, but performed at a pre-training level while engaging in an effector-specific, incongruent secondary motor task during prediction. In contrast, a perceptually trained group also significantly improved their prediction accuracy after practice, but did not exhibit any modulation of prediction accuracy while engaged in the secondary motor task. These results suggest that action prediction can be mediated by different processes, one motor-based and one visually-based, depending on type of training.

BIOGRAPHICAL NOTES

Place of Birth: Birmingham, England

Academic Studies:

M.B.A. Simon Fraser University, 2001
M.Sc. Simon Fraser University, 2008

GRADUATE STUDIES

Field of Study: Kinesiology (motor behaviour)

Courses

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Instructors</th>
</tr>
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<tbody>
<tr>
<td>HKIN 567</td>
<td>Human Motor Performance</td>
<td>Dr. R. Chua</td>
</tr>
<tr>
<td>HKIN 568</td>
<td>Seminar in Human Motor performance</td>
<td>Dr. I. Franks</td>
</tr>
<tr>
<td>EPSE 592</td>
<td>Experimental Designs and Analysis in Educational Research</td>
<td>Dr. N. Kishor</td>
</tr>
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AWARDS

Graduate Fellowship Award, Simon Fraser University, 2006, 2007
Graduate Fellowship Award, University of British Columbia, 2009, 2010, 2011

PUBLICATIONS


PRESENTATIONS


PROGRAMME

The Final Oral Examination
For the Degree of

DOCTOR OF PHILOSOPHY
(Kinesiology)

DESMOND E. MULLIGAN

M.B.A., Simon Fraser University, 2001
M.Sc., Simon Fraser University, 2008

Friday, April 1, 2016, 12:30 pm
Room 203, Graduate Student Centre
Latecomers will not be admitted

“Evidence for the Neuromotor Simulation Hypothesis in Action Prediction”

EXAMINING COMMITTEE

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Dr. Catharine Winstanley (Psychology)

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