



**University
of Victoria**

Graduate Studies

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

of

DUO WANG

BSc (University of Victoria, 2016)

**“Understanding the dynamics of functional and volumetric action
representations when prepared for immediate execution”**

Department of Psychology

Wednesday, December 12, 2018
10:00 A.M.
Cornett Building
Room B145

Supervisory Committee:

Dr. Daniel Bub, Department of Psychology, University of Victoria (Co-Supervisor)
Dr. Michael Masson, Department of Psychology, UVic (Co-Supervisor)

External Examiner:

Dr. Marc Klimstra, School of Exercise Science, Physical and Health Education, UVic

Chair of Oral Examination:

Dr. Yin-Man Lam, Department of Anthropology, UVic

Dr. David Capson, Dean, Faculty of Graduate Studies

Abstract

This study examines the state of competing affordances when an action is prepared for immediate production. More specifically, we investigated the nature of motor representations evoked by distinct action intentions, with a special interest in functional (grasp to use) and volumetric (grasp to lift) actions. With just two objects available, participants were asked to prepare an action on a particular object (e.g., preparing to lift the cellphone), and when signaled, either to perform this original action plan or to switch to executing an alternative one, either on the same or different object. By manipulating cueing methods used for indicating the preparatory and the target action plans, we found distinct patterns in the effect of preserving either object (different action on the same object) or action (same grasp type on a different object) on action execution. Changing either component of the action-object pairing incurred a cost in response time. In Experiment 1, a cost was observed when a prepared action was switched to an alternate action on the same object. For example, preparing to lift a cellphone but switching instead to a use action on the same object, incurred a cost. A further cost was found when subjects prepared a functional action to one object (e.g., use the cellphone) but switched to the same class of action on the alternate object (e.g., use the spray can). Both these effects were found to operate at the motor level. No costs were observed when subjects switched from a planned action to naming the target object (Experiment 3). Crucially, it was found that the nature of the cueing method instructing subjects to switch from a planned to an alternate action impacted the effect of action congruency. The cost observed in Experiment 1 when subjects switched to an alternate action on the same object occurred when the switch from a planned to an alternate action was cued by a verb-noun combination (e.g., *use cellphone*). No such cost occurred when the action was cued by a verb (e.g., *use*) and the target object was spatially cued by an arrow pointing to its location (Experiment 2). The cost of switching from a planned action type (e.g., a use action) to the same action type carried on the alternate object also depended on whether the planned action was verbally or spatially cued. These results provide new evidence on the nature of action representations associated with different motor intentions, as well as of the nature of action-object pairings.