

**Analyzing The Effects of Instrumental and Cognitive Workload on the
Control of Cognition at the Time Scale of Interactive Behavior**

By

Jason Ralph

An Abstract of a Thesis Submitted to the Graduate

Faculty of Rensselaer Polytechnic Institute

In Partial Fulfillment of the

Requirements for the degree of

MASTER OF SCIENCE

Major Subject: COGNITIVE SCIENCE

The original of the complete thesis is on file
in the Rensselaer Polytechnic Institute Library

Approved:

Wayne Gray, Ph.D., Thesis Adviser

Michael Schoelles, Ph.D.

Brett Fajen, Ph.D.

Rensselaer Polytechnic Institute
Troy, New York

October 2010
(For Graduation May 2011)

Abstract

This thesis reports a series of experiments designed to test the relative impacts of instrumental workload (eye movements), cognitive workload (memory, attention), and modality (visual, auditory) on dual task performance. Experiments were conducted using the NavBack paradigm, which combines a visual tracking task with an n-back style memory task. Results suggest that eye movement behavior, and not an overload of visual processing cause most of the effects discovered. In addition, memory load seems to affect the brain's ability to exert proactive control over eye movements, resulting in hard to predict performance effects. These results are analyzed in terms of the control of cognition at the timescale of interactive behavior and suggest that understanding these control functions may be the key to understanding how workload effects performance in a variety of tasks.