



**University
of Victoria**

Graduate Studies

Notice of the Final Oral Examination
for the Degree of Doctor of Philosophy

of

SIMEN HAGEN

BA (University of Victoria, 2011)

“The influence of real-world object expertise on visual discrimination mechanisms”

Department of Psychology

Tuesday, December 12th, 2017

10:00 a.m.

Clearihue Building

Room B021

Supervisory Committee:

Dr. James Tanaka, Department of Psychology, University of Victoria (Supervisor)

Dr. Daniel Bub, Department of Psychology, UVic (Member)

Dr. Clay Holroyd, Department of Psychology, UVic (Member)

Dr. Bob Chow, Department of Biology, UVic (Outside Member)

External Examiner:

Dr. Adrian Nestor, Department of Psychology, University of Toronto

Chair of Oral Examination:

Dr. Peter Oshkai, Department of Mechanical Engineering, UVic

Abstract

Object experts quickly and accurately discriminate objects *within* their domain of expertise. Although expert recognition has been extensively studied both at the behavioral- and neural-levels in both real-world and laboratory trained experts, we know little about the visual features and perceptual strategies that the expert learns to use in order to make fast and accurate recognition judgments. Thus, the aim of this work was to identify the visual features (e.g., color, form, motion) and perceptual strategies (e.g., fixation pattern) that real-world experts employ to recognize objects from their domain of expertise. Experiments 1 to 3 used psychophysical methods to test the role of color, form (spatial frequencies), and motion, respectively, in expert object recognition. Experiment 1 showed that although both experts and novices relied on color to recognize birds at the family level, analysis of the response time distribution revealed that color facilitated expert performance in the fastest and slowest trials whereas color only helped the novices in the slower trials. Experiment 2 showed that both experts and novices were more accurate when bird images contained the internal information represented by a middle range of SFs, described by a quadratic function. However, the experts, but not the novices, showed a similar quadratic relationship between response times and SF range. Experiment 3 showed that, contrary to our prediction, both groups showed equal sensitivity to global bird motion. Experiment 4, which tested the perceptual strategies of expert recognition in a gaze-contingent eye-tracking paradigm, showed that only in the fastest trials did experts use a wider range of vision. Experiment 5, which examined the neural representations of categories within the expert domain, suggested that the mechanisms that represents within-categories of faces also represented within-categories from the domain of expertise, but not the novice domain. Collectively, these studies suggest that expertise influence visual discrimination mechanisms such that they become more sensitive to the visual dimensions upon which the expert domains are discriminated.