

BACHELOR OF SCIENCE (2006)
MCMASTER UNIVERSITY
Hamilton, Ontario

TITLE: Characterizing Orientation Tuning Channels In Younger And Older
Humans

AUTHOR: Esther J. Roche

SUPERVISOR: Dr. Allison B. Sekuler

NUMBER OF PAGES: vi, 21

Abstract

Human visual function declines with age. Ocular structures and lower visual pathway structures both show negligible morphological and functional age-related changes. The primary visual cortex is now being studied to determine its role in the neural basis of aging visual performance deficits. Previous studies investigating orientation selectivity in monkey V1 cells have revealed reduced stimulus selectivity with age (Schmolesky et al., 2000), possibly as a result of lowered GABA functioning (Leventhal et al., 2003). We ask whether the same effects can be observed psychophysically in aging human orientation channels. A 2-IFC task measured detection thresholds for a horizontal Gabor target ($sf=2.5$ cpd; duration 200 ms) embedded in noise. Across blocks we manipulated the extent to which the noise was notched around the orientation of the Gabor target ($0^\circ, 30^\circ, 60^\circ, 90^\circ, 120^\circ, 150^\circ, 160^\circ$). Detection thresholds decreased as notch width increased, enabling us to estimate orientation bandwidths. Overall, the bandwidth of aged human orientation channels was comparable to that of younger observers. Although, as in monkeys, aged human V1 single cells may be less finely tuned for orientation, it is possible that psychophysical estimates of orientation tuning in humans incorporate compensatory age-related changes in processing at higher levels in the brain.

