7.8

RESPONSES OF CELLS IN MACAQUE V1 TO CHROMATIC STIMULI ARE COMPATIBLE WITH HUMAN COLOR CONSTANCY

T. Wachtler*, T.J. Sejnowski, T.D. Albright. The Salk Institute for Biological Studies, La Jolla, CA 92037.

The responses of chromatically selective neurons in striate cortex to color stimuli are thought to depend only on the local wavelength composition, unlike color percepts, which are influenced by chromatic context. However, some V1 neurons can be influenced by other contextual stimuli, so we recorded neural responses in V1 of awake macaques to color patches on colored backgrounds, stimuli that are typically used in color appearance studies. The patches were squares, between 2° and 4.5° in size and at least twice as large as the classical receptive field, and were presented on backgrounds of different chromaticities. In addition, 2° colored squares of the same chromaticity as the stimulus were displayed at 4–6 degrees from the receptive field. The chromatic tuning of cells was altered on chromatic backgrounds compared to responses on a neutral gray background (Wachtler et al 1999 *IOVS* 40 4:S641). With respect to a color constancy measure based on cone ratios, the response change for stimuli in the same chromatic direction as the background corresponds to an average degree of color constancy of 0.7 (±0.3). The presence of remote color patches, which alone did not evoke a response, changed the response to a stimulus in the receptive field in 50% of the cells tested. The response was reduced by 20% on average. This response modulation by remote chromatic stimuli in V1 cells is qualitatively similar to findings for color-selective cells in V4 (Desimone et al 1990 *J. Neurosci.* 10:3369) on a different spatial scale. It also matches the results of our studies of human color perception (Wachtler et al 1998 *Soc. Neurosci. Abstr.* 24 2:1398) where we had found a degree of color constancy of 0.5–0.9, depending on observer, which was significantly modulated by remote chromatic patches. These results indicate that chromatic context influences V1 cells consistent with corresponding perceptual effects, thus suggesting that early visual processing may contribute to color appearance and color constancy. (Supported by the Howard Hughes Medical Institute and the Sloan Center for Theoretical Neurobiology)