ARVO-95, no. 3017, Invest. Opthamology and Visual Science, Vol. 36, no.4, p.661

COMPENSATION FOR CHROMATIC ABERRATION IS INDEPENDENT OF BACKGROUND COLOR

((X-M. Zhang, E.S. Olds, H.Z. Hel-Or, E.J. Chichilnisky, and B.A. Wandell))
Department of Psychology, Stanford University, Stanford, CA.

Purpose: Chromatic aberration of the eye changes the ratio of the L/M/S cone contrasts of thin lines compared to thick lines. To preserve color appearance, the nervous system must compensate for this contrast difference. We have studied (1) whether the color appearance of a line remains constant as its width is reduced, and (2) whether the mechanisms that compensate for chromatic aberration are affected by backgrounds that alter the relative cone sensitivities.
Methods: We used two methods to measure the effect of background light on 5 deg lines of different widths (6 to 60 min). In the *achromatic method*, the observer adjusted a target presented on various colored backgrounds to appear achromatic. We obtained achromatic settings over a range of incremental and decremental contrast levels to define an achromatic locus for each background. In the *dichoptic method*, the left eye was adapted to a gray background (25 cd/m^2) and the right eye was adapted to a colored background. The observer set a color match between a test light presented on the gray background and a separate target presented on the colored background.
Results: Achromatic loci were virtually unaffected by line width despite the presence of chromatic aberration. Background light had the same effect on dichoptic matches and achromatic settings measured with thin and thick lines. In both experiments, background changes affected decrement settings more than increment settings. Decrement settings were consistent with independent gain changes in signals arising from each cone class. Increment settings were not. The last three results confirm Chichilnisky and Wandell (ARVO, 1995).
Conclusions: Observers compensate for the effects of chromatic aberration in their achromatic judgments. This compensation is independent of adaptation to the background light.

Supported by NEI EY03164. Commercial relationships disclosure: none.