

# LOWERING OF FUNCTIONAL PHOTOPHOBIA THRESHOLD WITH DAILY, SUSTAINED CLOSEWORK ACCOMMODATION

Benjamin C. Lane, O.D., C.N.S., F.A.A.S., F.A.C.N., F.C.O.V.D  
Nutritional Optometry Institute

*Eastern Seaboard Invitational Skeffington Symposium on Visual Training, 23, 64-78, 1978.*

**Abstract.** *Binocular facilitation of photophobia was elicited in at least 87.5% of college students by confronting them with a 120°-wide x 60°-high peripheral vision field of high luminance, averaging 32,000 candelas per meter-squared over a large area surrounding a 34° dark-appearing center--producing functional photophobia when viewed binocularly and no photophobia monocularly.*

*Subjective photophobia thresholds were compared with electro-oculographic response (EOG), galvanic skin response (GSR), video recording and a preliminary questionnaire.*

*An "Accommodative Stress Index," the product of the {logarithm of Daily Detailed Closework Hours} X {log of the averaged Accommodative Stimulus in diopters} is correlated with:*

*(a) functional photophobia threshold in log cd/m<sup>2</sup>,  $r = -0.92$ ;*

*(b) (log Central Suppression Zone Diameter in minutes-of-arc) X {Binocular Convergence Variance in minutes-of-arc},  $r = 0.74$ ;*

*(c) Palpebral Fissure to Corneal Diameter ratio (PF:CD),  $r = -0.81$ , measured for the narrower palpebral-fissure eye 5 minutes after adaptation to the glare display.*

*This study suggests a special role of the binocularly shared peripheral vision field as part of an "ambient-vision" system and a special role for accommodative fatigue as affecting the "focal-vision" system, with each in turn affecting motor and sensory fusion. Also suggested are important new parameters for optometric clinical measurement and mechanisms for the development of astigmatism. (Supported in part by IERI Grant #102AS1).*

**Intro.** What is the value of glare hypersensitivity in non-traumatized, non-diseased, nutritionally adequate eyes? Normal glare sensitivity is a valuable protective mechanism of the eye against photic damage. What ordinarily would be considered glare hypersensitivity, a seemingly excessive, even painful sensitivity to non-damaging levels of illumination, serves as a normal protective mechanism for the traumatized eye undergoing healing (Dalessio, 1972) or for the vitamin depleted photopigments in malnourished persons and in albinos (Sorsby, 1972).

At issue is the value of glare hypersensitivity in functional photophobia, first described by Lane (1963) as associated with what Kaufman (1963) has called "binocular convergence variance" (or variability)." Functional photophobia is the most commonly encountered form of glare hypersensitivity in the United States, and it is an important clinical problem in optometric practice.

This study notes that the functional photophobe has developed aversive behaviors that have the value of protecting the individual from fusion-degrading stresses created by the large fields of high luminance that he or she cannot manage binocularly. Secondly, this study notes that by reducing the retinal illuminance with severe wincing or by closing or virtually closing one eye, the functional-photophobia response enables performance under conditions beyond the individual's range of binocular wide-open-eye ability.