

## ABSTRACT

## Glare Mitigation in Night Driving

Using Partially Tinted Lenses. (December 1995)

Adam Konstanty Aleksander, B.S.M.E., California State University at San Jose;

M.E., University of Colorado

Chair of Advisory Committee: Dr. Newton C. Ellis

Glare from oncoming vehicles on a two-lane road can be mitigated by the use of partially-tinted lenses (PTL). The shape of the tinted area corresponds to the projected area of the oncoming lane.

This concept avoids the problem of full-sized tinted lenses, such as the yellow lenses sold for night-driving, which have proven to be detrimental to night vision, decreasing the amount of light under all conditions. Although the use of PTL, visors, or similar devices is patented (Cherian, 1989), there are no known investigations of their usability.

Both a laboratory and a simulated field experiment were conducted, to test the concept under controlled conditions, and in a more realistic driving environment. The laboratory study was performed using a night-driving simulator. Subjects performed a driving task, and identified acuity targets while glare was present. There were four vision treatments; normal vision, partial tinted lenses, full lenses with partial tinting, and full yellow lenses. The dependent variable was the time to a correct response.

Two 16-subject age groups represented drivers 21 to 35, and 35 to 75. The results indicate a small but statistically significant beneficial effect of the concept for older drivers, but no significant effect for younger drivers.

The simulated field experiment was conducted on a remote runway, on an instrumented course. Subjects were asked to drive down a simulated two lane highway, wearing the glare-blocking devices, while headlights were turned on in the oncoming lane. The dependent variable was the detection distance from the subject to acuity targets along the runway.

The group of 10 subjects included drivers from 20 to 64. The results indicate a small significant beneficial effect of the partially-tinted lenses, but the effect varies with the lighting condition. The benefit of the PTL devices was most evident for a single approaching vehicle, and for sudden intermittent lights.

The device may be particularly useful to a limited population sensitive to glare, after appropriate training and further refinement of the concept.

Further studies may consider the interaction of fatigue and glare, and the possible beneficial effects of the PTL devices.