Recognition of retroreflective road signs during night driving

J. Berzinsh[1], M.Ozolinsh[1], P.Cikmacs[1], and K. Pesudovs[2]
[1]Department of the Optometry and Vision Science, University of Latvia
Riga, Latvia
[2]Department of the Optometry, Bradford University
Bradford, West Yorkshire, UK

Temporal waveforms of the illumination at the driver eyes position were determined in various night traffic and weather conditions (ideal weather and correct aligned lights as compared with dirty lamps and raindrops on the windscreen). The statistics of retinal illumination were analysed, and a computer controlled technique was developed to simulate similar changes of eye illumination. The participant fixated on retroreflective optical stimuli at a distance of 5 m. The participant was then subjected to dazzle, and recovery from the glare took place. The background illumination was in the mesopic range. Experiments showed that at background illumination 0.1 Lx no dazzling took place in case of correctly installed clean headlights. The participant was dazzled if the high beam lamps were incorrectly aligned or cycloplegia was used for pupil dilation. The dazzle time depended on the background illumination level and could increase to three seconds for the illumination changes corresponding to the equivalent speed of vehicles 50 km/h.

Introduction

Vision plays a significant role in safe driving. Standards for vision must be met for a driver to hold a licence. These standards prescribe the vision quality in normal situations with sufficient illumination levels. Driving at night is a more difficult task (Charman, 1996; Priez *et al.*, 1998), more accidents per vehicle happen on roads at night (Federal Office of Road Safety, 1996). Many measures have been undertaken to ensure safe driving at night. These include optimal road design and marking, sufficient illumination of difficult road segments, and optimum car headlight construction to provide sufficient visibility without dazzling oncoming car drivers.

Many aspects of driver vision make the task of driving at night difficult. These include lower and non-uniform illumination, a smaller ratio between visibility and braking distance, decreased visibility during rain, less reflection from the roadbed, and refracted and scattered light from the windscreen. At high adaptation levels (during the daytime - photopic vision) cone type photoreceptors dominate

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