Assessment of the relative driver safety benefit of an advanced front lighting system

Nick Reed, Andi D. Flint, & Andrew M. Parkes
TRL Limited, Wokingham, UK

Abstract

An Advanced Front Lighting System (AFS) has been developed by Hella to improve drivers' road awareness and thereby improve safety at night. However, drivers may adapt behaviour to perceive risk equivalent to that experienced with standard headlights. This adaptation may involve driving faster, braking later, or avoiding obstacles at reduced separation. This hypothesis was tested by recreating the AFS system on TRL's driving simulator. Nine participants were recruited, each completing three drives in a simulated City environment and responding to static obstructions during each exercise. Lighting conditions were night with AFS, night with standard headlights and daylight. The resultant driving data were analysed across lighting conditions and event types. Participants completed questionnaires to determine subjective opinions of the lighting systems. The results demonstrated that although participants rated the subjective clarity of the AFS system greater than that of standard headlights, there were no significant differences in terms of speed, braking, or path. The hypothesis that drivers would adapt behaviour to experience an equivalent risk level was therefore rejected, suggesting that the AFS system would improve road safety. The suggestion was made that a longitudinal study should be performed to test how drivers adapt to the technology in the longer term.

Introduction

Each year across the European Community, around 55,000 people are killed and 1.7 million are injured in road accidents at a cost of around €50 billion. A disproportionate number of the fatalities occur on roads at night. Although only 25% of all driving is performed during the hours of darkness, 55% of all road deaths occur in this period. The restricted field of view that exists when driving at night may represent a source of increased risk for the driver.

This study investigated whether there were safety benefits achieved through the introduction of an Advanced Front-lighting System (AFS) designed to improve the field of view available to the driver at night dependent upon the current driving conditions. Aside from high beam, the AFS headlight system under test can operate in three modes. The 'Country Light' mode has an asymmetric beam distribution that is broadly similar to that of standard 'non-AFS' headlights but the beams

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