

Evaluation of driver's attention by binocular gaze co-ordination while conversing on a cellular phone

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Abstract

Effects of hands-free phone conversations on drivers' visual behaviour and detection performance were examined using a gaze-tracking device and fixed-based driving simulator. The participants engaged in various conversation tasks (shadowing /arithmetic /conversation) while following a lead vehicle. The results indicated that hands-free-phone conversations, even if the contents are not subjectively demanding, can affect a driver's visual behaviour. The increment of binocular gaze dissociation induced by conversing on a phone indicates that a driver's attention is diverted from the external scenery to the conversation. Furthermore, this observed dissociation of binocular gaze may represent a resting position, which is revealed only when binocular fusion is disrupted by occluding one eye.

Introduction

Driver distraction induced by cell phone use has become a significant safety concern. Earlier research has proved that aspects of manual manipulation, dialing, and/or answering the phone can impair driving performance (Briem & Hedman, 1995, Brookhuis et al., 1991). Many countries presently have legislation banning cell phone use without hands-free equipment.

The primary advantage of hands-free equipment is that it allows drivers to use cell phones while viewing the road ahead and keeping their hands on the steering wheel. However, recent studies have indicated that even phone conversations on a hands-free phone may have a distracting effect on driving. Specifically, event detection and/or braking response performance are impaired (Consiglio et al., 2003, Cooper et al., 2003, Strayer & Johnston, 2001).

Several studies have investigated visual behaviour to evaluate the effect of a phone conversation on a driver's attention. Demanding conversation was found to restrict visual searches and/or the visual scanning area (Harbluk et al., 2002, Recarte & Nunes, 2000). However, it is difficult to discriminate whether a driver is just looking forward or gazing attentively at a safety-related object by measuring gaze directions