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Driving and Texting Performance When Drivers Text Behind the Wheel

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Abstract

Texting while driving is a prevalent risky behavior among drivers that causes thousands of fatalities each year. Compared to the attention cell phone conversations while driving is given, texting while driving is still not thoroughly investigated. This article reviews the risks of texting while driving, mutual interference of texting and driving performance and future research questions. More research focusing on texting while driving and technology solutions to reduce its risks is needed.

Keywords: Driver distraction; Cellphone; Texting while driving

Introduction

With the increasing prevalence of smartphones and wearable devices, texting while driving is becoming an important public safety hazard [1]. The National Highway and Traffic Safety Administration (NHTSA) reported that 11% of drivers are using cell phones at any one time [2]. In 2011 surveys, 74.3% to 91% of college students admitted they text while driving, with 51.8% doing so on a weekly basis [3,4]. According to the Fatality Analysis Reporting System (FARS), the proportion of driving fatalities caused by distraction increased from 10.5% in 2005 to 15.8% in 2008, which was partly due to texting while driving [5]. With new types of cell phones and devices emerging, such as Google Glass and smart watches, the rate of texting while driving may increase even more. According to the theory of dual-task performance, if two tasks share similar resources, performance of either or both tasks will be impaired when they are performed concurrently. Driving and texting require the same visual and cognitive resources, thus driving and texting performance can both be impaired when drivers text behind the wheel. A mutual interference of texting and driving performance has been reported [6].

Texting while driving impairs driving performance in various ways. For example, texting while driving increases hazard response time [7,8], causes larger variations of lane position [9-12], increases variability of headway distance [8,13], increases gaze-off-road durations [10,14,15], causes more collisions [8].

Driving also impairs texting performance [6,13]. In a study by the research group at Wichita State University, a classic Lane Change Task (LCT) and a car-following task were used to measure driving performance; a custom Android application logged the texting performance. Results showed that texting impaired driving performance by increasing brake response time and the standard deviation of lane positions [6,13]. Both the LCT and car-following tasks impaired texting by reducing the texting speed and increasing the texting errors. The mean and standard deviation of the time interval between key entries also increased significantly. Similarly, another study also reported that driving impaired concurrent secondary performance, such as language production and comprehension in a story-retelling task [16].

To better understand these risks, it is important to consider different features and designs of cell phones and their effects on driving performance, such as cell phone types (a phone with physical keyboard versus touch screen), hands-free vs. handheld phones, reading versus writing text messages.

Firstly, the texting performance may vary for keyboard type, such as a touch screen keyboard or a physical keyboard. Physical keyboards can provide texters tactical feedback about key entries, thus can potentially allow experienced texters to keep their eyes on the road longer than phones with a touch screen interface [17]. One eye-tracking study showed that touch screen smartphone users tended to produce a larger number of glances longer than 2s than users of physical keyboard, though the difference was not statistically significant [18].

Secondly, the impact of voice-recognition technology or handsfree texting is another important question concerning texting while driving. Several studies have shown the benefits of handsfree cell phone use over handheld cell phone [14]. However, the benefit of voice-recognition technology is not consistently observed [19,20]. A meta-analysis by Horrey and Wickens [20] has shown the distracting effect of handsfree and handheld phone use is similar. Whether a handsfree phone can provide better performance over a handheld phone may depend on the quality of the voice-recognition technology and duration of the texting task [12,13].

Thirdly, different components of texting behaviors can potentially influence driving performance differently, such as reading and writing text messages via either visual, auditory, or verbal modalities [12]. Text-to-speech and voice-recognition technologies may potentially reduce the amount of visual distraction compared to looking down at a phone to read messages [21]. A meta-analysis study found that lateral vehicle control and glances away from the road were less affected by reading text messages than writing them, however other research has found that reading and writing text messages almost equally impaired driving performance [1,12].

Texting while driving is becoming an increasing risk factor on the road, and the situation is likely to get worse with the rapid increase of mobile devices. More research should be carried out to promote our understanding of texting while driving and guide technology innovation, design, legislation, and driver training.

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