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Driver distraction in long-haul truck drivers

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Abstract

Research on driver distraction has typically been conducted by means of epidemiology or experimental testing. The study presented here uses a naturalistic approach, where real-world driving data were collected from truck drivers as they worked their normal delivery runs. Crash, near-crash, and crash-relevant conflict data from 41 long-haul truck drivers, driving approximately 140,000 miles, were examined. Of the 2737 crashes, near-crashes, and crash-relevant conflicts (collectively termed "critical incidents") that were recorded, 178 were attributed to "driver distraction". The 178 distraction-related critical incidents were analyzed and 34 unique distraction types were identified. Results showed that a small number of long-haul drivers were involved in a disproportionate number of distraction-related critical incidents. For example, two of the drivers accounted for 43 of the 178 distraction incidents. Important insight was also gained into the relative safety impacts of different distracting agents and behaviors. The frequency and duration of a task, along with the visual demand associated with performing the task, were found to contribute in combination to the prevalence of critical incidents. Finally, it was found that simply because a task does not necessarily require visual attention does not mean that long-haul drivers will not look (sometimes often) away from the roadway. However, it is also clear that visually demanding tasks carry the highest degree of risk, relative to other categories of tasks.

Keywords: Driver distraction; Commercial vehicle; Naturalistic; Cellular telephone

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1. Introduction

Driver inattention occurs whenever the operator of a vehicle diverts his or her attention away from the driving task. Driver distraction, on the other hand, has been defined to occur when this inattention leads to a delay in the recognition of information that is necessary to accomplish the driving task safely (Stutts, Reinfurt, Staplin, & Rodgman, 2001b). Thus, distraction occurs when inattention leads to a critical incident. This definition describes the construct of distraction on a quantifiable basis. It also accounts for the fact that drivers often gaze at areas that are irrelevant to the driving task without any undesirable consequences. By this definition, visual inattention (and many other types of inattention, including cognitive inattention) is considered harmless until it results in a critical incident. Therefore, driver distraction can be represented as: inattention + critical incident = distraction.

Using this model, studying driver distraction requires the identification of critical incidents. Critical incidents vary from high to low severity. Crashes are high severity critical incidents where there is an impact between the vehicle and another object. Low severity critical incidents include crash-relevant conflicts which involve a safety risk but where a crash does not occur. An example of a crash-relevant conflict is an unintended lane deviation in which the vehicle drifts outside the vehicle's lane of travel.

The study of distraction in the context of critical incidents has been described previously (e.g., Hancock, Lesch, & Simmons, 2003). Traditional research studying driver distraction can be classified into two broad methodological categories: epidemiology and empirical testing. Epidemiology involves looking at crashes (i.e., high severity critical incidents) after they have occurred. Researchers can use a variety of crash databases, such as the Fatal Accident Reporting System (FARS), in an attempt to assess crash causal factors. Conservative estimates based on epidemiological evidence suggest that driver distraction is a primary factor in 12.9% of all crashes (Stutts, Feaganes, Rodgman, Hamlett, Meadows, & Reinfurt, 2003a), although some of the estimates of this incidence are as high as 25–30% (Llaneras, 2000; Minter, 2000). Epidemiological research focused on specific technologies also suggests an increased crash risk due to the distraction generated by those technologies (Goodman et al., 1997; Redelmeier & Tibshirani, 1997; Violanti & Marshall, 1996). These data have prompted the National Highway Traffic Safety Administration (NHTSA) to study the driver distraction problem (Llaneras, 2000; Tijerina, Johnston, Parmer, Winterbottom, & Goodman, 2000).

However, these databases are not sufficiently detailed to assess driver behavior. For example, the crash report from a fatal crash seldom provides any information on the driver's behavior immediately preceding the crash. To obtain crash information of interest to driver distraction, researchers would require a substantial restructuring of the current data collection system. For example, police accident report forms could include a check box to indicate that the driver was using an electronic or telematics device (e.g., cellular phone) at the time of the crash (assuming that this could, in fact, be determined). Some of these restructuring efforts are already occurring (Model Minimum Uniform Crash Criteria, 2003).

Even these changes in the crash data collection process are unlikely to provide all the necessary data for the complete assessment of driver distraction, such as eye-scanning behavior. Because driving is primarily a visual task, secondary tasks and in-vehicle devices should not significantly divert the driver's eyes away from the forward roadway. By quantifying driver inattention, mea-