

# **Driver Distraction: Eye Glance Analysis and Conversation Workload**

The objective of this project was to:

- Assess the risk of performing a secondary task while driving a commercial motor vehicle (CMV).
- Better understand the relationship of conversation workload and visual distraction during mobile phone conversations or interpersonal interactions while CMV drivers are performing in real-world driving conditions.

This research analyzed naturalistic data from 6,379 commercial trucks and buses during a 4-month period. The onboard monitoring system used during the study captured numerous 30-second recordings. While reviewing the data associated with identified safetycritical events (SCEs), data analysts recorded information about each driver's behavior (including secondary tasks, talking time, conversation workload, and visual behavior) and environmental conditions. Study results documented the prevalence and risks of secondary tasks while driving, as well as conversation workload, talking time, and visual analysis during voice-related SCEs, non-safety-related events, and randomly-recorded events. Voice-related events involved the driver and/or passenger talking (e.g., driver talking to passenger, driver talking on a mobile phone, etc.). Table 1, below, displays results for the five research questions examined in this study.

# RESULTS

The final data set included 23,280 observations that were reduced by data analysts. SCEs (e.g., crashes, near-crashes, crash-relevant conflicts, and unintentional lane deviations) accounted for 1,121 observations. The data set included observations from 77 different companies at 483 different terminal locations.

The small sample size of specific secondary tasks prohibited an analysis at this level of the data.

#### Table 1. Basic findings for the four research questions examined in this study.

Research Question	Study Findings	Significant Risk (Yes/No)
What is the risk of secondary tasks while driving a CMV as related to involvement in voice-related SCEs?	• Talk to passenger(s) was a significant risk for SCEs.	• Yes
	• Talk/listen on an electronic device was not a significant risk for SCEs.	• No
What is the risk of visual distraction while driving a CMV as related to involvement in voice-related SCEs?	• Risk of SCE increased as time was closer to the triggering event.	• Yes
What is the risk of talking time while driving a CMV as related to involvement in voice-related SCEs?	• Amount of time talking on an electronic device did not increase risk.	• No
What is the risk of conversation workload while driving a CMV as related to involvement in voice-related SCEs?	• Not enough data for assessment.	• N/A



As such, the current analysis focused on secondary task categories, including the following:

- **Visual:** This could include looking at passengers and looking at a mobile phone.
- Visual/manual: This could include reaching for or putting away a Citizen's Band (CB) radio; interacting with a dispatching device; reaching for, picking up, dialing, answering, or texting on a mobile phone; reaching for, picking up, or putting away a mobile phone headset or earpiece; or reaching for or putting away a push-to-talk phone.
- **Talk/listen on an electronic device:** This could include talking or listening on a handheld or hands-free mobile phone, a push-to-talk phone, or a CB microphone.
- **Talk to passengers:** This includes talking directly to passengers.



Figure 1. Photograph. Two-camera view from the onboard monitoring system used in the current study.

Two interesting findings were related to the visual, visual/manual, and talk to passengers secondary task categories. Visual and visual/manual secondary task categories were consistently found to have no impact on the risk of involvement in an SCE compared to nonsafety-related and randomly-recorded events. Cell counts for visual and visual/manual secondary task categories were very low; thus, there were not enough data to make a meaningful interpretation. Although previous naturalistic driving truck studies have not aggregated visual/manual secondary tasks into secondary task categories as in the current study, most of the specific visual/manual secondary tasks in these prior studies have shown a significant increase in the likelihood of involvement in an SCE when performing these tasks while driving. Given the small sample size and grouping into secondary task categories, it is premature to indicate that visual or visual/manual secondary tasks are safe to perform while driving a truck or bus.

# Secondary Tasks

The only statistically significant secondary task category was "talk to passengers." Talking to passengers while driving significantly increased the likelihood of involvement in an SCE compared to non-safety-related events (odd ratios = 3.23 and 3.26) and randomly-recorded events (odds ratios = 2.85 and 2.79). Research about the risk of talking to a passenger while driving is mixed. Some studies have found a decrease in risk or no increase in risk. Studies that have found a decrease in risk suggest that an extra pair of eyes on the road to warn the driver of upcoming threats and/or the passenger's ability to modulate the conversation can benefit the driver.

Other studies have found this secondary task increases risk, suggesting the conversation itself and/or the propensity for drivers to look at the passenger with whom they are talking creates a safety deficit. However, this study does not address why talking to a passenger while driving is more likely to result in an SCE compared to talking/listening on an electronic device while driving.

# **Additional Findings**

There were very few instances where emotion type and/or emotion intensity were noted and recorded by the onboard monitoring system; thus, no analyses were performed. This suggests that emotional conversations while driving a CMV are rare.

This study assessed risk as a function of 0.25-second intervals. When calculating odds ratios in driver talking times of 0.25-second intervals, there were 14 statistically-significant odds ratios that showed a decreased likelihood of involvement in a voice-related SCE. This suggests that the amount of talking time (or the interval) during which a driver was talking on an electronic device did not increase the likelihood of a voice-related SCE. In eight of the 0.25-second intervals, eyes-off-forward-road glances significantly elevated the risk of a voice-related SCE. These intervals were close to the trigger event, suggesting that when a driver looks away is important.

To read the complete report, please visit: http://ntl.bts.gov/lib/56000/56200/56289/14-001-Cognitive\_Distraction-FINAL-NOV\_2015.pdf.

