Driver Distraction in Commercial Vehicle Operations

Dr. Richard Hanowski
Director, Center for Truck & Bus Safety
Virginia Tech Transportation Institute

First International Conference on Driver Distraction and Inattention
Gothenburg, Sweden September 28-29, 2009

VTTI
Driving Transportation with Technology

Presentation Overview

- Project Objectives
- Background
- Naturalistic Truck Studies
- Analysis Approach
- Key Findings
- Conclusions

Project Objectives

- Use VTTI's naturalistic truck study data
- Identify non-driving tasks/behaviors engaged in immediately prior to involvement in safety-critical events
- What tasks do drivers engage in and do they increase risk?
- What is the impact of tasks on drawing the driver's eyes away from the forward roadway?

Background

- There are many "driver distraction" studies; most are based on police accident reports (PARs) and simulator research
- PAR studies are limited because data is retrieved after the fact
  - Drivers may not remember details or may be hesitant to report
- Simulator results are limited because of external validity concerns
  - Simulators cannot account for perceived risk and driver choice behavior in the real-world (Sayer, Devonshire, Flanagan, 2007)

Trucking Research Gap

- Of the distraction research, most directed at light vehicle drivers
- Is driver distraction an issue in trucking?
- Current study focused on commercial motor vehicle drivers and uses continuously collected naturalistic data
  - Using video, able to determine what driver was doing *prior* to safety-critical events
  - "Instant replay"

VTTI's Naturalistic Truck Studies

- Current project used recent data from two separate studies:
  - 203 drivers, 7 fleets, 55 trucks, 3 million miles
  - Study 1: ~12 weeks per driver
  - Study 2: ~ 4 weeks per driver
- 4,452 safety-critical events
  - 21 crashes
  - 197 near-crashes
  - 3,019 crash-relevant conflicts
  - 1,215 unintentional lane deviations
- 19,888 baseline epochs (normal driving)

Analysis Approach

- Video review of all safety-critical events and baselines
- Determination made as to what driver was doing just prior to event onset (e.g., when lead vehicle began to brake)
- Some events and baseline epochs involved drivers engaged in secondary and/or tertiary tasks
- Odds ratios used to assess risk associated with different tasks (comparing event data with non-event data)
- Eye glance analysis conducted to determine where driver was looking prior to event (6 second epoch)

Is Distraction an Issue?

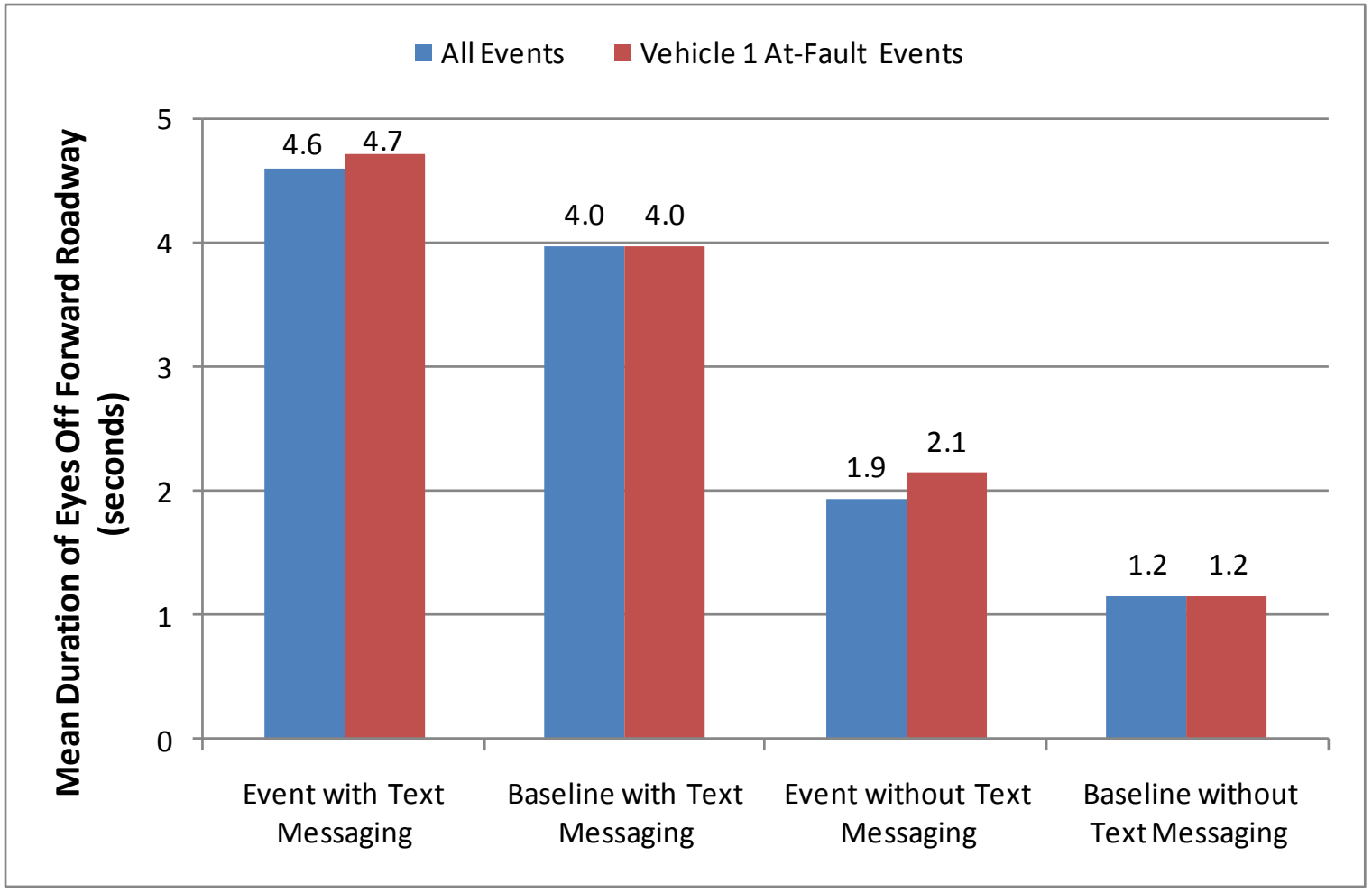
- 60% of the safety-critical events had some type of driver distraction

Event Type	All Safety-Critical Events
All safety-critical events	59.9%
Crashes	71.4%
Near-crashes	46.2%
Crash-relevant conflicts	53.6%
Unintentional lane deviations	77.5%

RQ#1- Sample of Tasks

Task	Odds Ratio	LCL	UCL	Frequency of Safety-Critical Events	Frequency of Baselines
Text message on cell phone	**23.24**	9.69	55.73	31	6
Interact with/look at dispatching device	**9.93**	7.49	13.16	155	72
Write on pad, notebook, etc.	**8.98**	4.73	17.08	28	14
Use calculator	**8.21**	3.03	22.21	11	6
Look at map	**7.02**	4.62	10.69	56	36
Dial cell phone	**5.93**	4.57	7.69	132	102
Talk or listen to hand-held phone	1.04	0.89	1.22	195	837
Talk or listen to CB microphone	**0.55**	0.41	0.75	50	399

Text Messaging on Cell Phone



VTTI
Driving Transportation with Technol

Texting Truck Driver Arrested After Hitting School Bus

April 08, 2009 1:35 AM
JACKSONVILLE, Fl.

Seven months after a school bus erupted into flames, killing one student aboard, the driver of an 18-wheeler that caused the crash has finally been arrested.
30-year-old Reinaldo Gonzales turned himself into the Florida Highway Patrol today. He was booked in the Marion County jail in Ocala, Florida charged with vehicular homicide and reckless driving with serious bodily injury. Gonzales admitted he was text messaging just minutes before he slammed into the stopped school bus with his 18-wheeler

Engineer Apparently Sent Text Message Before Crash

Federal Investigators Say They Will Seek Cell Phone Records Of Teens & Train Engineer

Sep 14, 2008 11:42 am US/Pacific
CHATSWORTH, Calif. (CBS)

Metrolink officials Saturday put the blame squarely on the engineer of the train for the deadly crash that has claimed at least 25 lives. They say he ran a red light.

One minute before the deadliest crash in Metrolink history, one teen said he received a text message on his cell phone from the engineer, whom the tee

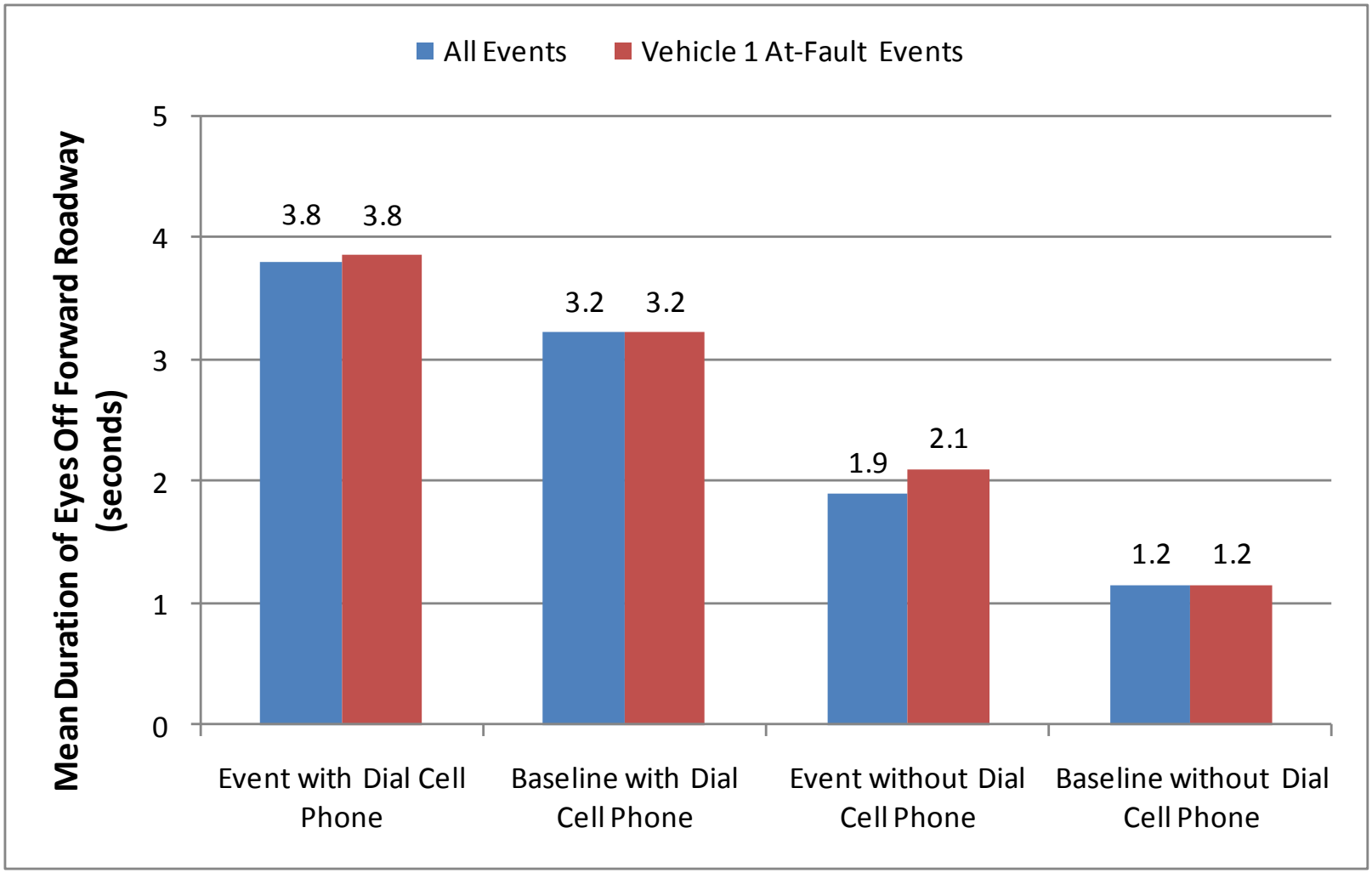
The text was brief, "Just two lin

1 in 4 Americans is texting while driving: poll

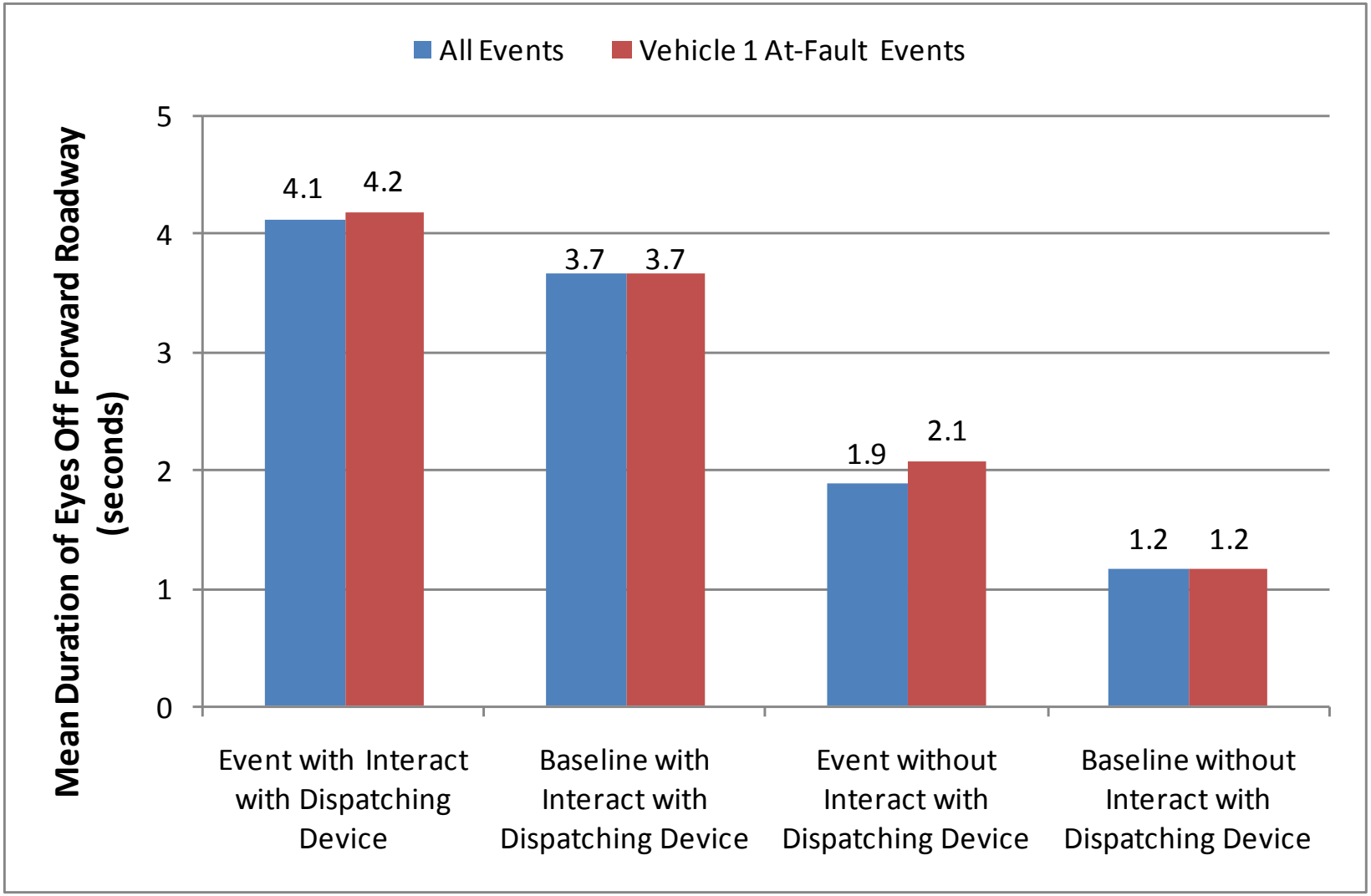
May 20 11:46 AM US/Eastern

In the United States, where driving while using telephones without hands-free adaptor kits and texting at the wheel are not widely illegal, one in four people confesses to texting and driving, a survey found Wednesday.
"We often like to say 26 percent of people admit to driving while texting. We are sure that underestimates the problem," said Dave Grannan, of Vlingo, a mobile voice application company that polled 4,800 people.
Vlingo says it is the inventor of "voice user interface" technology allowing people to "control their mobile phones with the power of voice" instead of punching buttons. The company said the poll has a plus or minus 1.41 percent sampling error.

Dialing Cell Phone



Interact with Dispatching Device



Conclusions

- Driver distraction is a prevalent contributing factor in CMV operations
- High risk tasks had high eyes off road time
- What about "cognitive distraction"?
  - Talking/listening tasks were not high risk when assessing behavior prior to safety-critical events
  - Not nearly as critical as "visual distraction": in driving, vision is king
- Naturalistic studies are the "gold standard" and reflect driver behavior and risk perception in actual driving conditions

Questions?

hanowski@vtti.vt.edu

Naturalistic Study Publications

Peer Reviewed Publications

- Wiegand, D.M., Hanowski, R.J., and McDonald, S.E. (in press). Commercial driver's health: A naturalistic study of the body mass index, fatigue, and involvement in safety-critical events. *Traffic Injury Prevention*.
- Hanowski, R.J., Hickman, J.S., Olson, R.L., Bocanegra, J. (2009). Evaluating the 2003 revised hours-of-service regulations for truck drivers: The impact of time-on-task on critical incident risk. *Accident Analysis & Prevention, 41* (2009), 268-275.
- Hanowski, R. J., Hickman, J. S., Fumero, M. C., Olson, R. L., and Dingus, T. A. (2007). The sleep of commercial vehicle drivers under the 2003 hours-of-service regulations. *Accident Analysis and Prevention, 39*(2007), 1140-1145.
- Hanowski, R. J., Hickman, J. S., Wierwille, W. W. Keisler, A. (2007). A descriptive analysis of light vehicle – heavy vehicle interactions using in situ driving data. *Accident Analysis and Prevention, 39*(2007), 169-179.
- Hanowski, R. J., Perez, M. A., and Dingus, T. A. (2005). Driver distraction in long-haul truck drivers. *Transportation Research Part F: Psychology and Behavior, 8*(6): 441-458.
- Hanowski, R. J., Wierwille, W. W., and Dingus, T. A. (2003). An on-road study to investigate fatigue in local/short haul trucking. *Accident Analysis and Prevention, 35*(2003), 153-160.
- Hanowski, R. J., Wierwille, W. W., Gellatly, A. W., Dingus, T. A., Knipling, R. R., and Carroll, R. (1999). Safety concerns of local/short haul truck drivers. *Transportation Human Factors Journal, 1* (4), 377-386.

Sample Conference Proceedings

- Wiegand, D. M., Hanowski, R. J., & Olson, R. (January, 2009). Fatigue analyses from 16 months of naturalistic commercial motor vehicle driving data. *Proceedings of the 88th Annual Conference of the Transportation Research Board.* (DVD). Washington, DC: Transportation Research Board.
- Hickman, J. S., Blanco, M., and Hanowski, R. J. (June, 2006). Safety and human factors applications of naturalistic driving methodology. Paper presented at *6th Annual Intelligent Vehicle Systems Symposium*. National Defense Industrial Association.
- Knipling, R. R., Hanowski, R. J., Hickman, J. S., Olson, R. L., Dingus, T. D., and Carroll, R. J. (November, 2005). Exposure-risk analysis of large truck naturalistic driving data. *Proceedings of the 2005 International Truck & Bus Safety & Security Symposium* (CD-ROM).
- Hanowski, R. J., Hickman, J. S., Olson, R. L., and Dingus, T. A., and Carroll, R. J. (September, 2005). Analysis of light vehicle-heavy vehicle interactions from the light vehicle driver's perspective. *Proceedings of the HFES 2005 Annual Meeting* (CD-ROM). Santa Monica, CA: Human Factors and Ergonomics Society.
- Knipling, R. R., Hanowski, R. J., Hickman, J. S., Olson, R. L. (September, 2005). Factors and driving errors associated with fatigue in a naturalistic study of commercial drivers. *Proceedings of the 2005 International Conference on Fatigue Management in Transportation Operations* (CD-ROM). Seattle, WA.
- Barr, L. C., Yang, D. C. Y., Hanowski, R. J., and Olson, R. (January, 2005). An assessment of driver fatigue, distraction, and performance in a naturalistic setting. *Proceedings of the Transportation Research Board 2005 Annual Meeting* (CD-ROM). Washington, DC: Transportation Research Board.