


Overview Presentation:
Safety for the Long Haul
Large Truck Crash Risk, Causation, & Prevention

- The first and only comprehensive textbook on large truck safety!
- Published by the American Trucking Associations (ATA).
- Sponsor: ATA Safety Policy David Osiecki, VP of Safety, Security, & Operations
- Author: Ronald R. Knipling, Ph.D.
- Target audiences:
 - Carrier safety managers & other officials
 - Government & industry officials
 - Students
- Purchase at (866) 821-3468 or www.atabusinesssolutions.com/




Industry Acclaim for
Safety for the Long Haul

“Every truck safety professional in the country should read this book. And every trucking company owner or chief executive, upon whom the ultimate responsibility for safety lies, should be familiar with it. And so should the next chief of the Federal Motor Carrier Safety Administration. . . What Ron Knipling . . . has attempted here is to put forth in one document, for the first time, the current best understanding of the theory and practice of truck safety . . . Knipling’s style is straightforward and efficient, and he has a passion for the subject that carries him through.”

Oliver B. Patton, *Heavy Duty Trucking Magazine*, March 2009.


Safety for the Long Haul
Author: Ronald R. Knipling, Ph.D.

- 33 years in truck & traffic safety
 - 18 years in contract R&D, including seven years with the Virginia Tech Transportation Institute
 - 12 years in U.S. DOT, including FMCSA, NHTSA, & FHWA.
- Author of more than 200 truck safety reports & presentations
- Specialty areas include:
 - Crash data analysis
 - Crash causation (LTCCS)
 - Naturalistic driving
 - Driver fatigue
 - Onboard technologies
 - Carrier safety management
 - Risk avoidance
- Accomplished trainer & instructional developer.



A Truckload of Information!
The First Comprehensive Text on Truck Safety

- ❖ Multifaceted & eclectic:
More than 100 topics covered
- ❖ Fact-filled but non-technical
[~ college survey textbook]
- ❖ 620 pages
- ❖ 196 illustrations, schematics, & graphs
- ❖ 156 tables & textboxes on special topics
- ❖ 18 invited expert commentaries
- ❖ Glossary, reference citations, & index




Expert Commentators

• Dr. Greg Belenky, Wash. State University	• Dr. Jerry Krueger, Krueger Consulting
• Dan Blower, UMTRI	• Gordon Lambert, C. R. England
• Roger Clarke, Alberta Transportation	• Dr. Brenda Lantz, NDSU
• Dr. Leonard Evans; SSS	• Dave Osiecki, ATA
• Gov. Bill Graves, ATA	• Don Osterberg, Schneider National
• Dr. Rich Hanowski, VTTI	• Doug Pape, Battelle
• Bob Inderbitzen, REI Consulting	• Dave Parker, Great West
• Steve Keppler, CVSA	• Larry Shelton, America’s Road Team
• Dr. Peter Kissinger, AAA Safety Foundation	• Steve Williams, Maverick

Safety for the Long Haul
Book Purposes


Useful Information

- Summarize crash causation safety facts & principles
- Review & recommend crash countermeasures & interventions (carrier emphasis).



New Directions:

- Articulate the need & opportunity for a shift in our national approach to truck safety.



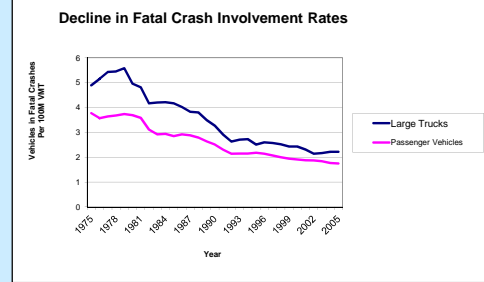
Safety for the Long Haul Chapters

1. Introduction & Overview
2. The Science of Safety
3. Driver Risk
4. Driver Error
5. Driver Fatigue
6. 4-Wheelers
7. Vehicle Design & Technologies
8. Roadway & Traffic Environment
9. Focus: Selected Crash Types
10. Carrier Safety Management
11. Special Topics in Carrier Operations
12. What About Regulation, Enforcement, & Compliance?
13. Beyond Compliance.



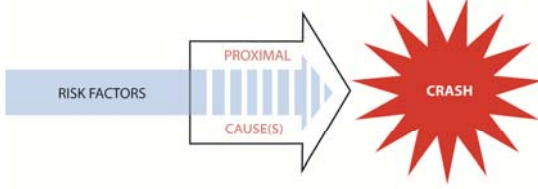
Chapter 1: Introduction & Overview

Crash Fundamentals & Trends



Basic Concepts: Risk & Causation

Timeline of Risk Factors and Proximal Cause(s) Before a Crash



- Driver Risk vs. Driver Error
- Risk:
 - Situational (e.g., roadway, traffic)
 - Driver Personal:
 - Enduring
 - Temporary
- Driver Error: *Misbehaviors vs. Mistakes.*

Chapter 2

The Science of Safety: Methods

- Experiments
- Crash Databases
- LTCCS & Other Investigative Studies
- Case-Control & Correlational Studies
- Naturalistic Driving Studies
- Surveys.

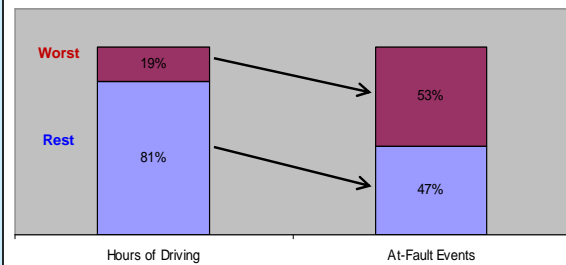


Pros & Cons of Safety Research Methods

Method	Pros	Cons
Experiments	<ul style="list-style-type: none"> • Determines causation • Precise 	<ul style="list-style-type: none"> • Narrow • Expensive
Crash Databases	<ul style="list-style-type: none"> • Problem size • Conditions of occurrence 	<ul style="list-style-type: none"> • No control group • Superficial
In-Depth Investigation	<ul style="list-style-type: none"> • In-depth, serious crashes • Error & causal taxonomies • Multiple methods 	<ul style="list-style-type: none"> • No control group • Small Ns • Expensive
Case-Control, Correlational	<ul style="list-style-type: none"> • Criterion-based • Many diverse factors 	<ul style="list-style-type: none"> • Association, not causation • Noisy data
Naturalistic Driving	<ul style="list-style-type: none"> • Direct observation • Exquisite exposure data • Large Ns (e.g., driver risk) 	<ul style="list-style-type: none"> • Not serious crashes • Triggers are selective • Expensive
Surveys	<ul style="list-style-type: none"> • Fast & easy • Flexible • Directly taps expertise 	<ul style="list-style-type: none"> • Opinion • Representativeness problematic

Chapter 3: Driver Risk

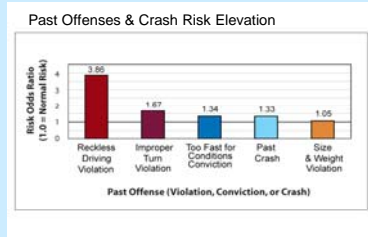
Relative Exposure & Risk for High & Low Risk Groups



Risk Odds Ratio = 4.9

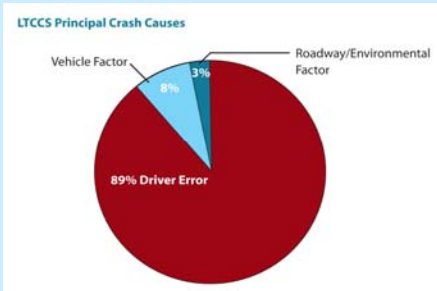
Major Factors Underlying Driver Risk

- Age & gender
- Physical & medical
- Personality
- Behavioral disorders
- Behavioral indicators

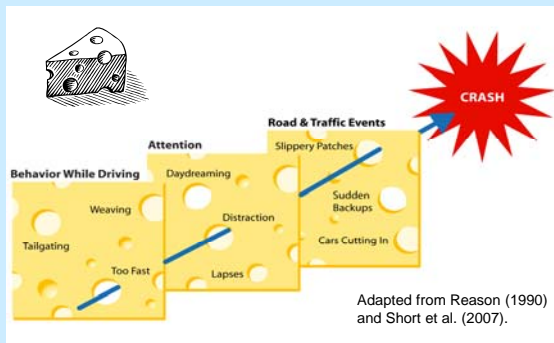


Source: ATRI Driver Crash Prediction Study

Chapter 4: Driver Error



Convergence of Events Causing Crashes The "Swiss Cheese" Causation Model



Chapter 5: Driver Fatigue

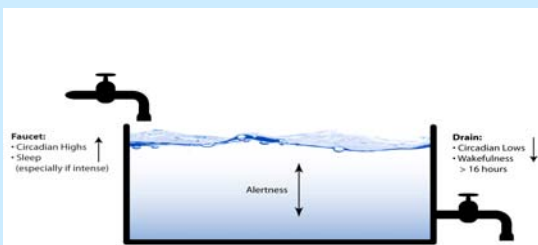
Causes of Fatigue: the "Gang of Four"

- Individual Susceptibility
- Three Temporal Factors:
 - Circadian valleys
 - Inadequate sleep
 - Excessive time awake



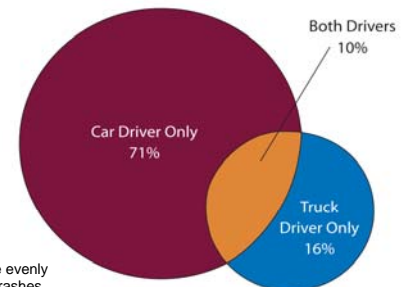
Daily Temporal Factors Affecting Fatigue: Sleep-Performance "Bathtub"

- Circadian highs & lows
- Sleep
- Hours of wakefulness (>16 hours).



Chapter 6: 4-Wheelers

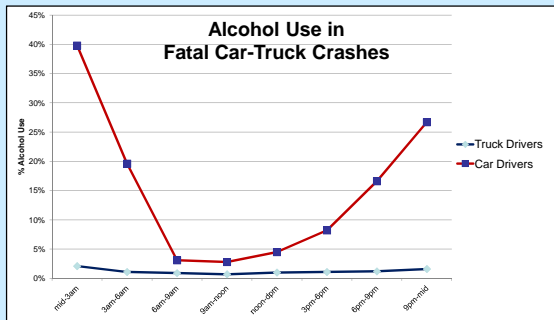
Driver Factors Cited in Fatal Car-Truck Crashes



Note: Fault is distributed more evenly in less severe crashes.

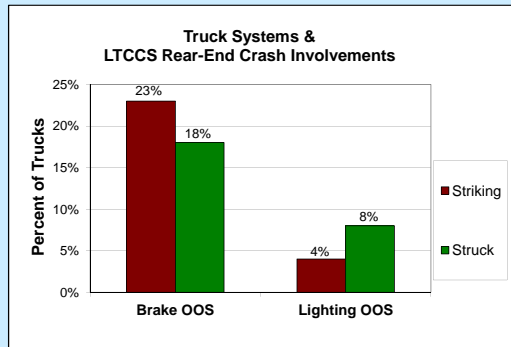
Source: Blower, 1998

4-Wheeler Misbehaviors

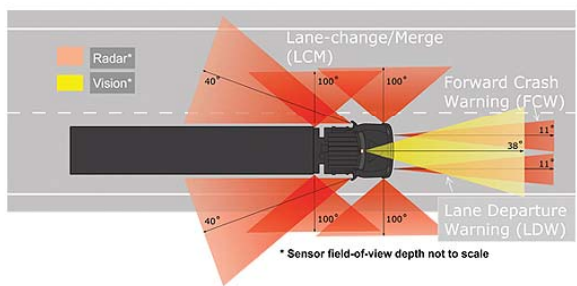


Plotted from Blower & Campbell, 1998

Chapter 7: Vehicle Design & Technologies



Collision Warning Systems; e.g., Side Object, Forward, & Lane Departure



Integrated Vehicle-Based Safety System (IVBSS) Truck Configuration

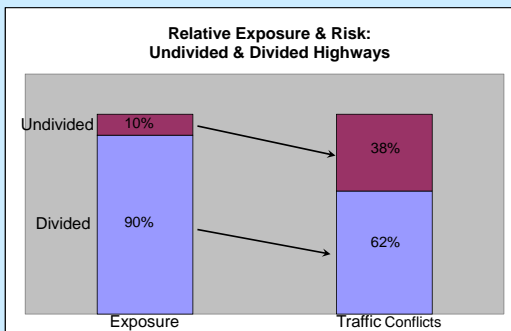
Chapter 8: Roadway & Traffic Environment

Risky Locations & Conditions:

- Curves & ramps
- Grades
- Undivided roadways
- Work zones
- Dense traffic; e.g., urban rush hours
- Adverse weather

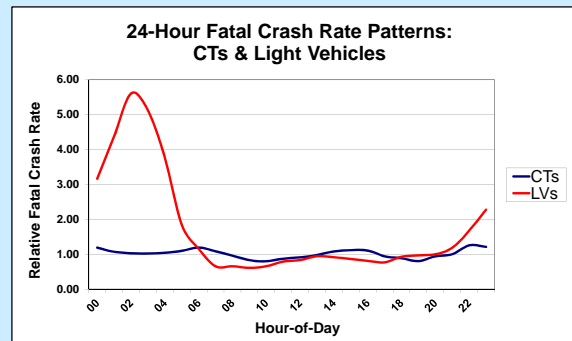


High-Risk Roadway Locations & Conditions; e.g., Undivided Highways



Risk Odds Ratio = 5.3

Night Driving: Generally Safe for Trucks

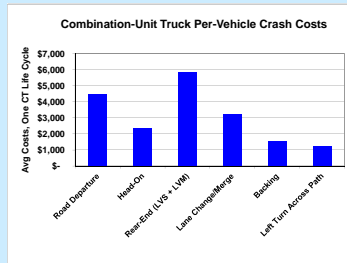


Source: Hendrix, 2002

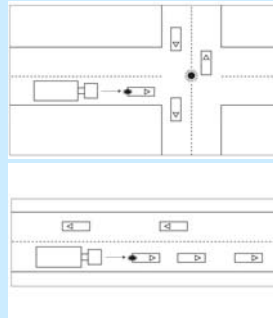
Chapter 9: Focus: Selected Crash Types

- Road Departure*
- Head-On
- Rollovers
- Jackknives
- Rear-End*
- Lane Change/Merge*
- Backing
- Crossing Path (Intersection)

* = "Big 3"



Rear-End Crashes Lead-Vehicle Stopped (LVS) & Lead-Vehicle Moving (LVM) Greatest Source of Carrier Liability



RE-LVS CRs:

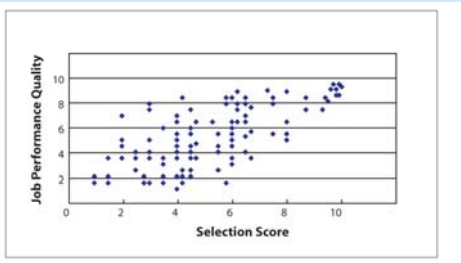
- Recognition failures (31%)
- Degraded braking (19%)
- Physical impairment (10%)
- Signs/signals missing (10%)
- Following too closely (8%)

RE-LVM CRs:

- Following too closely (33%)
- Too fast (25%)
- Recognition failures (20%)
- Other vehicle at-fault (16%)

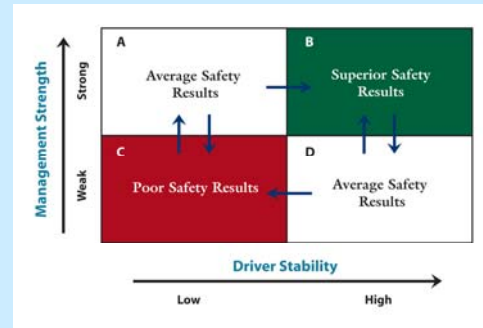
Chapter 10: Carrier Safety Management

Relation Between Selection Scores & Employee Job Performance for Hypothetical Job



Correlation Coefficient (r) = +0.68

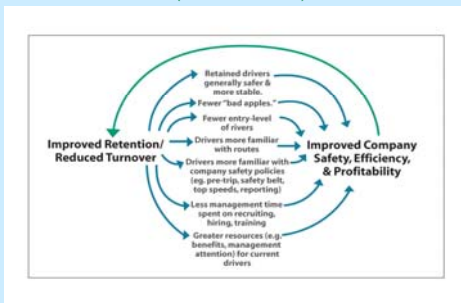
Safety Management Performance Matrix



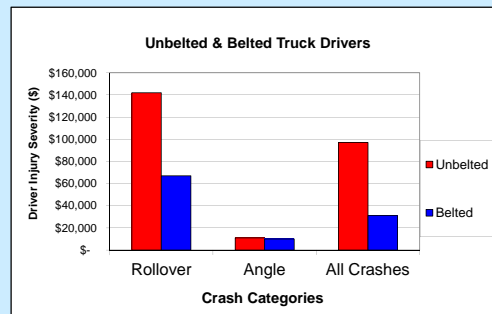
Contributed by Greer Woodruff, J. B. Hunt

Chapter 11: Special Topics in Carrier Operations

How Improved Retention Also Improves Safety (& Vice-Versa!)



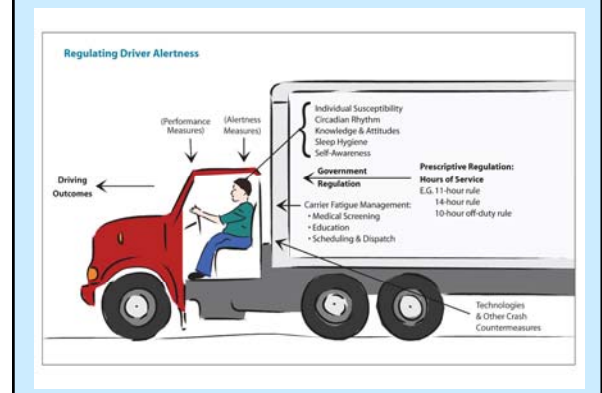
Increasing Safety Belt Use



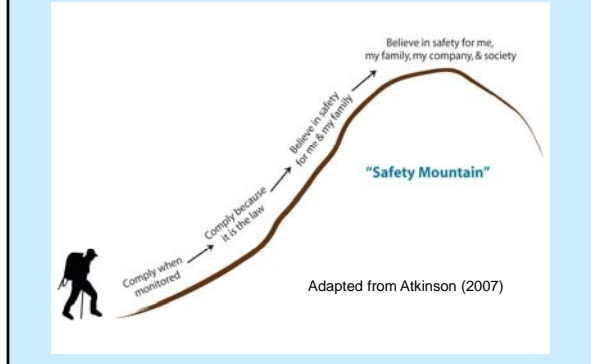
Chapter 12: What About Regulation, Enforcement, & Compliance?



Limitations of Prescriptive Rules



Chapter 13: Beyond Compliance The Safety Mountain



Watchwords for our drivers . . .

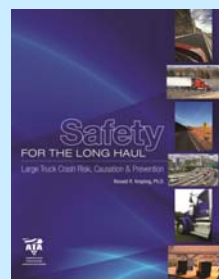


Safety for the Long Haul Seminars

- Dr. Knipling has provided Safety for the Long Haul training to both Con-way Freight and J. B. Hunt for their safety manager training. This seminar series is available to other carriers and trucking associations. If interested, contact Dr. Knipling at (703) 533-2895 or rknipling@verizon.net. The basic series consists of the six modules listed below, though the program can be customized to client needs.
- **Basic Seminar Topics:**
 - **Module A: Introduction & Overview**
 - **Module B: Crash Risk Factors**
 - **Module C: Crash Causes**
 - **Module D: Driver Fatigue & Alertness**
 - **Module E: Carrier Safety Management**
 - **Module F: Beyond Compliance: Comprehensive Risk Management.**



Thanks



Thanks for your interest!
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www.atabusinssolutions.com

For additional information on the book or related training or consultation, visit www.safetyforthehighhaul.com or contact the author at rknipling@verizon.net.