Field Operational Tests: A Truck Perspective

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First Human Factors Symposium: Naturalistic Driving Methods & Analyses
August 26th, 2008

Presentation Overview

- What is naturalistic data collection?
- Approach
- What is a field operational test?
- Example
  - Drowsy Driver Warning System Field Operational Test
- Key results
- “Safety takeaways”

Naturalistic Data Collection

- Collecting driver behavior and performance data in the study participant's normal environment
- Examples:
  - as light vehicle drivers commute to/from work (e.g., 100-Car Study)
  - as truck drivers operate their vehicles on revenue-producing runs (e.g., Sleeper Berth Study, Local/Short Haul Study)
- High validity
- Low control

Naturalistic Method

- Study participants use an instrumented vehicle for an extended period (e.g., several months to one year)
- Able to get detailed pre-crash/crash information along with routine driving behaviors
- Highly capable data acquisition systems (well beyond EDRs)
- Able to collect crash pre-cursor data and driver performance/behavior data using sensors and video cameras

Field Operational Test

- System (often technology) evaluation conducted under naturalistic conditions
- How do drivers use a system in their real-world driving environment?
- A FOT is (typically) a naturalistic study
- A naturalistic study is not, necessarily, a FOT
- If the data are collected (experimental design) and handled (analysis) appropriately, data from a FOT can be analyzed to investigate issues beyond the usability of the system being evaluated in the FOT

Drowsy Driver Warning System Field Operational Test

- Collect data that can be used to evaluate the effectiveness and operational capabilities, limitations, and characteristics of a drowsiness monitor

J.B. HUNT

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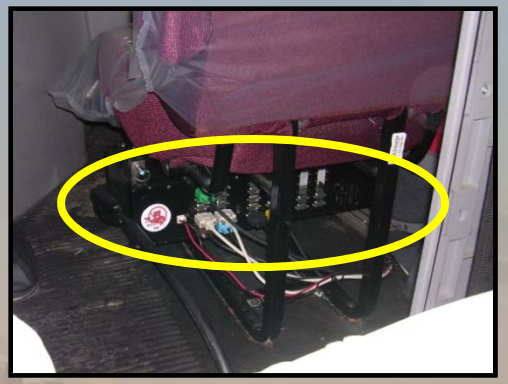
Data Collection Approach

- 46 trucks were instrumented with the DDWS and a Data Acquisition System (DAS)
- 103 drivers participated, driving for, on average, 12.4 weeks
- 3 trucking companies; line-haul and long-haul represented
- Continuous data collection approach used
- Over 100 data measures collected on driving performance (e.g., lane position), actigraphy, questionnaires and 4 video cameras
- 2.3 million miles of driving data were collected making this the largest study the USDOT has ever conducted



Analysis Overview (Example)

- Federal Motor Carrier Safety Administration (FMCSA)-sponsored study
  - Investigate research issues relating to:
    - Driver performance
    - Crash causation (crash pre-cursors)
    - NOT the safety benefits of DDWS
- Leveraged data from the DDWS FOT ("data mining")
  - Preliminary analysis
    - May 2004 to May 2005 (75% of data)
  - 95 drivers (94 males, 1 female)
    - Mean age 39.5 years old
    - Mean CMV experience 10.5 years

Research Issues

- Discussions with FMCSA identified four priority issues:
  - Analysis of heavy vehicle safety events
  - Correlates of driver risk
  - *Countermeasure identification*
  - *Driving patterns and work/rest schedules*

Results

- Crashes: 14 + 14 tire strikes = 28 total
- Near-crashes: 98
- Crash-relevant conflicts: 789
- Total safety-critical events (i.e., the sum of the above): 915
- Baseline epochs: 1,072

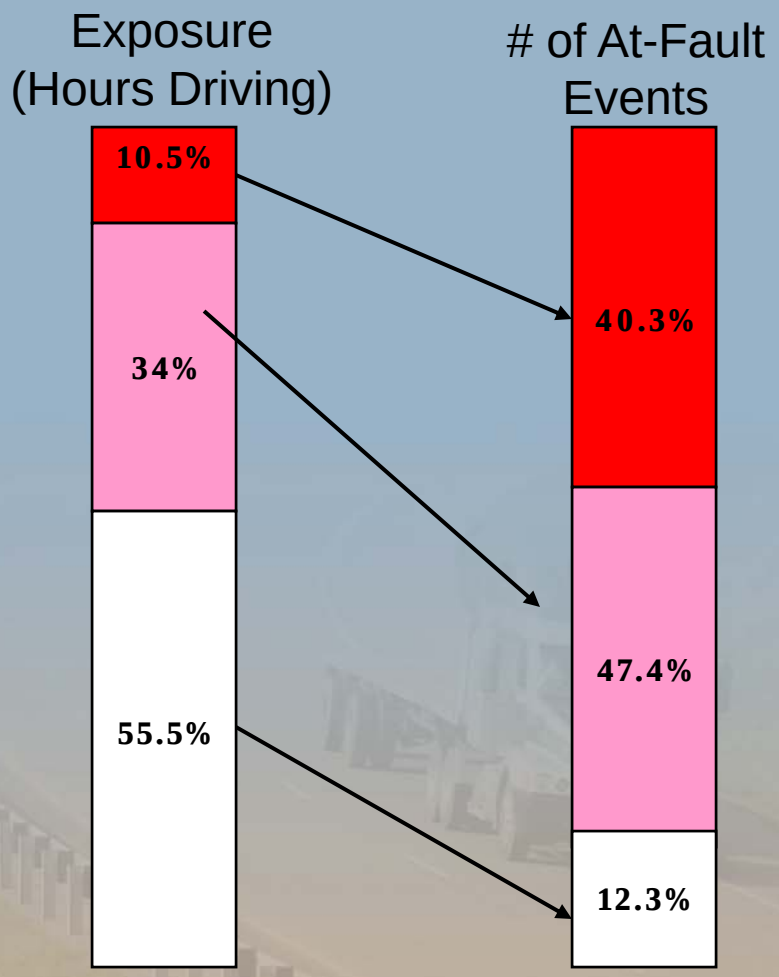
Issue 1: Analysis of Heavy Vehicle Safety Events

- Top 5 Critical Reasons coded to truck driver (V1):
  - Inadequate evasive action (14%)
  - Internal distraction (10.8%)
  - External distraction (6.2%)
  - Misjudgment of gap or others speed (5.7%)
  - Too fast for conditions (5.4%)
- Top 5 Critical Reasons coded to other driver (V2):
  - Apparent recognition or decision error (18.4%)
  - Aggressive driving (2.1%)
  - Too slow for traffic (1.5%)
  - Other illegal maneuver (1.1%)

Issue 2: Correlates of Driver Risk

95 Drivers:

- Worst 15
- Middle 30
- Best 50



What the Results Mean…

- Each fleet has a “high risk” group of drivers
- Driver-related factors are most important
- Minimize internal distractions
  - No cell-phone while driving policy?
- Defensive driving is critical and should be a major component of a fleet’s training program
  - *Smith System*
  - *FMCSA-VTTI’s “Driving Tips” website (Winter 2008)*
- There is a need to reach/educate the light vehicle driver and there is a need to reach law enforcement officers (need for more aggressive enforcement of existing laws)

Summary

- Naturalistic data collection provides a new and unique perspective to assess crash causation
- A FOT evaluates systems using a naturalistic method
- Provides an “instant replay” of the incident, and allows you to focus on driver behavior and crash pre-cursors

Concluding Remarks

- Epidemiological and empirical research will always be valuable to driving safety research
- Technology has advanced to a level to give researchers another tool to assess crash causation and develop crash countermeasures in a surface transportation environment
- This tool will be particularly important for the assessment of the crash risk associated with factors such as driver error, impairment, and distraction


Questions?
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