The Naturalistic Study of Distracted Driving

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Motor Carrier Safety Advisory Committee
June 8th-10th, 2010 Alexandria, VA

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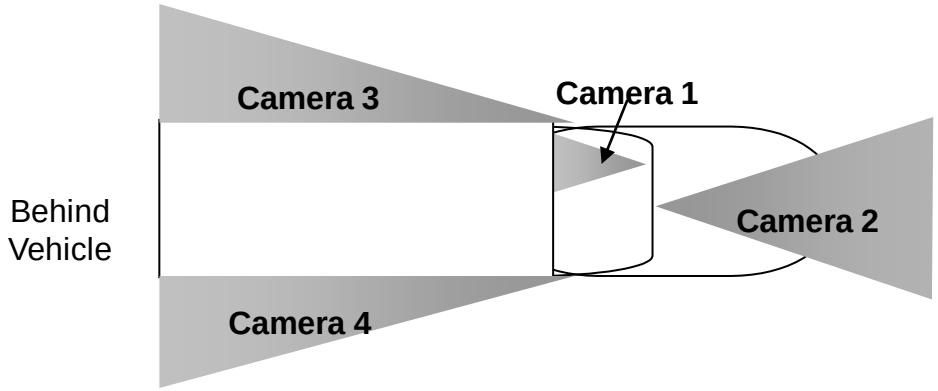
Presentation Overview

- What is naturalistic data collection?
- Key findings from truck and car studies
  - CVO Distracted Driving
  - 100-Car Study
- Study conclusions and recommendations
- Investigating countermeasures
  - Ford SYNC
- Future research needs

Naturalistic Method

- Study participants use an instrumented vehicle for an extended period (e.g., several months to one year)
- No experimenter present; no specific instructions
- Highly capable data acquisition systems (well beyond EDRs)
- Data collected continuously
- Over 600 drivers and 7 million miles
- Able to get detailed pre-crash/crash information along with routine driving behaviors



CVO Distracted Driving Study

- Research was funded by the **Federal Motor Carrier Safety Administration**
- Use VTTI's naturalistic truck study data
- Identify non-driving tasks/behaviors engaged in immediately prior to involvement in safety 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?

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 (n=4452) and baselines/normal driving (n=19,888)
- 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 non-driving (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?

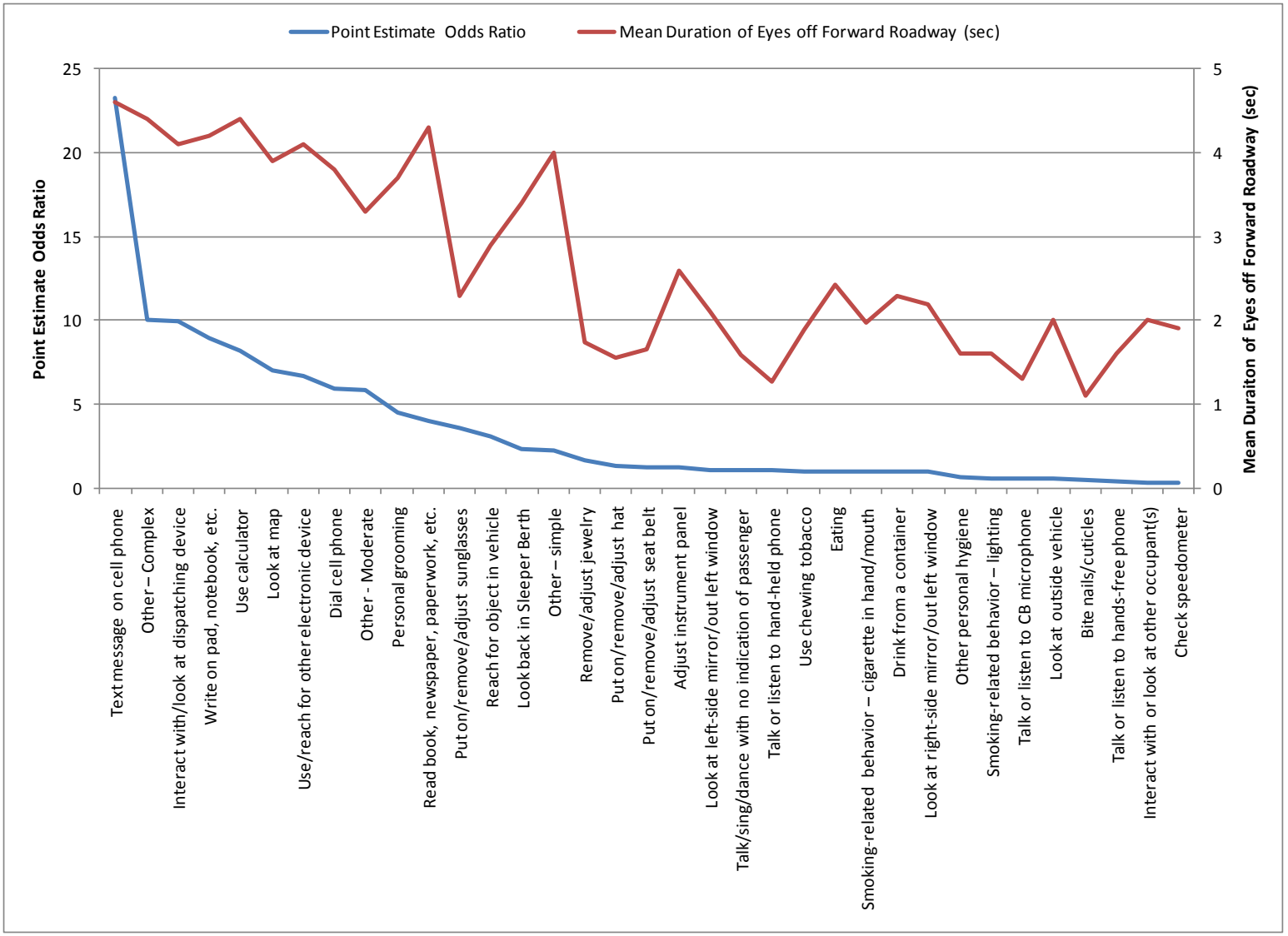
- 60% of the safety-critical events had some type of driver distraction

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%

Sample of Non-Driving 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 hands-free phone	**0.44**	0.35	0.55	91	901
Talk or listen to CB radio	**0.55**	0.41	0.75	50	399

"Vision is King"



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Light Vehicles vs. Heavy Vehicles

- Do we see the same issues in light vehicles?

Results from 100-Car Study

Type of Secondary Task	Odds Ratio	Lower CL	Upper CL
Reaching for a moving object	**8.8**	**2.5**	**31.2**
Insect in vehicle	**6.4**	**0.8**	**53.1**
Looking at external object	**3.7**	**1.1**	**12.2**
Reading	**3.4**	**1.7**	**6.5**
Applying make-up	**3.1**	**1.3**	**7.9**
Dialing hand-held device	**2.8**	**1.6**	**4.9**
Inserting/retrieving CD	2.3	0.3	17.0
Eating	1.6	0.9	2.7
Reaching for non-moving object	1.4	0.8	2.6
Talking/listening to hand-held device	1.3	0.9	1.8
Drinking from open container	1.0	0.3	3.3
Other personal hygiene	0.7	0.3	1.5
Adjusting radio	0.6	0.1	2.2
Passenger in adjacent seat	**0.5**	**0.4**	**0.7**
Passenger in rear seat	0.4	0.1	1.6
Combing hair	0.4	0.1	2.7
Child in rear seat	0.3	0.04	2.4

Study Conclusions

- Driver distraction is a prevalent contributing factor in light vehicle and heavy vehicle operations
- High risk tasks had high eyes off road time
- Talking/listening tasks (i.e., assumed cognitive distraction) were not nearly as risky as visually intensive tasks
  - Some of these tasks indicated a *protective effect*
- Countermeasures should not be limited to education, training and PSAs
  - Human factors design of driver-vehicle interfaces
  - Policy and legislation

Recommendations for Fleet Managers (*CVO Distraction Study*)

1. Education to highlight the importance of eyes on forward roadway and scanning
2. Reading, writing, and maps
3. Policies to curb use of in-vehicle devices that draw attention away from forward roadway
4. No texting
5. No manual dialing of phones

Recommendations

6. Is talking is okay?
7. No use of dispatching device while driving
8. Re-design of dispatching devices
9. Instrument panel re-design
10. Further research on protective effects

2010 Ford SYNC Study

- 21 participants drove instrumented cars on public roads and on the Virginia Smart Road test track

- Visual distraction and driving performance was measured as drivers used handheld phones, mp3 players, and the Ford SYNC system

- Tasks included:
  - Dialing
  - Phone conversations
  - Selecting music tracks

- Drivers able to maintain eyes forward when dialing and selecting tracks with Ford SYNC, but not with handheld devices

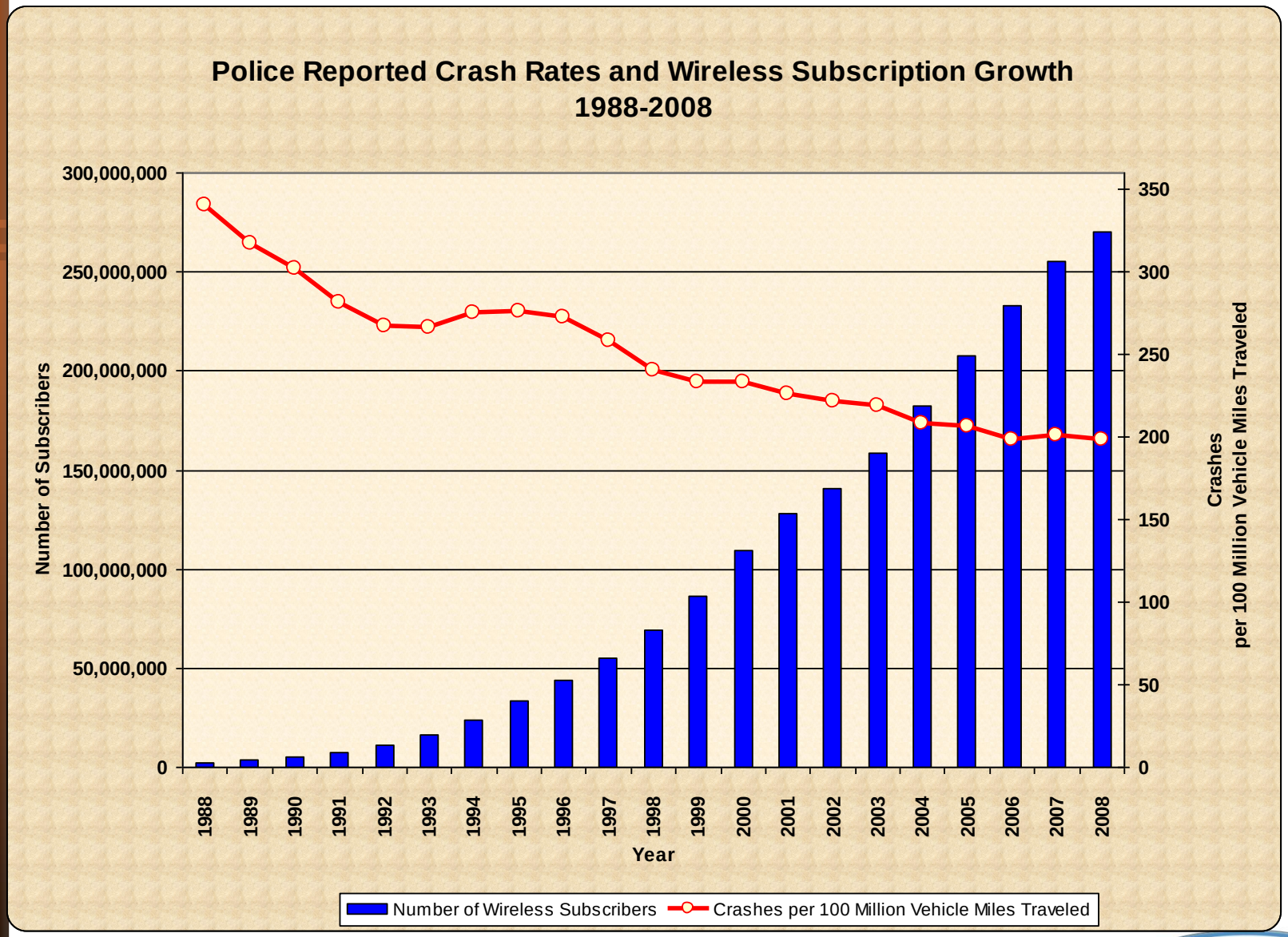
- Driving performance (e.g., steering) degraded when dialing and selecting tracks with handheld devices, but not degraded with Ford SYNC

- No difference when engaged in conversation between handheld phone and the Ford SYNC- <u>also, no difference from baseline</u>

Distraction Research Needs (*IntelliDrive Expert Distraction Panel*)

1. On-going and expanding naturalistic data collection
   - Development of (inter) national data center
   - Coordination of US-EU efforts
2. Generalizability of simulator/lab results to real-world driving?
   - Simulator validation work needed
   - ABWS experience (Shinar, 2000)
3. Impact of driver distraction in real-world crashes

Cell Phones Trends and Crash Rates



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Research Needs

4. Understanding work-induced distractions across transport modes
   - Distraction should be considered an "operator" issue and not limited to a single transport modality
   - If you believe that…need a comprehensive, multi-modal research plan
5. Updating FMCSA's "Driving Tips" distraction page
6. Teens, trucks, and safe driving

Questions?

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