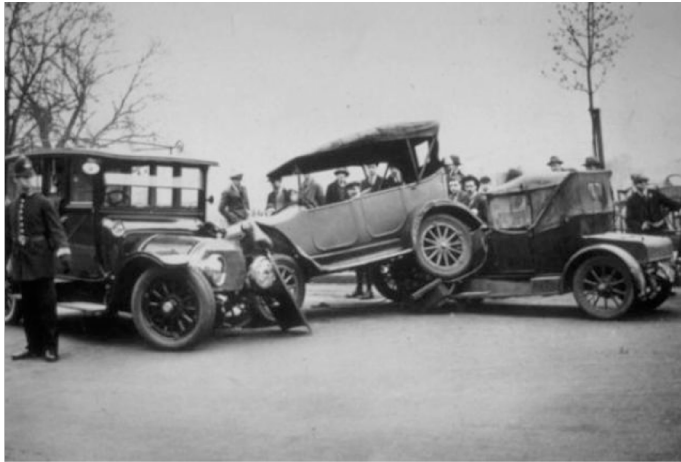




Emerging Technology and Distracted Driving: From the Model T to the Model S

**David Strayer, Ph.D.
University of Utah**

Distracted Driving – The Early Years



Proposed Car Radio Bans



- In 1930, legislation was proposed in Massachusetts to ban radios while driving
- An Auto Club of New England poll in 1934 found that 56% of respondents deemed the car radio a dangerous distraction

And Then Came the Car Phone



In-Vehicle Information Systems





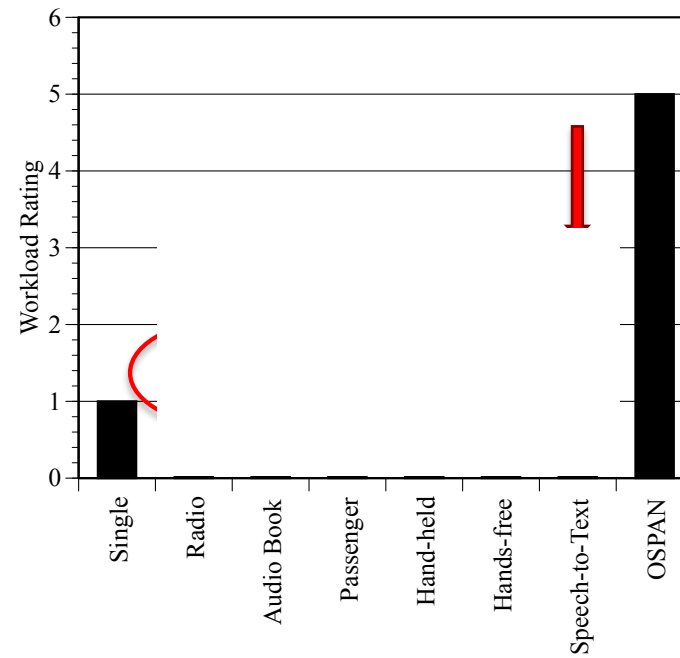
AAA: Phase I

Measuring Cognitive Workload: Phase I

Develop robust cognitive workload scale for measuring

- Single-task (undistracted driving – Category 1)
- Radio
- Audio book
- Passenger conversation
- Hand-held cell phone conversation
- Hands-free cell phone conversation
- Speech-to-text email/text (perfect fidelity)
- OSPAN (high workload memory/math task – Category 5)

Cognitive Workload Scale: Phase I

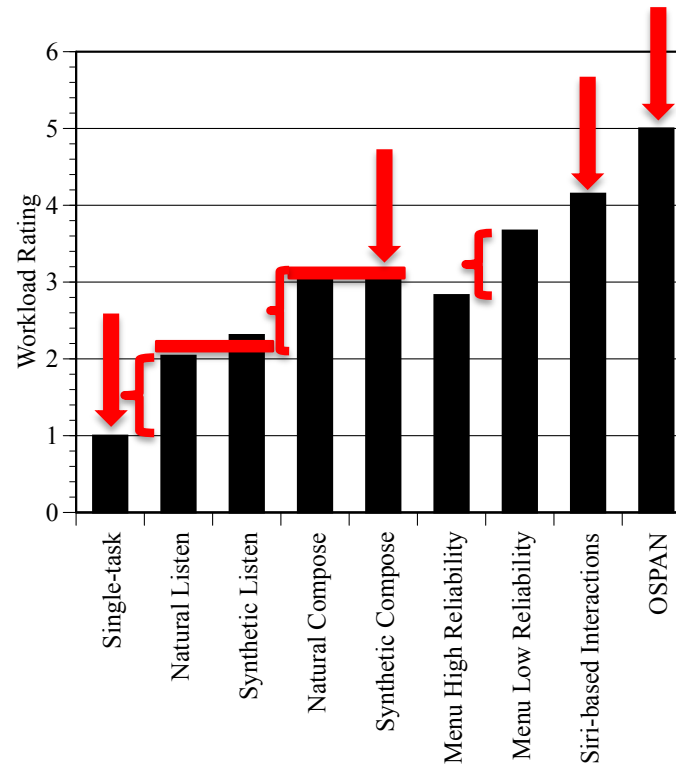


AAA: Phase II

Measuring Cognitive Workload: Phase II

- Examining voice-based texting/e-mail in greater detail
 - Complexity of commands
 - Quality of speech
- Menu-based interactions to support navigation (e.g., locate closest ATM)
 - Perfect reliability
 - Medium reliability
- Apple's hands-free Siri

Cognitive Workload Scale: Phase II

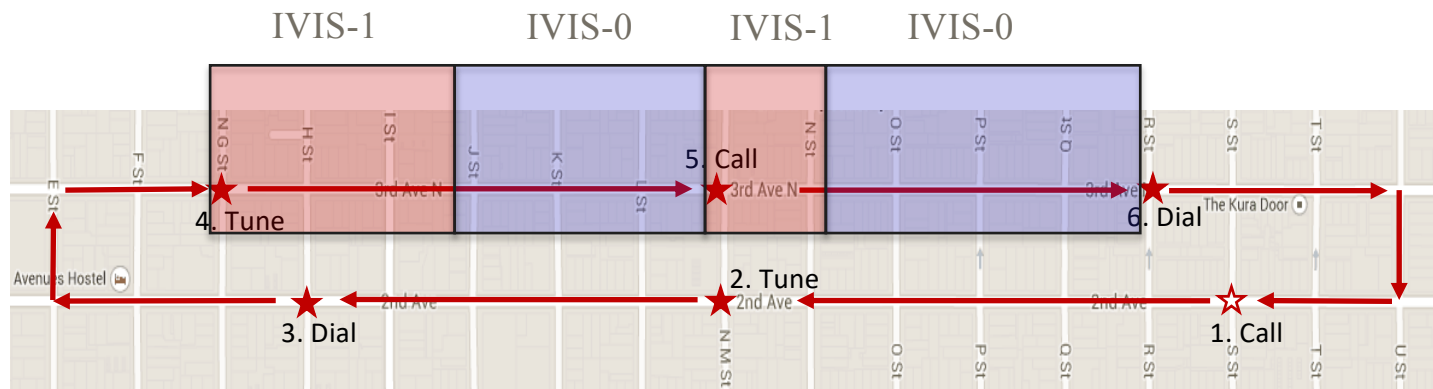


AAA: Phase III

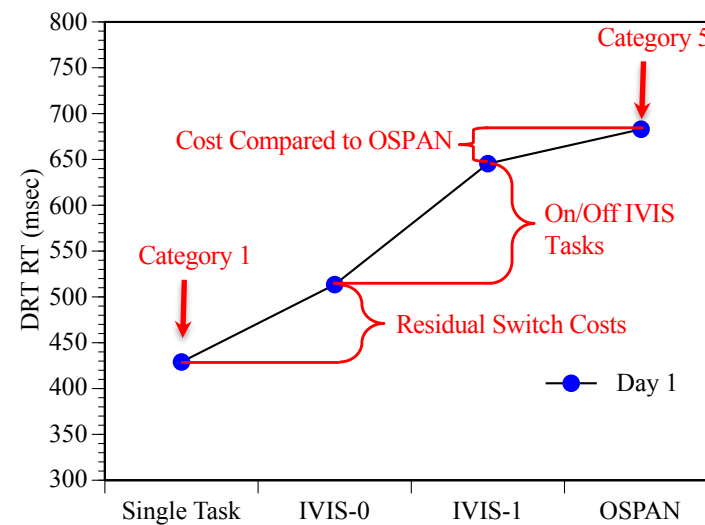
Measuring Cognitive Workload: Phase III

- Establish that the workload scale applies for all drivers
 - Across the age range (21-70)
- Determine if practice reduces driving impairments
- Assess cognitive workload in
 - 10 OEM voice-based interfaces
 - Commonly used tasks (dialing, music selection, voice texting)

In-Vehicle Information System Interactions

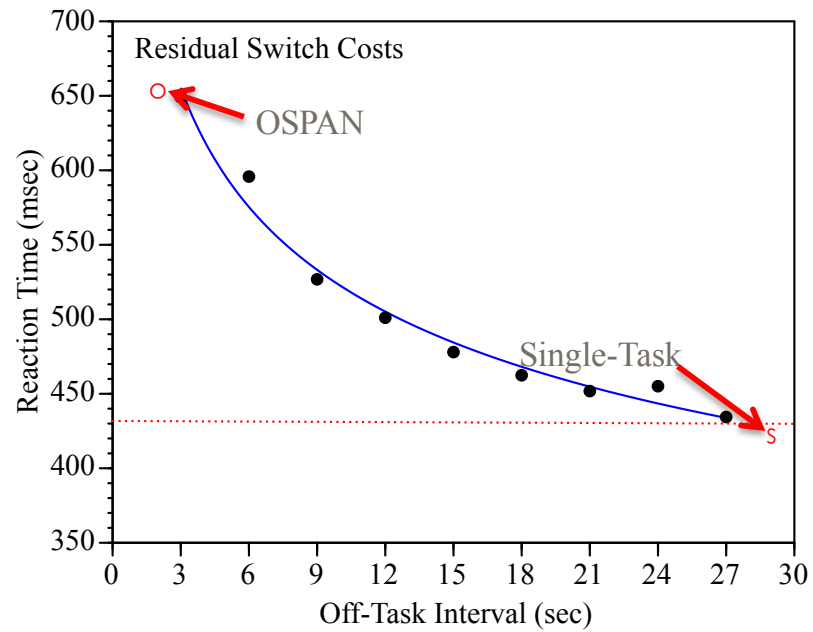


In-Vehicle Information System Interactions



- Large costs of IVIS interactions (Category 5)

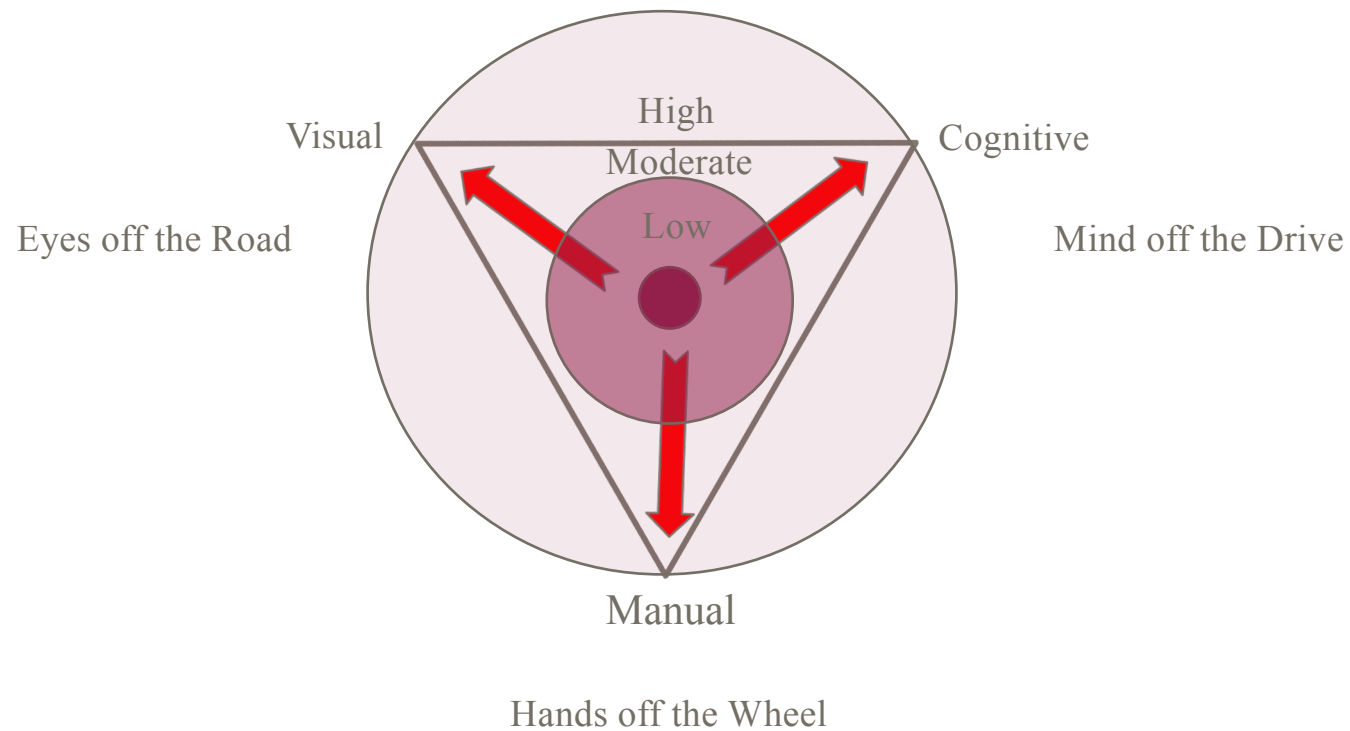
Persistent Distraction



- 27 seconds of residual costs of IVIS interactions!

AAA: Phase IV

The Driver Distraction Triad

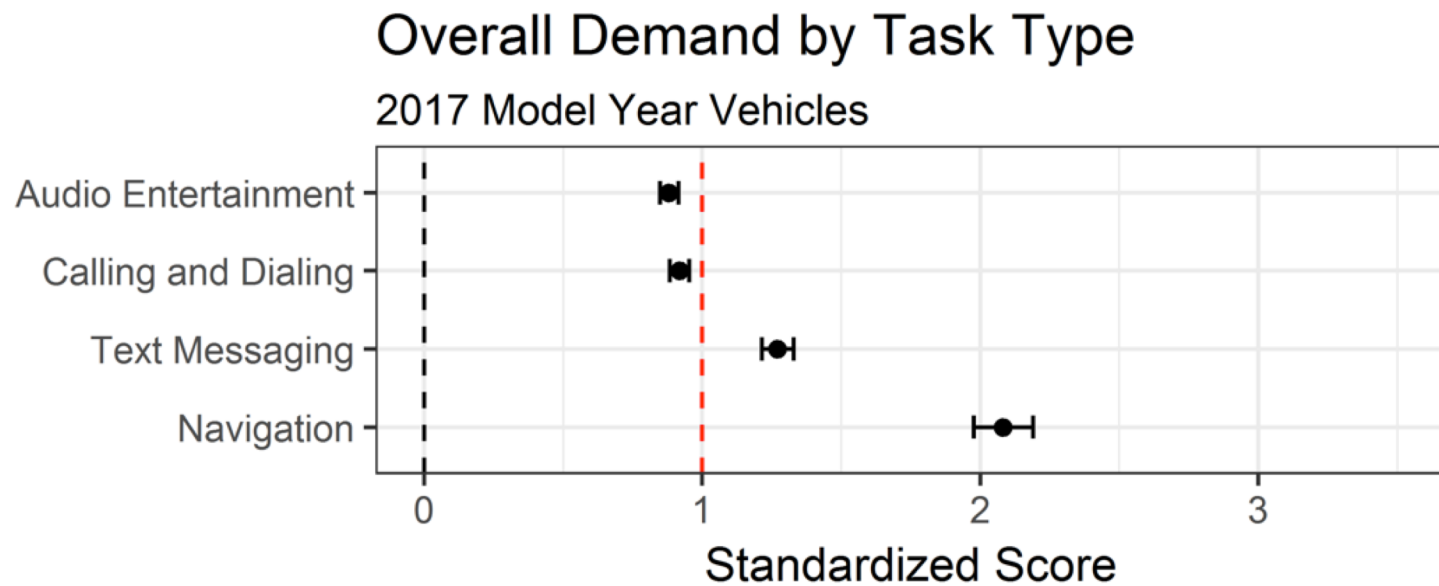


Research Question #1

Are some task types more impairing than others?

- *Audio Entertainment*
- *Calling and Dialing*
- *Text Messaging*
- *Navigation*

Overall Demand by Task Type



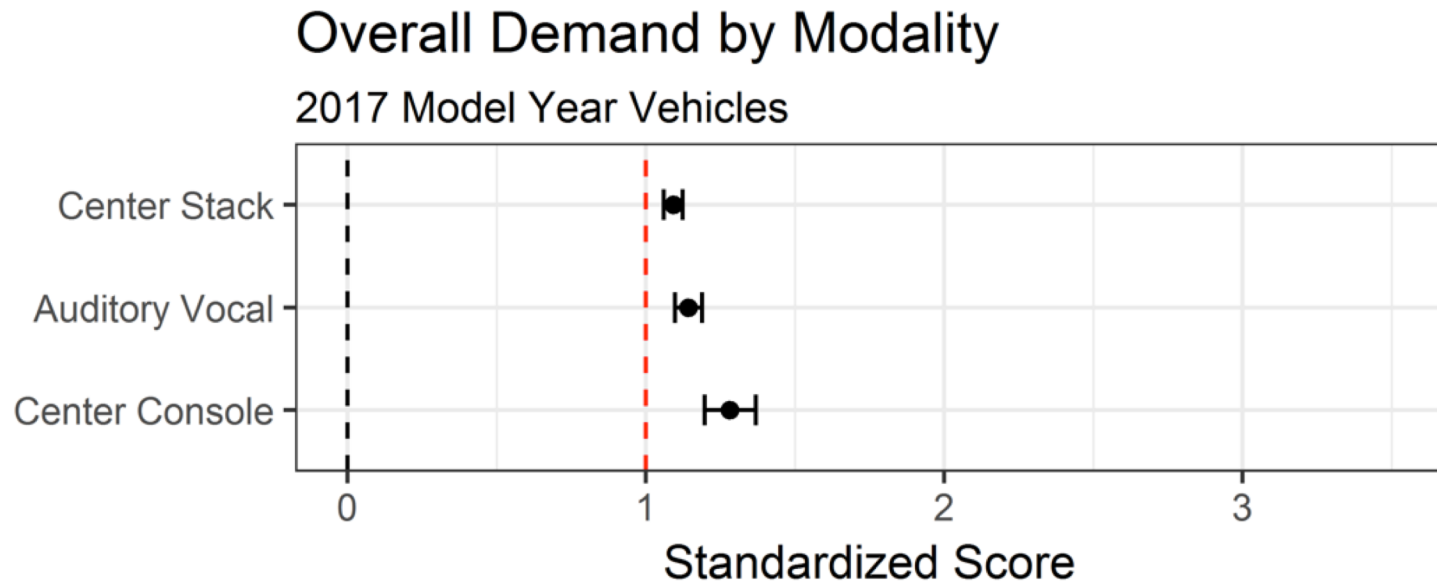
The red dashed line represents the mean visual and mental demand accounting for time-on-task

Research Question #2

Are some modes of interaction more distracting than others?

- *Center Stack*
- *Auditory Vocal*
- *Center Console*

Overall Demand by Modality



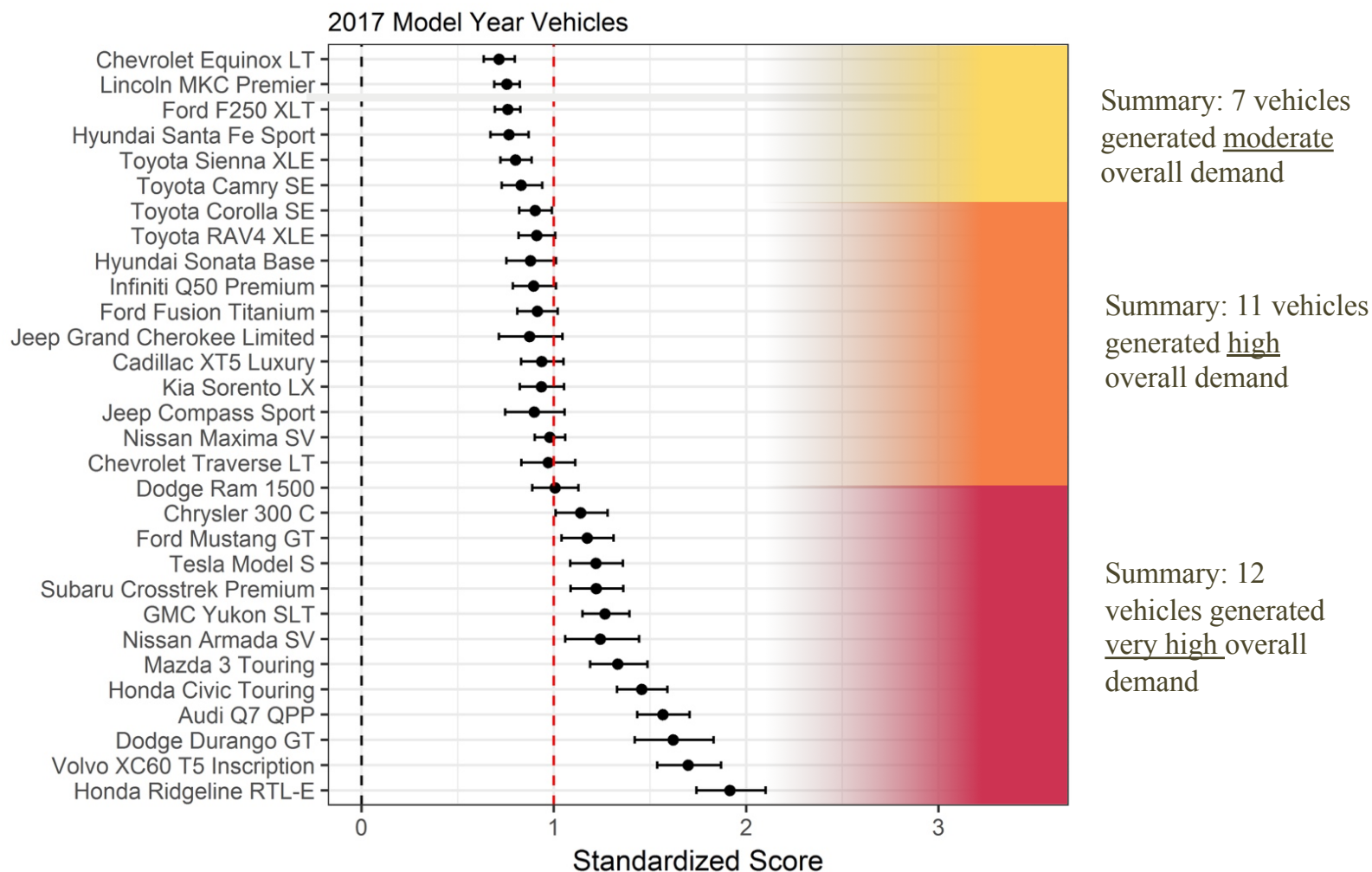
The red dashed line represents the mean visual and mental demand accounting for time-on-task

Research Question #3

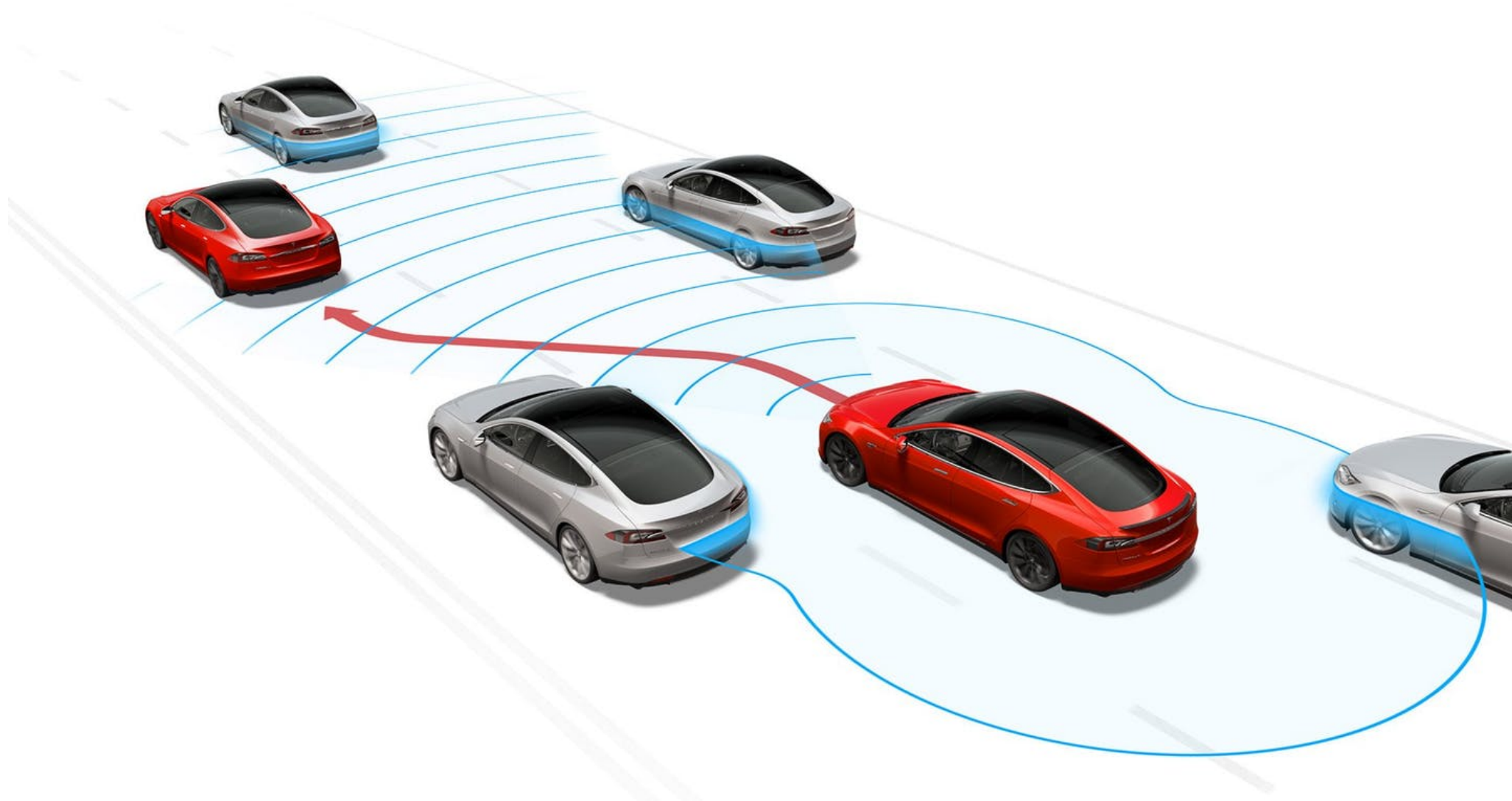
Are IVIS interactions
easier to perform in some
vehicles than others?

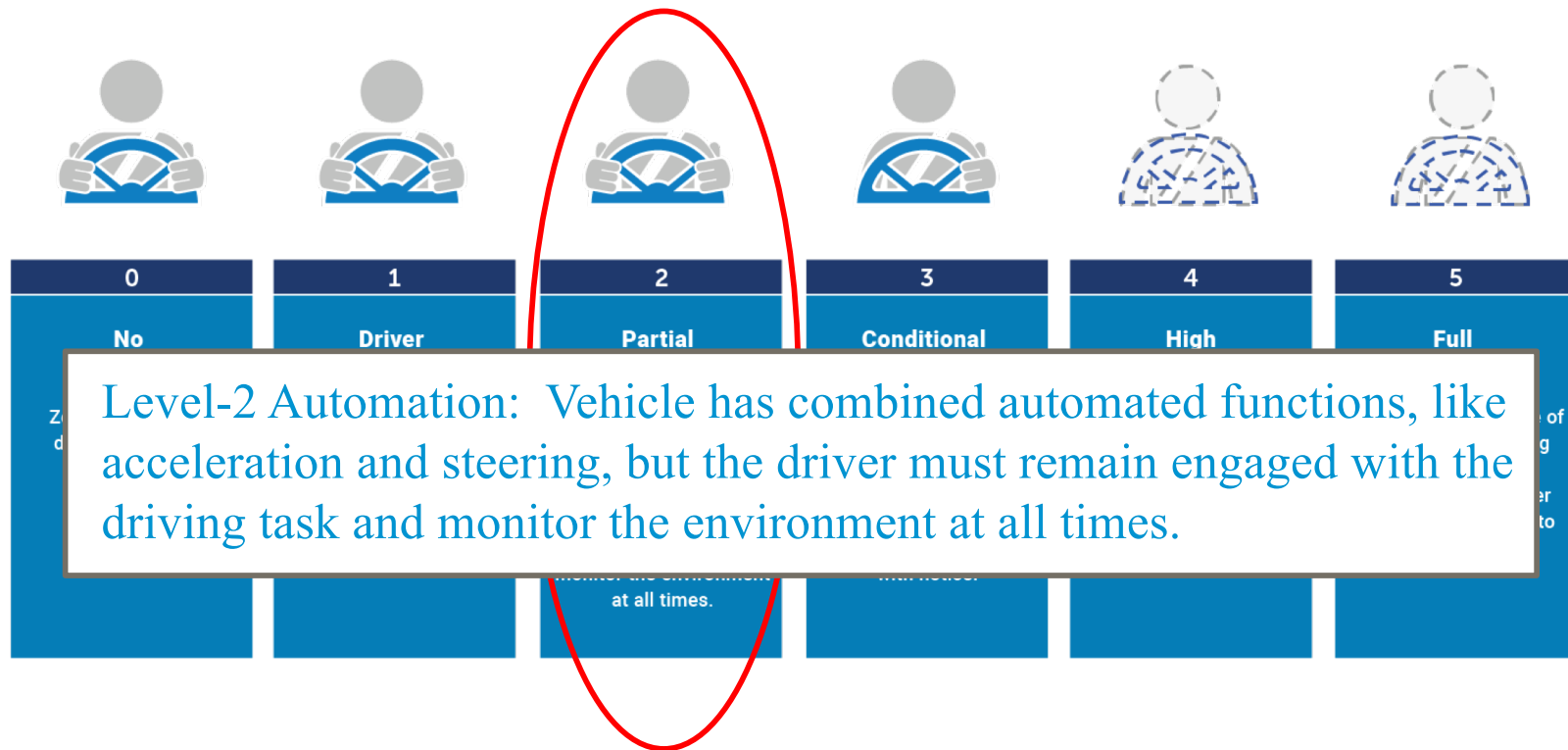
- *Evaluated 50 new 2017 vehicles*
- *Comprehensive on-road assessment*

Overall Demand by Vehicle

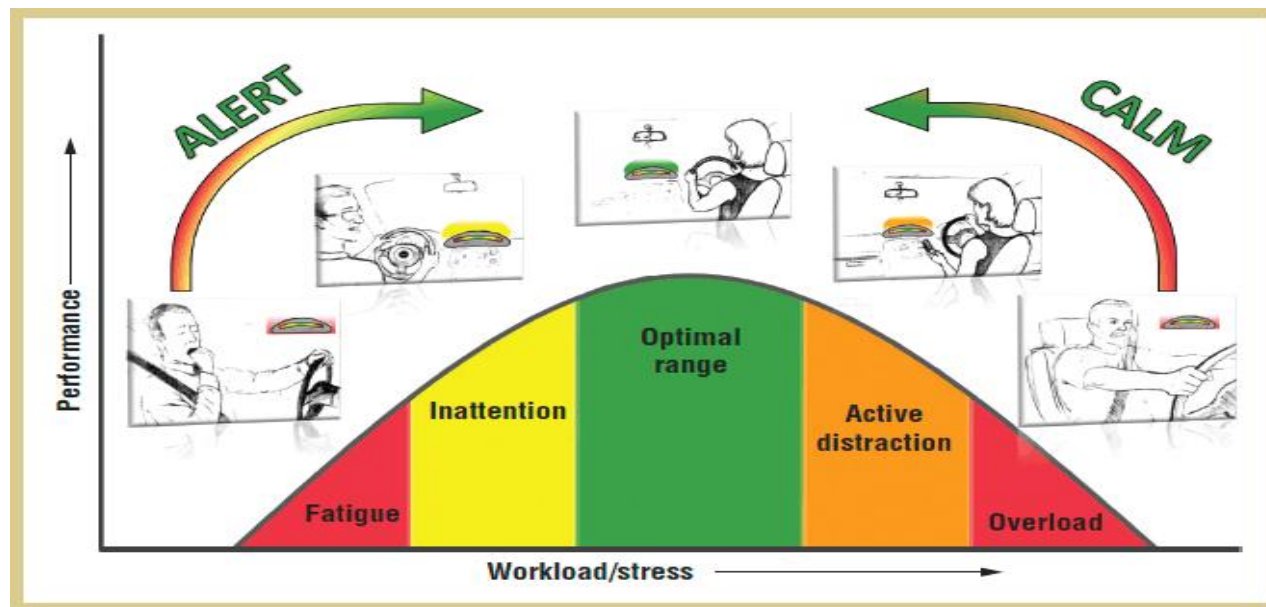


AAA: Phase V





YERKES-DODSON LAW



Tesla Model 3 with Autopilot

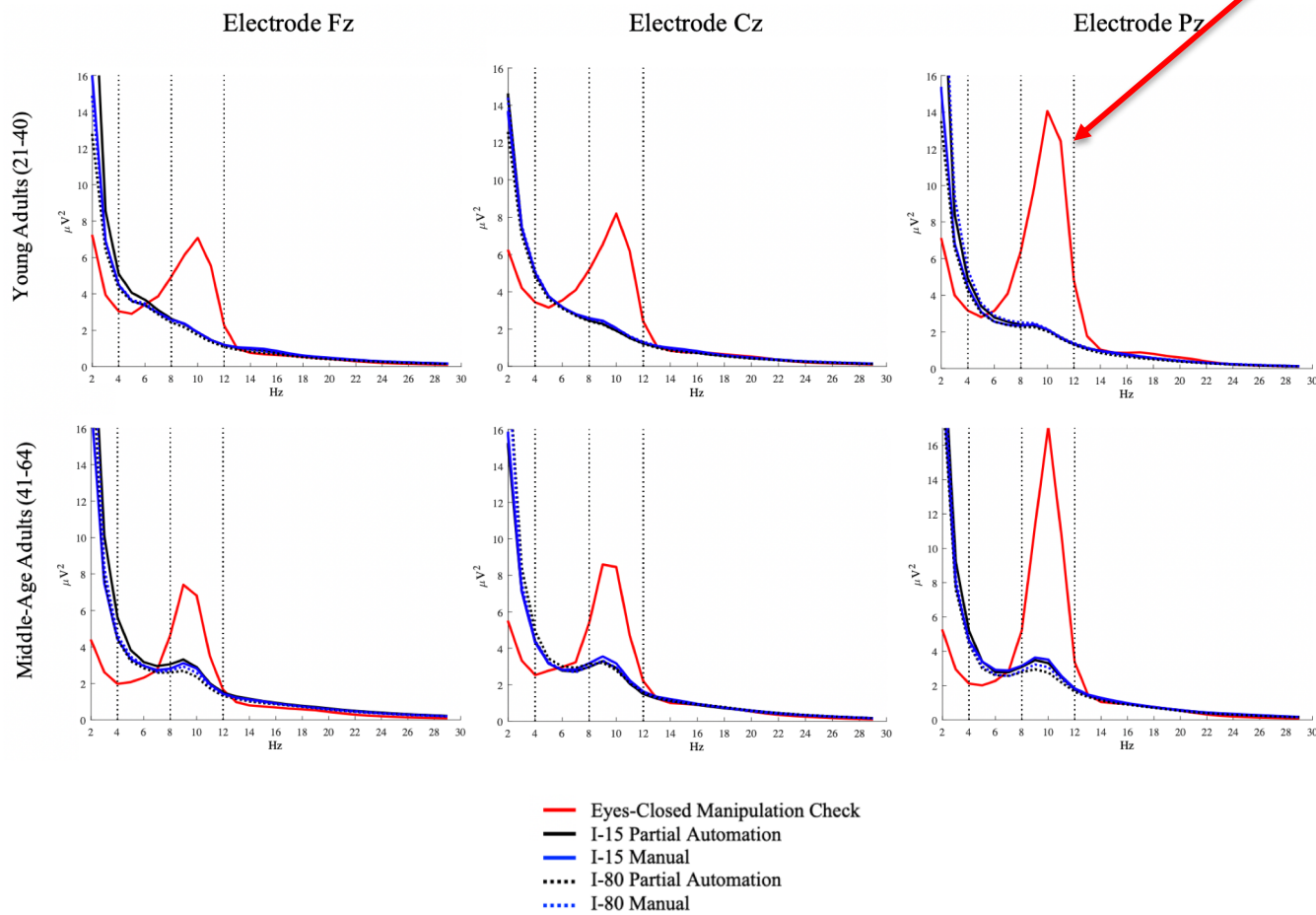


Cadillac CT6 with Super Cruise



Spectral EEG

Disengagement of
Visual Cortex



Fini

