

# Effects of Cell Phones on Driving Performance

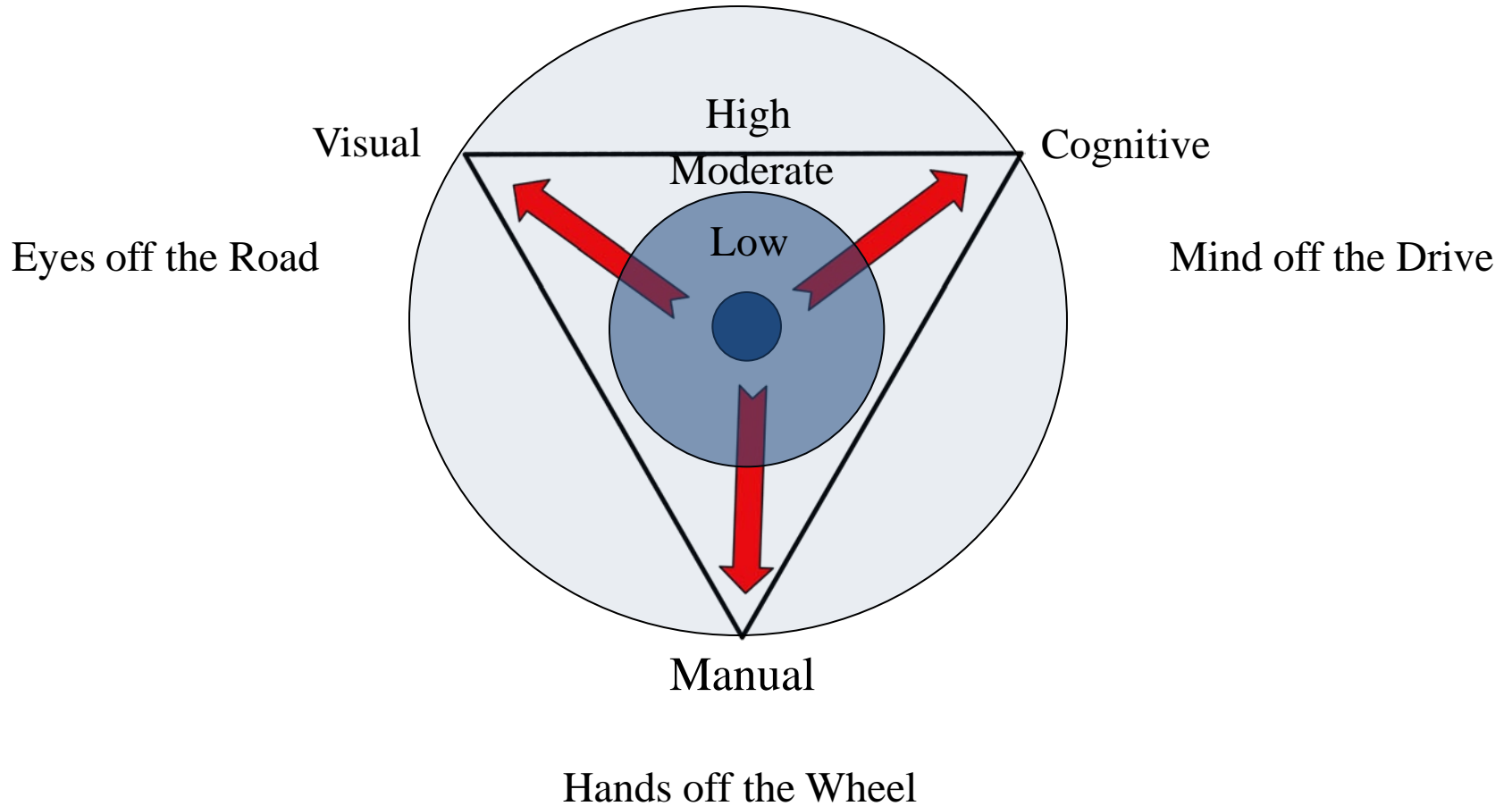
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# The Driver Distraction Triad



# An Example of Driver Distraction



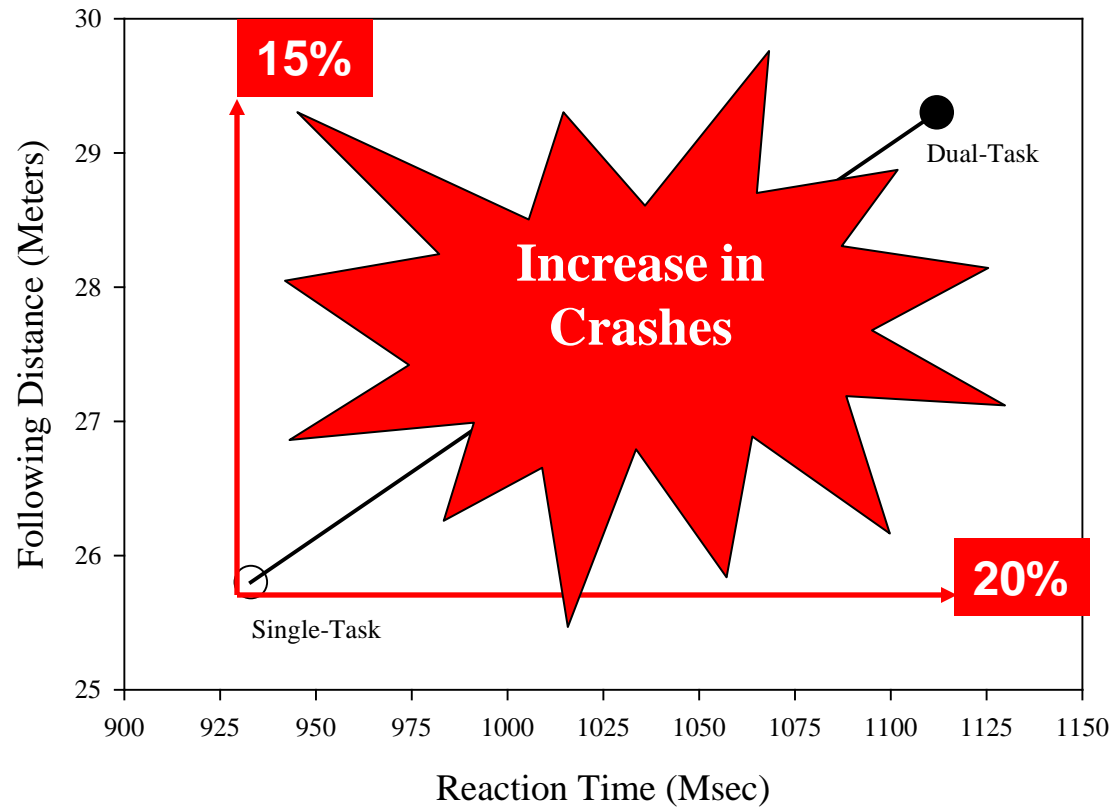
# Observational Study

(Intersection Study – 56K Drivers)



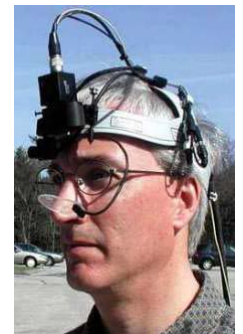
	Cell Phone	No Phone	
Failed to Stop	2416	12567	14983
Stopped Appropriately	3332	38294	41626
	5748	50861	56609

# Single-Task vs. Dual-Task

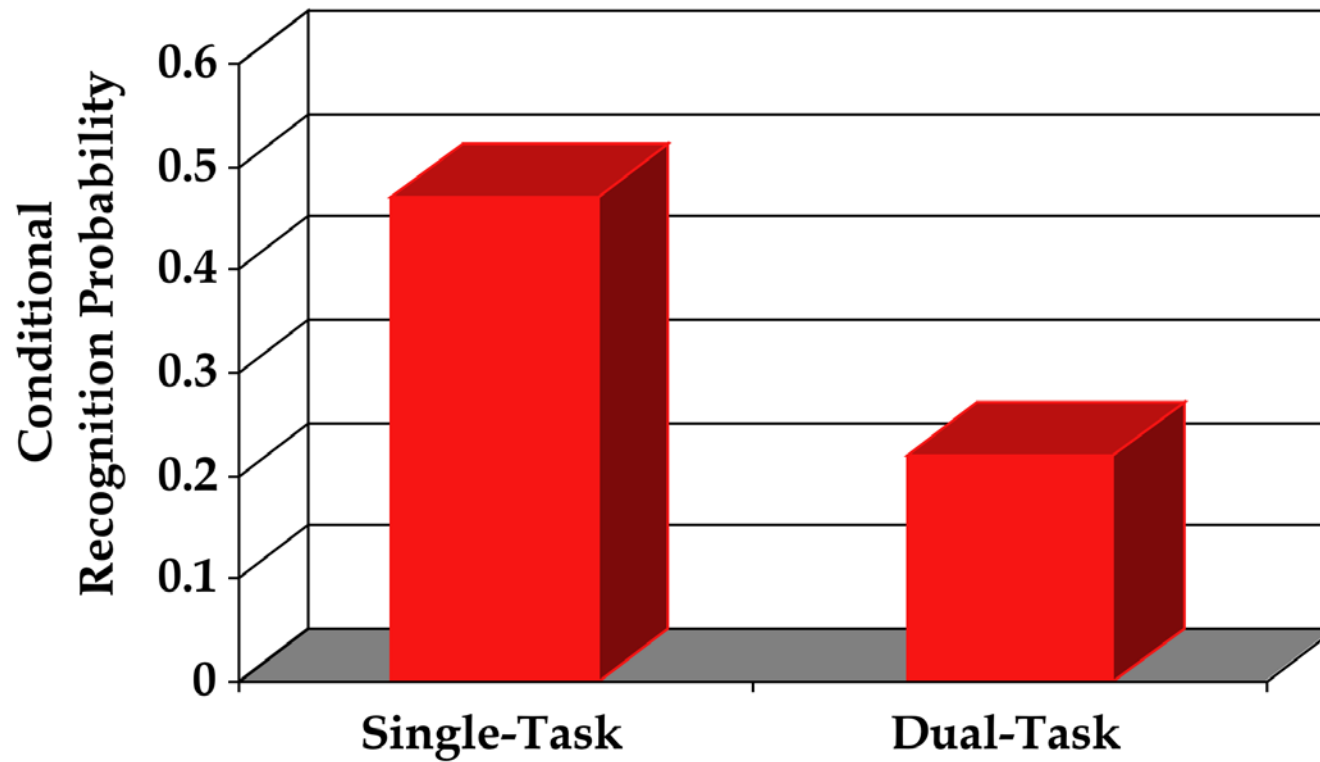


# Inattention-Blindness

- Test for evidence of cell-phone induced inattention blindness
  - High-fidelity driving simulator
  - Hands-free cell phone
  - Naturalistic conversation with confederate
  - Eye tracker
  
- Two phases to the study:
  - Phase 1: Single & dual-task driving
  - Phase 2: Recognition memory tests for objects encountered while driving



# Recognition Memory Given Fixation



# Encoding or Retrieval Deficits?

- Encoding deficits

- Reduced attention to perceptual inputs
- Clear implications for traffic safety



- Retrieval deficits

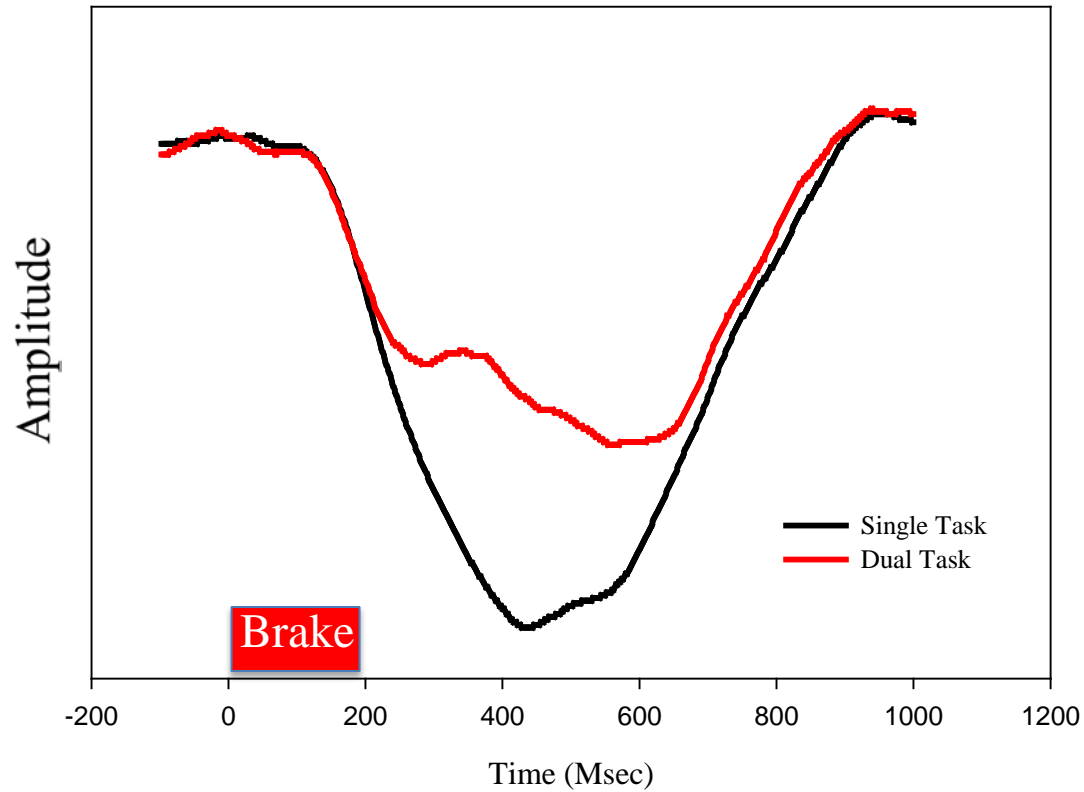
- Failure to retrieve prior episodes
- Less clear implications for traffic safety

- Event-related brain potentials recorded to traffic brake lights

- Single-task
- Dual-task



# Traffic-related Brain Activity Elicited by Brake Lights



# Cognitive Interference: Inattention Blindness



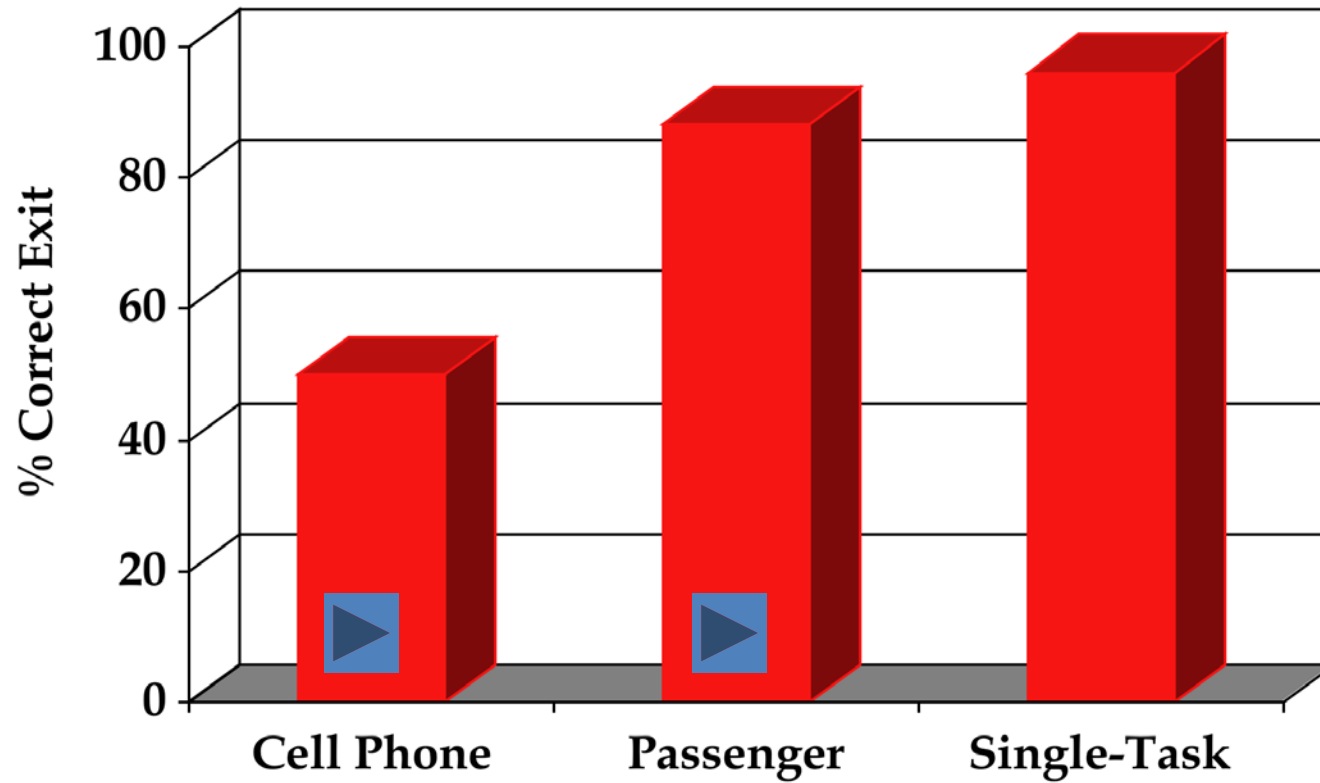


DID YOU HEAR ABOUT THAT NEW STUDY THAT SAID EVEN HANDS-FREE CELL PHONES ARE DANGEROUS?

I'M PROBABLY NOT EVEN SUPPOSED TO BE TALKING TO YOU RIGHT NOW...

JFK KERRA  
2001  
GARY VECCHI-HEARD

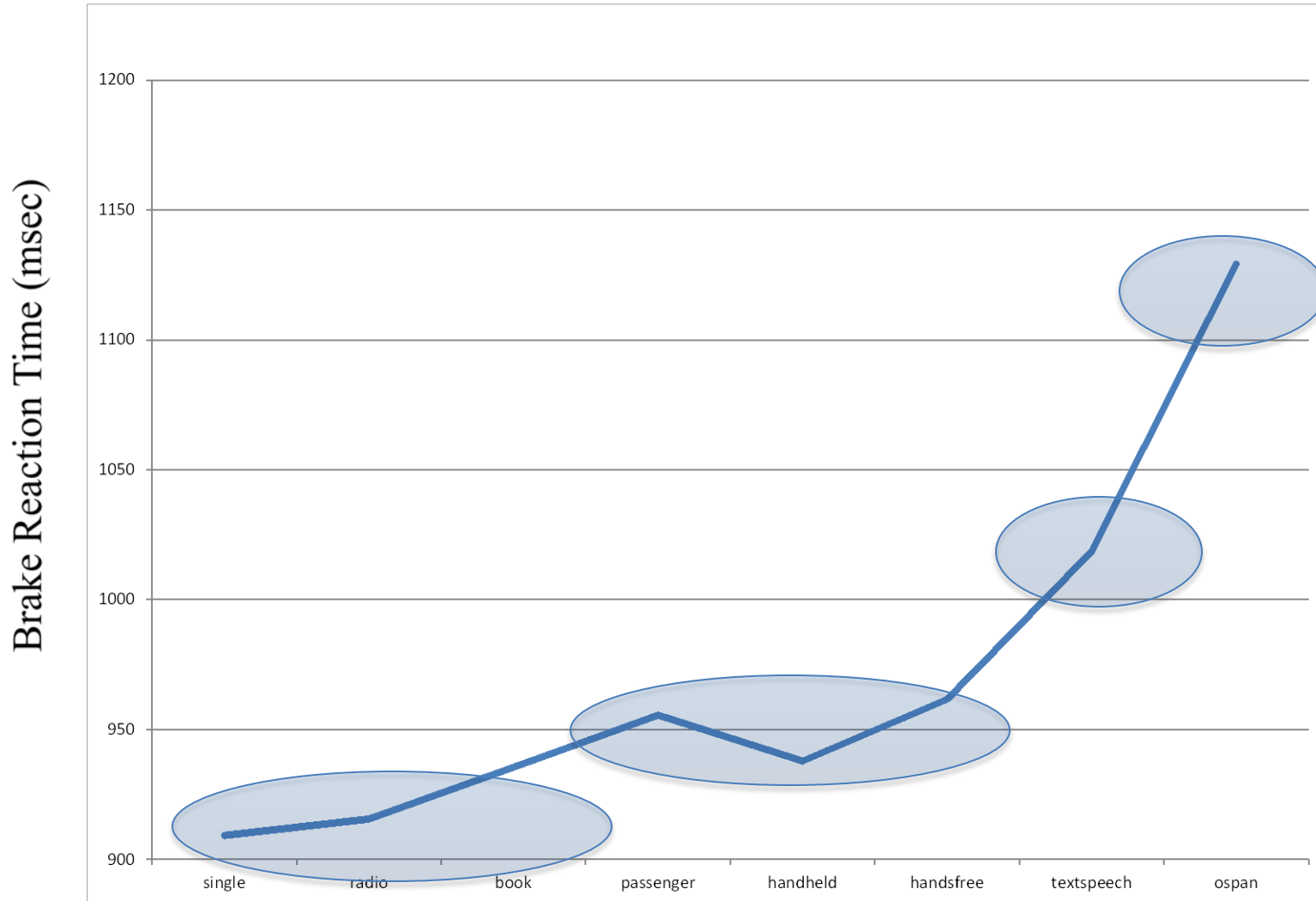
# Successful Navigation to Rest Stop



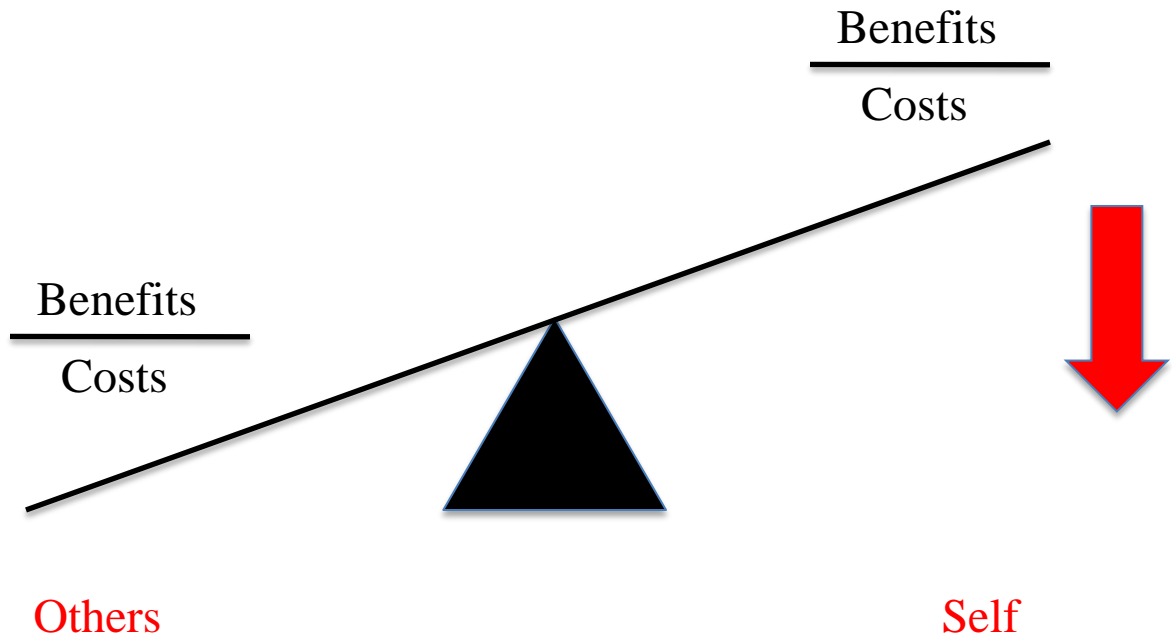
# Benchmarking Cognitive Distraction

- Sources of Driver Distraction
  - Baseline driving
  - Radio
  - Book on tape
  - Passenger conversation
  - Hand-held phone conversation
  - Hands-free conversation
  - Voice messaging / e-mail (speech to text & text to speech)
  - OSPAN task
- Driving Simulator
- On-Road Vehicle

# A Metric for Cognitive Distraction



# Why Do People Persist in Multitasking in the Vehicle? (yet support laws that would outlaw such behavior)



# Summary and Conclusions

- Three sources of Driver Distraction
  - Visual
  - Manual
  - Cognitive
- Cognitive Distraction
  - Inattention blindness
  - Impaired recognition memory, suppressed ERPs
  - Impaired visual scanning (tunnel vision)



# Applied Cognition Laboratory

