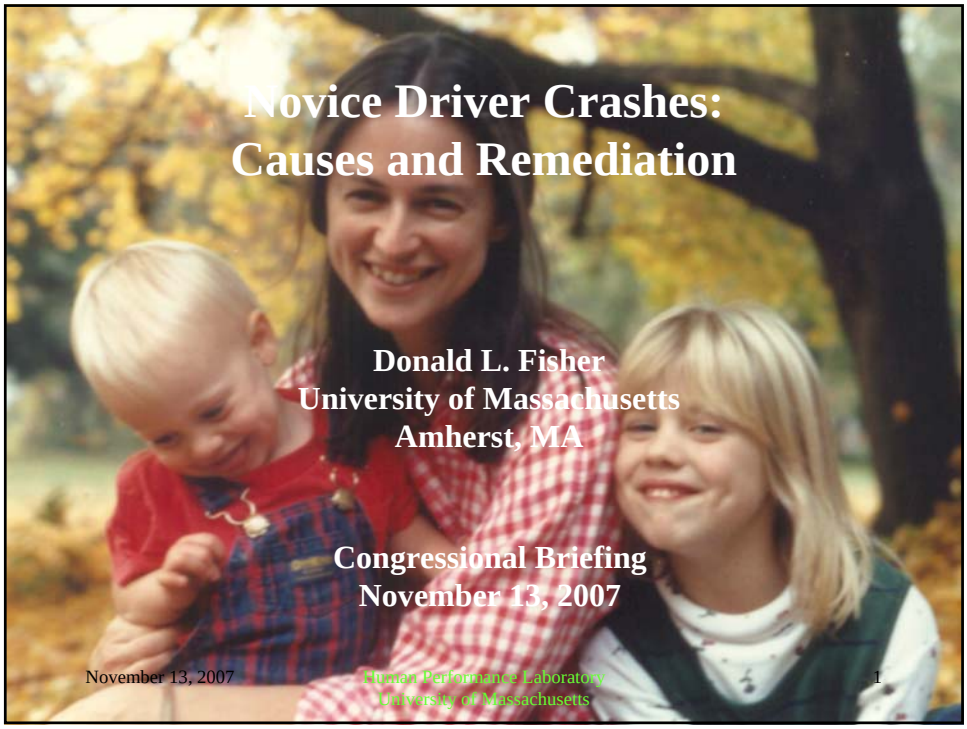


Novice Driver Crashes: Causes and Remediation

Donald L. Fisher
University of Massachusetts
Amherst, MA

Congressional Briefing
November 13, 2007

The First Six Months: A Problem That Will Not Go Away

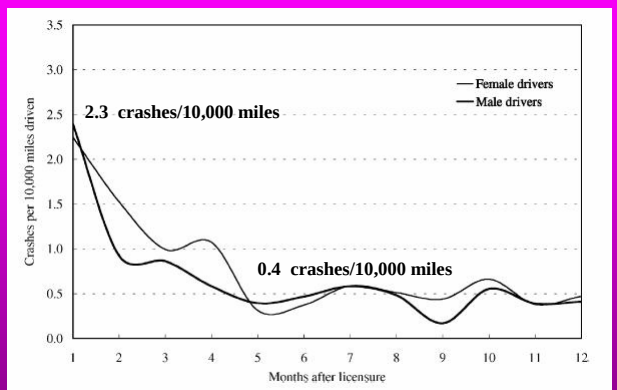


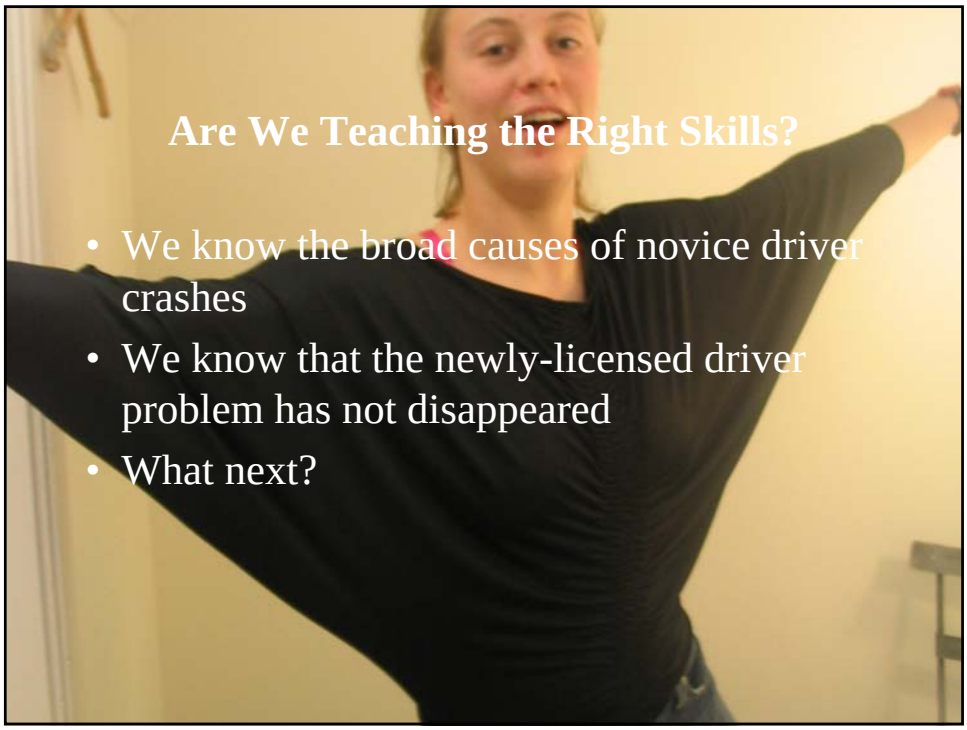
Fig. 3. Crash rate by month of licensure: male drivers and female drivers.

McCartt A.T., Shabanova, V.I., and Leaf W.A. (2003). Driving experience, crashes and traffic citations of teenage beginning drivers. *Accident Analysis and Prevention, 35*, 311-320.

I. First of Three Questions
Why Do Newly-Licensed Driver Crash?

- No
  - A. Maturation
  - B. Alcohol
  - C. Speeds over 70 mph
- Yes (based on analysis of police crash reports)
  - A. Failures of Hazard Anticipation (43%)
  - B. Failures of Attention Maintenance (23%)
  - C. Failures of Speed Management (20.8%)

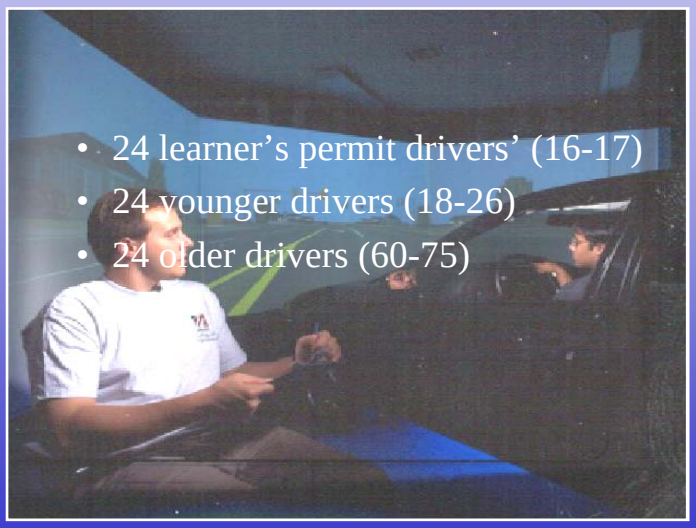
McKnight, J.A., and McKnight, S.A. (2003). Young novice drivers: Careless or clueless. *Accident Analysis and Prevention*, *35*, 921–925.



Are We Teaching the Right Skills?

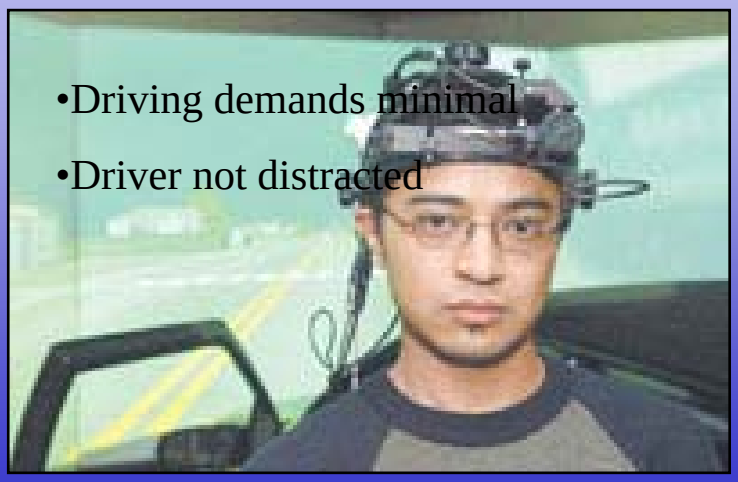
- We know the broad causes of novice driver crashes
- We know that the newly-licensed driver problem has not disappeared
- What next?

A. Why Do Novice Drivers Fail to Anticipate Hazards?



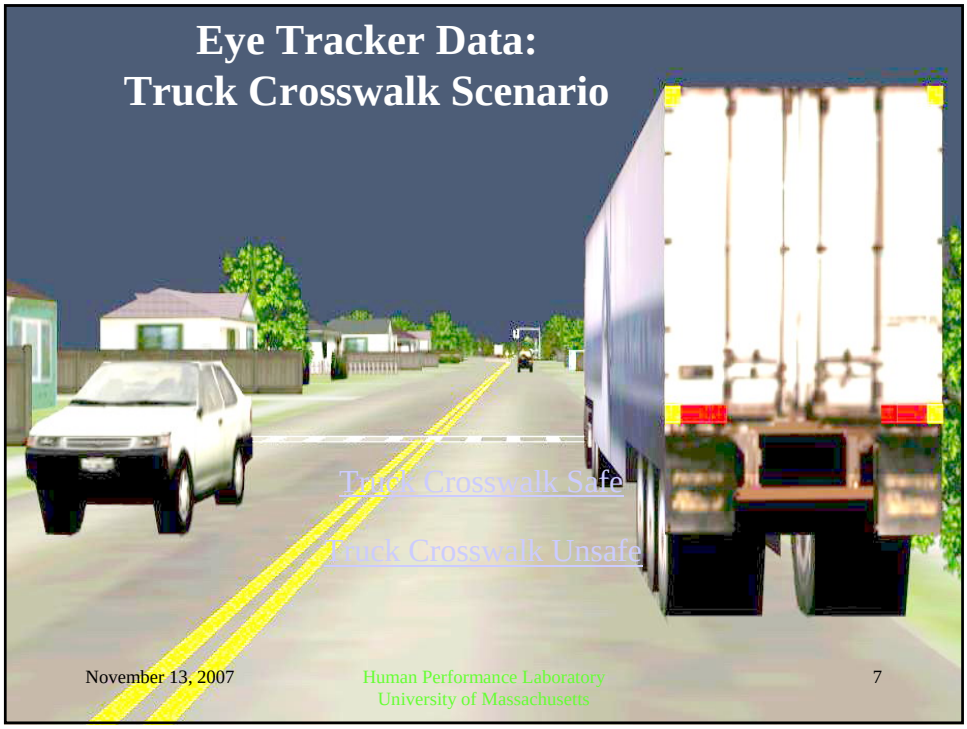
- 24 learner's permit drivers' (16-17)
- 24 younger drivers (18-26)
- 24 older drivers (60-75)

Does the Novice Driver Scan for Potential Threats?

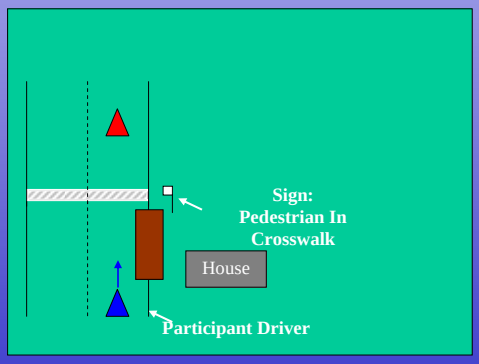


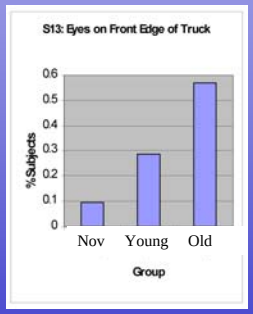
- Driving demands minimal
- Driver not distracted

Eye Tracker Data: Truck Crosswalk Scenario



Results: Truck Crosswalk Scenario



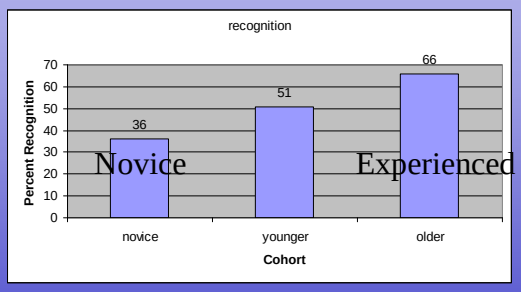


Novice: 16 – 17

Young: 19 – 29

Old: 60 - 75

Results:



Pradhan, A. K., Hammel, K. R., DeRamus, R., Pollatsek, A., Noyce, D. A. and Fisher, D. L (2005). The Use of Eye Movements to Evaluate the Effects of Driver Age on Risk Perception in an Advanced Driving Simulator. *Human Factors*, *47*, 840-852.

Conclusions:
Novice Drivers Do Not Anticipate Hazards as well as Experienced Drivers

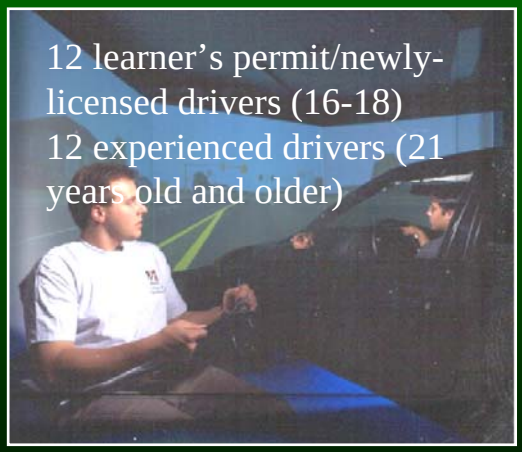
- Not always because
  - Driving demands are excessive
  - Drivers are distracted
- Rather
  - Drivers do not know where to look
  - Drivers do know where to look, but do not recognize importance

I. Why Do Newly-Licensed Driver Crash?

- A. Failures of Hazard Anticipation (43%)
- B. Failures of Attention Maintenance (23%)

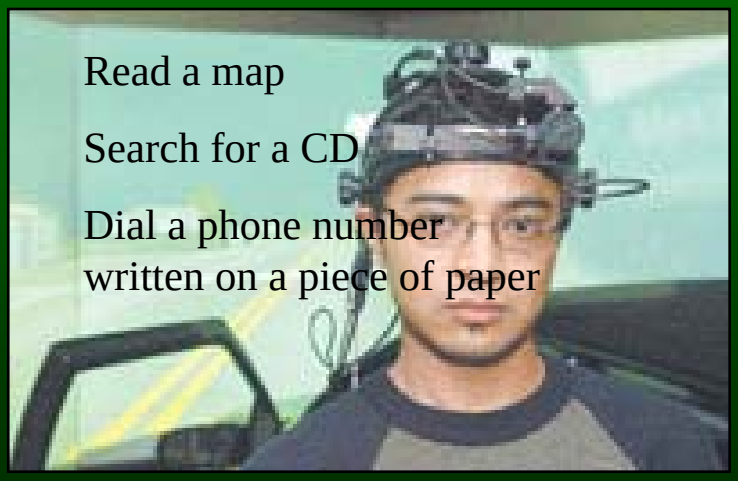
McKnight, J.A., and McKnight, S.A. (2003). Young novice drivers: Careless or clueless. *Accident Analysis and Prevention, 35,* 921–925.

B. Why Do Newly-Licensed Drivers Fail to Maintain Attention

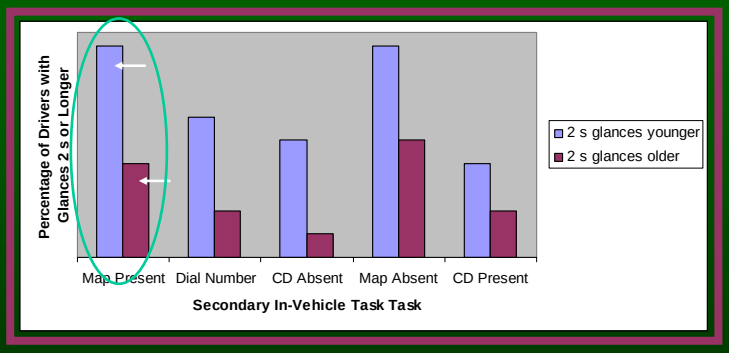


McKnight, J.A., and McKnight, S.A. (2003). Young novice drivers: Careless or clueless. *Accident Analysis and Prevention, 35,* 921–925.

Does the Novice Driver Spend too Long Glancing Away from the Forward Roadway?



Results:



Chan, E., Pradhan, A. K., Knodler, M. A, Pollatsek, A. and Fisher, D. L. (January 2008). Empirical Evaluation on a Driving Simulator of the Effect of Distractions Inside and Outside the Vehicle on Drivers' Eye Behaviors. *Presentation at the 87th Transportation Research Board Annual Meeting*, TRB, National Research Council, Washington, D.C.

Conclusion:
Novice Drivers Glance Away from the Forward Roadway Two Seconds or Longer Much More Frequently Than Experienced Drivers

- In-vehicle text messaging
- In-vehicle iPod use

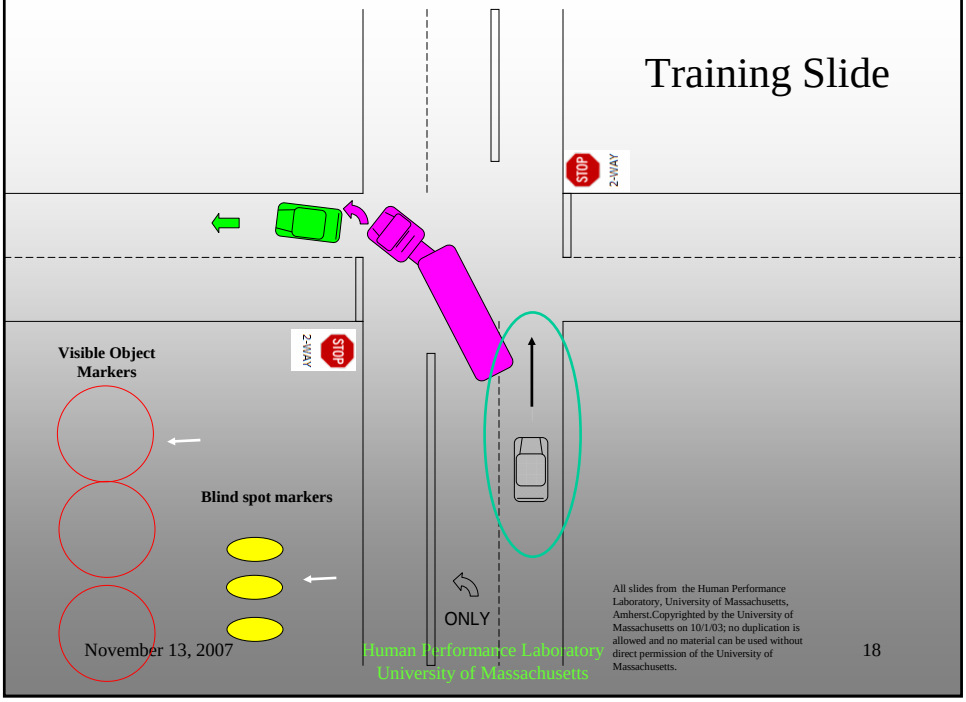
Second of Three Questions

- I. Why do newly-licensed drivers crash?
- II. Can a new driver training program be developed which reduces the likelihood of these crashes?

Can We Train Hazard Anticipation Skills in Novice Drivers?

- Inexpensive
- Widely disseminable
- Would improve skills
  - In a driving simulator
  - On the open road

Training Slide



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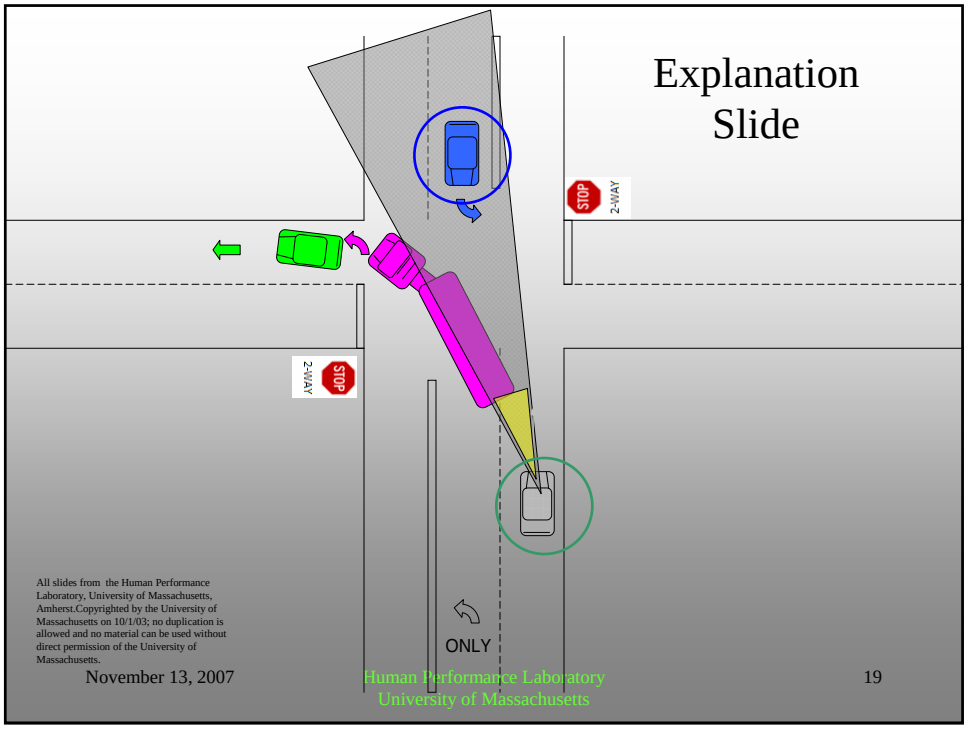
Explanation Slide
STOP
2-WAY
STOP
2-WAY
ONLY
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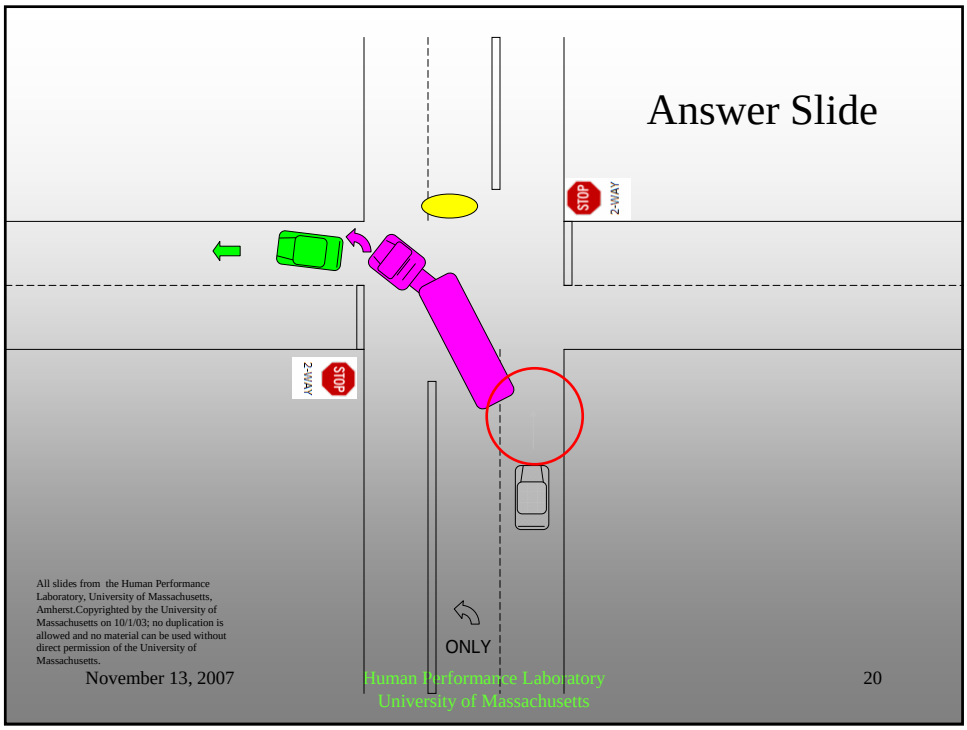
Answer Slide
STOP
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2-WAY
ONLY
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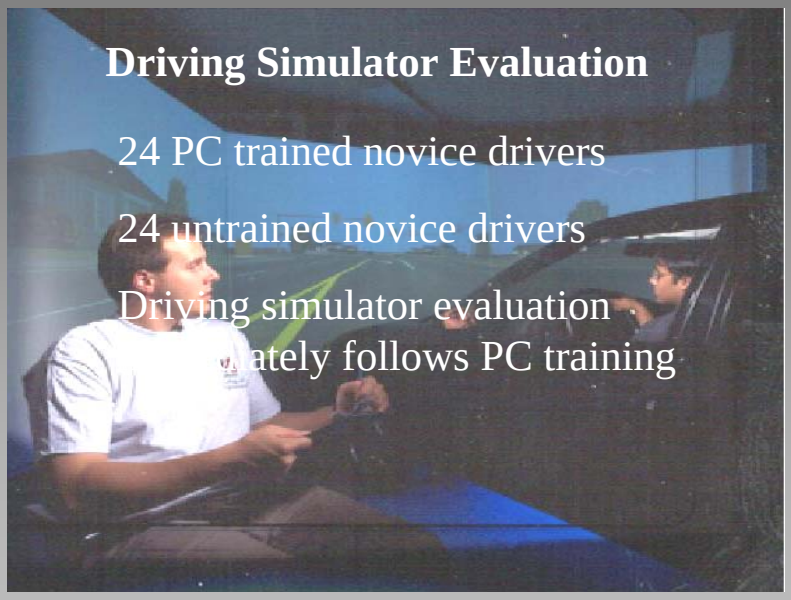


Driving Simulator Evaluation

24 PC trained novice drivers

24 untrained novice drivers

Driving simulator evaluation immediately follows PC training

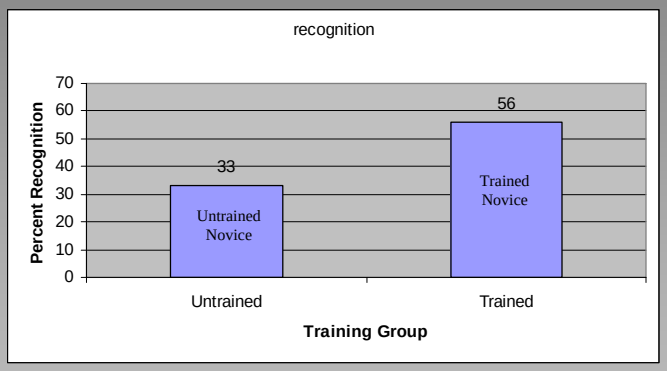
Will Trained Novice Drivers Look More Often in Area of Potential Threat?

The Near Data: Truck Left Turn

NearTransfer-TLT-Safe.rm.ram

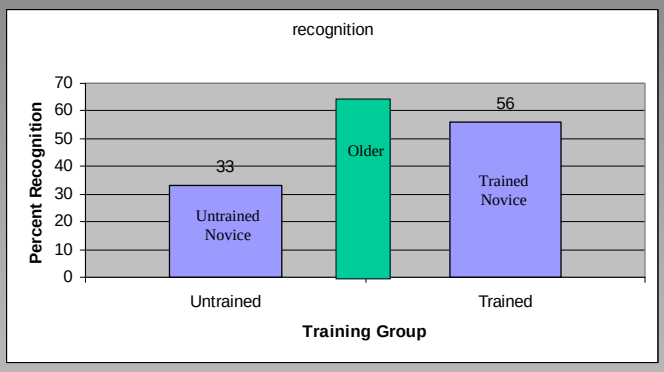
NearTransfer-TLT-UnSafe.rm.ram

Results:

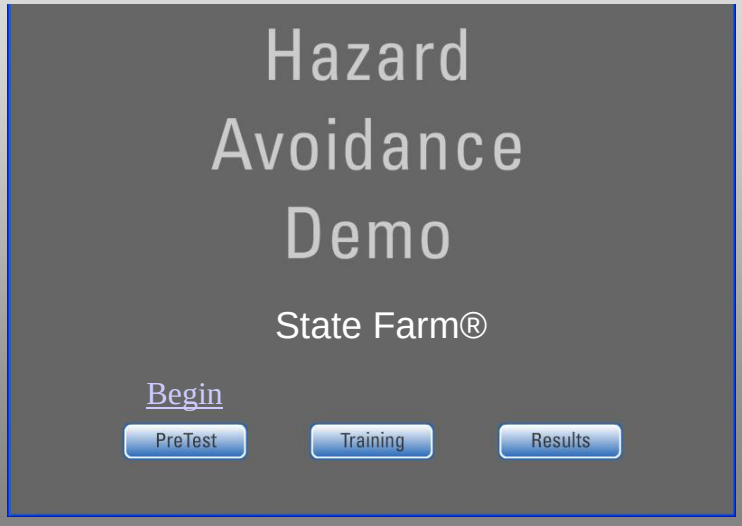


Pollatsek, A., Narayanaan, V., Pradhan, A., and Fisher, D. L. (2006). The Use of Eye Movements to Evaluate the Effect of PC-Based Risk Awareness Training on an Advanced Driving Simulator. *Human Factors, 48*, 447-464

Conclusion:
Training Can Makes a Difference



Can We Improve Hazard Anticipation Skills of Novice Drivers Still?



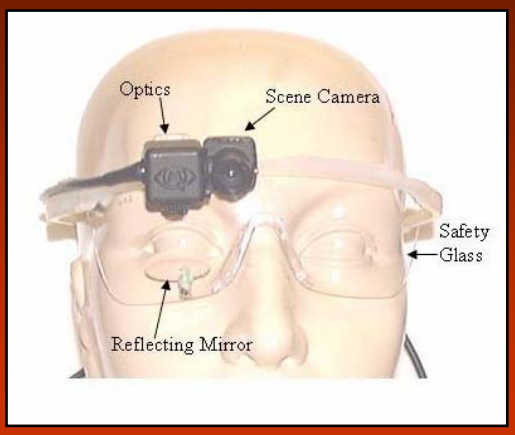
Can We Train Hazard Anticipation Skills in Novice Drivers?

- Inexpensive to purchase
- Widely disseminable
- Would improve hazard anticipation skills both
  - On a driving simulator
  - On the open road

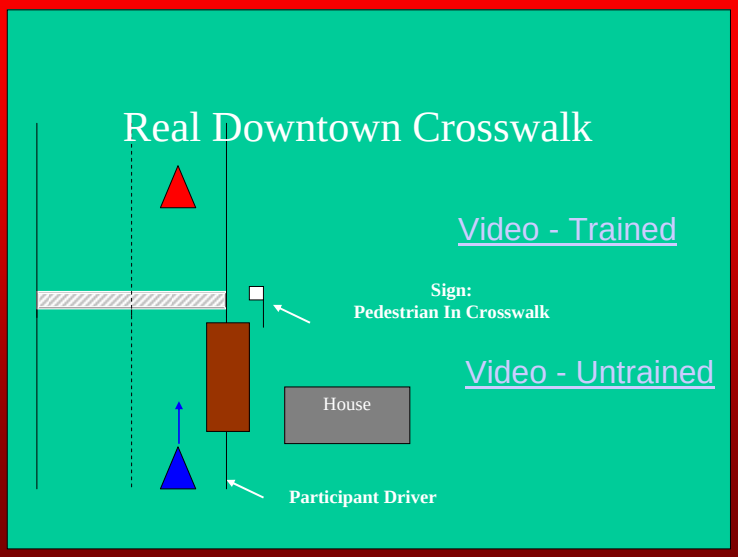
Field Experiment

- 12 trained drivers 18-21
  - PC training
  - Evaluation on the open road
- 12 untrained drivers 18-21
  - Evaluation on the open road

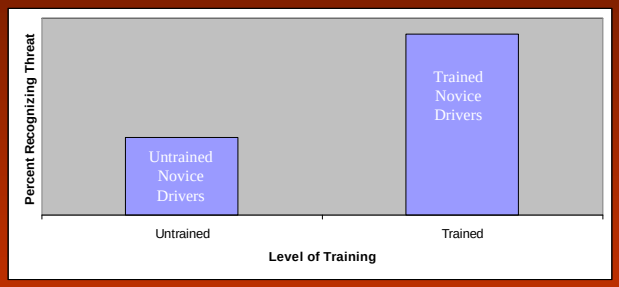
Will Trained Novice Drivers Look More Often at Potential Threat?



Field Studies: Eye Tracker Data

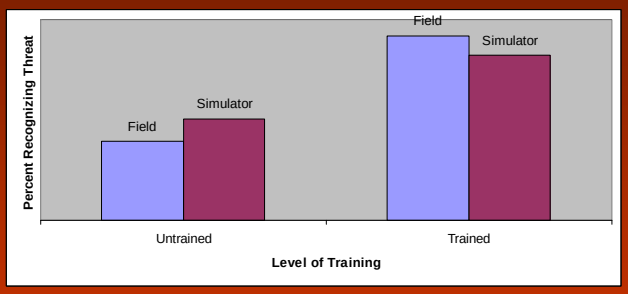


Results:



Fisher, D. L., Pradhan, A. K., Pollatsek, A. and Knodler, M. A. Jr. (submitted). Empirical evaluation of hazard anticipation behaviors in the field and on a driving simulator using an eye tracker. *Transportation Research Record.*

Conclusions:
Training Works in the Field



Fisher, D. L., Pradhan, A. K., Pollatsek, A. and Knodler, M. A. Jr. (submitted). Empirical evaluation of hazard anticipation behaviors in the field and on a driving simulator using an eye tracker. *Transportation Research Record*.

Third of Three Questions

- I. Why do newly-licensed drivers crash?
- II. Can driver training reduce the likelihood of these crashes?
- III. What can the federal government do?

III. State of the Art

- We know now
  - What behaviors differentiate newly-licensed from experienced driver
  - What training programs show real promise
- We need to know
  - Whether other training programs could lead to bigger gains
  - Whether these training programs reduce actual crashes, injuries and fatalities
  - Whether broader involvement of parents and driving instructors would help during the first six months of solo driving

The First Six Months: What Can the Federal Government Do?

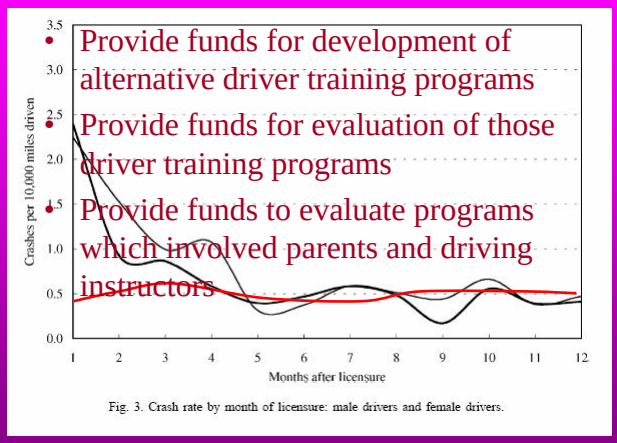


Fig. 3. Crash rate by month of licensure: male drivers and female drivers.

- Provide funds for development of alternative driver training programs
- Provide funds for evaluation of those driver training programs
- Provide funds to evaluate programs which involved parents and driving instructors

McCartt A.T., Shabanova, V.I., and Leaf W.A. (2003). Driving experience, crashes and traffic citations of teenage beginning drivers. *Accident Analysis and Prevention, 35*, 311-320.

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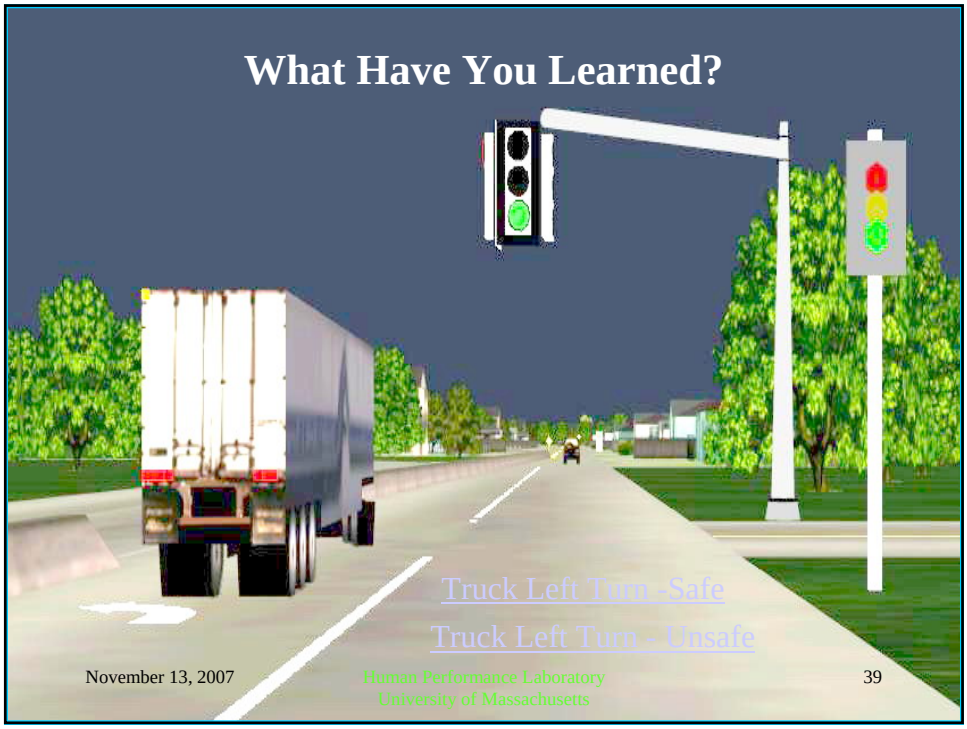
- Nancy Laurie
- Vinod Narayanan
- Alexander Pollatsek
- Anuj Pradhan
- Matthew Romoser
- Bhupinder Singh

What Have You Learned?

Raise Your Hand When You Recognize the Hidden Threat

State Farm Video


What Have You Learned?
Truck Left Turn -Safe
Truck Left Turn - Unsafe
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