

How Do You Turn This Driving Simulator On?

Tutorial for Traffic Engineering and Roadway Design Research Using Driving Simulation

Sue Chrysler

Linda Ng Boyle

Richard Romano

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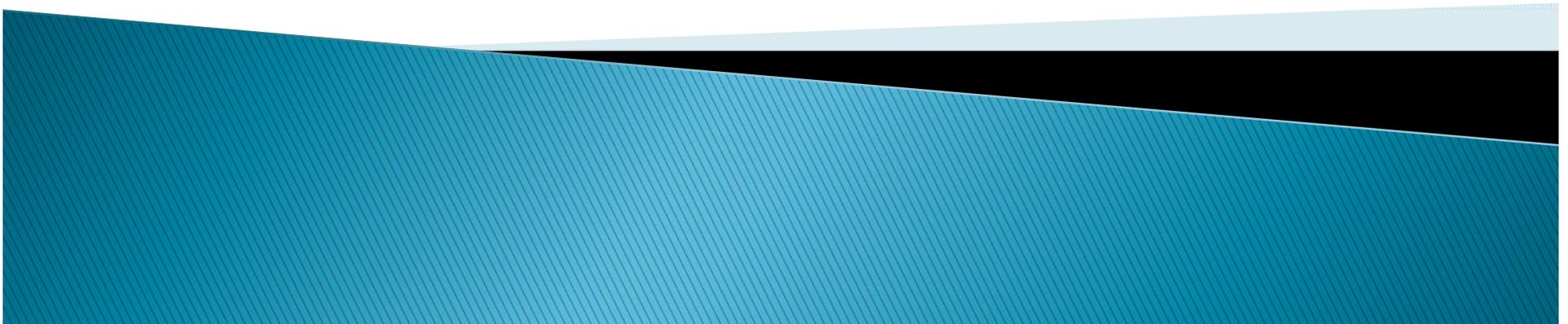
Agenda

- 1:30 Introductions
- 1:45 Hardware Selection and Room Set-up
Richard Romano
- 2:05 Research Topics and Scenarios
Sue Chrysler
- 2:20 Experimental Design Concepts
Linda Ng Boyle
- 2:40 Data Collection Tips
Sue Chrysler
- 3:00 Group Exercise
- 4:00 Discussion and Questions
- 4:30 Adjourn



Research Topics and Scenarios Selection

Sue Chrysler



Research Question Must...

- ▶ Fit your equipment
 - Bad choice #1: study gap selection on cross-street traffic with a single screen simulator
 - Bad choice #2: study speed selection on curves with a fixed-base simulator
 - Bad choice #3: study different route choices if limited routes available
- ▶ Fit your available participant pool
 - Bad choice: study night driving with only college-aged participants



Choosing appropriate performance measures

▶ Typical driving measures:

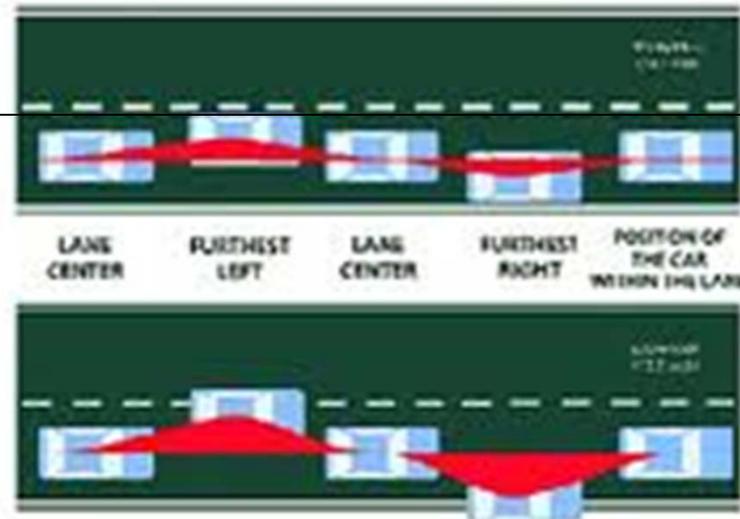
Longitudinal Control

- Speed
- Std deviation of speed
- Acceleration
- Lane position
- Coherence
- Car Following

Lateral Control

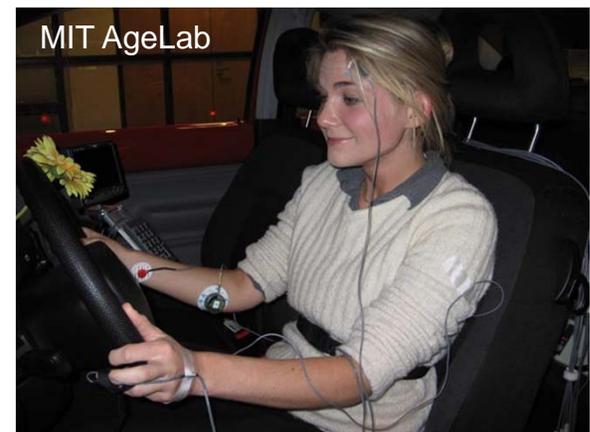
- Std deviation of lane position
- Steering wheel angle
- Steering entropy
- Lane exceedence

▶ Sampling Rate ?



Other measures

- ▶ Performance on Secondary Tasks
 - Response time (e.g. light detection task)
 - Accuracy (e.g. mental arithmetic, menu selection)
- ▶ Eye gaze
 - Eye tracking systems
 - Video capture, manual coding
- ▶ Physiological measures
 - Do you really know what you are measuring ?



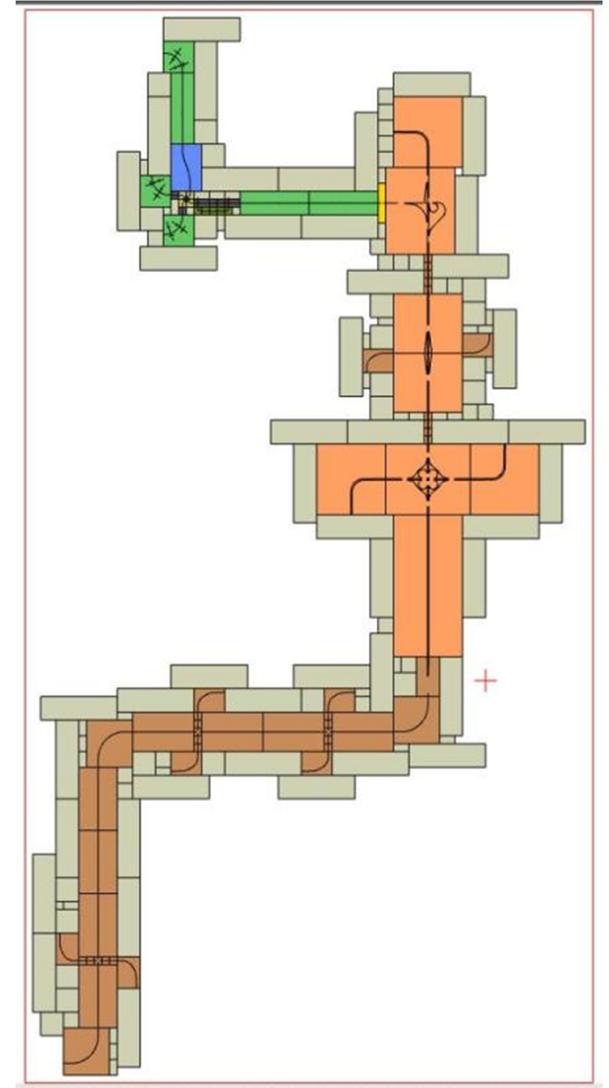
Examples of matching performance measures to study

- ▶ Study objective: Effect of school crossing signs on safety at crosswalks.
- ▶ Appropriate measures
 - Response time to pedestrian target with and without sign
 - Eye gaze patterns
- ▶ Questionable measures
 - Speed when pedestrian is not present



Designing the scenario

- ▶ List critical events
- ▶ Draw a map
- ▶ Think in terms of time, not distance
- ▶ Allow periods of non-eventful driving
- ▶ Provide warm-up drive separately or at start of scenario
- ▶ Allow for time to reach target speed
- ▶ Specify behavior of other vehicles



Discussion

- ▶ What tools do you use to lay out your road (Post-its, whiteboard, Scotch tape) ?
- ▶ How do you identify the measures you use ?
- ▶ How do you specify the behavior of other vehicles or entities ?

