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

TRB Annual Meeting January 13, 2013
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
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:**

<table>
<thead>
<tr>
<th>Longitudinal Control</th>
<th>Lateral Control</th>
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<tbody>
<tr>
<td>Speed</td>
<td>Std deviation of lane position</td>
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<tr>
<td>Std deviation of speed</td>
<td>Steering wheel angle</td>
</tr>
<tr>
<td>Acceleration</td>
<td>Steering entropy</td>
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<tr>
<td>Lane position</td>
<td>Lane exceedence</td>
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<td>Coherence</td>
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<td>Car Following</td>
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- **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?
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?