The Effects of Reading and Writing Text-Based Messages While Driving

Christine E. Yager, Texas A&M Transportation Institute
Joel M. Cooper, Precision Driving Research
Susan T. Chrysler, University of Iowa
Objectives

- Primary Objective: To assess the distraction potential of reading and writing text-based messages while driving under varying roadway and texting response demands
  - Closed course testing versus driving simulator?
  - Changes in task interaction as driver workload varies?
  - Does reading differ from writing?
Methodology

Demographics
- 42 participants
- Ages ranged from 16-54
- 17 male, 25 female

Closed course testing
- Divided course sections (WZ and open)
- Separated reading versus writing
Methodology

- Three experimental segments

<table>
<thead>
<tr>
<th>Experimental Condition</th>
<th>Writing Texts?</th>
<th>Reading Texts?</th>
<th>Told to Drive 30mph?</th>
<th>Asked to Maintain Lane Position?</th>
<th>Asked to Respond to Light Task?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td></td>
<td></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Writing</td>
<td>✓</td>
<td></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Reading</td>
<td></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

- Content of text-based messages
Methodology

- Instrumented vehicle on a closed course

- Performance metrics recorded:
  - Reaction time to a hood-mounted LED light
  - Lane position
  - Speed

- Video:
  - Face
  - Profile/hand positions/duplicate response light
  - Forward roadway from right and left sides of the vehicle
## Video Layout

<table>
<thead>
<tr>
<th>Eye glance position</th>
<th>Reaction time light and Hand position</th>
</tr>
</thead>
<tbody>
<tr>
<td>Left side view</td>
<td>Right side view</td>
</tr>
</tbody>
</table>
Video of Experiment: Control Condition
Video of Experiment: Writing Condition
Video of Experiment: Reading Condition
Missed Detection Events per Drive

<table>
<thead>
<tr>
<th>Activity</th>
<th>Average Number of Missed Events</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline Driving</td>
<td>0.5</td>
</tr>
<tr>
<td>Driving + Writing</td>
<td>3.5</td>
</tr>
<tr>
<td>Driving + Reading</td>
<td>2.5</td>
</tr>
</tbody>
</table>
Text Entry Rate

<table>
<thead>
<tr>
<th></th>
<th>Characters per Minute</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not Driving</td>
<td>100</td>
</tr>
<tr>
<td>Barreled Section</td>
<td>60</td>
</tr>
<tr>
<td>Open Section</td>
<td>60</td>
</tr>
</tbody>
</table>
Text Reading Rate

Bar graph showing reading rates per minute for different sections:

- Not Driving: 1400 characters
- Barreled Section: 800 characters
- Open Section: 400 characters
Further Discussion

- Closed course testing versus driving simulator?
  - Similar results
  - Even greater response time impairment
- Changes in task interaction as driver workload varies?
  - Both wrote and read fewer characters per minute in barred section than open section
- Does reading differ from writing?
  - Significant impairment from both reading and writing when compared to control condition
  - Only response time was differentially affected by the two tasks, showing greater impairment associated with writing text-based messages
Thank you! Questions?

Christine Yager
c-yager@ttimail.tamu.edu
(979) 845-6528