DESTINATION ENTRY WHILE DRIVING: SPEECH RECOGNITION VERSUS A TOUCH-SCREEN KEYBOARD

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1 Issues

1. Effect of destination entry method (speech recognition by word, by character, and touch-screen typing) on:
   • task completion time (and errors)
   • concurrent driving performance
   • perceived difficulty and perceived safety

2. Effect of driving workload (while parked, on a straight road, a moderate curve, and a sharp curve) on:
   • destination-entry task performance
   • glance behavior
   • task partitioning (character entry)

2 Test Method

<table>
<thead>
<tr>
<th>Destination Entry</th>
<th>Keyboard</th>
<th>Typed on touch-screen</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speech Recognition</td>
<td></td>
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<tr>
<td>Word dictation</td>
<td>&quot;DEXTER&quot;</td>
<td></td>
</tr>
<tr>
<td>Character spelling</td>
<td>&quot;D&quot; &quot;E&quot; &quot;X&quot; &quot;T&quot; &quot;E&quot; &quot;R&quot;</td>
<td></td>
</tr>
</tbody>
</table>

24 Subjects

<table>
<thead>
<tr>
<th></th>
<th>Female</th>
<th>Male</th>
</tr>
</thead>
<tbody>
<tr>
<td>Young (20-29)</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Old (65-72)</td>
<td>6</td>
<td>6</td>
</tr>
</tbody>
</table>

3 Driving Workload Levels

- Straight sections (least workload)
- Broad curves ($r = 582$ m)
- Sharp curves ($r = 194$ m) (most workload)

20 Character Address entered on modified QWERTY keyboard
3 Results

Destination-Entry Performance

- Task completion time while driving was shortest in word mode, and longest in keyboard-entry.

![Graph showing task completion time in different modes](image1)

- Task completion time with the touch-screen keyboard increased with increasing driving workload.

![Graph showing task completion time with touch-screen keyboard](image2)

Driving Performance

- Most first lane departures occurred within the first minute of the entry task.

![Histogram showing number of lane excursions](image3)

- Standard deviation of lane position increased with elapsed time.

![Graph showing standard deviation of lane position](image4)
**Task Partitioning**

- Pauses between fields (+57%) and between groups (+27%) increased as road curvature increased.

- Total glance duration at the display remained relatively constant under all workload levels.

- Glances at the display were consistent for all participants. Glances at the road by young participants were shorter.

**Post-Test Subjective Rating**

- Driving rated more difficult than parked, and keyboard entry rated most difficult.

- Keyboard entry rated least safe, and no method rated extremely safe.