Street Crossing by Blind and Sighted Pedestrians at Modern Roundabouts: An Overview of Research

- Richard Long, Daniel Ashmead, Nagui Rouphail, David Guth, Ron Hughes, Paul Ponchillia, Robert Wall, and a host of others

- Western Michigan University, Vanderbilt University, The University of North Carolina, North Carolina State University
Background
• Baltimore and Tampa judgment studies
  – Measures
  – Findings
• Nashville and Raleigh crossing studies
  – Effect of judging position and yield detection system
Implication of finding on interventions for cumulative risk of dangerous crossings

![Graph showing probability of a dangerous crossing attempt vs. number of crossings. The graph includes data points for 9%, 6%, and 3% rates of intervention.]

National Roundabout Conference 2005 DRAFT
Where do we go from here?

- Enhancing detection of gaps and yielded vehicles
- Signal strategies
- Other technologies
- Training and education of drivers and pedestrians
Roundabout Yield Detection

Blind Pedestrians
• Approach speed = 35 mph, Circulating speed = 18 mph
• Inscribed diameter = 88 ft, Central Island diameter = 52 ft
• Peak Hour Volume ~ 1400 veh, 160 peds

Credit: www.skysiteaerial.com
Yield detect system

- One induction loop in crosswalk and one upstream of crosswalk
- If a vehicle was over the upstream loop for 2 seconds without the crosswalk loop being activated, the message “vehicle is yielding” was broadcast from a speaker – until the crosswalk loop was activated
General procedures

- 13 blind and 6 sighted subjects crossed entry and exit lanes 16 times with yield system on and 16 times with yield system off
- Measures included:
  - wait time
  - what traffic was doing when crossing was initiated
  - when the O&M instructor (or the ped) halted a crossing
General Results

• Blind peds tended to wait for cars to stop instead of taking rolling yields or crossing in gaps in traffic
• Blind peds missed crossable gaps at 3X the rate of sighted peds (325/832 vs. 51/382)
Yield detect system did not affect the number of stopped cars blind pedestrians missed

\[ \chi^2(2) = 0.12 \]

<table>
<thead>
<tr>
<th></th>
<th>Entry lane</th>
<th>Exit lane</th>
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<tbody>
<tr>
<td>System on</td>
<td>21</td>
<td>10</td>
</tr>
<tr>
<td>System off</td>
<td>21</td>
<td>12</td>
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Yield detect system decreased the number of crossable gaps blind pedestrians missed (but not significantly)

\[ \chi^2(2) = 0.55 \]

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<tr>
<td>System on</td>
<td>75</td>
<td>71</td>
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<tr>
<td>System off</td>
<td>82</td>
<td>91</td>
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Blind pedestrians had 36 interventions in 832 crossings (4.3\%)

Interventions reflect “bad judgments” on the part of the pedestrian

\[\chi^2(2) = 1.65\]

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<tr>
<td>System on</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>System off</td>
<td>7</td>
<td>18</td>
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In Summary

- Auditory yield detection is promising
  - Appears to improve crossing efficiency
- Position of loops is critical and site specific
Thank you