DRIVERS' AND PEDESTRIANS' UNDERSTANDING OF IN-STREET CROSSWALK SIGNS

Juan C. Medina
Rahim F. Benekohal

University of Illinois at Urbana - Champaign
Introduction

- Study conducted at the University of Illinois at Urbana-Champaign

- Main objective of the study was to evaluate pedestrian safety under different crosswalk treatments, traffic conditions

- This presentation focuses on differences in safety perception among population subgroups (age, gender, affiliation, etc)
Introduction

- Layout of main campus area:
Introduction

- Crosswalks have low/moderate vehicular, but very high pedestrian traffic
- Cities population ~150K, university ~42K students + 10K faculty and staff
- Different types of crosswalk treatments are used (marked, unmarked, curbside signs, in-street signs, in-pavement flashing lights)
Introduction

- Wide variety of crosswalk treatments:
Introduction

- Crosswalk treatment with “novelty” signs

In-street Signs

“Yield-here-to-pedestrian” curb-side signs
Introduction

- Wide variety of crosswalk treatments:
  - Sensor-activated in-pavement flashing lights
  - In-pavement flashing lights
Introduction

- Wide variety of crosswalk treatments:

![Unmarked, de-facto crosswalk (no treatment)](image)
Issues

- Challenging environment to improve pedestrian safety
- Innovative treatments have potential, but are they correctly understood?
- Two opinion surveys used to obtain safety perceptions:
  - From pedestrians’ perspective, and
  - From drivers’ perspective
Opinion Surveys

- Web-based, anonymous, distributed through official university listings

- Initial screening to determine valid surveys:
  - >70% questions answered, and
  - answers for all pedestrian signage questions

- 6677 valid pedestrian surveys, and 4732 valid driver surveys
Participation from all university affiliations:

- Freshman: 12.3%
- Sophomore: 3.0%
- Junior: 11.4%
- Senior: 5.8%
- Graduate Student: 12.6%
- Faculty: 13.8%
- Staff: 13.3%
- Other (specify): 19.2%
- NR: 6.7%
- Pedestrians: 24.5%
- Drivers: 37.1%
Survey Results

Main topics analyzed for subgroup differences:

1. Feeling Safe with Crosswalk Signs (relative to each other)
2. Feeling Safe with Combinations of Crosswalk Signs
3. Understanding of Novelty Signs (In-street signs)
Survey Results

1. Higher number indicates preference

Have you seen these signs

Rate how safe you felt:
- Very unsafe (1)
- Somewhat unsafe (2)
- Neither safe nor unsafe (3)
- Somewhat safe (4)
- Very safe (5)
Survey Results

1. Preference in terms of feeling safe:

*Participants included only if they have seen the sign at UIUC campus*
Survey Results

1. Preferred Crosswalk Signs
   - By gender (example pedestrian survey):

   - In street signs provide significantly safer perception among males
   - Similar results from driver survey
Survey Results

1. Preferred Crosswalk Signs
   - By affiliation type:
     - Greater safety perception among students than faculty and staff
     - Similar results from driver survey
Survey Results

1. Preferred Crosswalk Signs
   - By Age:
     As age increased, perception of safety decreased for both in-street signs
   - By previous near misses experiences:

     Significantly lower rating if participants had near miss experience at locations with in-street signs
Survey Results

2. Preferred Combination of Crosswalk Signs:

![Bar chart showing average ratings for different configurations of crosswalk signs.]

- Config. 1: 3.31
- Config. 2: 3.37
- Config. 3: 3.71
- Config. 4: 3.91
- Config. 5: 4.26

* Participants included only if they have seen the signs and gave ratings to all configurations.
Survey Results

2. Preferred Combination of Crosswalk Signs:
   - By gender:
     Male ratings are higher than female (90% confidence)
   - By affiliation type (example pedestrian survey):
     
     Clear decreasing trend from youngest students to older students, to faculty/staff

     Similar results from driver survey
Survey Results

2. Preferred Combination of Crosswalk Signs:
   - By Age:

As age increased, average rating of devices decreased.

Similar results from driver survey.
Survey Results

3. Understanding of Novelty Signs (In-street signs):

6. Which statement(s) best describe(s) your understanding of the sign below (Sign B)? (Select all that apply)

☐ When a pedestrian is already within the crosswalk, drivers must yield
☐ When a pedestrian is waiting at the curb, but he/she is not yet within the crosswalk, drivers must yield
☐ When a pedestrian is approaching the crosswalk, drivers must yield
☐ Other (SELECT THIS TO describe)
3. Understanding of Novelty Signs (In-street signs):

Which statement(s) best describe(s) your understanding of Sign B?

- When a pedestrian is already within the crosswalk, drivers must yield: 75.6% (Pedestrian Survey), 77.9% (Driver Survey)
- When a pedestrian is waiting at the curb, but he/she is not yet within the crosswalk, drivers must yield: 37.4% (Pedestrian Survey), 35.6% (Driver Survey)
- When a pedestrian is approaching the crosswalk, drivers must yield: 19.8% (Pedestrian Survey), 17.9% (Driver Survey)
- Other (describe): 1.8% (Pedestrian Survey), 1.8% (Driver Survey)
Survey Results

3. Understanding of Novelty Signs (In-street signs):

Correct answer
Survey Results

3. Understanding of Novelty Signs (In-street signs):

- By Age:
  - Better interpretation of signs by participants 31 and older
  - Similar results from pedestrians and drivers
3. Understanding of Novelty Signs (In-street signs):
   - By Affiliation Type (example driver survey):

   "Drivers must yield when pedestrian is..."

<table>
<thead>
<tr>
<th>Affiliation</th>
<th>Freshman</th>
<th>Sophomore</th>
<th>Junior</th>
<th>Senior</th>
<th>Graduate Student</th>
<th>Faculty</th>
<th>Staff</th>
</tr>
</thead>
<tbody>
<tr>
<td>All previous</td>
<td>9.2</td>
<td>16.2</td>
<td>17.0</td>
<td>19.3</td>
<td>17.5</td>
<td>15.5</td>
<td>13.6</td>
</tr>
<tr>
<td>Within crosswalk or waiting at curb</td>
<td>9.8</td>
<td>17.0</td>
<td>10.7</td>
<td>9.4</td>
<td>9.3</td>
<td>6.2</td>
<td>6.7</td>
</tr>
<tr>
<td>Approaching to crosswalk</td>
<td>3.5</td>
<td>10.5</td>
<td>6.7</td>
<td>9.6</td>
<td>15.5</td>
<td>6.4</td>
<td>5.9</td>
</tr>
<tr>
<td>Waiting at curb</td>
<td>17.6</td>
<td>12.4</td>
<td>6.7</td>
<td>11.3</td>
<td>16.2</td>
<td>14.1</td>
<td>9.8</td>
</tr>
<tr>
<td>Within crosswalk</td>
<td>50.0</td>
<td>41.3</td>
<td>45.5</td>
<td>46.2</td>
<td>46.8</td>
<td>56.0</td>
<td>62.3</td>
</tr>
</tbody>
</table>

Better understanding from faculty and staff
Conclusions

- Clear differences in safety perception within the surveyed population
- Both pedestrians and drivers clearly prefer crosswalks with added signs (curb + in street) and devices (in-pavement lights)
- However, perception is significantly affected by:
  - Age
  - Affiliation
  - Near-miss experiences
Conclusions

- User understanding of novelty signs is limited. Various degrees of misunderstanding of the signs
- The misunderstanding plus higher safety perception may result in **False sense of security**
- Safety education with different emphasis is needed to target population subgroups
Recommended Actions

- Results provide insights to potential specific actions such as:
  - Orientations on the use of crosswalks, specially for new students
  - Publicize correct use of signs on buses
  - Identification of most hazardous locations combining survey and field data
  - Potential upgrade of crosswalks (additional and more conspicuous devices), according to data from surveys and analysis of conflicts
Questions?

Contact info:

Rahim F. Benekohal  (rbenekoh@illinois.edu)
Juan C. Medina (jcmedina@illinois.edu)

Find full reports at:
http://ict.illinois.edu/TOL/reports.html

University of Illinois at Urbana - Champaign