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Cyclist Compliance at Signalized Intersections

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Bicyclist Compliance at Signalized Intersections:
The makings of a thesis

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Why study cyclist compliance?

- Growing mode of utilitarian travel
  - Room for further growth
    - Increasingly bicycle-friendly transportation policy
    - Decline in car use by younger generations
    - Large percentage of trips are bikeable (under 3 miles)

- Little is known about the *actual* compliance rates for cyclists in the United States.
  - Much anecdotal evidence of cyclist non-compliance.
Origins of the study

- Part of Operational Guidance for Bicycle-specific Traffic Signals project with ODOT
  - DISCLAIMER
Data Collection

- Two data sources:
  - City of Portland
    - Archived from previous research
    - 3 intersections
      - Portland
      - Bicycle-specific Signals
  - Portland State
    - Project-specific
    - 4 intersections
      - Varying intersection characteristics/locations
Data Reduction

- Cyclists were eligible to become part of the study if they were observed to:
  - Arrive on the red indication
  - Utilize bicycle infrastructure (and bicycle signal where applicable) on both sides of the intersection
Data Reduction

- Three types of data collected:
  - Descriptive
  - Event
  - Compliance-specific
Compliance Indicators

- Compliant
- Non-compliant
  1. Gap Accepted
  2. Signal Jump
Compliance Indicators

Gap Accepted
Compliance Indicators

Signal Jump
Results

- Total of 2,617 cyclists
- Compliance Rate: 89.7%

<table>
<thead>
<tr>
<th>Compliance Indicator</th>
<th>Percent</th>
<th>Number of Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compliant</td>
<td>89.7</td>
<td>1809</td>
</tr>
<tr>
<td>Gap Accepted</td>
<td>5.9</td>
<td>118</td>
</tr>
<tr>
<td>Signal Jump</td>
<td>4.3</td>
<td>87</td>
</tr>
<tr>
<td>Other</td>
<td>0.1</td>
<td>3</td>
</tr>
</tbody>
</table>
The average non-compliance rate for pedestrians is 15.8\%\textsuperscript{2}.
- Cyclists in this study had combined violation rate for signal jumps and accepted gaps of 7.8\%.

Motorists were found to run red indications at a rate of 1.3\%\textsuperscript{3}.
- Cyclists in this study accepted gaps at a rate of 4.5\%. 
Compliance at Bike-Specific Signals

- No Bike Signal: 100% Compliant, 0% Other
- Bike Signal: 100% Compliant, 0% Other

- Gap Accepted: No data
- Signal Jump: No data
- Other: No data
Compliance per Location

- Beaverton 5th & Lombard: 100%
- Portland Broadway & Lovejoy: 100%
- Portland Broadway & Williams: 75%
- Corvallis 9th & Buchanan: 50%
- Eugene 18th & Pearl: 25%
- Portland Rosa Parks & I-5: 0%
- Clackamas Co. Johnson & Bell: 0%

Legend:
- Compliant
- Gap Accepted
- Signal Jump
- Other
Compliance by Presence of Cargo

- No Cargo: 100% Compliant, 0% Gap Accepted, 0% Signal Jump, 0% Other
- Some Cargo: 100% Compliant, 0% Gap Accepted, 0% Signal Jump, 0% Other
Compliance by Helmet Use

<table>
<thead>
<tr>
<th>Helmet Use</th>
<th>Helmet</th>
<th>No Helmet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compliance</td>
<td>100%</td>
<td>75%</td>
</tr>
<tr>
<td>Gap Accepted</td>
<td>50%</td>
<td>25%</td>
</tr>
<tr>
<td>Signal Jump</td>
<td>25%</td>
<td>0%</td>
</tr>
<tr>
<td>Other</td>
<td>0%</td>
<td>0%</td>
</tr>
</tbody>
</table>
Compliance by Peak Period

AM
- Compliant: 100%
- Gap Accepted: 0%
- Signal Jump: 0%
- Other: 0%

PM
- Compliant: 100%
- Gap Accepted: 0%
- Signal Jump: 0%
- Other: 0%

Off Peak
- Compliant: 100%
- Gap Accepted: 0%
- Signal Jump: 0%
- Other: 0%
Compliance by Wait Time

![Compliance Chart]

- **Gap Accepted**
- **Signal Jump**
- **Other**

<table>
<thead>
<tr>
<th>Wait Time (sec)</th>
<th>Compliance</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>100%</td>
</tr>
<tr>
<td>20</td>
<td>75%</td>
</tr>
<tr>
<td>40</td>
<td>50%</td>
</tr>
<tr>
<td>60</td>
<td>25%</td>
</tr>
<tr>
<td>80</td>
<td>0%</td>
</tr>
</tbody>
</table>
Gap Accepted by Cross Traffic

Ratio of Accepted Gap to AASHTO BCT

Cross Traffic (veh/hr)
Compliance at bicycle-specific signals is comparable to compliance at traditional signals
  - Cyclists understand bicycle signals
Observed compliance nearly 90%
Continuing Work

- Further analysis needed
  - Previous analysis was descriptive
  - Varying compliance at study locations
  - Risk-taking profile for non-compliant cyclists
    - More likely to not wear a helmet
    - Not influenced by wait time
    - Minimum gap accepted equal to or less than minimum crossing time (determined by AASHTO) for high volume intersections.
[PRELIMINARY] Factors Affecting Gap Acceptance

- # Cyclists Already Waiting
- Sex = Female
- Cross Traffic Squared
- Lack of helmet
Continuing Work – Survey

- Personality type
- Justifications
- Intersection types
- Demographics
Acknowledgements

- Oregon DOT Research Project TAC
- OTREC and Oregon DOT
- Dr. Christopher Monsere, Dr. Miguel Figliozzi, Kirk Paulsen
- All the potential takers of the attitudes survey
Questions?


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References for Discussion

