A Study of Bicycle Signal Compliance Employing Video Footage

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A Study of Bicycle Signal Compliance Employing Video Footage

Institute of Transportation Engineers – Western District Annual Meeting
Session 7A: Planning and Modeling Our Communities
Tuesday, July 16th

Presenter:
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Portland State University
Civil & Environmental Engineering
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

- Helmet: Yes
- Cargo: Yes
- Car in Adjacent Lane: Yes
- Clothing Type: Casual
- Sex: Male
- Bike Type: Mountain
Compliance Indicators

- Compliant
- Non-compliant
  1. Illegal right turn on red (RTOR)
  2. Gap Accepted
  3. Signal Jump
Compliance Indicators

Illegal Right Turn on Red: RTOR

2011/07/10 12:02:43
Compliance Indicators

Gap Accepted
Compliance Indicators

Signal Jump

[Images of traffic signals and vehicles]

[Images showing a vehicle passing through a red light]
Results

- Total of 2,617 cyclists
- Initial Compliance Rate of 69.1%
- Compliance Rate excluding RTOR: 89.7%

<table>
<thead>
<tr>
<th>Compliance Indicator</th>
<th>Percent</th>
<th>Number of Observations</th>
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</thead>
<tbody>
<tr>
<td>Compliant</td>
<td>89.7</td>
<td>1809</td>
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<tr>
<td>Gap Accepted</td>
<td>5.9</td>
<td>118</td>
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<tr>
<td>Signal Jump</td>
<td>4.3</td>
<td>87</td>
</tr>
<tr>
<td>Other</td>
<td>0.1</td>
<td>3</td>
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</table>
Compliance at Bike-Specific Signals

<table>
<thead>
<tr>
<th></th>
<th>No Bike Signal</th>
<th>Bike Signal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compliant</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Gap Accepted</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Signal Jump</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Compliance by Helmet Use

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

- AM
- PM
- Off Peak

- Compliant
- Gap Accepted
- Signal Jump
- Other
Compliance by Wait Time

- Compliant
- Gap Accepted
- Signal Jump
- Other

Wait Time (sec):

- 0
- 20
- 40
- 60

Compliance percentages:

- 100%
- 75%
- 50%
- 25%
- 0%
Gap Accepted by Cross Traffic

Ratio of Accepted Gap to AASHTO BCT vs. Cross Traffic (veh/hr)
Comparison to Other Modes

- Motorists do not come to a complete stop before completing a right turn 56.9% of the time\(^1\).
  - Cyclists in this study committed RTOR violations at a rate of 23%.

- The average non-compliance rate for pedestrians is 15.8%\(^2\).
  - 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%\(^3\).
  - Cyclists in this study accepted gaps at a rate of 4.5%.
Conclusions

- Compliance at bicycle-specific signals is comparable to compliance at traditional signals.
- Observed compliance nearly 90% excluding RTOR.
- 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.
Acknowledgements

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- Dr. Christopher Monsere, Dr. Miguel Figliozzi, Kirk Paulsen
Questions?

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References for Discussion

