A Study of Bicycle Signal Compliance Employing Video Footage

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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
Sex: Male
Clothing Type: Casual
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

2011/09/14 09:02:21
Compliance Indicators

Signal Jump
### 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>
</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>
Compliance at Bike-Specific Signals

No Bike Signal

- Compliant
- Gap Accepted
- Signal Jump
- Other

Bike Signal
Compliance per Location

- Beaverton 100%
- Broadway & Lovejoy 75%
- Portland 5th & Lombard 50%
- Broadway & Williams 25%
- Corvallis 0%
- Eugene 18th & Pearl 0%
- 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
- Some Cargo: 75% Compliant, 25% Gap Accepted, 0% Other
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>100%</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Compliance by Wait Time

<table>
<thead>
<tr>
<th>Wait Time (sec)</th>
<th>0%</th>
<th>25%</th>
<th>50%</th>
<th>75%</th>
<th>100%</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Compliant</td>
</tr>
<tr>
<td>20</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Gap Accepted</td>
</tr>
<tr>
<td>40</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Signal Jump</td>
</tr>
<tr>
<td>60</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Other</td>
</tr>
</tbody>
</table>

Compliance by Wait Time is shown in the chart. The chart indicates the percentage compliance across different wait times, with specific categories for Compliant, Gap Accepted, Signal Jump, and Other.
Gap Accepted by Cross Traffic

![Graph showing the ratio of accepted gap to AASHTO BCT versus 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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Questions?

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