Using behavioural observation studies to evaluate (vulnerable) road users’ safety

Wouter van Haperen (Imob)

ICTCT, 22/10/2016, Lund, Sweden
Observing observation of road user behavior

A scoping review on current practices in scientific literature
Our objectives

1. Provide an overview of conducted road user behaviour observation studies

2. Assess the usefulness of behavioural observation

3. Identify topics and behavioural indicators

4. Prevent duplicate research efforts
Behavioral observation?

<table>
<thead>
<tr>
<th>Actual (objective) traffic safety</th>
<th>Proxy for actual (objective) traffic safety</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Naturalistic data collection</td>
</tr>
<tr>
<td>Revealed</td>
<td></td>
</tr>
<tr>
<td>Crash data</td>
<td><strong>Behavioural Observation</strong></td>
</tr>
<tr>
<td></td>
<td>Traffic conflict observation</td>
</tr>
<tr>
<td></td>
<td>Naturalistic Driving</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Controlled data collection</td>
</tr>
<tr>
<td>Simulated</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Driving Simulator</td>
</tr>
<tr>
<td></td>
<td>Microsimulation</td>
</tr>
<tr>
<td>Stated</td>
<td>Questionnaires</td>
</tr>
<tr>
<td></td>
<td>Interviews</td>
</tr>
<tr>
<td></td>
<td>Focus groups</td>
</tr>
</tbody>
</table>

Studies observing road user behaviour, in which the road users are not informed (beforehand) of their participation in the research (experiment).
Our focus

Traffic Safety

Peer-reviewed journal articles

• Not uncommon
• Available resources
• Publication bias
• Study objective

English
Methodology

A scoping review

- To “map rapidly the key concepts underpinning a research area and the main sources and types of evidence available”. (Mays et al, 2001)
- A systematic literature retrieval process

Databases used

- Web of Science
- ScienceDirect
- TRID
The process

12188 unique references

Selection screening

7072 references for first screening

Relevance screening

701 references for second screening

Eligibility screening

600 references included

Conference Proceedings (3616)
Book/Book sections (329)
No journal article (221)
Not peer-reviewed (569)
Not in English (381)
Not about road traffic (35)
No uninformed observation (6331)
Traffic Conflict Technique (5)
Not about safety (18)
No behavioral observations (23)
Aware of experiment (26)
Traffic Conflict Technique (9)
Literature review (2)
Irretrievable (23)

Web of Science (1997)  ScienceDirect (2545)  TRID (16761)
21243 references found

Duplicates (9055)
Road user focus

- 223/600 (37%) studies included at least one VRU
- 490/600 (82%) studies included at least one Driver
Their purpose

The main goal of behavioural observation studies
- Software development in certain papers a side-goal or not directly linked to behavioural observation!

---

**VRU [#]**
- 67
- 133
- 19
- 4

- Monitoring
- Effectiveness Testing
- Model Development
- Software development

**DRIVER [#]**
- 183
- 255
- 49
- 3

- Monitoring
- Effectiveness Testing
- Model Development
- Software development
Common topics

VRU studies
- Crossing (39%)
- Yielding (22%)
- Red light running (10%)

Driver studies
- Speed (16%)
- Yielding (13%)
- Crossing (13%)
Common topics & indicators

VRU studies
- Crossing (39%)
- Yielding (22%)
- Red light running (10%)

Driver studies
- Speed (16%)
- Yielding (13%)
- Crossing (13%)

VRU studies
- Red light running (33%)
- Yielding (32%)
- Looking (22%)

Driver studies
- Speed (60%)
- Yielding (16%)
- Red light running (12%)
Testing sites

Number of sites per research purpose

- Monitoring
- Effectiveness Testing
- Model Development
Reporting

Missing information

- Heavy vehicles
- Observation period
  - Week vs weekend (18% VRU; 47% Driver)
  - Day vs night (14% VRU; 33% Driver)
  - Peak vs off-peak (22% VRU; 53% Driver)
- Sample sizes
  - 13% VRU; 25% Driver
## SWOT analysis

<table>
<thead>
<tr>
<th>Positive</th>
<th>Negative</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Internal factors</strong></td>
<td><strong>Weaknesses</strong></td>
</tr>
<tr>
<td><strong>Strengths</strong></td>
<td>Control of traffic events</td>
</tr>
<tr>
<td>Behavioural and situational processes</td>
<td>Data processing</td>
</tr>
<tr>
<td>Natural driving behaviour</td>
<td>Control groups</td>
</tr>
<tr>
<td>Data quality</td>
<td>Bias</td>
</tr>
<tr>
<td><strong>Opportunities</strong></td>
<td><strong>Threats</strong></td>
</tr>
<tr>
<td>Amount of data</td>
<td>Privacy legislation</td>
</tr>
<tr>
<td>Automated video-analysis software</td>
<td>Validity</td>
</tr>
<tr>
<td>Combination with other methodologies</td>
<td></td>
</tr>
</tbody>
</table>
Observing observation of road user behavior

A scoping review on current practices in scientific literature
Thank you very much for your attention!

Wouter van Haperen (Imob)