Hazard perception training: does it need to be complicated?

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• Hazard perception – a special skill?
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Context – driver training and education
On-road experience reduces crash risk\(^1\)

Training (as done in the past) does not\(^2\)
Hazard perception – a special skill?
Hazard perception...

- ...discriminates between high- and low-risk groups (e.g. inexperienced and experienced drivers)\(^3, 4\)

- ...is related to collision risk \(^1, 5, 6, 7\)

- ...can be trained\(^7\)
Driver performance versus driver behaviour

- Evans (1991; 2008)$^9,10$
  - Driver performance (what the driver CAN do)
  - Driver behaviour (what the driver DOES do)
- In ‘normal driving’ driver behaviour seems to be more important than driver performance in determining risk
- Is hazard perception the exception?
Hazard perception testing

• Some evidence that it has reduced some new driver collisions by around 17% in GB\textsuperscript{5}

• Higher performance on video hazard perception test is associated with lower crash risk in GB and in Australia\textsuperscript{5,11}
How has hazard perception been trained?
On-road training and classroom lectures

- McKenna and Crick (1994)⁴

- Only trained group (RoSPA course) showed improvement over nine month period (video HP test)

### TABLE 3: Group means for overall hazard perception score (ms) in Session 1 and Session 2

<table>
<thead>
<tr>
<th></th>
<th>Session 1</th>
<th>Session 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trained Group n=12</td>
<td>4312</td>
<td>3902</td>
</tr>
<tr>
<td>Control Group n=14</td>
<td>4337</td>
<td>4404</td>
</tr>
</tbody>
</table>
Listening to expert commentary

- McKenna, Horswill and Alexander (2006)\textsuperscript{12}

- Specific reduction in speed for trained group (video speed test)
Producing and listening to commentary

- Horswill et al. (2013)

- Experienced drivers retain HP advantage over placebo-trained group 1 week later (video HP test)
Discussion group using videos

- Helman et al. (2012)\textsuperscript{14}

- Novices (motorcyclists) trained in HP showed non-specific reduction in risk taking (video speed test)
Still photos and plan-views of scenarios

- Pradhan et al. (2009)

- Trained ‘where to look’ so as to be aware of potential hazards

- Trained drivers more likely to look in correct places (on-road drive)

### Table 1. Comparison of trained and untrained groups on individual scenarios: Field study*

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Name</th>
<th>Performance in Trained Group</th>
<th>Performance in Untrained Group</th>
<th>Difference Between Trained and Untrained</th>
</tr>
</thead>
<tbody>
<tr>
<td>Near Transfer</td>
<td>1. Left Fork</td>
<td>50.0%</td>
<td>18.2%</td>
<td>31.8%</td>
</tr>
<tr>
<td></td>
<td>2. Right Turn (Reveal)</td>
<td>75.0%</td>
<td>58.3%</td>
<td>16.7%</td>
</tr>
<tr>
<td></td>
<td>3. Left Turn (Reveal)</td>
<td>100.0%</td>
<td>41.7%</td>
<td>58.3%</td>
</tr>
<tr>
<td></td>
<td>4. Abrupt Lane Change</td>
<td>55.0%</td>
<td>25.0%</td>
<td>30.0%</td>
</tr>
<tr>
<td></td>
<td>5. Hidden Sidewalk</td>
<td>75.0%</td>
<td>25.0%</td>
<td>50.0%</td>
</tr>
<tr>
<td>Far Transfer</td>
<td>2. Blind Driveway</td>
<td>36.4%</td>
<td>8.3%</td>
<td>28.0%</td>
</tr>
<tr>
<td></td>
<td>3. Truck Blocking Crosswalk</td>
<td>28.8%</td>
<td>4.2%</td>
<td>24.6%</td>
</tr>
<tr>
<td></td>
<td>4. Hidden Drive</td>
<td>20.0%</td>
<td>36.4%</td>
<td>−16.4%</td>
</tr>
<tr>
<td></td>
<td>5. Curve Stop Ahead</td>
<td>62.5%</td>
<td>57.1%</td>
<td>5.4%</td>
</tr>
<tr>
<td></td>
<td>6. Truck Blocking Travel</td>
<td>90.0%</td>
<td>62.5%</td>
<td>27.5%</td>
</tr>
</tbody>
</table>
Simply driving

- Kinnear et al. (2007)\textsuperscript{16}
- Novice drivers with more than 1000 miles of driving showed similar physiological anticipatory response to hazards as experienced drivers (video HP test)
Summary of literature

• Large literature (1990-2014: 2,343 hits for “Hazard AND Perception AND Training AND Driving” in ScienceDirect; 186 hits in TRID)

• Wide range of training methods (and wide range of outcome measures)

• No coherent understanding of which is best training approach (on any outcome measure)
What is the mechanism by which HP might reduce risk?
Possible mechanisms

- Possible mechanisms through which hazard perception might reduce collisions include (at least):
  - Skill increases leading directly to earlier detection of hazards, allowing earlier response (PERFORMANCE)
  - General lower risk (e.g. lower speed) arising from insight into limitations of hazard perception skill (BEHAVIOUR)
  - Blocking access to driving (REMOVING RISK)
Evidence

- Wells et al. (2008)\(^5\) and Boufous et al. (2009)\(^{11}\) find links between performance on HP TEST and collisions

- Collision reduction in Wells et al. (2008)\(^5\) attributable to the introduction of the HP TEST
Poor HP skill → Higher chance of collision

Good HP skill → Lower chance of collision

Poor HP skill → HP training → Good HP skill → Lower chance of collision
High cholesterol → Higher chance of heart attack

Low cholesterol → Lower chance of heart attack

High cholesterol → Statins → Low cholesterol → Lower chance of heart attack
Evidence

• No reliable evidence linking HP TRAINING to reduction in collisions

• Some data – for example Allen et al. (2008)\textsuperscript{17} showed some differences between higher and lower fidelity simulators – but methodological limitations in such studies prevent firm conclusions
Conclusions
Conclusions (and first steps)

• Training probably does not need to be complicated, but even within the simpler approaches we don’t know which is best.

• Therefore first step for hazard perception implementation should focus on a TEST that can discriminate low and high-risk groups, and can show a link with collision risk.

• This test will at least delay access to those who lack the appropriate level of skill.
Next steps

• We need a research programme examining and developing those (hopefully simple) training methods that show the most promise

• We then need Randomised Controlled Trials of the effectiveness of these methods in reducing COLLISIONS or INJURIES or BOTH

• Such trials need not be difficult; they will give us evidence on which we can build ACTUAL EVIDENCE-BASED POLICY
Next steps

• Alongside the development of HP training and testing, interventions that we know work to reduce collisions and injuries (graduated licensing) should be moved up the agenda

• Europe-wide agreement will make it easier to overcome political reluctance in individual states, and will provide a stronger licensing system in which to innovate
Thank you

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References


References


References


