

The effects of road commentary training on novice drivers' visual search behaviour

Initial investigation of hazard perception and eye-movements

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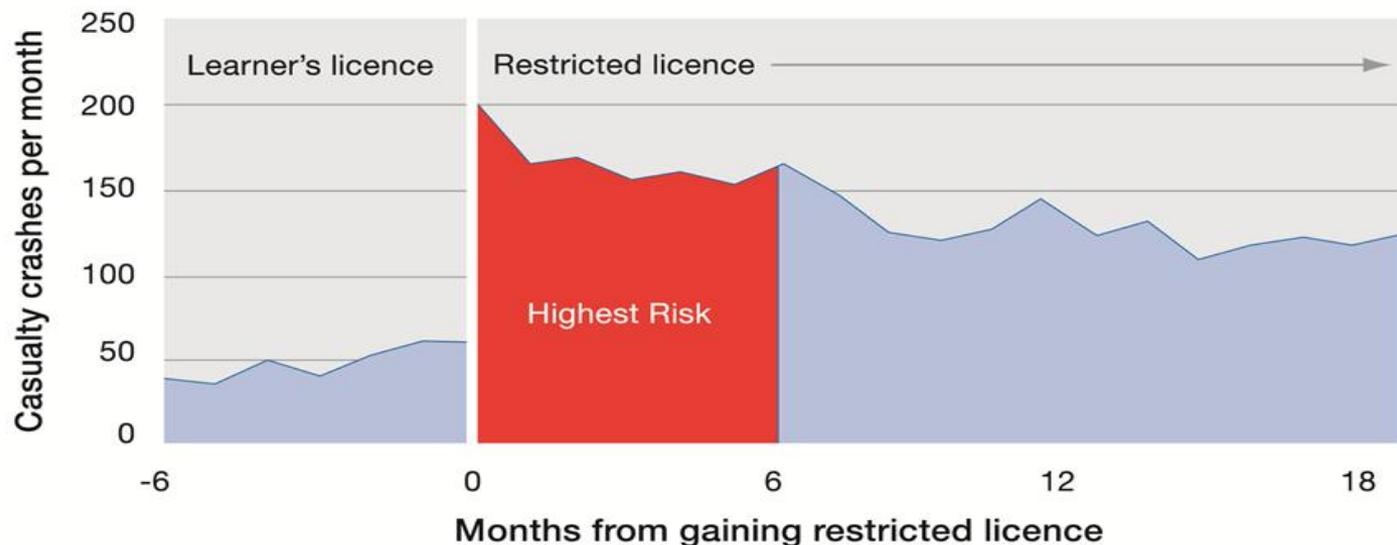
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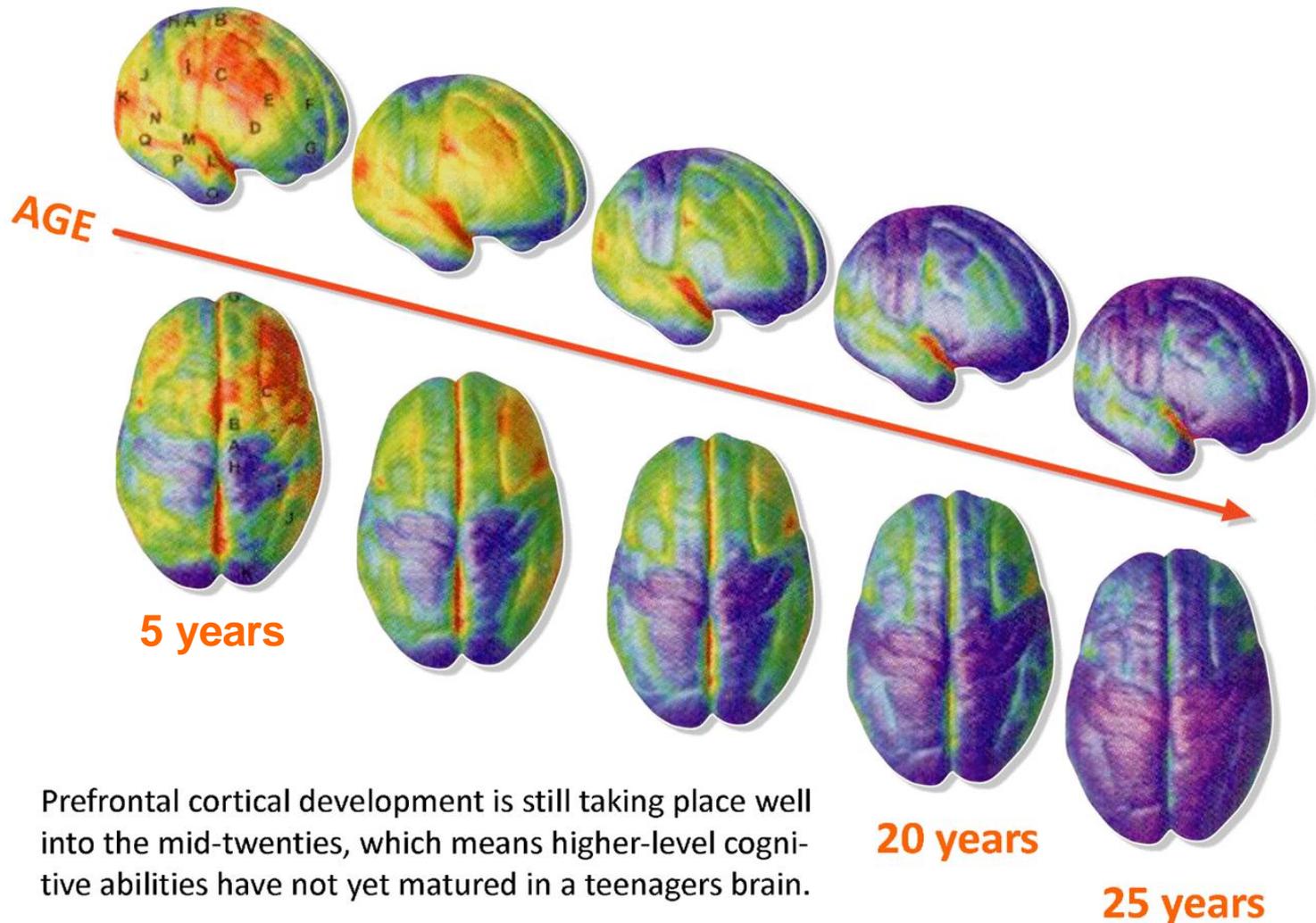
Challenges facing young drivers

Insufficient amount of quality supervised driving compared to recommended guidelines

- Poor situation awareness and hazard perception (McKenna et al., 2004, 2006)
- Failure to adapt speed to conditions (Cantwell, 2010)
- Risk taking behaviour & dangerous manoeuvres



Maturing “executive” functions



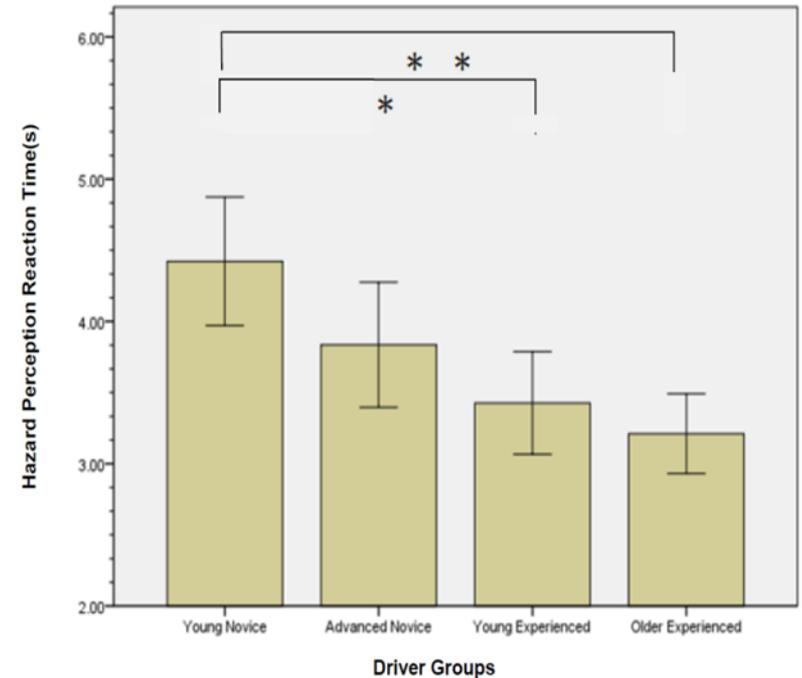
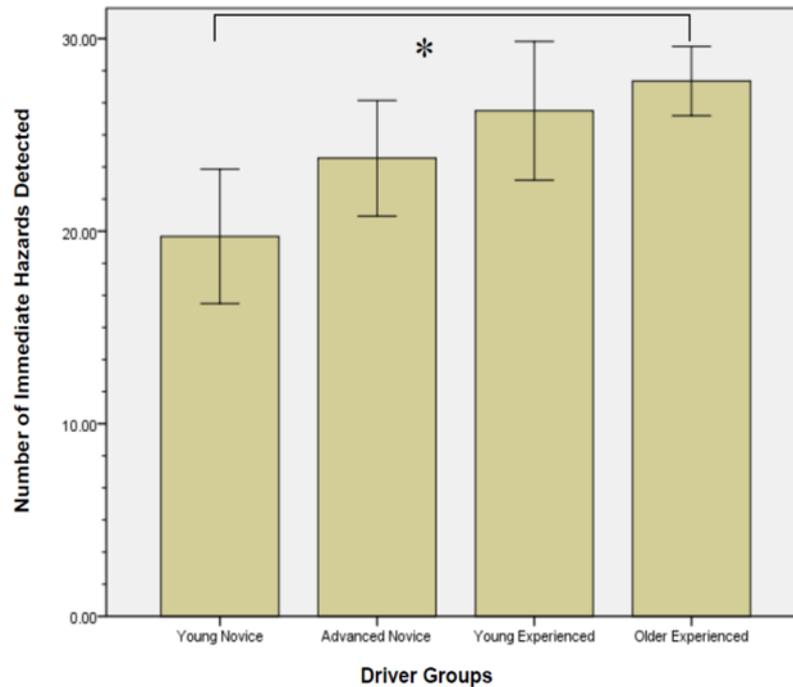
Limitations of novice drivers

- Poor hazard perception
 - Perceiving immediate (and latent) hazards
 - Generating an appropriate driving response
- Inadequate situation awareness
 - Maintaining a **comprehensive mental representation** of the current road/traffic environment
 - Prediction and anticipation of the road situation in the near future

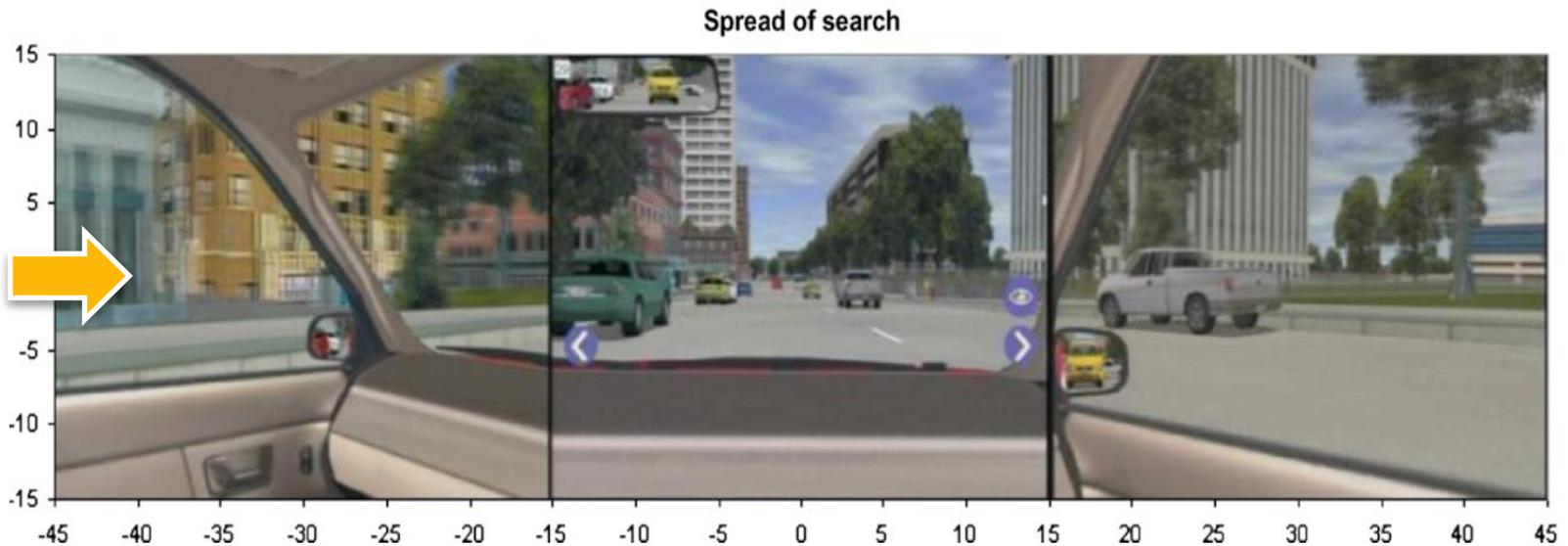
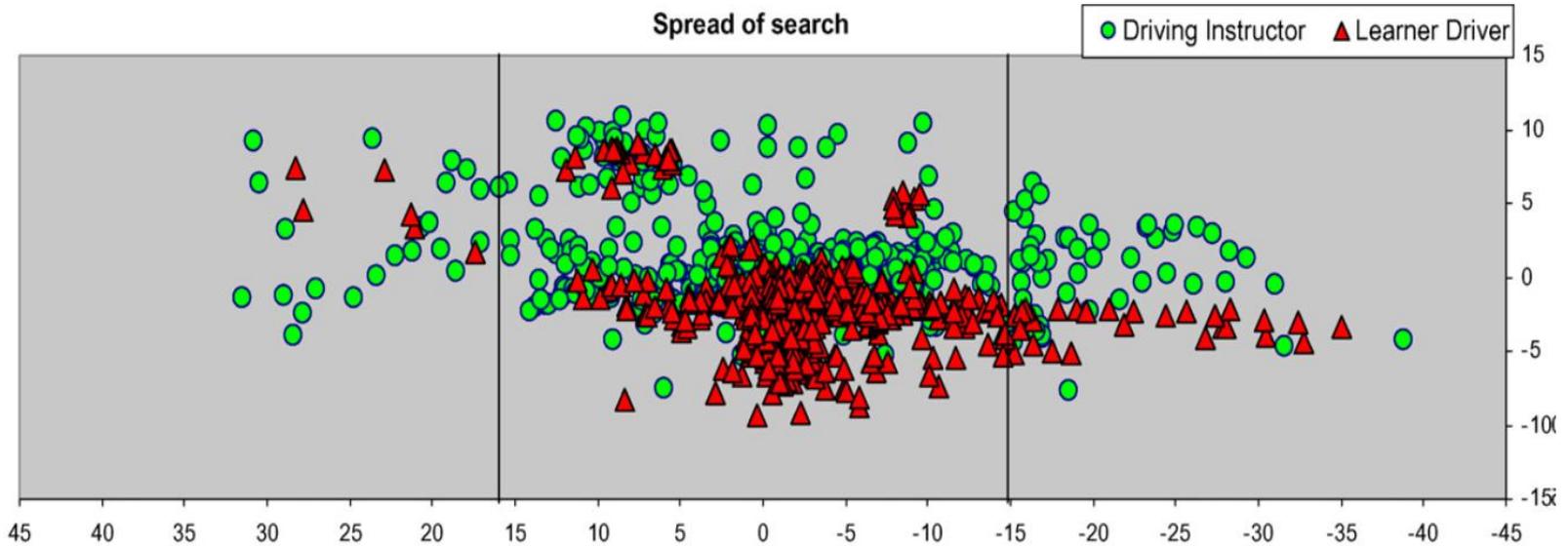
Hazard perception as a crash predictor

- Vulnerable to driving errors associated with inefficient visual search (Underwood et al., 2002; Crundall et al., 2004; McKenna et al., 2006) and poor cognitive skill (Deery, 1999)
“... the single most common contributor to a crash was failure to search the roadway... not searching far enough ahead the vehicle... inattention, or failing to avoid distraction.”
- Horswill and McKenna (2004) suggest hazard perception skill as the most likely source of any skill gap between novice and experienced drivers
- The development of efficient visual search strategies is one of the fundamental skills marking the transition from novice to experienced driver (Underwood, 2007)

Hazard perception naturally develops with experience



Greater number of hazards detected as experience increases, while reaction times to hazards decrease. (Starkey, Isler, and Cantwell, 2012)



The difference between experienced and novice drivers' visual search behaviour (Konstantopolus et al., 2010)

What is commentary training?

- There are several methods of commentary training
 - “Commentary involves the verbalisation of at least some of the driving-related contents of awareness, while actually driving through a situation (on road or simulated)” pp. 8 (Helman, 2008)
- Commentary is already employed as part of advanced police driver training in several countries.
- In our training, participants were asked to:
 - Describe everything that was occurring on the road environment relevant to the driving task (i.e., hazards)
 - And how they might adjust their behaviour accordingly

Previous commentary training research

- Mills, Hall, McDonald, and Rolls (1998)
 - Improved hazard detection, and response times
 - Improved in on-road driving assessment ratings
- Isler, Starkey, and Williamson (2009)
 - Demonstrated improvement in the number of **hazards detected** and **response times** within a very short period of training
 - “... encourage drivers to actively search for hazards and may improve their situation awareness and lead to a better appreciation of the risks involved.”
- Crundall, Andrews, van Loon, and Chapman (2010)
 - Reduction of speed on approach to hazards (responsiveness)

Participants

Sixteen males and 4 females with learner licenses were recruited from two local high-schools

- Average age was 16.6 years (SD = 0.6)
- Held license for average of 11.6 months (SD = 11.7)
- Average self-report distance driven per week was 38km (SD = 38.9)

Participants were randomly allocated (gender balanced) to either non-training (control) or commentary training group

Commentary Training

No Training

2 practice trials for Hazard Perception Task

Baseline assessment (HPT 5 trials)

2 commentary practice videos with
expert commentary

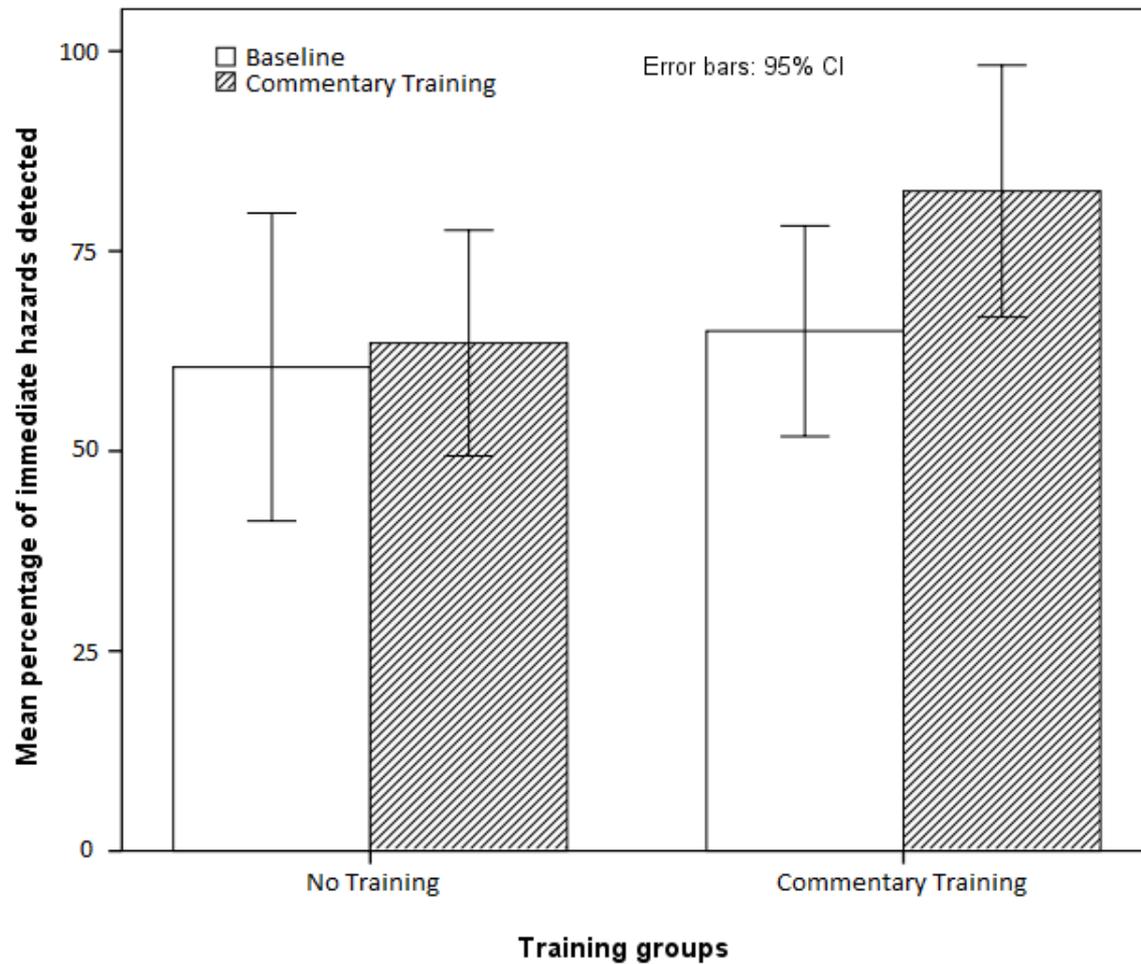
12 scenarios with participants
providing commentary

12 scenarios with participants
**observing from drivers
perspective**

Post-training assessment (HPT 5 trials)

Hazard Perception Task



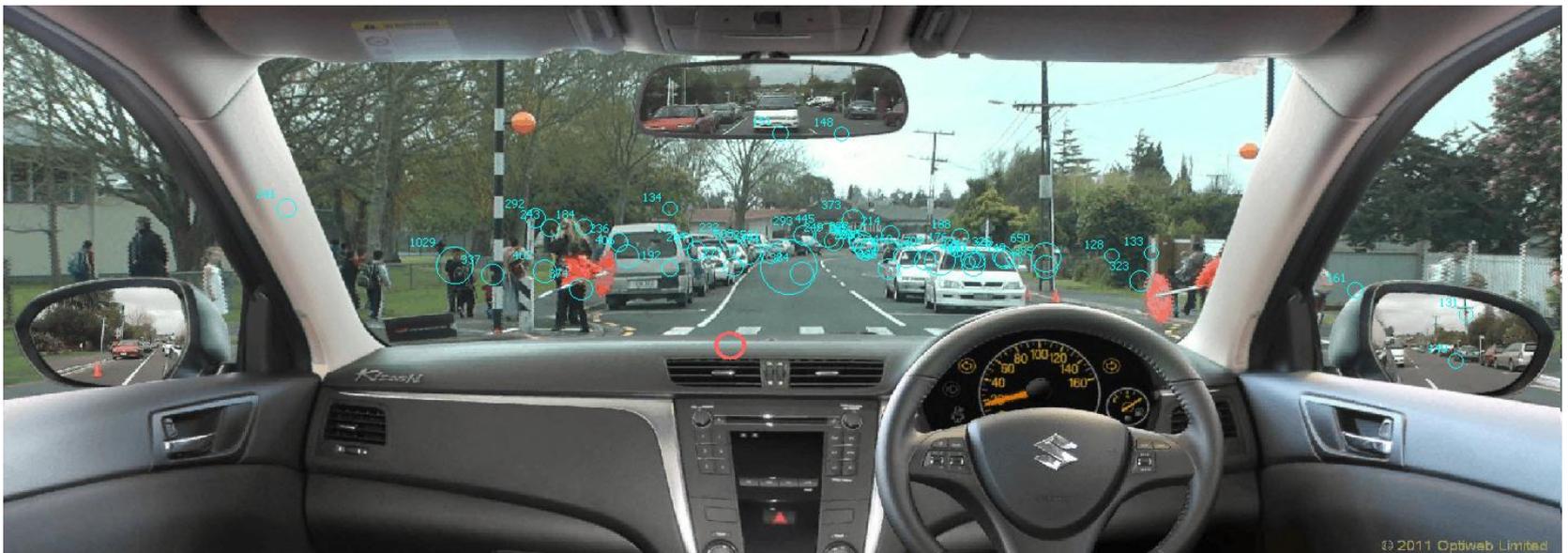


Commentary training significantly improved the percentage of hazards detected between baseline and post-training assessments

Interaction $F(3,17) = 6.944, p < 0.05, \eta_p^2 = 0.416$



Commentary trained participant



No training (control)

Baseline



Commentary trained participant

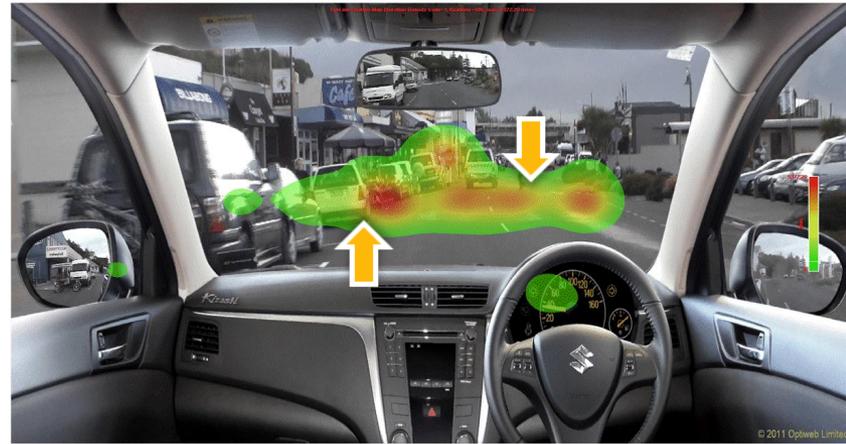


No training (control)

No Training



Commentary Training



Initial observations demonstrated some interesting differences between training groups, notably the location and duration of visual search throughout video scenarios

Commentary trained participants demonstrated a significantly* greater number of fixation “clusters” potentially indicating longer search time for hazard rich regions

* Training effect on fixation clusters: $F(3,17) = 12.802, p < 0.01, \eta_p^2 = 0.416$

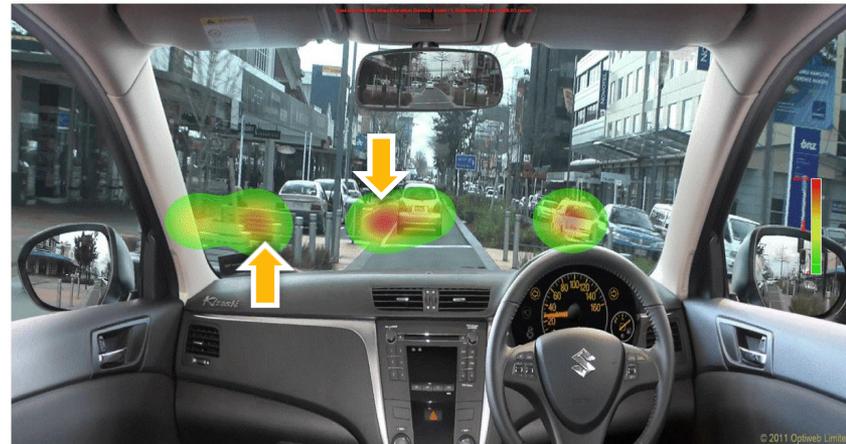
No Training



Commentary Training



Evidence of broader spread of road-way search



Visual search dedicated to hazard rich areas

Summary of initial findings

- Commentary training might be a useful tool in enhancing hazard perception in novice drivers
- Commentary might change the way drivers search the road environment, and allocate their visual attention

Future directions

- Investigating the role of commentary seeing/perceiving hazards, and hazard detection times
- A more detailed analysis of the effect of commentary on fixation distribution, duration; saccades, and interest areas (hazardous regions)
- Including experienced drivers in our analysis
 - Can commentary potentially improve existing, poorly developed schema in experienced drivers?



Novice driver



Experienced driver

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