

---

# DRIVER DISTRACTION FROM ROADSIDE ADVERTISING:

---

The clash of road safety evidence, highway  
authority guidelines and commercial  
advertising pressure

Tim Horberry<sup>1</sup>, Michael A. Regan<sup>2</sup> and  
Jessica Edquist<sup>3</sup>

<sup>1</sup>University of Queensland, Australia

<sup>2</sup>INRETS, France

<sup>3</sup>Monash University, Australia

Presented by Mike Regan

---

# Scope of the presentation

Examines possible driver distraction from billboards and other 3<sup>rd</sup> party roadside advertising.

Three stakeholders:

- research community: road safety evidence
- road authorities: to develop balanced, defensible and robust guidelines to regulate
- commercial advertisers and advertising bodies: to maximize the exposure of their billboards





# Introduction

Amount of visual information in most road environments increasing:

- progressively higher traffic densities,
- more complex traffic management and roadway maintenance practices,
- increased commercial roadside development,
- more commercial pressure on road authorities to permit (and often receive revenue from) advertising next to large roads.

So many road environments increasingly prone to producing information that may distract a driver.

Increasing number of older drivers a concern, as often more susceptible to visual clutter.

---

# Introduction- continued

---

Roadside advertising is constantly changing.

- More billboards, more electronic ones.
- Technologies becoming more sophisticated and often interactive.

Clearly, this whole area should be of key interest to the road safety community.

But...Time lag exists. Research often far behind new advertising technologies.

Even so..little research into how and to what extent roadside advertising can cause driver distraction.

---

# EFFECTS OF 3<sup>RD</sup> PARTY ADVERTISING ON DRIVING PERFORMANCE

Whole area is difficult to study due to differences in billboard types, drivers, roads, traffic etc.

## **‘Classic’ studies**

Johnston and Cole - distractions from advertising billboards not affect vehicle control but might affect hazard detection.





---

# Eye tracking

---

The attention-grabbing property of their products often a major selling point for outdoor advertising.

So distract attention from the driving task? A small collection of research evidence supports this, eg:

- Horberry - advertisement or other form of visual clutter in a road scene looked at for over 14% of the total driving time.
- Beijer, Smiley and Eizenman . Advertising signs with moveable displays approximately 50% of signs, but had 69% of glances, and over 75% of glances that lasted more than 0.75 seconds.
- Crundall et al – Street level advertisements fixated by participants more often and for longer, but did not result in better recognition. Videos containing such adverts rated as more hazardous than those containing raised adverts.

# Simulator studies

Edquist et al- billboards had significant effects on:

***Driver ability*** to follow lane change road signs - took longer to change lanes, more lane change errors.

***Speed maintenance.*** Drivers drove slower when advertising billboards present, and less able to maintain a target speed.

***Eye movements.*** Billboards increased time looking at roadsides, at the expense of looking at the road ahead and lead vehicles.

***Older drivers*** especially affected.





---

# Simulator studies continued

---

Young and Mahfoud found that the presence of roadside adverts has detrimental effect on vehicle lateral control, increases driver mental workload and eye fixations.

Also, on some roads adverts can draw attention away from official road signage.

So the simulator studies provide evidence that some advertising may attract drivers' attention at inappropriate times, and hold it for long enough so drivers might be unable to avoid a crash should a critical incident occur.

---





# Naturalistic studies

100 Car naturalistic study - time drivers spent with their eyes off road due to external to the vehicle distraction or inattention estimated to contribute to more than 23% of all crashes or near misses.

Equally, extended times of eyes off road (2 seconds or longer) increased by 3.7 times the likelihood of a crash.

Other naturalistic studies ongoing - eg Europe and the USA.

---

## Other reviews and meta- analyses

---

Most reviews of the presence of roadside advertisements and the number of crash rates conclude that these two factors are correlated.

Cairney and Gunatillake - greater density of advertisements tends to correlate with a higher crash rate, especially for changeable-message advertising signs.

Farbry et al- the effect of electronic billboards on crash rates. Of the nine studies they reviewed, most found that electronic billboards were associated with higher crash rates.

---

---

## Other reviews and meta- analyses - continued

---

Wallace - higher crash rates were associated with the presence of roadside advertisements at intersection and on long monotonous stretches of road.

Hatfield concluded:

*“On balance, the available literature suggests a small impact of advertising installments on crash rates, particularly if they feature bright lights or motion, and are located at intersections or in otherwise complex road situations. Unfortunately, it is in such sites that advertising installments are likely to be located.”*

---

## Other reviews and meta- analyses - continued

Finally, a major recent review by Wachtel focused purely on electronic advertising signage.

- divided the research evidence into independent scientific research and research sponsored by the outdoor advertising industry.

- independent scientific research regularly demonstrates that the presence of digital billboards contributes to driver distraction at levels that impact upon driving performance.

**Taken together, these analyses indicate safety implications in some situations for advertising in the road environment.**

---

# Advertising content

---

Advertising content an obvious issue yet it is difficult to study empirically.

Not been studied in much detail.

- Most, Chun and Widders - billboards with emotive images could be more distracting.
- Hatfield stated that advertising likely to maintain attention if difficult to understand or 'crowded'.

Certainly more road safety research needed here.

But difficult to make adverts salient, interesting or attention grabbing to all drivers in a study.

---





# Summary of the research evidence

Advertisements in the road environment:

- Looked at for a large proportion of time – the time spent looking at the forward roadway reduced.
- Impair hazard detection by drivers.
- Impair ability to react to and follow traffic signs (especially if the colour contrast between the advertisement and sign is low).
- Higher crash rates especially at intersections.
- Extra problems for older drivers.
- Content vital, not studied enough - emotive advertisements, or something of interest to the driver could be the most distracting.



---

# From research to regulation

---

Still a lack of comprehensive research evidence to form guidelines or standards about how much distraction from outside of the vehicle is 'safe'

Much current work ongoing around the world, but until complete, the regulation of such information cannot be fully evidence-based.

That so, emphasis should be placed more on advertisers to prove that a potential roadside advertisement is safe, rather than purely on road authorities to prove it is unsafe.

---



---

## REGULATION OF ROADSIDE ADVERTISING

---



Theoretically, 3<sup>rd</sup> party advertising one of the easiest objects in the road environment to control.

But... highway authorities often receive revenue from advertising- often both an initial roadside advertising application and an annual renewal fee.

And... advertisers often have significant financial incentives to make adverts as conspicuous as possible.

And... things change. Most advertising signs have a limited life-span. Annual approval permits are often a good idea.

---



---

## REGULATION OF ROADSIDE ADVERTISING - MORE PROBLEMS

---

How much knowledge and certainly must regulators have before they can be confident about issuing guidelines and regulations about roadside advertisements?

Proof of advertisements causing crashes is rarely obtainable....

Also, problems with the time-lag:

*“Potential research, even now, is years behind the implementation of the types of signs that are the subject of the research”. Wachtel.*

---

---

## CURRENT (AND PROPOSED) WORLDWIDE GUIDELINES

---

So, road authorities often only consider restricting advertisements on motorways and other major roads in some instances (e.g. at junctions).

Because of research gaps, road authorities often develop guidelines around the visual appearance of the road environment based largely on engineering judgement or conventions.

These guidelines are often challenged (especially by outdoor advertising associations).

Particularly where they are being updated and/or tightened.

---

---

## Main Roads Queensland (Australia) current guidelines (from December 2002)

---

Their current guidelines focus on situations requiring particular driver concentration and manoeuvres.

Longitudinal placement controls: '*Clear zones*' on either side of road for a distance around traffic signs and merging areas.

Also, advertisements are not permitted for a distance upstream of an on-ramp or exit.

Some flexibility - further restrictions may apply, eg:

- on large high-speed roundabouts,
  - at complex intersections/locations,
  - on pedestrian crossing facilities,
  - on sections with a crash history higher than average.
-

---

## Main Roads Queensland proposed guidelines (from 2009)

---

Currently considering additional 'safety in design' restrictions.

Driver-centred approach, based on conditions drivers likely to meet at different motorway areas

Based on the average speed of the roadway ( $V$ ), these are...





### **1. On Approach to a Motorway Interchange.**

Generally an advance direction sign is located about 1km from the Off Ramp

- A Viewing zone restriction of 2.5V before the sign.
- An Extension zone of 2.5V after the sign for reading and sign comprehension without distraction from advertising signs.

**2. Area Between the Direction Sign and the Off Ramp (where direction signs are not present).** Advertising signs may be permitted.

### **3. Off Ramp Area.**

- A Turbulence Zone (where drivers may change lanes or prepare for leaving the motorway) restriction of 4.5V.
- A Conflict Zone (where drivers can leave the motorway) of up to 5V.
- An Extension zone of 2.5V after the off ramp

**4. Area Between the Off Ramp and the On Ramp (where direction signs are not present).** Advertising signs may be permitted.

### **5. On Ramp Area**

- A Preview Zone (where drivers on the Motorway are first able to identify vehicles on the On Ramp) restriction of 3.5V.
- A Conflict Zone (where can enter the Motorway) restriction of up to 5V.
- A Turbulence Zone (return to the normal free Motorway flow) of 4.5V.

**6. Motorway Mid-Block Locations (away from Interchanges, Overtaking Lanes, Signs etc).** Advertising permitted where placed away from traffic control devices (& other advertising). Minimum spacing between advertising devices is 2.5V (e.g. 250m or approx 9 seconds of travel at 100km/h).

---

# Other guidelines and restrictions around the world

---

Brief review of current guidelines and restrictions around the world presented below.

Overall, this presents a mixed picture.

Given this range, it is difficult to state a single image of world's best practice.

Queensland, Australia guidelines probably sit somewhere in the middle.





---

# USA

---

The restrictions on billboards and similar advertising devices are controlled on a state by state basis.

This creates a very fragmented picture.

Four states currently have a total ban (old and new): Alaska, Hawaii, Maine, and Vermont. Some States /cities have extra restrictions on electronic billboards.

Contrast with Nevada, where full-motion billboards are allowed on the Las Vegas Strip.

Wachtel recently proposed a comprehensive set of guidelines for digital advertising signs.

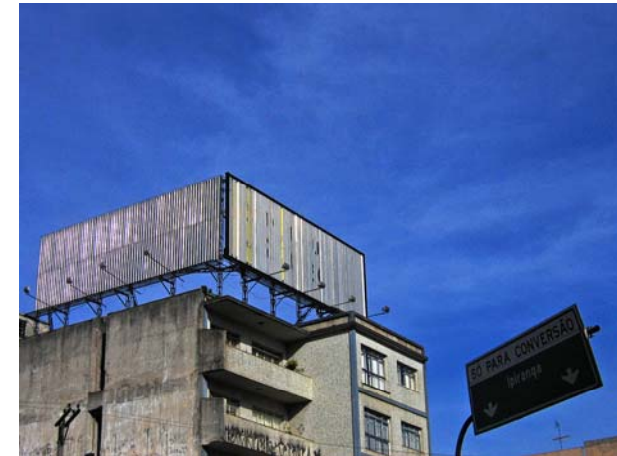
Whole area is currently the subject several research projects.

---

---

*Brazil.* In 2007, Sao Paulo banned billboards. Similar law was also passed in Tehran, Iran. However, probably not for road safety reasons.

---



---

# UK

---

Regulations and guidelines attempting to control roadside advertising do exist, eg:

- the HA's Design Manual for Roads and Bridges
- the Town and Country Planning (Control of Advertisements) Regulations 1992.

Now controlled by the planning permission system.

But, local planning authorities not obliged to enforce any aspect of planning control, merely to have 'appropriate arrangements in place for enforcement'

So enforcement of illegal billboards very variable.

---



---

# *Canada (Quebec)*

---

Roadside Advertising Act: no commercial advertising sign visible from a highway may be displayed within 300 metres of the highway.

Further, restrictions apply within 600 metres of the entrance or exit ramp of an autoroute, measured from the head of the ramp.

Roadside 3rd party advertising are further restricted:

- 1) In a school zone, pedestrian crosswalk zone etc
  - 2) On curves where a traffic sign shows reduced speed.
-

---

# *The Netherlands*

---

Currently developing decision criteria for visual distracters (eg roadside advertising). They include:

- no moving objects,
  - amount of information depending on available reading time based on a reading time formula
  - no distractions at intersections, merges, exits/entrances, close to road signs or on curves,
  - no telephone numbers,
  - no fluorescent colours used,
  - no ambiguity,
  - no controversial information displayed, eg sex,
  - and, advertisements not mimicking legitimate road signs.
-

---

# CONCLUSIONS - 1

---

Lack of both comprehensive research evidence and international regulatory agreement.

So road authorities around the world justified in using the best research information available coupled with engineering judgement to develop advertising guidelines.



---

# CONCLUSIONS - 2

---

The Main Roads Queensland 'safety in design' approach to restricting advertising billboards seems to be based on the best information available.

In line with a recent recommendations of Hatfield:

*"...advertising signs should only be located in road conditions that do not require frequent driver response to driving-relevant stimuli. For example, installation on a straight freeway without extremely dense traffic is least likely to result in crashes. Proximity to traffic entry points, intersections, and pedestrian crossings, should be avoided."*





## CONCLUSIONS – 3

Suggested that Main Roads Queensland draft revisions taken further, and additional advertising restrictions are recommended around other known areas of high driver workload.

Include blackspot locations, hills, road works / abnormal traffic flows and curves/bends.

In line with Wachtel - restriction of adverts when driver decision, action points and cognitive demand are greatest.

Although useful for all road users, would be of specific benefit to older drivers.

---

# CONCLUSIONS - 4

---

More broadly, a need for countermeasures for better road design to minimize driver distraction.

Regan et al - these include:

- the need for road safety audits that include criteria for the identification and assessment of roadway objects that could distract drivers;
  - the need for methods and metrics for quantifying the impact on driving of distractors;
  - the need for reference tasks, which induce “acceptable” levels of distraction- against which the impact of distractors (eg advertising material) on driving performance can be assessed.
- 



---

# CONCLUSIONS - 5

---

Perhaps road safety researchers and regulators will always be playing catch-up with advertisers.

Likely that there will always be tension between these different groups - due to the nature of their roles (ie promoting marketing and commerce vs. maintaining a safe road system).

But continued independent research efforts and the development of evidence based guidelines should help produce highway environments that are safe, and yet not unnecessarily restrictive.

---