ResearchFoundation

Road Safety Research Summary

Making Speed Limits Clear

Is there a better way to communicate speed limits?

In the past, New Zealand basically had two speed limits: 50 or 100km/h. However, over the years a wide range of speed limits have been introduced, including 30, 40, 60, 70, 80, 90 and even 110km/h. There are many places where roads with lower limits look the same as a 100km/h road, so miss a sign and you can be left guessing what the limit is. About 60% of AA Members say they have found themselves in just this situation.

New Zealand research has found that drivers only see about 30% of roadside signs[1]. When drivers do notice speed limit signs they often check their speed, but between signs the reminder 'wears off' with researchers observing speeds creep up between signs[2].

Speed signs can have periodic effects on drivers' speed
70km/h speed limits on former 90km/h roads[2]

Could different road markings complement speed limit signs?

Previous research has shown that drivers notice road markings more than signs. So the AA Research Foundation asked the Transport Research Group (TRG) at the University of Waikato to test whether different continuous road markings could be used to help drivers stay closer to the speed limit.

1 Charlton, S.G. (2006). Conspicuity, memorability, comprehension, and priming in road hazard warning signs. Accident Analysis and Prevention, 38, 496-506.
2 Jongen, E. M., Brijs, K., Mollu, K., Brijs, T., and Wets, G. (2011). 70 km/h speed limits on former 90 km/h roads: effects of sign repetition and distraction on speed. Human Factors, 53, 771-785.

Research method

Over 100 drivers participated in the research, which used a driving simulator.

Participants visited the laboratory twice, firstly to learn about the simulator and practise driving on roads with the experimental markings, and a week later for researchers to record their speeds on the experimental markings.

The research looked at:

1. Whether different types of continuous road markings (experimental markings) could be used to send a continuous signal to drivers about the speed limit.
2. Whether drivers comply more when they know what the experimental markings mean.
3. Whether drivers who are distracted comply better when there are continuous markings indicating the speed limit compared to just signs.
4. How satisfied drivers feel with different continuous markings being used to communicate speed limits.

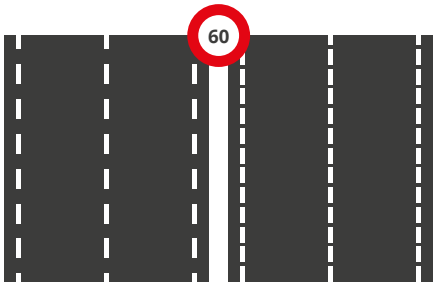
How tests looked on the TRG driving simulator

Good consistency has been found in past research when comparing simulator results with on-road tests.

What was tested?

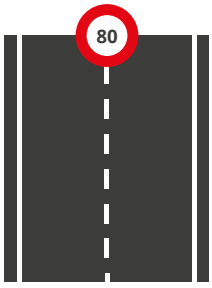
- 60, 80 and 100km/h speed limits were tested, with each speed allocated a different type of experimental marking.
- The researchers experimented with different styles of marking to test whether some styles were more effective than others.
- A control group drove all speeds on standard road markings (current New Zealand open road markings), and all groups had this marking in 80km/h zones.
- Some groups were told what the experimental markings meant, while others were left to work it out for themselves.
- Some groups had speed limit signs as well as the experimental markings; others only had the experimental markings.
- All groups were tested when they could fully focus on their driving and when distracted (asked a maths addition task).

Different experimental markings tested



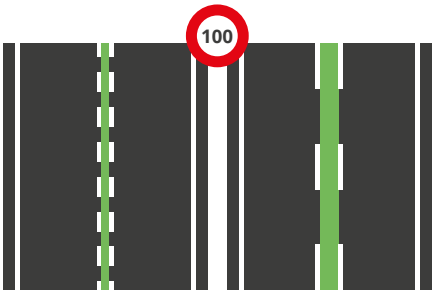
Experimental marking A | Experimental marking B

Standard NZ road markings tested



Used for all 80km/h tests and the control group

Different experimental markings tested



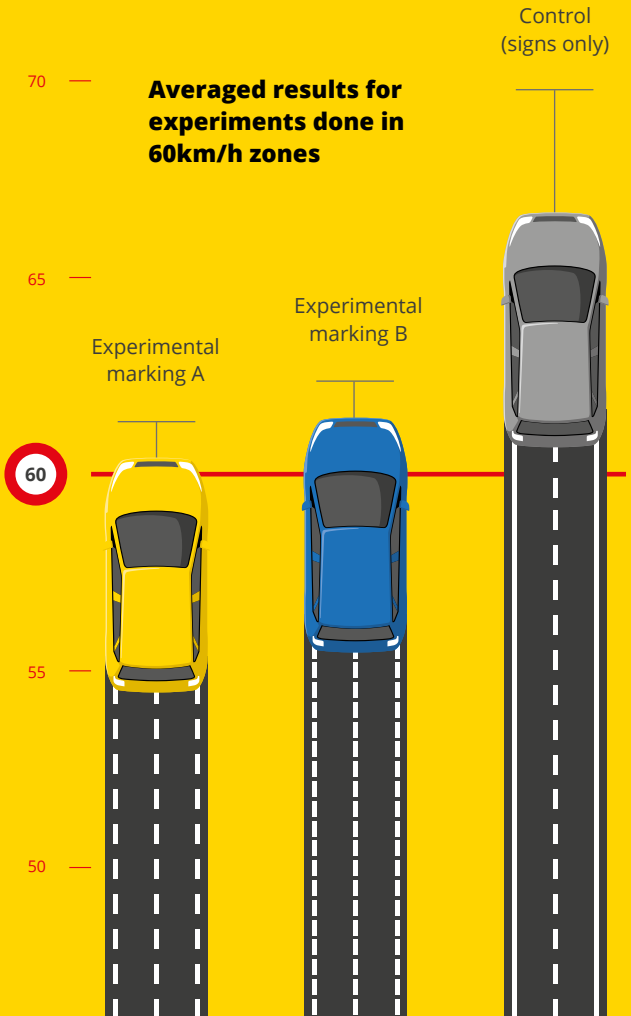
Experimental marking C | Experimental marking D

Except for the standard NZ road marking, the other markings used in this research are not legal New Zealand markings and must not be used by road controlling authorities. They were designed for the purposes of the research only, being distinctive and realistic enough for the experiments in the simulator.

Experimental markings showed an **advantage** over signs alone

Results

- Overall, the experimental markings showed an advantage over signs alone, including when drivers were distracted:
  - Participants chose speeds closer to the speed limit.
  - Participants chose the same speed for the same stretch of road.



- Within the 60km/h speed limit areas, only 11% of drivers tested with the experimental markings travelled at speeds more than 3km/h over the limit, compared with 46% of drivers in the control group (who were driving on standard NZ road markings and relying only on speed signs).
- In lower 60 and 80km/h zones, in all tests drivers' speed crept up when they were distracted, but less so on the experimental markings than on standard road markings. For example, in 60km/h zones, when distracted, the control group averaged 12km/h over the limit compared to an average of only 4km/h over the limit for drivers on the experimental markings.
- In 80km/h zones, in all tests participants drove on average slightly faster than 80km/h, which might be in part due to familiarity – drivers are used to driving up to 100km/h on standard NZ road markings.
- In 100km/h zones, in all tests including the control group driving on standard NZ road markings, compliance was on or just under 100km/h when not distracted, and on or just over when distracted.
- Overall, researchers did not observe a significant difference between the different experimental markings – they worked equally well.
- Informing drivers of what the experimental markings meant resulted in better compliance than trusting drivers would work it out for themselves.
- With numerous tests done over two days, the effectiveness of the experimental markings appeared to strengthen with practice rather than wear out.
- Participants rated the experimental markings' acceptability and usefulness 9/10.

What the AA says:

Speed limit communication needs to cater for drivers who slip into auto-pilot or get distracted.

Speed limits must also be credible, matching the look and feel of a road, or drivers either consciously or unconsciously don't observe them.

Safety is improved when drivers travel close to the same speed as each other. In this environment drivers are better at judging other drivers' speed and less inclined to overtake in unsafe places. This research found drivers' speeds were more similar on the experimental markings that constantly informed them of the speed zone.

The AA believes that when roads are given new speed limits, complementing speed limit signs with different continuous road markings that indicate the speed zone would be more effective and fairer to motorists, resulting in better compliance and improved safety.

Next steps:

- NZTA participated in the research and is investigating how it might use the findings to better manage drivers' speeds.
- There are opportunities now for real-world testing of this research on roads that already have different speed zones in place. On-road trials could further test effectiveness and investigate ways to reduce implementation costs. However, the style of continuous road markings tested would need to be agreed nationally.
- Local authorities who are looking at changing speed limits should take from this research that new speed limit signs alone may not be as effective as they want. More innovative approaches, such as those demonstrated by this research, may be needed.

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