

TECHNICAL NOTE

IPENZ TRANSPORTATION GROUP-FUNDED STUDY TOUR

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ABSTRACT

At the 2007 IPENZ Transportation Group Conference I was awarded the 2007 Group Study Award. In my award application, I proposed to use the funding to visit leading researchers and engineering practitioners in Europe working in driver behaviour and road categorisation. I am currently enrolled part-time for a Masters in Engineering Transportation through the University of Canterbury. My thesis topic is a study of rural roads in New Zealand, with a focus on whether perceptual speed management treatments could be applied to manage speeds and reduce accident risk. The study tour, conducted in January 2008, considerably enhanced my research by linking the New Zealand experience to that of successful overseas activities through meetings with the world's most respected driver behaviour researchers and engineers. This report discusses key study tour findings relevant to New Zealand.

STUDY TOUR FINDINGS: SPEED MANAGEMENT

My foremost impression from talking to world leaders in the field of traffic psychology and in particular speed management is that driver speed choice is a very complex issue. The following list is by no means exhaustive but presents an example of the range of issues discussed.

Perceptual Speed Management Treatments

Perceptual speed management treatments ideally create an environment where the safe operating speed of a section of road is so apparent as to not require enforcement. Roadworks sites, for example, show significantly lower operating speeds when they have been dug out, are surfaced in rough gravel, and have 2.5m traffic lanes delineated by cones, than when they appear the same as any standard 10m wide, sealed rural road carriageway – despite 30km/h speed limit signs being optional in both cases. However, road workers will attest that some people still might attempt to drive far faster than an appropriate safe speed even with such extensive ‘perceptual’ treatments. The main advantage of perceptual treatments such as narrower traffic lanes and painted flush medians is that they are very cheap to install. As part of The Netherlands’ ‘Sustainable Safety’ strategy, all rural two lane roads (as seen for example in Figure 3 below) are to be re-marked with a one metre median and narrower marked traffic lanes, within the existing carriageway, and over the regular re-marking maintenance cycle. Research has shown that such markings result in safer operating speeds and reduced crash risk. With much evidence linking lower speeds to fewer accidents (e.g. Taylor et. al, 2000), re-marking rural two lane rural roads is likely to deliver an impressive cost-benefit ratio for The Netherlands.

Speed Limits

Many people working in road safety in Europe were surprised to learn that the majority of New Zealand rural roads have a 100km/h speed limit, from unsealed gravel to motorway. Typically in the countries I visited, motorway speed limits are 100 to 120 km/h, with 80 and 90km/h limits on all other single carriageway rural roads which in appearance resemble the majority of New Zealand’s rural State Highway network (see for example Figure 1).



Figure 1 Rural Arterial, The Netherlands: 80km/h speed limit

Some of the more densely populated countries have extensive motorway networks linking many major towns and cities, meaning that the 80 and 90km/h routes can be avoided. However, Denmark, Finland and Sweden all have vast single carriageway rural road networks similar to New Zealand's. In these countries it appears to be accepted that even if a route is the only option between a trip production and trip attraction, that fact alone does not necessitate operating speeds up to and in excess of 100km/h. While overtaking lanes as we know them in New Zealand are not common in Europe, many countries make use of the '2+1' system, where a long stretch of rural road will be three lanes, with the third lane alternating direction. The different traffic directions on these roads are always separated with a wire rope median barrier. From a human factors perspective, it can be argued that if a manoeuvre is not safe (for example, overtaking in the opposing stream of traffic), it should be made impossible. This in itself is a form of traffic enforcement.

Road Hierarchy

As well as speed limits discussed above, there appears in many European countries to be a much more comprehensive and obvious road hierarchy than is in place in New Zealand. The more densely populated countries of the United Kingdom and The Netherlands have clearly defined motorways, which differ from expressways and other rural roads in appearance, traffic flow, and speed limit. When I explained New Zealand's rural road system to some researchers, for example the stretch from Wellington to Auckland on State Highway One, I was advised that this road must 'simply not have any access allowed'. Clearly in New Zealand we have issues of remoteness and sparse, low population levels which mean that overseas systems cannot necessarily be directly applied in our backyard. Despite these issues, consistency of road design clearly aids drivers' unconscious perceptions and is therefore desirable from a speed management perspective.

STUDY TOUR FINDINGS: OTHER DRIVER BEHAVIOUR ISSUES

Driver Training

In all countries visited and throughout Europe, the minimum age at which drivers can obtain a provisional or full driving licence is at least 17, compared to New Zealand's current age of 15. While driving licence tests vary between countries, it tends to be harder to get a full driving licence in Europe than in New Zealand. In the Netherlands for example, lessons from approved driver trainers are compulsory, with a minimum of 40 lessons required at a cost of around NZ\$65 per lesson. Even with this training, practical driving test failure rates average 20 to 40% for first time applicants. In Sweden and Denmark, a defensive driving-type practical course is a requirement of getting a licence.

Traffic Enforcement

It is generally agreed that enforcement of speeds and traffic rules is an essential component of road safety. Researchers vary as to their opinion on how effective enforcement can be in preventing accidents. Some believe that enforcement is the primary method available, as it targets intentional violators – those people that knowingly exceed either appropriate safe driving speeds, and/or the posted speed limit. It is suggested that those who speed are overrepresented in other violations, for example illegal overtaking (on yellow lines or on the inside, for example). Therefore, as speed is a relatively easy violation to enforce, it seems obvious to target intentional speeders.

A form of speed enforcement generating a lot of research in Europe and elsewhere, and much discussed during my study tour, is Intelligent Speed Adaptation (ISA). This is a GPS-based technology that in its 'compulsory' format limits vehicle speeds to the prevailing posted speed limit. 'Voluntary' ISA performs the same function but can be manually overridden by a driver as wished, for an entire trip, or temporarily if they intend to overtake, for example.

On the first day of my study tour, in Leeds, I read a magazine article about Ethical Design, which did not mention cars explicitly but referred to consumable products freely sold that have the potential to injure or even kill their users and other people, within their standard functionality. As technology improves, cars are becoming increasingly easy to drive fast. The positive feedback people seek from driving fast is much more readily obtained than any negative feedback – rare in the form of getting a fine, and even more rare in terms of being involved in an accident. Of course, many speed-related crashes occur at speeds significantly lower than the posted speed limit, but these are not the crashes being prevented by enforcing speed limits exclusively. If systems such as ISA eventually become commonplace, it might beg the question why we allow such high speed cars on our roads in the first place, only to have to counter their effects with enforcement, speed-limiting gadgets, or at worst, by dealing with the social cost of traffic crashes influenced by excessive and inappropriate speeds.

Government Policy

Fred Wegman at SWOV was instrumental in bringing Sustainable Safety to the Netherlands. This is a proactive rather than reactive approach to road safety and is current national policy with a range of implementation measures being carried out. Road safety experts are involved in projects' planning phases, in a similar but more extensive manner than for the safety audits we have in New Zealand. Starting with transport plans, alternatives are developed with safety as one of a range of inputs. Sustainable safety is there from the start and influences the planning and design process.

In Sweden, 'Vision Zero' has been in place since 1997. While research suggests that simply implementing a target reduction in road casualties is correlated with a decrease in actual casualties, Lars Åberg reports that there has been no real fall in accident numbers since this policy was introduced. Policy therefore should be accompanied by research, leading to successful implementation measures.

There was general concern among researchers during my study tour that it is rare to see research outcomes resulting in real-world changes. Often the decision makers in our controlling authorities take a lot of convincing that change might be beneficial. It was also commonly reported that people with limited experience in any sort of specialist transportation field end up being the ones making major transportation policy decisions.

WHERE TO FROM HERE

Despite the obvious differences between New Zealand and countries I visited in Europe, there are interventions available that are not necessarily costly or reliant on dense populations.

1) Road Hierarchy

While various formal and informal road hierarchies exist on maps in reports and guidelines around New Zealand, there is no clear hierarchy understood by the average driver, as for example the motorway, A, B and local roads are understood in the UK. In conjunction with clarification of hierarchy, setting of speed limits appropriate for the road conditions and in line with hierarchy levels is encouraged. In most instances this would involve a reduction in the posted rural speed limit of 100km/h, though there may be justification to increase the limit on the highest standard motorways. Increasing the limit within strict conditions would help public acceptance of a shift from a general 100km/h limit on all rural roads.

2) Automatic enforcement of legal speeds

From a human factors perspective, it is not surprising that excessive speeds are reached on our rural roads, given that most legal road vehicles can travel in excess of 150km/h. A car can fail its Warrant of Fitness inspection due to faulty windscreen wipers, but maximum speeds are not considered. Providing registration for high-speed vehicles and then relying on people to choose wisely to drive within the posted speed limit leads to high-speed accidents. I support the introduction of speed-limiting in vehicles, whether through ISA or some other means, to remove the temptation to drive within a vehicle's capability.

3) Driver training

More extensive training is required to get a drivers' licence in many European countries than is the case in New Zealand. It is likely that this increases young driver safety (without eliminating the problem entirely) while decreasing mobility in the population generally. Licences are more expensive and take longer to obtain, meaning fewer people can afford the lessons, and those living remotely might struggle to attend training. The New Zealand way of learning to reverse a trailer in the paddock has practical mobility applications, but our safety record for young drivers suggests that mobility may need to be compromised in our efforts to improve safety for all road users.

REFERENCE

Taylor, M. C., Baruya, A., & Kennedy, J. V. (2002) The relationship between speed and accidents on rural single-carriageway roads *TRL Report TRL511* TRL Limited, UK