

## Influencing speeding behaviour through preventative police enforcement

*Paper presented at the VIth PRI World Congress 'Marketing Traffic Safety',  
3-6 October 1994, Cape Town, South Africa*

D-94-21  
Paul Wesemann  
Leidschendam, 1994  
SWOV Institute for Road Safety Research, The Netherlands

**SWOV Institute for Road Safety Research**  
**P.O. Box 170**  
**2260 AD Leidschendam**  
**The Netherlands**  
**Telephone 31703209323**  
**Telefax 31703201261**

# Influencing speeding behaviour through preventative police enforcement

*A contribution to the PRI World Congress 'Marketing Traffic Safety', 3-6 October 1994, Cape Town, South Africa*

Paul Wesemann

SWOV Institute for Road Safety Research, Leidschendam, the Netherlands

## Introduction

In this paper, the following three questions will be dealt with:

- How do driving speeds affect road safety? (section 1)
- Which methods can be used to influence speeding behaviour? (section 2)
- How can the use of these methods be best promoted? (section 3)

## 1. Relationship between speed and road hazard

Everyone knows from personal experience that the high driving speed of motorized traffic is one of the principal causes of road accidents, and that it also has a great influence on the severity of accidents. Thanks to research, these relationships can be described in a more precise and quantified form.

To begin with, three probabilities can be distinguished: the probability that an accident occurs, the probability of someone sustaining injury in the process and the probability that the injury sustained is fatal.

*The probability of an accident* is primarily dependent on the speed at which a vehicle is driving, and more particularly the *difference* in driving speed between this vehicle and other road users. For instance, a speed 100 km/h creates little hazard on a motorway where other road users are driving at about the same speed on separate carriageways without intersecting traffic. In this case, there is question of a fairly 'homogenous' traffic flow with little likelihood of disruption. However, *if* a disruption occurs or if a vehicle is driven off its course, then the high speed causes considerable safety problems.

Driving at 100 km/h is quite a different matter on roads without separate carriageways and with mixed traffic, such as a connecting road between towns or villages which also carry agricultural vehicles, or cyclists and moped riders travelling at speeds of 15 to 30 km/h. A car driving 100 km/h here, that is to say 70 to 85 km/h faster than these other road users, will then present a considerable risk; not only to the motorist, but also to the other road users. During overtaking manoeuvres, the difference in speed in comparison to oncoming traffic is of course still many times greater.

The same speed of 100 km/h creates a much higher probability of an accident on roads which pass through a built up area; such roads not only carry much more slow traffic but also a large volume of intersecting traffic, including crossing pedestrians. The difference

in speed when compared to traffic crossing at right angles can even be 100 km/h in this case.

For a more general evaluation, it can be assumed that for every type of road, the probability of an accident is related to the average driving speed of the vehicles on that road.

When an accident occurs, the *probability of injury or fatality* is primarily determined by the speed of impact, that is to say the difference in speed between the driving vehicle and that of its 'collision partner' at the moment of impact. This is dependent on many factors, such as the degree to which both have braked, the angle at which both objects hit each other, whether the vehicle leaves the road and whether it hits an obstruction on the verge. Again, various studies have shown that in general, the likelihood of injury and fatality is related to the average driving speed of the vehicles on a road. For example, it is known that, relatively speaking, accidents which occur outside the built up area are associated with more fatalities and injuries than accidents which occur inside the built up area.

The relationship between the average speed and the degree of road hazard can also be described in a quantitative sense on the basis of the studies referred to (Roszbach & Koornstra, 1991).

It appears that a 10% rise in the average speed on roads that represent a certain road type, results in a 20% increase in the number of accidents. The same increase in the average speed has also been shown to result in almost 35% more injuries and 50% more fatalities. This relationship does not necessarily represent a fixed law which will remain exactly the same under all circumstances, but the general impression has been adequately demonstrated. This means that by reducing high driving speeds, it is possible to considerably reduce the number of accidents and, to an even greater degree, the number of road accidents victims.

The question which next arises is: at what point do we reduce the existing driving speeds? It is clear that any speed higher than walking pace is associated with risks. In the early years of the automobile, people in the Netherlands were well aware of this fact.

The government therefore introduced a general speed limit of 10 km/h for all motorized traffic. Today, the traffic system is geared to far greater travelling speeds, and society is prepared to accept more risks.

The assumption made here, is that the speed limit set per type of road in each country is an expression of the risk still considered acceptable under those conditions. This means that speeds which exceed this limit represent too great a risk and must be reduced.

Of course, this perspective ignores the question of whether the road network is adequately equipped to process existing (and future) traffic flows, and whether the current speed limits are suitable in view of the design of these roads and the scope and composition of the traffic they carry. These are important questions, but they do not form part of the subject of this paper.

## **2. Police enforcement with information campaigns**

This section gives a brief sketch of the effects on speeding behaviour that can be achieved through police enforcement combined with information campaigns. Many countries,

including the Netherlands, have had experience with the police enforcement approach to speed checks (Zaal, 1994; Goldenbeld, 1994; Riedel et al, 1988; Koornstra, 1994). In latter years, tests have been performed in the Netherlands using new, computerized technology and unconventional control strategies (Oei & Polak, 1992; De Gelder 1994; Veling, 1993).

This series of studies has given a fairly accurate indication of the conditions which police enforcement should meet in order to be effective. For some tests, use was made of photo cameras which automatically record speeding offences; for others, the speed measurements were performed by the police. It is not likely that this difference influences behaviour: speeding behaviour is mainly determined by the perceived risk of detection.

The focal concept adopted by these studies was that road users will observe the limits if (a) they understand *why* they should adjust their speed and (b) they find the risk of detection and subsequent penalty too great. The subjective impression people form concerning this risk of detection is partly based on experiences - either personal or vicarious - with police enforcement, and partly based on messages concerning police campaigns which reach them through the media.

It also goes without saying that punishment should always follow if someone is caught speeding. Therefore enforcement is also intended to have a deterrent effect on people who have not been controlled and penalized themselves (or not yet). This means that the behaviour of a far greater group of people will be influenced, rather than the behaviour of a much smaller group - offenders actually caught speeding.

In order to realize this so-called 'general preventative' effect of police enforcement, such enforcement and the supporting information campaigns should meet the following four conditions:

1. Road users are informed about the advantages of calm driving and the disadvantages of speeding; according to the principles of social marketing, the enforcement campaign should *not* only be presented as an instrument to restrict freedom and responsibility by creating fear of punishment. People are speeding because of time pressure and sensation seeking. But at the same time most people do appreciate relaxed driving because of its convenience, financial gains, and the benefits for the environment and the traffic safety. By stressing these advantages, the authorities provide people with the arguments for calm driving. When enforcement has compelled people to observe the limits, that is by means of external motivation, they can use these arguments to justify psychologically their speed adjustment; in the long run this will facilitate the internalization of these norms (Wittink, 1993a, 1993b).

2. Speed measurements are carried out on selected road sections according to some requirements:

- The frequency of the measurements should be sufficiently high. People will only take the likelihood of control into account if they notice a checkpoint from time to time; over this minimum level of enforcement, the effect on speeding behaviour will increase as more controls are carried out. In one experiment a significant effect was found at a probability of detection of 50 % for every road user (supposing he is speeding all the time; Oei & Polak, 1992). A study is currently in progress in the Netherlands which should offer information about the effectiveness of lower enforcement frequencies, like four times a year for the average road user.

- Speed monitoring is organized such that drivers are not able to see a control point in advance, therefore enforcement should be inconspicuous. At the point of passing or after passing the control point, people are informed that their driving speed has been or is being checked; this is made possible if motorists can observe the controlling policemen or equipment at the moment of passing, or when, just beyond that point, a sign is placed on the shoulder with the message "your speed has been controlled"; it can also be done by stopping offenders, such that this is visible to all who pass. There are no indications that one form of enforcement has more impact on passing drivers than another, although there are important differences in cost. A sign obviously costs much less than employing police to stop an offender.

3. The speed measurements are done at changing times or locations. It is important that road users cannot predict when or where they will be controlled.

4. A message is regularly distributed via the media that these speed checks are held very frequently on the selected roads; however, the exact times and locations of the controls should not be given, but should remain unpredictable.

In the Netherlands, tests have recently been carried out with enforcement organized in the manner described. In order to measure the effect of enforcement, the change in driving speed on the road sections in question was monitored. In all cases, clear drops in speed were registered during the trial period.

One of the tests concerned the use of electric warning signs and speed recording cameras on rural roads with a limit of 80 km/h. The experiment was evaluated over a seven month period; the study was performed by the SWOV at the request of the Ministry of Transport (Oei & Polak, 1992; Oei, 1994). The cameras were in operation for about half the time, generally every other hour; the risk of detection on these road sections was therefore very high, in fact considerably more than once a year for the average road user. The evaluation study led to the following results: a 6 km/h drop in the average speed, in casu from 78 to 72 km/h; the number of people breaking the 80 km limit dropped 27 percent points; the maximum speed which 85% of drivers adopted (V 85) dropped from 87 km/h to 79 km/h.

After this study was completed, the national traffic police set up a large scale enforcement campaign on parts of the motorway network; the SWOV provided advice on the basis of the results discussed. This campaign lasted several months. Inconspicuous speed measurements were performed from parked police cars. The risk of detection for the average road user was much greater than before on these road sections, but considerably less than with the experiment performed on rural roads. Nevertheless, the interim results showed a clear drop in the average speed (De Gelder, 1994).

In a third project, the Regional Directorate North Holland of the Ministry of Transport requested that another method of performing speed measurements be tested as part of the intensive police campaigns. This time, the measurements were not performed at one point within a road section. Rather, the time a vehicle took to cover a certain distance was recorded; this gave the average speed over that road section. Again, the experiences with this method of 'interval-control' were positive (Veling, 1993).

No matter how successful these trials were, it should be realized that the effects are markedly place- and time-dependent. Speed reduction is only seen at the points where control is performed and reverts soon after passing by. Besides, speed reduction does not hold after enforcement has been terminated. It should be questioned, therefore, if enforcement is able to prevent a sufficient number of accidents and road accident victims. And do these benefits weigh up against the costs of enforcement?

During the evaluation of the test on rural roads described previously, it was investigated how many accidents and victims were recorded on the controlled road sections during the seven months of the trial. In comparison to the non-monitored road sections, there proved to be a 35% accident reduction. Expressed in financial terms on a yearly basis, this implied a saving of some Dfl 900,000 , that is about \$ 500.000.

In addition, it was considered what costs were involved to install and operate the equipment used for automatic enforcement: electronic signs, speed recording cameras and their housing. In total, on a yearly basis these costs ran to some Dfl 360,000 or \$ 200.000 (Oei & Polak, 1992).

---

Benefits:	35% fewer accidents \$ 500.000 less damage and injury revenue (fines issued)
Costs:	equipment \$ 200.000 personnel costs

---

A comprehensive cost-benefit analysis could not be made, since a number of data were lacking. With respect to benefits, the total sum of fines collected was not known. On the costs side, there were no data concerning the cost of manpower associated with the processing of offender photos and their subsequent prosecution. However, the positive balance of the items included in the assessment is of such a magnitude, that there is no reason to doubt the value of the enforcement method.

### 3. Stimulating the use of police enforcement

Despite these positive results, it is not to be expected that this approach to speed checks will be immediately put into practice on a large scale by the Dutch police. We can learn this from experiences with similar methods of enforcement used to control driving under the influence and the wearing of seat belts. The difficulties which presented themselves with the stimulation of improved enforcement methods are based on general reasons, which may also be relevant to police organizations in other countries. There are three principal barriers to be mentioned in this respect.

1. The first barrier is due to the fact that management often attaches greater priority to counteracting 'ordinary' crimes and enforcing regulations for the protection of the environment. It is more likely that a team is formed to solve a murder case or an environmental

fraud case for weeks at a time, than that an alcohol control is organized ten times a year. Surely, many considerations play a role in setting such a task priority, which are of an entirely different order from road safety. Yet one aspect, by no means the least important, can be subjected to a comparison: even with 'ordinary' crimes, the objective of the police and the judicial system is to prevent deaths, injuries and material damage. This, one could say, is even the main objective of their activities in this field. If we then compare the saving in the number of victims and damages which such an investigation team can realize and which can be achieved through alcohol controls in traffic, for example, then alcohol controls offer by far the most favourable results. It is for this reason that it may be wondered whether giving priority to the control of ordinary crimes is justifiable. When we consider environmental crimes, the comparison is even more likely to be in favour of traffic enforcement.

2. The second barrier that stands in the way of using improved enforcement methods, is located not only at the decisionmaking level, but also at the level of the policeman 'on the beat'. It relates to the way the police view their prime task and how they measure the results of their efforts. Mostly they see their task as the pursuit and apprehension of law offenders; in their opinion, the performance of purely preventative controls, supported by information campaigns, does not always fit into this framework. Particularly when little offenders are being caught, the usefulness of enforcement campaigns is sometimes questioned.

Again, it can be said that other interests can also be served by the detection, rather than purely the prevention of offences. Nevertheless, police and justice still regard the latter as their prime objective. When viewed in this way, one can only support control methods which are so effective that offences are no longer committed. The fact that, as a result, there are no offenders to be apprehended can surely not be seen as an objection.

Of course there is a need to receive feedback about the effects of enforcement. In the past the number of arrested offenders was being used as a feedback indicator. However, to evaluate the effectiveness of preventive enforcement, one should use a different indicator. In the case of traffic enforcement one should receive information about the number of offenders in traffic. One could collect information on this subject via separate, random tests, and feed back the results to the police. If these data show that the offences in question are no longer being committed, then it might be possible to reduce the level of enforcement, so that the same effect is maintained with less effort.

3. The third barrier in this respect is connected with the professional culture of the police and the motivation of policemen and -women to choose this profession. One of the major motives is the high degree of autonomy that is left to the man/woman on the beat when performing his/her duties (Twisk, 1993; Pröpper & Eversdijk, 1993). Traditionally police management issues no detailed directives on how, where and when to enforce specific laws. If the management would prescribe the detailed strategies for speed-enforcement as discussed just now, this probably would be considered by the man in the field an encroachment on his own responsibility; consequently such directive would excite a lot of criticism and resistance.

How, despite these barriers, can it be ensured that improved enforcement methods for speeding offences are put into practice by the police? For this purpose, the following police information plan may be serviceable. (At present, work is being done on parts of



a similar plan at the request of the Dutch Ministry of Transport. This not only covers speed enforcement, but all behaviour which represents a danger in traffic.)

The plan consists of three steps:

- The first step is aimed at the managerial level of the police organization. Police executives are provided with information about the importance of speed limits for road safety and about the pros and cons of improved enforcement: costs, effect on speeding behaviour and on safety.
- The second step (which can in fact be made concurrently with the first step) is aimed at both the managerial level and the police in the field. The information provided will relate to the general tasks and objectives of the police, to the means which are available for these objectives and to how they can be put into use most effectively. This also deals with the relationship between, on the one hand, action taken against apprehended offenders (generally referred to as repressive action) and, on the other, control for the prevention of offences (generally referred to as preventative action). It is useful to also consider the indicators for the effectiveness of campaigns, how the police can obtain information on this subject and how the information is fed back to the various levels of the organization.
- The third step is aimed at the police in the field, and enters in detail into the most effective control strategies for the various types of offences. The principles of social marketing can be applied for this purpose as well. It is very important to take into account the views and motives of the policemen and -women in the field and their direct superiors. This could be done, for example, by asking them to draw up a workplan in which the most effective instruments for speed enforcement are being applied and to submit it for approval to the management. In this planning a certain room for manoeuvre can be allowed to the individual policeman. At the same time the management should make appointments about the way the men and women in the field are going to account for the use of their own responsibility.

The way in which such information can be organized on a practical basis is largely dependent on circumstances. In countries where a good infrastructure for education and training of management and in-the-field personnel is available, information can be provided in that context. If such a infrastructure is lacking, training can be organized on a project basis instead.

## **Conclusions**

By lowering driving speeds, a great contribution to road safety can be made. In the short term, this can be achieved through intensive enforcement of speed limit compliance. Studies have offered clear indications about the most efficient organization of police enforcement. While this may require a clear additional input of police resources (manpower and funding), the saving in road accident victims and damages weighs up against the costs. Through information to management and in the field personnel within the police organization, knowledge about effective methods of enforcement can be efficiently transferred.

There are many road safety measures which cannot simply be 'exported' from one country to another. What is effective in one country may not always have the same effect elsewhere: the problems are different, the circumstances detract from the means to resolve the problem or simply do not allow application of the measure. However, this export barrier is much less of an issue when it comes to combating excessive driving speeds through police enforcement.

## References

Gelder, A. de (1994). *Resultaten van het gericht verkeerstoezicht op de A2 tussen Amsterdam en Utrecht en vice versa, na 15 weken*. Speech delivered 26 April 1994, at the KPLD, Driebergen, Netherlands.

Goldenbeld, Ch. (1993). *Handhaving van verkeersregels in Nederland; Inventarisatie van handhavingstechnieken. Ervaringen in Nederland*. R-93-66. SWOV, Leidschendam, Netherlands.

Koornstra, M.J. (1994). *Police Enforcement: a European Evaluation*. Paper contributed to the TRB Congress, 9 January 1994, Washington, U.S.A.

Oei, H.L. & Polak, P.H. (1992). *Effect van automatische waarschuwing en toezicht op snelheid en ongevallen; Resultaten van een evaluatie-onderzoek in vier provincies*. R-92-23. SWOV, Leidschendam, Netherlands.

Oei, H.L. (1994). *Effective Speed Management through Automatic Enforcement*. Paper contributed to the 22nd European Transport Forum (The PTRC Summer Annual Meeting), 12-16 September 1994. Warwick, U.K.

Pröpper, I.M.A.M. & Eversdijk, J.J.C. (1993). *Beleidsinhoud en projectmatig werken als motivatie voor deelname aan de verkeersveiligheids campagne 'Veilig op de fiets'*. Vakgroep Politicologie en Bestuurskunde Vrije Universiteit, Amsterdam, Netherlands.

Riedel, W., Rothengatter, J.A. & De Bruin, T. (1988). *Selective enforcement of speeding behaviour*. In: Rothengatter, J.A. & De Bruin, T. (eds.), *Road user behaviour: Theory and Research*. Traffic Research Centre, University of Groningen, Netherlands.

Roszbach, R. & Koornstra, M.J. (1991). *Snelheidsbegrenzers voor vrachtwagens en bussen; Overwegingen bij de keuze van een maximum instelwaarde*. R-91-76. SWOV, Leidschendam, Netherlands.

Twisk, D.A.M. (1993). *Veilig op de fiets in Amsterdam; De campagne 'Veilig op de fiets': effecten, proces en motivatie*. R-93-56. SWOV, Leidschendam, Netherlands.

Veling, I.H. (1993). *Verkeersveiligheids campagne N9; samenvattend eindrapport*. TT-92-38. Traffic Test, Veenendaal, Netherlands.

Wittink, R.D. (1993a). *Voorlichting als instrument voor beïnvloeding van vervoers- en verkeersgedrag*. R-93-28. SWOV, Leidschendam, Netherlands.

Wittink, R.D. (1993b). *Social marketing; An Additional Method for Road Safety*. In: Proc. Conference on Asian Road Safety 1993, 'Cars '93'. Kuala Lumpur, 25-28 October 1993.

Zaal, D. (1994). *Traffic Law Enforcement: A Review of Literature*. Report no. 53. Monash University, Accident Research Centre, Australia.