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THE HISTORY AND DEVELOPMENT OF SPEED CAMERA USE

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Title and sub-title: The History and Development of Speed Camera Use

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Abstract:

The use of automated speed enforcement technologies is now wide spread throughout many parts of the world and research has consistently demonstrated the positive road safety benefits achieved through the use of these technologies. However, there is wide variation in the nature, extent of use and perceived acceptability of automated enforcement technology, particularly as the primary form of speed enforcement. Despite these differences controversies associated with the use of speed enforcement technology have arisen in each jurisdiction and some common elements across jurisdictions are evident.

This report examines the controversies experienced in Australia, North America and Britain in terms of one of the four dilemmas identified by Goldenbeld (2002). The four dilemmas are as follows:

- Credibility dilemma: encompasses concerns about the purposes of the countermeasure and the interests in which it is pursued.
- Legitimacy dilemma: refers to the fairness of the countermeasure
- Implementation dilemma: occurs where the acceptance of a measure is hampered because difficulties associated with implementation are not compensated for
- Social dilemma: occurs where there is a mismatch between individual preference and collective interests

Despite the common themes that emerge across countries, the impact of negative public perceptions of speed camera programs may be seen to be especially severe in North America, particularly in British Columbia where they contributed to the decision to abolish the photo radar program. Therefore, the approaches adopted in Australia and Great Britain to address public concerns and minimise the effect on the operation of automated speed enforcement initiatives are considered.

Key Words:
Speed Cameras, Photo Radar, Implementation, Public Acceptance

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Preface

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EXECUTIVE SUMMARY

Introduction

The use of automated speed enforcement technologies is now wide spread throughout many parts of the world and research has consistently demonstrated the positive road safety benefits achieved through the use of these technologies. However, there is wide variation in the nature, extent of use and perceived acceptability of automated enforcement technology, particularly as the primary form of speed enforcement. Despite these differences controversies associated with the use of speed enforcement technology have arisen in each jurisdiction and some common elements across jurisdictions are evident. This report considers the use of automated speed enforcement technology (primarily fixed and mobile speed cameras) across Australia, Britain and North America with particular focus on the controversies associated with its use and approaches adopted to address such concerns.

The Use of Speed Cameras

The use of speed cameras has perhaps been most widespread in Australia and Britain. In Victoria, Australia a trial of speed cameras commenced in 1985 with the widespread use of 54 cameras across the state commencing in 1991 for an average of 4,200 hours per month. The speed cameras are mobile devices moved between sites across the road network and operated covertly. The intention of the program is to create a perception that illegal speeds can be detected at any place across the road network and thus reduce speeds and crash frequency across the network. Since the introduction of the program a number of changes have been made to the mobile camera operations including the progressive increase in camera operating hours, the staged introduction of flashless operations during daytime and the reduction in the speeding offence detection threshold from 10 km/h in excess of the speed limit in each speed zone, to an unspecified amount. These changes are aimed at increasing the covert nature of the enforcement and consequently the unpredictability of enforcement location. Studies of the Victorian speed camera program have demonstrated its effectiveness in reducing the frequency and severity of casualty crashes both at speed enforcement sites and more generally across the road network (Cameron et al., 1992 and Rogerson et al., 1994).

Other Australian states also have active speed camera programs some of which follow the Victorian approach and others which rely more heavily on fixed or overt camera operations.

The British speed camera program commenced in 1991 with only a modest uptake of the technology. However, by 2000 there were an estimated 4,500 safety camera sites in use on British roads, the majority of which employed fixed speed cameras with a smaller number of red-light and mobile cameras. It is noted that not all camera housings have a camera present and one camera is moved between several sites. In contrast to the Victorian program, speed cameras operating in Great Britain are highly visible to motorists and are predominately located at sites with a history of frequent or severe casualty crashes. Signs warning of speed camera use are also required ahead of individual speed camera sites or routes upon which frequent mobile speed enforcement activity occurs.

A two year pilot evaluation (Gains et al 2003), demonstrated the effectiveness of safety cameras in reducing the number of people killed or seriously injured in road traffic accidents at cameras sites by 35 percent relative to the long term trend. The effectiveness of the fixed site cameras was to reduce killed or seriously injured casualties by 65 percent at camera sites and for mobile cameras it was 29 percent. Further, speed measurements showed that vehicle speeds at the camera sites has reduced on average 3.7 miles/h.

Across North America the extensive use of speed cameras as the primary form of speed enforcement is very limited. The published literature suggests that speed camera use is restricted to a small number of cities and the hours of operation per month are small in comparison to the driving population. Where speed cameras are used they are generally operated overtly with warning signs advising of the operation of speeding cameras in the area or at particular sites. Despite the relatively small level of use, evaluations of speed camera use both in the United States and Canada have demonstrated the effectiveness of speed cameras in reducing casualty crash frequency (Chen et al., 2000 and Retting & Farmer 2002).

Controversies Associated with Speed Camera Use

Despite the demonstrated safety benefits associated with speed camera use, a number of controversies associated with their use have arisen in each of the jurisdictions examined. These controversies can be expressed in terms of one of the four dilemmas identified by Goldenbeld (2002). The four dilemmas are as follows:

- Credibility dilemma: encompasses concerns about the purposes of the countermeasure and the interests in which it is pursued.
- Legitimacy dilemma: refers to the fairness of the countermeasure
- Implementation dilemma: occurs where the acceptance of a measure is hampered because difficulties associated with implementation are not compensated for
- Social dilemma: occurs where there is a mismatch between individual preference and collective interests

The key controversies associated with the use of speed cameras in each of the jurisdictions are summarised in Table 1.

Table 1. Controversies associated with speed camera use in each of the jurisdictions grouped according to Goldenbeld's dilemma classifications.

	JURISDICTION		
	Australia	US and Canada	Great Britain
Credibility Dilemma	• Dual perceived role of revenue raising and road safety. • Revenue from speed cameras is not reserved for use in road safety but rather goes to consolidated revenue. • Total revenue from speed cameras is excessive. • Inappropriate location of speed cameras in areas where it is "safe" to speed. • Overt operation of cameras is most effective in deterring speeders at unsafe locations. Covert operations aim to increase revenue.	• Perceptions of speed cameras as primarily revenue raising mechanisms. • Speed cameras are seen to be located on the most "lucrative" routes. • Inappropriate location of speed cameras in areas where it is "safe" to speed.	• Dual perceived role of revenue raising and road safety. • Increasing fines after implementation leads to perceptions of a stealth tax. • Overt operation of cameras is most effective in deterring speeders at unsafe locations.
Social Dilemma	• Belief that speeding slightly in excess of the limit is not associated with increased crash risk if otherwise driving safely. • Ambivalent support for reduced enforcement tolerances.	• Belief that speeding slightly in excess of the limit is not associated with increased crash risk if otherwise driving safely.	• Belief that speeding slightly in excess of the limit is not associated with increased crash risk if otherwise driving safely.
Legitimacy Dilemma	• No opportunity afforded to explain circumstances of the event. • Penalties for exceeding a speed limit by <= 10 km/h are less fair than those for exceeding the limit by more than 10 km/h.	• No opportunity afforded to explain circumstances of the event. • Automated enforcement does not identify the driver of the vehicle. • There is a delay in notification of the offence to the driver. • The process does not enable witnesses to verify the circumstances of the offences.	• The level of the enforcement tolerance is important in forming public opinion about the fairness of the measure. • Automated enforcement is perceived as an infringement of civil liberties. • Speed limits should be reviewed prior to strict enforcement to ensure that enforcement is fair.

Implementation Dilemma	• The reliability of speed cameras is brought into question when individual cameras prove faulty. • Speedometers may not be sufficiently accurate to keep detected speed within enforcement tolerances.	• Diversion of police resources away from more serious criminal offences • Reductions in road trauma are not seen to compensate for slower travel speeds.	• Review and appropriate setting of speed limits for the conditions is required.

It appears from Table 1 that a number of the controversies associated with speed camera use are common across jurisdictions. However, within each jurisdiction there is variation in the prominence of each dilemma and individual controversies within it. Further, experience suggests that different facets of a dilemma are likely to develop and gain momentum over time. The discussion that follows examines each of the dilemmas in more depth and details approaches taken to address them in each of the jurisdictions.

Credibility Dilemma

The credibility dilemma is perhaps the most frequently cited dilemma in relation to automated speed enforcement. As indicated in Table 1 expressions of this dilemma commonly assert that the central aim of a speed camera program is to raise revenue rather than to improve road safety. This may be particularly so during the early stages of a speed camera program when the road safety benefits are yet to be realised. The experience from Victoria and Britain suggests that as an enforcement program develops, perceptions of a dual role of enforcement as a revenue raising and road safety initiative may emerge. The balance between these two perceived roles is influenced by factors such as the individual characteristics of the enforcement program and other associated controversies detailed in Table 1. In particular, changes to an enforcement program after initial implementation that lead to an increase in fine revenue are likely to further highlight perceptions of this controversy. Examples of such changes include the lowering of the enforcement threshold, increasing the hours of speed camera operation or the level of fines and increasing the covert nature of operations.

In April 2000 a new funding approach to speed camera programs was adopted in Britain enabling local authorities, the police, magistrates' courts committees and other agencies involved in the enforcement process to have all of their camera enforcement costs refunded from a proportion of the fine revenue. Adopting such an approach would be expected to improve public attitudes towards speed camera programs. However, in Britain the controversy about deployment of speed cameras increased following the decision to hypothecate fine income for use in road safety. The reasons for this are unclear, however, concomitant increases in overall public awareness and media attention directed towards the speed camera program may have contributed. Further, strict regulations relating to the visibility of speed cameras were not introduced until June 2002 which would be expected to reduce perceptions of revenue raising motives.

The second key credibility dilemma relates to the location of speed cameras. In Australia and North America concern is raised over the perceived inappropriate location of speed cameras in areas where it is "safe" to speed. Related to this is the idea that, if a location is

demonstrably unsafe due to speeding, speed cameras should be operated in an overt, visible way in order to immediately deter speeders at the location. This idea assumes that traffic law enforcement achieves its effects in the same way as traditional criminal law enforcement *only*, i.e. through the detection and punishment of offenders to encourage them not to re-offend. It is not widely understood that enforcement can also achieve positive effects on speeding across diverse locations by operating covertly and/or broadly across the road network, thereby ensuring that enforcement locations are unrecognisable and unpredictable.

Specific efforts directed at addressing these concerns have not been widely documented in any of the jurisdictions examined. However, as part of the well resourced, State sponsored road safety advertising campaign in Victoria, advertisements highlighting the risks of been caught speeding at any place across the road network at any time of day have been aired at various times throughout the life of the speed camera program. Emotive and educational style advertisements have also been used to emphasise the risks associated with speeding across the road network in a range of driving situations. Evaluations of the effectiveness of the package of road safety advertising operating in Victoria (including the above mentioned advertisements) have consistently shown the positive contribution of such advertising on casualty crashes. Road safety advertising is an effective way of influencing public attitudes towards road safety issues and has also been used in Britain.

Social Dilemma

Somewhat related to a credibility dilemma is the social dilemma that derives from a general belief that speeding slightly in excess of the limit (up to at least 5 km/h, perhaps as much as 10 km/h) is not associated with increased crash risk if the driver is otherwise driving safely. There is general acceptance that the injury severity outcome of crashes increases with increasing speed, but this is viewed as irrelevant in the case of speeding slightly in excess of the limit. This dilemma has arisen in all the jurisdictions examined and the ambivalent response to reductions in enforcement tolerances in Victoria to an unspecified level below 10km/h reinforces that road users continue to hold such beliefs.

The belief that speeding slightly in excess of the limit is not associated with increased crash risk if otherwise driving safely is a social dilemma that may be addressed through appropriate media campaigns. Campaigns highlighting the reduced crash and injury risk associated with lower speeds may target the social dilemma by raising awareness of the proven relationship between speed and injury risk. As discussed above road safety advertising is an effective way of influencing public attitudes towards road safety issues.

Legitimacy Dilemma

This dilemma includes concerns about the failure to identify the driver of the vehicle, the failure to promptly notify the offender, the lack of a witness to verify that the offence occurred and the absolute nature of the offence (i.e. there is no opportunity to explain the circumstances of the events giving rise to the offence). Many of these concerns appear to derive from the lack of consistency in the rights afforded to offenders determined by traditional and automated enforcement. The concerns associated with the legitimacy dilemma do not apply to traditional forms of enforcement. For example, where a police officer sees a speeding vehicle and intercepts it to issue an infringement notice, the driver of the vehicle is immediately identified, informed of the offence and given the opportunity to explain his or her behaviour and prepare a defence in the event that s/he contests the infringement in court.

It is suggested that these are particularly prominent in the minds of those opposed to the use of automated enforcement in North America where it is often cited as unfair that an opportunity to "explain" is not available when offences are detected by cameras. Public concern about the absolute nature of the offence was not evident in the early years of automatic surveillance in Victoria (speed and red-light cameras) and is a relatively new phenomenon in this jurisdiction.

Implementation Dilemma

A key concern associated with the implementation dilemma is that it diverts police resources away from the enforcement of "more serious" criminal offences. Related to this is the concern that the automation of speed enforcement leads to reductions in manual enforcement and the detection of irresponsible driving behaviour other than speeding. Such behaviour is considered by many anti-speed camera groups to be more dangerous than speeding. This concern has been most prominent in North America.

In Australia and Britain issues surrounding the reliability of enforcement and in-vehicle equipment and the appropriateness of speed limits are more common manifestations of the implementation dilemma. Perceptions of low enforcement tolerance also contribute to these perceptions. For example, in Victoria, the common (but incorrect) perception of a 3km/h tolerance led some commentators to suggest that drivers may inadvertently speed above that level while intending to stay within the limit due to speedometer error or insufficient resolution on the dial. Similarly, recent problems with the accuracy of a limited number of fixed speed cameras in Victoria also led to questions about the reliability of all other enforcement technology. In contrast the reliability of technology has not been raised as a significant issue in the US and Canadian literature.

It is suggested that the attention given by the Victoria Police and the justice department to risk management during the establishment of the Victorian speed camera program demonstrates an effective mechanism through which both implementation and legitimacy dilemmas can be minimised. Smith (2000), who had a key role in the justice department at the time, outlines the key issues which were addressed in implementing a program to detect and process a high volume of traffic offences (much higher than previously handled in Victoria). The risk management strategies included:

- independent technical testing and quality assurance (less than ten appeals against the initial five million speeding tickets issued for offences detected by the mobile speed cameras were successful)
- operational procedures that genuinely identified road safety as the primary objective
- winning public support for the program even though the level of fines was substantial
- subjecting the program to independent evaluation research to establish its road safety benefits, or modifications to the program if necessary.

Further details of the risk management principles necessary for successful establishment of a speed camera program are given by Smith, Cameron and Bodinnar (2002).

Conclusion

Any of the controversies discussed above are common across several jurisdictions. However, the impact of them may be seen to be especially severe in North America, particularly in British Columbia where they contributed to the decision to abolish the photo radar program. The approaches adopted in Australia and Great Britain to address public concerns and minimise the effect on the operation of automated speed enforcement initiatives illustrate that controversies that arise can be effectively managed.

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[1] A full reference list is provided at the end of this report.

1. INTRODUCTION

The use of automated speed enforcement technologies is now wide spread throughout many parts of the world. However, there is also wide variation in the nature, extent and perceived acceptability of their use, particularly as the primary form of speed enforcement. This project aims to document the history of speed camera use internationally with particular focus on Australia, Britain, Canada and the United States of America.

It is necessary at this early stage to define a number of key terms to be used throughout this report as they are critical to a complete understanding of the speed enforcement programs and the factors that may influence the acceptability of them. First, it is noted that the terms photo radar and speed camera are used interchangeably throughout this report and their use is not intended to reflect a difference in the technology.

Overt enforcement operations are intended to be highly visible to all road users. The high visibility of operations is aimed at increasing the perceived risk of detection and operating upon road user behaviour immediately in time and space. In contrast, covert enforcement operations are based on creating a perception that detection of an offence may occur at any time and at any location. It is not intended that the timing and location of covert enforcement operations be known to the public. Whether used overtly or covertly, speed enforcement devices can be fixed or mobile. Fixed devices are located permanently at one site with infringement details collected periodically either manually or by digital electronic transfer. Mobile devices, on the other hand, are able to be moved from site to site with relative ease and are not intended to operate at one site for extended periods of time.

Similarly, distinctions can be made between automated and manual enforcement. Automated enforcement uses technology to reduce the need for human intervention in the enforcement process. In many instances, the use of automated enforcement technologies does not completely eliminate human intervention as the equipment must be set up and monitored during its operation by qualified persons to meet legal or operational requirements. However, there are a number of key characteristics of automated enforcement that distinguish it from manual enforcement. These include, the ability to detect a large number of offences per hour of operation, delayed notification of the offence or issuance of infringement notice to the offender and a lack of human interaction with the driver at the time the offence is committed. Examples of automated enforcement include fixed position and mobile speed cameras. In contrast, manual enforcement, as the name suggests, requires human intervention throughout the enforcement process. In general, manual enforcement will involve the operator identifying that an offence has occurred, intercepting the offender and immediately issuing the penalty notice where the offence attracts one.

The mix of the above characteristics present in a speed enforcement program will likely affect the mechanisms through which the enforcement operates to influence speed. It is suggested that there are two primary mechanisms through which speed enforcement operates to influence road user behaviour; general deterrence and specific deterrence. General deterrence is a process of influencing a potential traffic law offender, through his fear of detection and the consequences, to avoid offending. Specific deterrence is a process of encouraging an apprehended offender, through his actual experience of detection and its consequences, to avoid re-offending (Cameron & Sanderson, 1982). These mechanisms of effect must be distinguished from the nature of the effect itself. An enforcement program may have a general effect (i.e. an effect on speed or crash frequency across the whole road network) or a specific effect limited to the enforcement location and

immediate surrounds. The nature of effect of the program will not necessarily correspond to the deterrence mechanism used.

The underlying philosophy concerning enforcement locations is also likely to impact upon the mechanisms of effect and the outcome of the program. In particular, a distinction can be drawn between a black spot approach towards speed enforcement where enforcement occurs only at sites where there is a speed related crash problem, and, a whole of network treatment where speed cameras are used across the entire road network and are not restricted to black spot locations. The latter approach aims to create a perception that illegal speeds can be detected at any place across the road network and thus reduce speeds and crash frequency across the network whilst the former approach is concentrated on reducing speeds and crash frequency at black spot locations.

It has been necessary to consider the range of components of speed enforcement programs as it is suggested that the mix of characteristics in a program will likely influence public perceptions of the program. Therefore, in the consideration of the history and development of speed camera use in various jurisdictions that follows, details of the speed enforcement undertaken will be provided. The remainder of this report considers the history and development of speed camera use in each of the relevant jurisdictions in turn. Evaluations of public attitudes and perceptions will be presented and the controversies arising from the use of speed cameras over time highlighted. These controversies will be broadly categorised into four distinct dilemma types; social dilemmas, legitimacy dilemmas, credibility dilemmas, and implementation dilemmas as identified by Goldenbeld (2002). Where possible, strategies used to address these controversies will be detailed. The final section of the report draws together the findings from each of the jurisdictions and presents some general principles that can be extracted from the published research.

2. NORTH AMERICA

2.1. INTRODUCTION

The use of automated speed enforcement technologies in Australia and Europe has been extensive and produced significant road safety gains. A significant aid to the successful implementation of the use of these technologies has been the high levels of public support for the initiatives. However, the use of these technologies in the United States and Canada has been limited in comparison. In this context it is useful to examine public perceptions surrounding the use of automated speed enforcement in these countries to determine whether public opinion may act to limit their use.

Following is a consideration of a number of studies relating to public perceptions of speed cameras use in North America. As most of these studies focused on acceptability of specific existing camera programs it is necessary to describe in some detail the nature of the program for which acceptance was being measured.

2.2. THE UNITED STATES

An early study of speed camera use conducted in 1989 involved an evaluation of two speed camera programs operating in Paradise Valley, Arizona (population approximately 12,000) and Pasadena, California (population approximately 130,000) (Freedman et al, 1990). The speed camera program in Pasadena commenced in June 1988 and involved the use of one speed camera unit for 15 to 25 hours a week. Notice of the operation was given to motorists by signs posted throughout the city. Further signs were posted after actual camera sites to inform motorists that they had passed through a camera site. The operation of the speed camera program in Paradise Valley was similar in nature. It involved the use of one camera unit only that operated for around 30 hours a week commencing in September 1987. Signs were posted at entrances to the community to inform road users of the use of speed cameras for speed enforcement. In addition, signs were posted before active camera sites to allow vehicles to reduce their speed before passing the camera. To further add to the overt nature of the operations, the speed camera units were deployed in clearly marked police vehicles.

Telephone surveys of were conducted between August and September 1989 in and around both communities to assess public awareness of and attitudes towards the use of photo radar. The majority of those surveyed across the two communities (58%) expressed approval or strong approval of the speed camera operations and 37 percent expressed disapproval or strong disapproval. Equal numbers of respondents strongly approved and strongly disapproved (15%) of the speed camera operations. Of the residents of Paradise Valley, 72 percent were aware of speed camera use. However, in Pasadena only 56 percent of those surveyed were aware of speed camera use.

Perhaps most relevant to this study are the common reasons provided for disapproval of speed camera operations. Commonly cited reasons include that the wrong person may receive the ticket (i.e. the owner who may not necessarily be the driver), that the Police receive an unfair advantage and operations are sneaky, that operations violate the right to privacy, that the driver is not given an opportunity to tell his side of the story and that camera operations are ineffective in reducing speed.

The number of respondents who had received a ticket issued by the speed camera system in both communities was relatively low: 5 percent in Paradise Valley and 3 percent in Pasadena. It is suggested that the low percentage of people who have received penalty notices issued by speed camera operations may have influenced responses relating to approval and disapproval of the speed camera program. Given the research referred to in Section 5 suggesting that attitudes towards speed camera use by those who have received tickets issued by the speed camera program is less favourable than amongst those who have not, increased hours of operation or operation over a longer period of time may increase the proportion of those who have received a ticket and thus reduce support for speed camera operations. This must be considered when interpreting the results.

Self-reported behaviour change of respondents was also examined. Of those who were aware of the use of speed cameras and who drove through the relevant community, 56% (Paradise Valley) and 39% (Pasadena) drove slower through the town as a result of speed camera enforcement. Of these 60% (Paradise Valley) and 56% (Pasadena) reported driving slower all the time within the relevant community but only around 28 percent reported driving slower outside of the relevant community.

More recently, the speed camera program in operation in Washington D.C. (population approximately 572,000) since July 2001 has been evaluated (Retting and Farmer, 2002 and Retting, 2003). Sixty targeted enforcement zones were selected for enforcement by five speed cameras on the basis of speed related fatalities, use by children and known speeding problems. Speed camera enforcement occurred between 6am and 10pm Monday to Saturday with a presence in each of the enforcements zones twice per week for an initial period of 2½ months after which speed camera enforcement was limited to 28 of the 60 zones. Unlike in the communities of Pasadena and Paradise Valley speed cameras operated from unmarked police cars. Nevertheless, signs informing road users of the use of speed cameras for enforcement were posted at entrances to the city.

Following a 30-day warning period in which no penalties were imposed, offences detected by speed cameras attracted fines ranging from $30 to $200, however, demerit points were not applied to these offences. During the first six months of speed camera use, 197,786 infringement notices were issued from the 5 speed cameras in operation (Retting, 2003).

A survey of 500 Washington D.C. residents was conducted nine months after the introduction of speed camera enforcement (Retting, 2003). A high proportion of respondents (83%) were aware of speed camera enforcement in the city with 56 percent of those surveyed having either received an infringement notice themselves or knowing someone who had. It is noted that these levels of receipt or knowledge of receipt of infringements is substantially greater than those presented in the study conducted by Freedman et al. Similarly support for speed camera use in Washington D.C. was also lower than for operations in Pasadena and Paradise Valley. Further analysis of support for speed camera use demonstrates that support was significantly higher in Washington D.C. amongst those who had not received an infringement notice or did not know anyone who had (62%). Support amongst respondents who had themselves received an infringement or knew someone who had was approximately 44 percent. It is noted that approximately 64 percent of respondents thought that drivers exceeding the speed limit were a problem.

The level for public support for potential but not yet existing speed camera operations has also been assessed (Lynn et al, 1992). It was proposed that speed camera enforcement would be introduced on the Capital Beltway around Washington, D.C.. A study was commissioned to investigate all aspects of the proposed introduction of speed cameras

including public awareness of and attitudes towards the potential use of speed cameras in the area. This was assessed through 336 telephone interviews. It is emphasised that this study related to potential but not yet existing speed camera enforcement. Similar proportions of interviewees expressed strong attitudes in favour of and against speed camera enforcement in the area. Approximately 17 percent of respondents strongly approved of the use of speed cameras and around 15 percent strongly disapproved. This is roughly equivalent to the percentages found in the Freedman et al study.

In total approximately 35 percent disapproved or strongly disapproved compared to 60 percent who approved or strongly approved. This indicates that whilst the majority of those surveyed were in favour of the use of speed cameras on the Capital beltway, a significant minority were opposed.

2.3. CANADA

Speed cameras were first introduced on a trial basis in south-western British Columbia in 1988, in particular in the lower mainland, interior and southern Vancouver Island areas. Surveys were conducted in smaller communities to determine driver perceptions of the fairness of traffic law enforcement using these devices and the perceived effectiveness of them in reducing red light and speed infringements (Zuo and Cooper, 1991).

The questionnaire was designed to elicit responses relating to public perceptions or attitudes towards speed cameras. The analysis considered changes in acceptance of the speed camera program over the two-year period and the relationships between attitudes towards the program and aggression responses to common traffic conditions and prior convictions and accident involvements. The results indicate that there were no statistically significant differences between 1989 and 1990 in relation to public attitudes towards the speed camera program.

The author's fitted a logit model to the data to identify factors that influence public attitudes towards the speed camera program. The model estimated identified the respondent's age and gender as relevant factors in estimating attitudes. Those aged between 41 and 55 years responded significantly more positively towards the speed camera program than those in lower age groups with around 75 percent of respondents giving a positive response compared to approximately 62 percent in the 31-40 year old age group and 70 percent in the under 30 group. Further, the proportion of those in the over 56 year age group expressing a positive attitude towards the speed camera program was statistically significantly higher when compared to the other three age groups combined (approximately 85%).

In respect of gender, the results of the survey are consistent with those of the surveys discussed previously. That is, females reported significantly more positive attitudes towards the speed camera program than males. In addition, there was a significant correlation between attitudes towards the fairness of speed camera enforcement and the effectiveness of this mode of enforcement.

The relationship between aggression responses to the three common traffic nuisances and attitudes towards speed cameras were examined and positive correlations were identified. However, only the aggression response to the second nuisance, that involving a car ahead of you at a stop light not moving when the signal turns green, was significantly correlated with attitudes towards speed cameras. That is, as the aggressive response to the situation described intensified, the attitudes towards speed cameras became less positive.

The relationship between the number of previous convictions for 'moving violations' is also significantly related to the perceived fairness of speed cameras. The greater the number of previous convictions the less likely the respondent was to react positively to the speed camera program. Where two or more previous convictions have been recorded, the relationship is particularly evident. However, there was no significant relationship between previous involvements in accidents and attitudes towards speed cameras.

Finally, the authors examine whether public attitudes towards speed camera enforcement are specific to automated forms of enforcement or apply equally to traditional forms of enforcement. The authors conclude from results of previous surveys that that there is a "small apparent preference for conventional enforcement (that) was not found to be age or sex related" (Zuo and Cooper p.438). Further, the authors suggest that public acceptance of speed cameras may depend upon the manner in which these devices are deployed. It is suggested that if a move towards the targeting of less extreme speeders were to occur, public acceptance of automated enforcement may decline particularly if operations were to be seen as revenue raising opportunities rather safety initiatives.

In 1996 the Photo Radar Program was introduced in British Columbia and built on previous efforts in the province to address the speeding problem. The program constituted 30 speed cameras used throughout the province the use of which was extensively publicised. Whilst official responsibility for the photo radar program rested with the Ministry of Attorney General, the police, the Insurance Corporation of British Columbia (ICBC) and the Ministry of Transportation and Highways were also heavily involved in the promotion and implementation of the program. The program commenced operation in March 1996 and after a five month period of warning notices, the first infringement notices resulting from the program were sent to owners in August 1996. As a result of significant lobbying by interest groups, the photo radar program was withdrawn in 2001. However, two studies of the program were conducted prior to its cessation. Both studies investigated public attitudes towards the photo radar program. A survey of 600 BC residents was first conducted in 1995, with follow up surveys of 300 residents per month for the duration of the photo radar program. The evaluation conducted one year after implementation showed that support for speed limit enforcement remained high throughout the duration of the program with the lowest level of support (approx. 80%) in February 1997. Agreement with the statement the photo radar is a good way to prevent speed-related accidents fluctuated throughout the 18 month survey period with the highest levels of agreement around 78 percent and lowest level around 60 percent. Finally, agreement with the statement that catching more speeders reduces accidents fluctuated between 60 and 75 percent in the 18 month period from March 1996 to November, 1997.

Further evidence on public attitudes towards speed camera use is provided by a survey of a sample of 2,114 Canadians in late 2000 and early 2001. The survey was conducted nationally and found that up to 55 percent of Canadians believe that current levels of traffic enforcement by police are about right (Canada Safety Council, 2001). In respect of automated enforcement, Canadians expressed high levels of support for the use of speed cameras particularly in school zones. Strong support for the use of speed cameras in school zones was indicated by 65 percent with only 9 percent opposing their use in these areas. However, when asked about the use of speed cameras on highways, the proportion of those opposed increased to 32 percent and strong support dropped to 39 percent. Around 67 percent of those surveyed expressed support for the use of speed cameras on highways. The results of the survey were also able to indicate the relative support for speed camera use by province. In comparison to the average, residents of British Columbia where the speed camera program was in force at the time of the survey, were

less likely to strongly support the use of speed cameras in either school zones or on highways. The results of the survey in relation to relative support for speed camera use by age and gender is consistent with previous surveys in that women and older Canadians were more likely to strongly support the use of automated enforcement.

2.4. SUMMARY

It is clear from the evaluation of the published research material that consistent themes can be identified in respect of public attitudes. Rates of approval for speed camera enforcement have consistently been reported around 60 percent in the United States. Further, research from Canada suggested that these responses are dependant upon demographic variables such as age and gender. Rates of disapproval and strong disapproval represent a substantial minority of motorists with up to 35 percent of respondents in some surveys reporting that they disapprove of speed camera enforcement. It is noted that rates of disapproval of automated enforcement are higher amongst those who have received infringement notices compared to those who have not.

2.5. CONTROVERSIES

The published research material discussed above provides information on public attitudes towards speed cameras from a number of perspectives. It is clear, particularly from the research of Freedman et al that a number of issues are relevant to the public in forming their attitudes towards the use of automated speed cameras. It is these issues which have generated much of the controversy associated with the use of automated speed enforcement technology in the US and Canada. The National Motorists Association (NMA) and SENSE (Safety by Education Not Speed Enforcement) are two key lobby groups based in the US and Canada respectively that provide a voice to many of the concerns expressed about speed camera use. Each of these concerns can be expressed in terms of one of the four dilemmas identified by Goldenbeld (2002).

Perhaps the most frequently cited dilemma in relation to automated speed enforcement is the credibility dilemma. The credibility dilemma encompasses concerns about the purposes of the countermeasure and the interests in which it is pursued. Commonly, expressions of this dilemma assert that the central aim of a speed camera program is to raise revenue and not to improve road safety. Indeed, following the election of the BCLiberals party in 2001 on a platform of abolishing the photo radar program in British Columbia, the new government contended in parliament that “the government that introduced [photo radar] was more interested in revenue generation than it was interested in public safety.” Similarly, the NMA asserts in its statement of position that automated enforcement is used heavily on the routes where it is profitable and emphasises ticket volume not improvements in road safety. This expression of the credibility dilemma has been refuted on the basis of scientific evaluations of speed camera programs in various jurisdictions including the US that demonstrate the positive crash effects of speed camera programs (IIHS, 2001). Nevertheless, the issue remains one which features prominently in criticisms of speed camera programs.

The legitimacy dilemma refers to the fairness of the countermeasure. In particular, this dilemma includes concerns about the failure to identify the driver of the vehicle, the failure to promptly notify the offender, the lack of a witness to verify that the offence occurred and the absolute nature of the offence (i.e. there is no opportunity to explain the circumstances of the events giving rise to the offence). Many of these concerns appear to

derive from the lack of consistency in the rights afforded to offenders determined by traditional and automated enforcement. The concerns associated with the legitimacy dilemma do not apply to traditional forms of enforcement. For example, where a police officer sees a speeding vehicle and intercepts it to issue an infringement notice, the driver of the vehicle is immediately identified, informed of the offence and given the opportunity to explain his or her behaviour and prepare a defence in the event that he/she contests the infringement in court.

Addressing the concerns associated with the legitimacy dilemma is perhaps more difficult than for the credibility dilemma as it is the very nature of automated enforcement that creates the inconsistencies. Nevertheless, some of the issues raised may be addressed through the technology itself. For example, cameras able to photograph the image of the driver as well as the licence plate may be developed and used. Immediate notification of the offence may also be possible through the use of signs downstream from camera sites notifying drivers of the offence. This would give drivers notice of the offence and eliminate any negative impact on their ability to defend the infringement notice subsequently received. Such approaches have not been adopted in the other jurisdictions examined. However, it is suggested that the issues associated with the legitimacy dilemma are particularly prominent in the minds of those opposed to the use of automated enforcement in North America.

The final two dilemmas are the implementation and social dilemmas. The implementation dilemma describes the situation in which the acceptance of a measure is hampered because difficulties associated with implementation are not compensated for. The potential negative effects of the use of automated enforcement such as increased travel time must be compensated for in some form whether real or perceived. A further concern associated with the implementation dilemma is that it diverts police resources away from the enforcement of "more serious" criminal offences. The reliability of the technology used is also of particular importance in relation to this dilemma although it has not been raised as a significant issue in the US and Canadian literature.

The social dilemma relates to a mismatch between individual preference and collective interests. Often motorists contend that they are able to travel safely in excess of the posted speed limit and for that reason should not be subject to strict enforcement (NMA, 2003). This contention focuses on the ability of the individual driver and does not consider the overall impact on road safety of less strict enforcement of speed limits. That is, it favours individual preferences for speed against the proven effect of automated enforcement on total road safety.

The controversies highlighted in this section are not exclusive to the North American jurisdictions, however, the impact of them may be seen to be particularly severe, particularly in British Columbia where they contributed to the decision to abolish the photo radar program. Nevertheless, beyond the mention of general publicity campaigns associated with the implementation of speed camera programs there is little in the literature that details attempts made to deal explicitly with these controversies and minimise their impact in this jurisdiction.

3. AUSTRALIA

3.1. VICTORIA

3.1.1. History of use of mobile speed cameras

Speed cameras were first introduced in Victoria on a trial basis in 1985 and were aimed at detecting a large number of speeding vehicles per hour. The initial trial involved a small number of mobile cameras operating with warning signs at high crash frequency sites. The effect of this operation was minimal. No statistically significant reductions in crashes in the areas surrounding the camera sites were found. In addition, the effect on speed was limited to distances of approximately one to two kilometres from the camera sites (Portans, 1988).

Following the evaluation of the initial trial, a new program of speed camera enforcement was introduced in December 1989 that involved the use of covert speed cameras operated from unmarked cars and without warning signs. At this time, strong public statements asserting that widespread use of numerous cameras would occur were made.

In April 1990, a high-profile publicity campaign was launched that related to speeding and the speed camera enforcement program. However, it was not until the Traffic Camera Office was established in June of the same year that the increasing number of cameras were used extensively. It is noted that the establishment of the Traffic Camera Office corresponded with a rapid increase in the number of traffic infringement notices issued per month. The full complement of 54 new slant radar cameras came into operation in January 1991.

More recently, in November 1998, the operation of the speed camera program was outsourced to LMT Australia (now Tenix Solutions). At that time, the enforcement program involved the use of 54 speed cameras and aimed to achieve 4200 hours of enforcement per month.

During 2001/02, the following changes were made to the mobile camera operations:

- progressive increase in camera operating hours (from 4200 to 6000 target hours per month) between August 2001 and February 2002,

- staged introduction of “flashless” camera operations during daytime, use of a greater variety of unmarked cars, and use of new locations and times of day, all aimed at making the enforcement more covert and unpredictable to speeding drivers, and

- reduction in the speeding offence detection threshold from 10 km/h in excess of the speed limit in each speed zone, to an unspecified amount, in progressive stages from March to September 2002.

During the period from mid 1990 to December 1993 the total number of traffic infringement notices (TINs) issued per month varied from 14,000 to 64,000. During the second half of 1990, an average of 16,100 TINs were issued each month. This increased to a monthly average of more than 40,000 TINs for each of the years between 1991 and 1993. It is noted that the increase in the monthly average number of TINs issued corresponds to the introduction of the complete set of 54 speed cameras in January 1991. Since that time, the monthly average number of TINs issued remained between 40,000 and 50,000, until

mid-2002 when the number started to rise, reaching about 96,000 in January 2003 before falling again.

In describing community opinions of speed cameras, it is useful to outline some perceptions of the objectives (real or otherwise) of camera programs in practice. While there is a perception that the cameras aim to improve road safety (though the mechanism by which this may be achieved is not fully developed in people's minds), there is also a perception that an additional, or sole, objective is to raise revenue for the government by collection of traffic fines on a large scale in a cost-effective way. An extension of this is a perception that the revenue may be diverted to fund road safety programs (i.e., hypothecation) or, alternatively, retained in consolidated revenue (i.e., supplementary taxation).

There is also a perception that speed cameras, being a physical device operated at various locations (either fixed, or variable in the case of mobile cameras), should aim to address speeding problems identified at a location (and that locations, so identified, will continue to have the same problem until some intervention). There is relatively poor understanding and low level of perception that speed camera programs could aim to address speeding across broad locations or whole road systems (by, for example, giving the impression that cameras may be anywhere or more numerous than they really are).

Finally, there is a perception that speeds up to the speed limit are without risk of crashing (except in extreme adverse circumstances clearly demanding speed reduction) and that even speeds slightly in excess of speed limits are "safe". There is a perception that only "excessive speeds" (poorly defined) are unsafe. These perceptions are dominated by feelings about the role of speed as a causal factor in crashes, and there is relatively little consciousness (or even understanding) about the role of speed in producing kinetic energy and, through its dissipation in crashes, producing personal injury and death.

3.1.2. Community perceptions and controversies when speed cameras were first introduced in Victoria

Community attitudes to speeding

VicRoads (the Victorian roads authority) conducted a series of surveys on driver attitudes to speeding over the period 1987-1991 (AGB, 1991; Cavallo, 1991). These surveys focussed on intended speed behaviour, perception of the likelihood of being detected for speeding, attitudes towards speeding penalties, and perception of the dangers of speeding. Responses were obtained for three road environments: rural freeways, urban arterials, and residential streets.

"Speeding" was usually defined in people's minds as exceeding the limit by 1-10 km/h, and a majority of respondents considered excesses of 30km/h or more as "very dangerous". Not surprisingly, exceeding the speed limit by 30km/h or more was viewed as a more serious infringement on residential streets than on rural freeways. Other qualitative research, though, (Brian Sweeney & Associates, 1993) suggests that speeding is not automatically perceived by drivers as being irresponsible or dangerous in the same way that drink driving and careless driving are, with the implication that speeding can still be "safe" depending on the driver's level of skill, experience and the road conditions.

Results for all road environments indicated that the proportion of respondents intending to travel above the speed limit did not fall in the first 12 months following the introduction of speed cameras (May, 1990 - May 1991) but there was a noticeable downward trend apparent in December, 1991 (the last wave of the survey). In general, young drivers and urban dwellers indicated higher intended travel speeds than older drivers or rural dwellers. The findings of the Federal Office of Road Safety Australia-wide surveys (1992) support these trends. They found that intended adherence to legal speed limits was more widespread in the community in 1990 and 1991 than in preceding years. In both 1990 and 1991 the number of people who said they would drive at the legal limit "if there was no other traffic around" was higher than the number who said they would not (60% compliance cf less than 50% in previous years). Furthermore, the likelihood of compliance with legal speed limits was higher for females and rural dwellers and increased with age.

Perception of the likelihood of being detected for speeding on *residential streets* remained consistently low across all waves of the VicRoads survey; risk perceptions for *urban arterials* and freeways were twice as high, with *urban arterials* showing signs of an upward trend in the December 1991 wave (not surprising given that speed cameras are more prevalent on urban arterials).

Furthermore there was consistent strong agreement (68%) that a fine was the correct penalty for exceeding the speed limit by more than 20km/h on any road environment. Notably though, knowledge of the fine amount and the existence of licence demerit points penalties for speeding was very low. A key recommendation for future advertising communications about speeding which arose out of qualitative research (Brian Sweeney & Associates, 1993) was greater concentration on the financial penalty and possible loss of licence as major speeding deterrents.

Perceptions of speed cameras

The last two waves of the VicRoads survey of drivers' attitudes towards speeding conducted in May and December 1991 included additional questions on the use of speed cameras (AGB, 1991). Results are presented for the December 1991 wave with comparisons with the earlier results where possible.

Overall support for the use of speed cameras was high (79% of respondents cf. 80% in May, 1991), but was slightly higher amongst females and drivers over the age of 45 years. Fifty percent of supporters mentioned their direct benefit in deterring speeding and slowing down traffic, and a further 31% mentioned their indirect benefit of making roads safer and reducing the road toll. The primary reasons offered by the relatively small number of speed camera opponents were that they are merely government revenue raisers (35%) and are placed in inappropriate places (16%).

Perceptions of the general effect of the speed camera program in Victoria were mainly that it has reduced traffic speeds (57% of respondents); only 27% of respondents spontaneously mentioned revenue raising for the government as the primary effect of the program. Responses also indicated a perception that speed cameras have had a 'moderate' effect of speed reduction and a 'less moderate' impact on reducing road accidents.

Thirty-nine percent of respondents (cf. 29% in May) claimed that the speed camera presence has had no effect on their own driving, however 49% of respondents claimed that speed cameras had either reduced their speed or increased their adherence to the speed limit. Interestingly, country residents, those aged over 45, and those who had not been

caught speeding in the last 12 months were more likely to claim that speed cameras have had **no effect** on their driving habits.

While 32% of the sample thought that the use of speed cameras was acceptable in all road situations, roughly 20% of the sample in each case felt that speed cameras would be unacceptable at the bottom of downhill slopes, or on open roads/freeways.

The majority of respondents favoured 6-10km/h over the limit as the minimum threshold for booking by speed cameras (in both 60km/h and 100km/h speed zones).

Knowledge of the use of speed camera revenue was not high, with 37% of respondents being totally unaware of its use and a further 32% believing that it is used in government areas unrelated to road safety.

Qualitative group discussions amongst a group of drivers who had received speeding fines in the last 2 years (Brian Sweeney & Associates, 1993) revealed a high level of acceptance of speed cameras as a "necessary evil" and a belief that they have been instrumental in reducing Victoria's road toll. However, drivers also expressed strong criticism of the police use of speed cameras as "revenue raisers" rather than "safety enforcers". This ill-feeling stemmed from the belief that speed cameras are usually placed in relatively safe areas where the maximum number of people can be caught (e.g., 60km/h speed zones on straight sections of urban arterials) rather than in potentially dangerous areas (e.g., near schools, at uncontrolled intersections, or in narrow residential streets). Additionally, the results suggested that the direct link between speeding and causing harm (i.e., *the faster you drive, the harder you hit, the more damage you do*) is not firmly established in drivers' minds, and that the prime motivation for not speeding is "fear of being caught".

Summary of community attitudes when speed cameras first introduced.

- Speeding was one of the most prominent road safety issues in the minds of the general public and was perceived as a major contributing factor to the road toll.

- Speeding is most often defined in people's minds as exceeding the speed limit by 1-10 km/h whereas excesses of 30km/h or more are viewed as "dangerous driving". Six to ten km/h over the limit is considered the minimal threshold for booking by speed cameras.

- Intended driving speeds did not drop immediately in response to the introduction of speed cameras, although there was a downward trend evident after 18 months of operation.

- Adherence to posted speed limits tends to be lower for males, younger drivers, urban dwellers and in 100 km/h speed zones.

- The link between speeding and causing harm is more tenuous in people's minds than that between drink driving and causing harm, and is perceived to be mediated by other factors such as driving skill, experience and road conditions.

- The vast majority of drivers support the use of speed cameras and believe they act as a direct deterrent. However, there is also a moderate perception of speed cameras as revenue raisers**,** and strong opposition to their placement in "safe" and inappropriate areas such as the bottom of downhill slopes or on open roads/freeways.

- Knowledge of various speeding penalties (financial and licence demerit points) and the use of speed camera revenue is low.

Controversies in the early years of speed cameras

The speed camera program in Victoria was associated with relatively few controversial issues during its initial years compared with those that had arisen a decade later. Controversies appeared to lie in only two of the four areas of dilemma identified by Goldenbeld (2002). Issues which could be considered legitimacy dilemmas (e.g., not taking into account individual circumstances related to the offence) or implementation dilemmas (i.e., the program had not been accepted by Victorians because of difficulties with its implementation) had not yet arisen.

Most of the controversies related to credibility dilemmas (i.e. confusion about the real purpose of the speed camera program). There was a belief by a minority that the primary motive and effect of speed cameras was to raise revenue for the Victorian government rather than to achieve road safety goals. This belief was supported by a feeling that cameras are placed in inappropriate places, in a sense that some camera locations did not seem unsafe and worthy of enforcement attention to prevent (speed-related) crashes at those places. It was considered unacceptable to use cameras at the bottom of downhill slopes (detection of high "spot" speeds at these locations may have been considered unrepresentative of drivers' normal behaviour) and on open roads and freeways (where a causal role of speeding in crash occurrence was doubted by many).

There were also issues reflecting social dilemmas (the clash between individual preferences and collective social interests). The link between speeding and causing injury or death (through either speed's causal role or its injury potentiation role) was not accepted by some, and these drivers resented the constraint on their mobility brought about by cameras. Even for those who accepted that speeding can cause harm, and that cameras were necessary to minimise this, there was strong opposition to the fine payments contributing to government revenue (i.e., supplementary taxation).

Risk management

The absence of controversies relating to implementation dilemmas or legitimacy dilemmas in the early years of the Victorian speed camera program may be related to the attention given by the Victoria Police and the justice department to risk management while the program was being established. Smith (2000), who had a key role in the justice department at the time, outlines the key issues which were addressed in implementing a program to detect and process a high volume of traffic offences (much higher than previously handled in Victoria). The risk management strategies included:

- independent technical testing and quality assurance (less than ten appeals against the initial five million speeding tickets issued for offences detected by the mobile speed cameras were successful)
- operational procedures that genuinely identified road safety as the primary objective
- winning public support for the program even though the level of fines was substantial
- subjecting the program to independent evaluation research to establish its road safety benefits, or modifications to the program if necessary.

Further details of the risk management principles necessary for successful establishment of a speed camera program are given by Smith, Cameron and Bodinnar (2002).

3.1.3. Community perceptions and controversies a decade later

In recent years in Victoria, a number of organisations have again surveyed community opinion regarding speed enforcement activities. Organisations such as MUARC, Australian Transport Safety Bureau (ATSB), Transport Accident Commission (TAC), Department of Justice, and Royal Automobile Club of Victoria (RACV) have all undertaken surveys of varying sample size (in Victoria) with varying questions. In October 1999 and again in October 2002, MUARC conducted surveys of a random sample of 1000 licensed drivers in metropolitan Melbourne. ATSB conducted Wave 13 of the Community Attitudes Survey in March 2000, with a sample of 250 Victorians. Surveys for TAC were conducted by Sweeney Market Research between October 2000 and July 2002. Sample size was approximately 600 at most time points, targeting licensed drivers in Victoria. In May 2002, Millward Brown conducted a survey of 2500 Victorians on behalf of the Department of Justice. RACV conducted a survey of 500 RACV members in May/June 2002. In May 2002, ATSB conducted a special survey of speeding and enforcement, modelled on their Community Attitude Surveys, with a larger sample of 500 Victorians. This section will review the findings and trends indicated by these surveys.

In this review, recent trends in community opinion will be considered, with particular focus on periods of changed enforcement operations. Specific changes in enforcement occurred in August 2001, when the hours of speed camera use began to increase and "flashless" camera operations became more widespread, and in March 2002 when it was announced that the speed offence threshold was reduced from 10 km/h above the limit to an undefined level (with the implication of at most 3 km/h tolerance).

Revenue Raising Perceptions

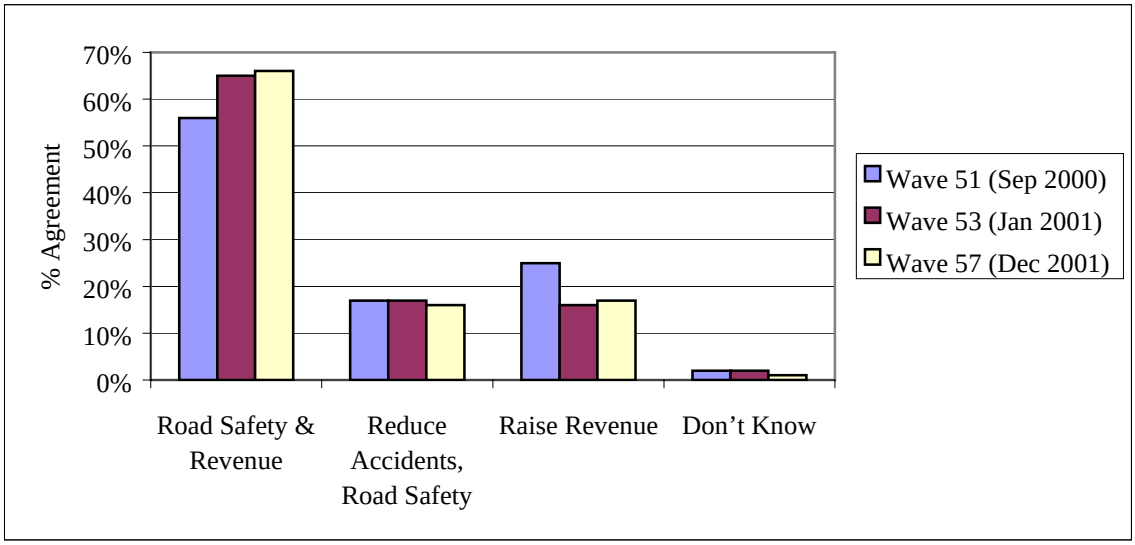
Surveys of community opinion have investigated public perceptions of speed enforcement. Specifically, questions have been asked about perception of enforcement as a revenue raising exercise as opposed to a road safety exercise. A survey conducted by MUARC in 1999 found that 87% of respondents agreed with the statement "Enforcing the speed limit with speed cameras helps lower the road toll". This finding differs from that of Mitchell-Taverner (2000). In Wave 13 of the Community Attitudes Survey (CAS), 53% of respondents agreed with the statement "Fines for speeding are mainly intended to raise revenue". Males were more likely to agree than females, as were beer drinkers, those who had been booked for speeding in the last 2 years, and drink-drivers.

Sweeney also investigated the perception of speed camera use. Participants were asked to speculate on the motivation underlying the widespread use of speed cameras in September 2000, January 2001, and December 2001 (see Figure 1). Over time, an increasing proportion of respondents believed that speed camera use was "to both improve road safety and raise revenue", increasing from 56% in September 2000 up to 66% in December 2001. However, the percentage that believed speed camera use was "to reduce accidents and improve road safety" declined very slightly from 17% to 16%. There has also been an overall decline in the number who believed speed cameras operate "to raise revenue". In September 2000, 25% supported this position before dropping to 16% (in January 2001), then climbing slightly in December 2001 to 17%. This belief was more common among young males (aged 21-29). Rural drivers were less likely to support the revenue raising

option. Those sceptical of speed camera operations cited speed camera location, or the amounts being collected in fines, as rationale for their position.

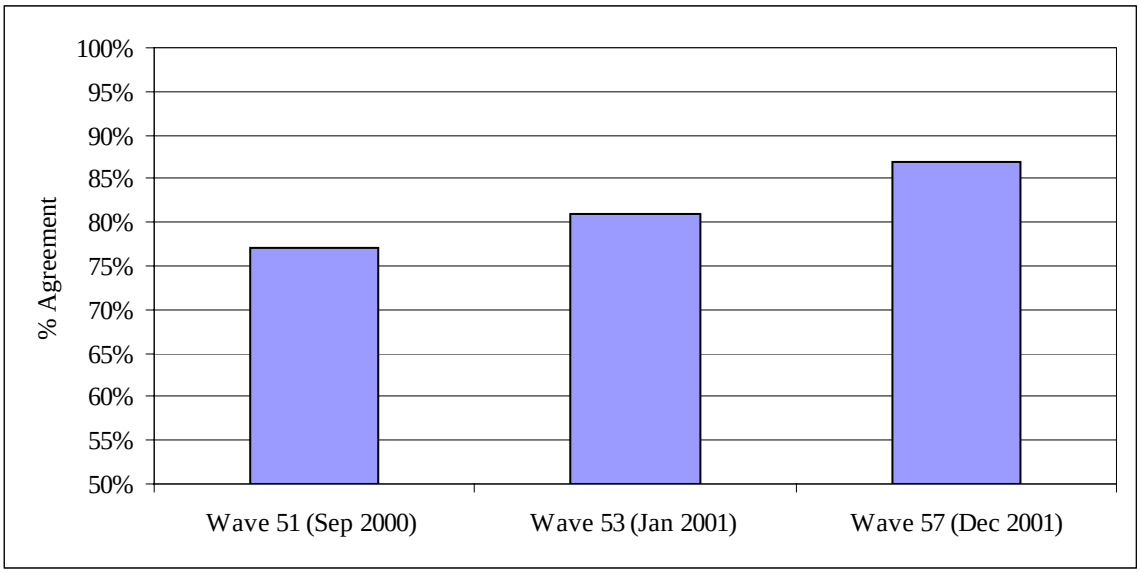
While findings from MUARC and Mitchell-Taverner may initially appear mutually exclusive, there are further issues for consideration. In both cases, respondents were given one statement and asked to express agreement or disagreement. In the survey by Sweeney, where respondents were given a range of options, it is evident that recent community opinion was evenly balanced between the perceptions of altruistic and self-serving motivations regarding the use of speed cameras. During the time frames of enforcement change, there has been little change in community opinion as outlined thus far.

Figure 1: Community perceptions - the use of speed cameras (Sweeney)



Sweeney further investigated the extent of speed camera use, asking drivers if they would support greater speed camera use if the extra revenue raised was put into road safety programs. Support increased from 77% of drivers in September 2000 to 87% support in December 2001 (see Figure 2). Metropolitan drivers showed a greater increase in support than rural drivers. Females were also more likely to be supportive than males. Opposing reasons predominantly revolved around scepticism that fines would be used for the stated purpose, that there were already enough cameras, or that such action would not improve road safety.

Figure 2: Support for greater speed camera use (Sweeney)



The RACV survey of members (RACV, 2002) also showed strong support (89%) for the return of speeding fine revenues into road safety programs, compared to support for general revenue (4%) or no preference (7%). Thus, community opinion is showing increasing support for speed camera use if revenue is directed into road safety programs. The increase in support has occurred through times of increased enforcement, suggesting that a large proportion of the public believe there is currently a link between speed camera revenue and road safety. This result is also consistent with the previous finding (Sweeney) that speed cameras operate to "improve road safety and raise revenue".

In 2002, Millward Brown investigated support for enforcement in different locations for both breaking the speed limit and running red lights. Respondents were supportive of enforcement on freeways and highways (71%), residential streets (80%) and red lights (89%). Respondents were also invited to provide "things you'd like to say to the enforcement authorities" regarding "On-the-Spot" Fines. The most common suggestion (8% of respondents) was to have circumstances taken into consideration. Five percent of respondents suggested that fixed cameras were just used for raising revenue, and 3% of drivers disagreed with the location of cameras - for example, rather than at the bottom of the hill, they should be put "where it is dangerous".

In summary, public opinion on whether speed cameras operate to raise revenue is divided. Depending on the phrasing of the questions, the public expressed support for a range of suggestions that are not incompatible. The results suggest support for both the concept that cameras are used to raise revenue, and that cameras are used to improve road safety. In isolation, these issues can appear to gain much stronger support. For example, Mitchell-Taverner (2000) reported that 53% of respondents agree speeding fines are for raising revenue, as opposed to Sweeney's report that only 17% of respondents support the "raising revenue" option. It seems evident that the belief in raising revenue needs to be considered in light of the fairly predominant suggestion that speed cameras both raise revenue and contribute to road safety. Furthermore, while there is support for the notion that revenue can be directed towards road safety, there is still scepticism within the community in regard to the likelihood of this happening.

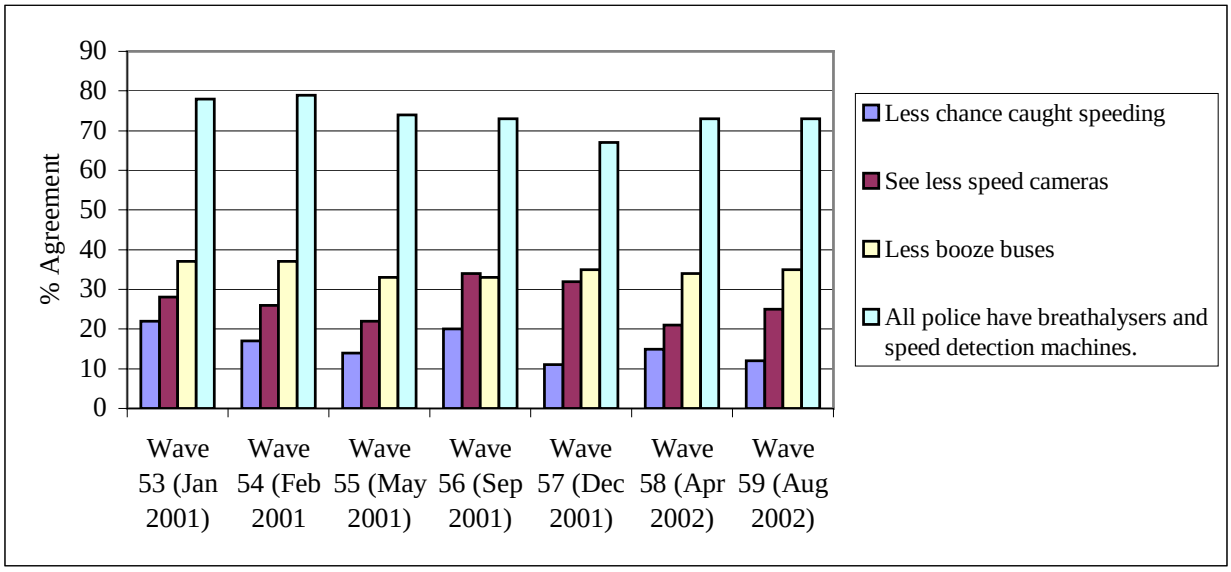
Speed enforcement perceptions over time

In 1999, MUARC found that 49% of respondents had not observed as many speed cameras as they used to, reflecting divided opinion on speed camera activity levels. Correspondingly Mitchell-Taverner (2000) reported that 55% of respondents believed that the amount of speed enforcement had increased in the last 2 years, compared to 27% who believed it had stayed the same, and 9% who said it had decreased. Drivers over 60 years showed the least awareness of any change in speed enforcement.

In a recent RACV survey (RACV, 2002), members were asked about their awareness of recent new speed management measures. Awareness of the increased level of speed camera use was relatively low, with only 22% spontaneously recalling this and a further 30% on prompting.

Sweeney investigated perceived police activity (see Figure 3). From January 2001 to August 2002, the number of respondents perceiving less chance of being caught speeding fluctuated, and actually rose (September 2001) just after the initial increase in speed camera hours, before dropping again at the end of 2001. Similarly, the percentage of respondents seeing less speed cameras followed a similar pattern, peaking in September and December 2001 before dropping in 2002. The proportion of drivers agreeing that all police are now equipped with breathalysers and speed detection machines dropped slightly over time, but maintained a high level (73%) of support.

Figure 3: Speed enforcement activity (Sweeney)



These results suggest that there is a lag in public awareness, with changes in community opinion appearing some months after changes in enforcement. Furthermore, the change in speed camera enforcement has been a steady increase over time commencing in August 2001, which would not necessarily be reflected in community opinion in a linear fashion, partially due to the influence of other variables that are not under consideration here.

Perceptions of speed enforcement operations

In 1999, MUARC investigated public perception of speed camera visibility. More than half the respondents agreed with the statement that speed cameras were easy to see (59%), yet conversely, 56% of respondents agreed that they rarely saw speed cameras.

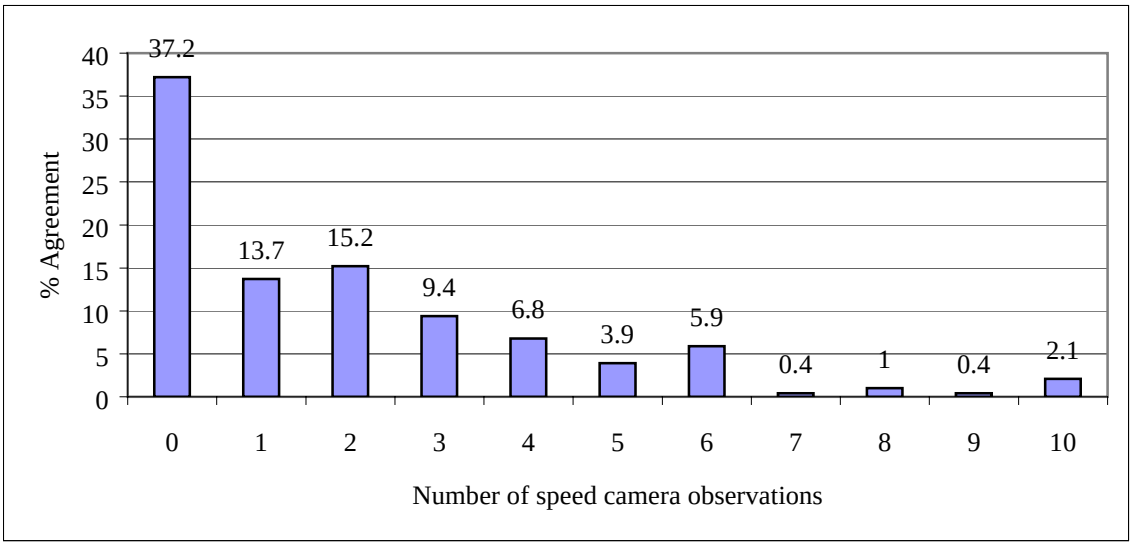
Furthermore, most respondents agreed that speed cameras were usually well hidden (71%). Only 8% of respondents had never seen a speed camera. Most respondents agreed that speed cameras were often used from different types of cars. Few respondents (16%) agreed that speed cameras would slow drivers down more effectively if they were in full view, while 84% of respondents agreed that speed cameras would catch more people if they were completely hidden. These responses highlight the community awareness regarding the strategic issue of visibility.

Just under half the sample agreed (45%) that it was easy to avoid being caught by a speed camera. Furthermore, approximately one third of respondents thought there wasn't much chance of being caught. However, most respondents (84%) disagreed with the statement "even if a speed camera catches you, you can still avoid being fined". Most respondents (76%) had not been caught speeding by a speed camera within the last 2 years. The majority of the remainder had been caught once (17%), or twice (5%).

Millward Brown (2002) asked drivers who had been fined how they had previously rated their chances of getting caught for speeding at less than 10 km/h, and at more than 10 km/h over the speed limit. In both categories, over a third of drivers had previously perceived their risk of being caught as very low. Over half the drivers agreed that the penalties for speeding (in either speed bracket) were fair. Slightly more drivers (37%) disagreed with penalties for speeding up to 10 km/h over the limit, compared to penalties speeding more than 10 km/h over the limit (31%).

In 1999, MUARC investigated public perception of speed camera predictability. Nearly two-thirds of respondents believed that speed cameras always operate at the same locations (59%) and only 40% agreed that enforcement only happens during the day. Most respondents (72%) agreed that "It's hard to predict where there are speed cameras", but also knew of some speed camera locations (84%). Respondents reported how many times they had seen a speed camera in the last 4 weeks, with 37% not observing any speed cameras. Observations (maximum of 10) in a 4-week period are presented in **Figure 4**. There were also reported observations as high as 28 speed cameras seen in 4 weeks. The majority (61%) of respondents stated they would not let other drivers know when they saw a speed camera.

Figure 4: Frequency of speed camera observations in a 4-week period (MUARC)



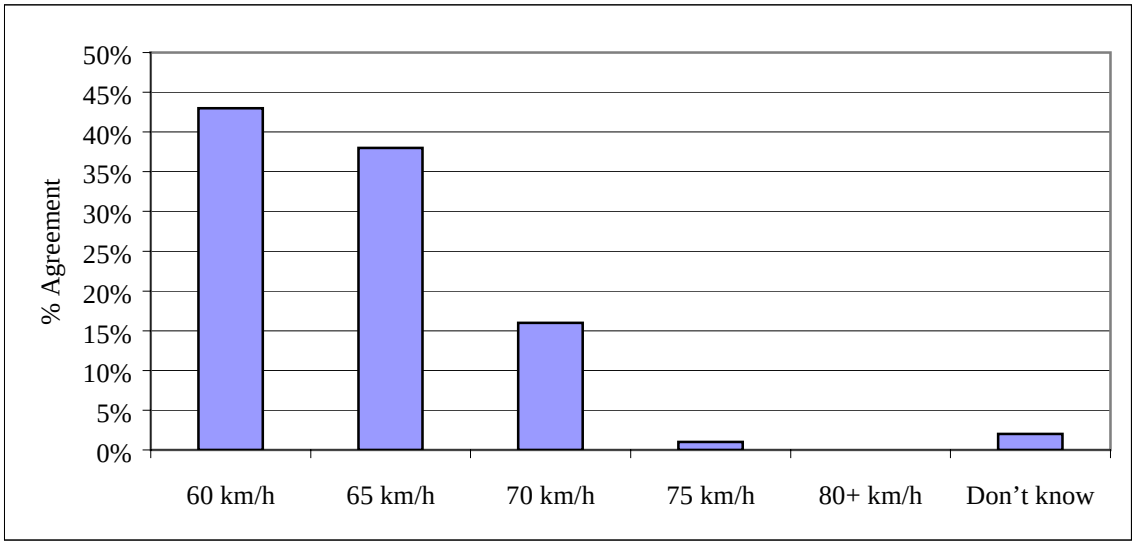
Similarly, CAS13 (Mitchell-Taverner, 2000) investigated how easy it was for respondents to pick the locations where speed cameras or radars were likely to be operating. The majority (58%) thought it was easy to pick the spots. Most respondents also received warnings (by word of mouth, radio or other drivers etc) quite often (38%), sometimes (20%), or occasionally (30%). Only a small proportion (10%) of respondents had never received any warning.

In summary, the issue of speed camera visibility is rife with contradiction, with drivers supporting both hidden and visible cameras, and reporting that cameras are easy to see yet they have not seen many. This suggests an underlying assumption of low-level speed camera use, and also highlights the need for further investigation of these issues since changes in speed enforcement.

Tolerance of speeding and speed limits

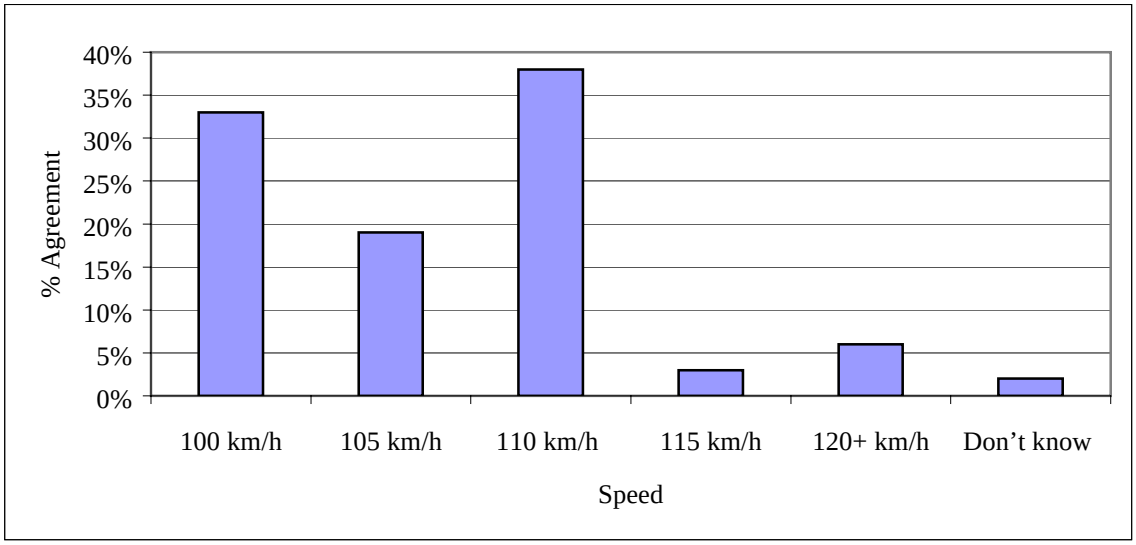
CAS 13 (Mitchell-Taverner, 2000) reported that 30% of respondents believed it was acceptable to exceed the speed limit if driving safely. Males were more likely to agree than females. Most drivers (49%) occasionally drove at 10 km/h or more over the speed limit, with 5% always or nearly always driving at 10 km/h over the limit. Males continued to be more likely than females to speed. Age was also a consistent predictor of how frequently drivers exceeded the speed limit. Tolerance of speed in a 60 km/h speed zone was also investigated (see Figure 5). Nearly half the respondents supported zero tolerance (43%), and most of the remainder (38%) supported a tolerance of 65 km/h. Once again, males were more tolerant of higher speeds than females. The over 60 age group were also much less tolerant of speeds over 60 km/h than the younger age groups.

Figure 5: Suggested tolerance of speed in a 60 km/h speed zone



Similarly, tolerance of speed in a 100 km/h speed zone was investigated (see Figure 6). Interestingly, support peaked at 38% for travelling 110 km/h, followed closely by support for zero tolerance from 33% of drivers. Significantly more females (40%) than males (25%) agreed with zero tolerance. Similarly, tolerance was increasingly strict with older drivers.

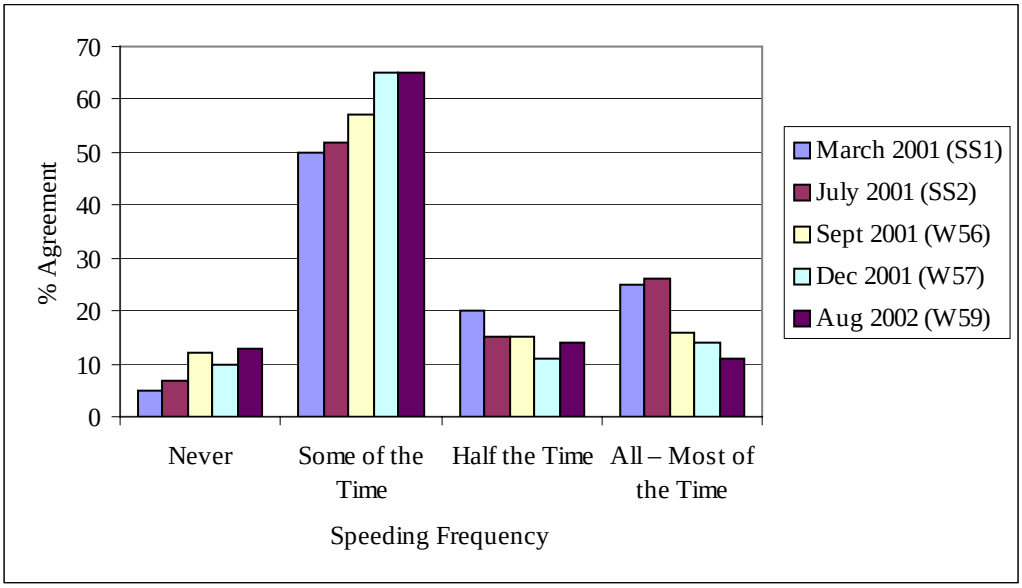
Figure 6: Suggested tolerance of speed in a 100 km/h speed zone



CAS 13 also investigated attitude to speed related issues. Over the last 4 years, an increasing number of respondents agreed that an increase of 10 km/h in driving speed significantly increased the likelihood of an accident. Similarly, most respondents thought an accident at 70 km/h would be much more severe than at 60 km/h (92%). Furthermore, nearly all respondents thought that speed limits were generally set at reasonable levels (90%). Thus, community opinion again seems divided between what could thought of as socially correct, as opposed to actual individual driving behaviour.

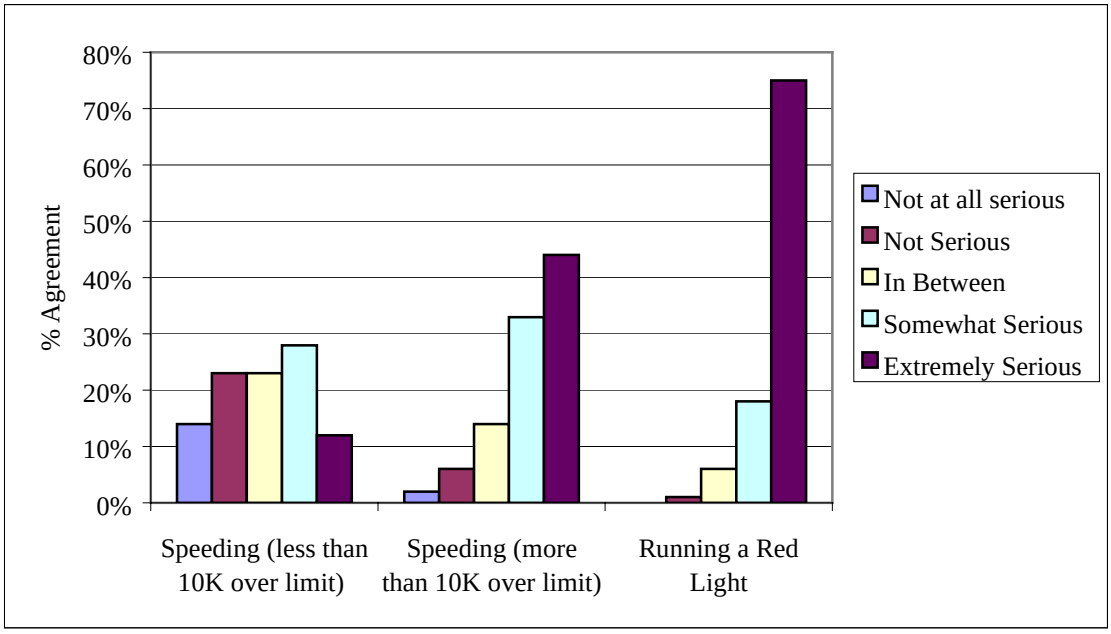
Sweeney also investigated self-reported frequency of speeding (see Figure 7). Approximately 90% of the drivers reported exceeding the speed limit at least some of the time. The proportion of drivers who reported speeding either half or most of the time has declined, with a corresponding increase in those speeding some of the time. In particular, the greatest reduction in drivers speeding all/most of the time occurred during the initial period of increased speed camera hours (between July and September 2001) and the reduction continued as the hours increased in late 2001 and early 2002. However, there was very little change (between December 2001 and August 2002) to reflect the March 2002 announcement of reduced speeding tolerance.

Figure 7: Frequency of speeding



Millward Brown asked drivers to rate perceived severity of a range of offences, including speeding (less than 10 km/h) over the limit, speeding (more than 10 km/h) over the limit, and running a red light (see Figure 8). Forty percent of respondents perceived a violation less 10 km/h over the limit as serious, compared to 77% of respondents for a violation over 10 km/h. Running a red light was considered a serious offence by 93% of respondents.

Figure 8: Perceived severity of offences



RACV members (RACV, 2002) also indicated strong support (69%) for police concentration on enforcement against excessive speeding (20 km/h or more over the limit). In comparison, the option of widespread enforcement "including drivers travelling a few km over the speed limit" gained little support (4%). The notion of police concentrating on "both" (options above) gained more support (26%).

In summary, age and gender continue to be consistent predictors of speeding tolerance. Tolerance in different speed zones varied greatly, with support in a 60 km/h zone decreasing with every 5 km/h above the posted speed, whereas the support in a 100 km/h zone was highest for a tolerance of 10 km/h above the posted speed. Conversely, public opinion also supported statements about increased risk at speeds increased by 10km/h. This contradiction appears to represent the conflict between social correctness and actual driving behaviour. The community in general also displayed greater support for enforcement against excessive speeding rather than speeding only a few kilometres above the limit. Self-reported speeding behaviour appeared to have reduced through the same time period as the increased speed camera hours. Reduced tolerance of speeding appeared to have little impact up to August 2002.

Perceptions of enforcement tolerances

Following the announcement of reduced speed enforcement tolerances in Victoria in March 2002 (including a suggestion that at most 3 km/h in excess of limits would be tolerated), ATSB conducted a survey of speed enforcement perceptions in the Australian mainland states, including a sample of 500 Victorians, during May 2002 (Mitchell-Taverner et al 2003).

For 60 km/h zones, 36% of Victorians nominated 63 km/h as the maximum permitted speed and 67% stated allowable speeds in the range 60 to 64 km/h. These figures were higher than percentages in every other state. In addition, Victorians were relatively less likely to be unable to nominate a maximum permitted speed, suggesting a higher level of perception of speed enforcement tolerance policies in that state.

Regarding 100 km/h zones, 21% of Victorians nominated 103 km/h and 26% nominated 104 to 106 km/h. Only 16% stated the speed limit as the maximum allowed, and 27% thought 110 km/h was generally permitted. In other Australian states, 39% considered 110 km/h to be the maximum allowed and 24% thought that it was in the range 104-106 km/h. Again, Victorians were relatively less likely to be unable to nominate an allowed speed.

The MUARC survey in October 2002 asked respondents how they felt about the lowering of the speed enforcement tolerance. Approximately equal numbers (24%) approved strongly or disapproved strongly, with slightly more approving somewhat (25%) than disapproving somewhat (18%). Thus Victorian drivers appeared ambivalent about the reduced tolerances, possibly because of the public controversy which accompanied this change. The same survey found that the most common speed nominated as that which people should be allowed to drive was 65 km/h in 60 km/h zones (31% of respondents) and 110 km/h in 100 km/h zones (32%). These preferred speed results were similar to those found by Mitchell-Taverner et al (2003) in May 2002.

Summary of community opinion

In conclusion, recent community opinion supports the use of speed cameras to both raise revenue and improve road safety. There appears to be opportunity for further promotion regarding revenue use for road safety purposes. Awareness of speed enforcement did not appear to directly reflect changes in enforcement, yet some changes in awareness were evident later, suggesting a delayed impact. Support for enforcement was much stronger for that focused on excessive speeding. However, there was a reduction in self-reported speeding behaviour concurrently with increased speed camera hours. Public perception of speeding tolerance indicated stated views regarding safety that were not consistent with self reported speeding behaviour. Victorians appeared to be well aware of speed enforcement tolerances and perceived them to be relatively low compared with drivers in other states. They were ambivalent in their support for these low tolerances and believed that they should be allowed to drive at somewhat higher speeds.

Controversies which have arisen

In recent years, controversies have had a high public profile in all four of the areas of dilemma identified by Goldenbeld (2002), as outlined below in order of those controversies which were most common.

<u>Credibility dilemmas (perceptions of the purposes of speed cameras)</u>

Because of the escalation in the total amount of speed camera fines (due to increased camera hours, more covert operations, and reduced enforcement tolerances) and projections of further increases, this has been viewed as excessive and beyond a level considered justifiable as a necessary by-product of an effective program that deters speeders principally through their detection and punishment. Thus the recent changes to the program have reinvigorated the perhaps latent view that the program was established principally to raise revenue for the government.

Compared with earlier years, some Victorians appear to have rationalised this dilemma by agreeing that the speed camera program has dual motives (road safety and revenue raising). Associated with this dilemma is the idea that, if the above is the case, the additional revenue from camera fines should be hypothecated to road safety programs rather than diverted to the government's consolidated revenue. Credibility of the possible dual motives of the program is still doubted in some people's minds while this is not the case.

The balance of public opinion among those who see only one objective for the program seems to relate to their recent personal experience with the enforcement, and public statements (usually negative) about the personal effects of the program. The credibility of the idea that (at least one) objective is road safety needs to recognise this balance of opinion, and be supported by evidence of the road trauma benefits in the public domain at key times. Without this balancing, it is likely that people will generally rationalise the dilemma by agreeing that the true motive is to raise revenue for the government.

Credibility has also been tested in recent years by a resurfacing of suggestions that speed camera locations are not always appropriate, if road safety is the principal objective. Some commentators have highlighted locations where it is "safe" to speed, and hence the use of cameras at these locations questions the safety objective. Related to this question is the idea that, if a location is demonstrably unsafe due to speeding, the speed cameras should be operated in an overt, visible way in order to immediately deter speeders at the location.

In this case the dilemma derives from confusion about how speed cameras can be expected to improve road safety if they are not located where speeding is most rife and do not operate in a way to present an immediate threat to speeders, as well as actually detecting and later punishing speeders. The confusion comes about because traffic law enforcement is thought to achieve its effects in the same way as traditional criminal law enforcement, i.e. through the detection and punishment of offenders to encourage them not to re-offend. While speed cameras certainly use that mechanism of deterrence, it is not understood that they can achieve effects on speeding across broad locations by operating covertly, so that their locations are unrecognisable and unpredictable.

Social dilemmas (individual preferences clash with collective social interests)

Somewhat related to a credibility dilemma is the social dilemma that derives from a general belief that speeding slightly in excess of the limit (up to at least 5 km/h, perhaps as much as 10 km/h) is not associated with increased crash risk if the driver is otherwise driving safely. This is because many individuals have a preference to complete their journey as quickly as is reasonable, and view restrictions below 5-10 km/h above the limit as being unnecessary. There is general acceptance that the injury severity outcome of crashes increases with increasing speed, but this is viewed as irrelevant in the case of speeding slightly in excess of the limit.

This dilemma manifests itself in the form of many survey respondents reporting actual speeding behaviour substantially above speeds which they thought to be socially correct. Also, there was ambivalent support for the reduction in the speed enforcement threshold below 10 km/h, and a preference to be able to drive up to that speed, especially on the rural highways. While Victorians seemed well aware of the reduction in enforcement tolerance which took place in 2002, they generally are in a dilemma about the need for such a constraint of their driving speeds.

Legitimacy dilemmas (fairness of the countermeasure)

A new area of public concern which has arisen in recent years relates to the feeling that the speed camera program cannot take into account any extenuating circumstances (as perceived by the driver) associated with the offence. There is a view that drivers detected speeding should have at least an opportunity to explain their circumstances, as could be available to them if they were apprehended by a police officer following detection of the offence. There was no evidence of this dilemma during the early years of automatic surveillance in Victoria (speed and red-light cameras), unlike the situation in North America where it is often cited as unfair that an opportunity to "explain" is not available when offences are detected by cameras.

Another area of concern about legitimacy relates to a perception that penalties for exceeding a speed limit by less than 10 km/h are less fair than the penalties for exceeding the limit by more than 10 km/h. This attitude needs to be considered against the background of staged penalties for speeding offences in Victoria, where since December 2002 the penalties for speeding by at most 10 km/h are $125 fine and one demerit point, and $200 and three demerit points for higher levels of speeding (up to 24 km/h in excess, above which higher fines, demerit point levels, and even licence suspensions apply). Perhaps the concern about the fairness of the (relatively low) penalties for exceeding limits by no more than 10 km/h derives from a feeling that speeds up to this level are generally "safe" (as outlined above), and that enforcement and punishment of speeding in that range is unnecessary and unreasonable.

Implementation dilemmas (acceptance of the countermeasure is hampered)

During 2002, associated with public announcements about the reduced speed enforcement thresholds, public concern turned to the question of whether speedometers in cars were calibrated and/or could be read to the required level of accuracy. There was a perception that the enforcement tolerance was as low as 3 km/h and some commentators suggested that drivers may inadvertently speed above that level while intending to stay within the limit due to speedometer error or insufficient resolution on the dial.

This concern raised a dilemma in the minds of those supporting speed cameras for safety reasons that the technology (speedometers and cameras, as operated from 2002) had a problem which had not been compensated for under the new arrangements. The perceived enforcement tolerance of 3 km/h was taken literally by many drivers (see above), whereas in practice it was not set that low. The mis-perception was not helped by the police practice of alleging an illegal speed on the traffic infringement notice which was (coincidentally) 3 km/h less than the actual detected speed, to allow for the legislated maximum error of 3 km/h in the mobile speed cameras when certified on regular occasions. Thus many drivers received speeding tickets indicating a speed close to the perceived tolerated speed, so reinforcing the mis-perception.

During 2003, another implementation issue arose which might also qualify as a legitimacy dilemma. Three of the relatively new, fixed speed cameras monitoring Melbourne's urban freeways and tunnels were found to have recorded high speeds which subsequently appeared to have been impossible for the vehicles to achieve in the circumstances. The camera systems were not the traditional Gatso slant radar, wet-film camera systems which had been used in Victoria since at least 1989. The new fixed cameras were a combination of either piezo-electric or radar speed detectors, and analog video or digital image capturing devices. When the full extent of the problem became apparent, the processing of

the offences detected by all fixed speed cameras was suspended while the source of the apparent errors was investigated. Police media comment aimed to distance the Gatso mobile camera systems from the problem and suggested that they would continue to be used to detect and prosecute speeding offences.

The legitimacy dilemma this raised for many people was a feeling that this apparently fool-proof automatic surveillance system could make occasional errors, yet there was little or no opportunity to explain to a police officer why a driver had doubt about its correctness. However, the major concern could be considered to be an implementation dilemma, i.e. the acceptance of the new fixed cameras was hampered by a difficulty which apparently had not been anticipated or compensated for. This may have eroded the credibility of the fixed speed cameras (perhaps also the mobile cameras) at an operational level, but not necessarily at a strategic level because it was perhaps obvious that the extent of the technological error was so large that it would eventually be found and corrected.

The implementation dilemma associated with this relatively extreme inaccuracy of a few fixed speed cameras has been a very unusual event in the history of Victoria's speed camera system. It is perhaps testimony to the diligence which the responsible authorities gave to risk management in the early years of the program, which stood it in good stead for over a decade while the technology used was essentially unchanged. During the trials and initial implementation of the new camera technologies introduced in recent years, perhaps the difficulties which eventually arose should have been anticipated to a greater degree and risk management processes instituted to avoid implementation dilemmas about this socially very sensitive, but highly effective road safety program.

3.2. NEW SOUTH WALES

The fixed digital speed camera program was first introduced in NSW in 1999. Prior to that however, mobile speed cameras had been in operation since 1991. The aim of the fixed camera program was to target crash risk and crash severity at black spot locations. Therefore, the positioning of the fixed speed cameras was focused on locations where there had previously been a high incidence of casualty crashes or a number of particularly severe crashes. Signs indicating the presence of speed cameras are located throughout the state indicating the operation of speed cameras.

Community attitudes towards the new fixed digital speed camera program were assessed through a series of four surveys conducted between September 2000 and September 2002. A total of 750 randomly selected respondents were interviewed from metropolitan and non-metropolitan regions (RTA, 2003). Awareness of the fixed digital speed camera program was high from the commencement of the program (64%) and increased over time reaching 82 percent at the time of the final survey. As awareness of the program increased, expectations concerning the impact of the program on crashes also increased. At the time of the final two surveys, over 50 percent of respondents believed that cameras would have a 'big' or 'medium' impact on crashes. However, throughout the total survey period between 15 and 25 percent of respondents suggested that the use of fixed digital speed cameras was a revenue raising mechanism. Further, infringement notices resulting from fixed camera operations were seen as primarily revenue raising by approximately 45 percent of respondents in each of the survey periods. In combination, these results suggest that whilst the majority of road users believe that the use of speed cameras generates real road safety benefits, there remains a not insignificant proportion of road users that perceive the use of speed cameras to be associated with revenue raising and not road safety. A

survey of professional drivers (drivers who drove as part of their job most days) indicated, particularly at the commencement of the fixed speed camera program, that professional drivers were more likely to associate infringement notices resulting from fixed speed camera operations as primarily revenue raising.

Despite the results above indicating that a large proportion of respondents view traffic infringement notices for speeding offences as primarily revenue raising, it is noted that one-third of those who believed speed cameras are very effective, also believed that infringement notices are primarily revenue raising. This suggests that the negative perception by some of the use of speed cameras as revenue raising devices may not be clear evidence of disapproval of speed camera programs as might be expected. Co-existing but apparently inconsistent perceptions of the operation of speed cameras suggest that there may be scope to improve the perception of the speed camera program.

The attitudes towards speed camera use of those who were aware of someone who had previously been issued a fixed camera infringement notice were examined separately as part of the study. Respondents in this category were most likely to believe that speed cameras act to deter speeding or were used for legitimate road safety purposes. However, the response of those drivers who had actually received an infringement notice for a speeding offence to these issues was not examined separately.

The above research demonstrates that negative perceptions of speed camera programs remain in the community. It is reasonable to expect that the media contributes to the development of public attitudes towards speed enforcement operations. A study of two major newspapers in circulation in NSW by Blows (2003) examined news articles published between 1996 and 2001 and the attitudes expressed in them towards speed and speed camera use. Those articles examined were restricted to news items and did not include letters to the editor or opinion pieces. The analysis conducted identified the key themes presented and distinguished between messages in favour of speed or against speed camera use and those against speed or in favour of speed camera use.

The following were the key messages identified as pro-speed or anti-speed cameras.

- Revenue raising: much media comment focused on the substantial government revenue generated by speed cameras. Actual dollar amounts of revenue were provided and increases over time were highlighted. In these articles, the generation of revenue was not linked to either the level of illegal speeding in the community or the negative consequences of speeding.

- War against speed cameras: Blow suggests that “battle imagery” was used to describe speed camera operations. That is, speed cameras were portrayed as “an enemy to be defeated” without reference to the road safety benefits associated with speed camera use.

- Big brother: as commonly cited in US research, the use of speed cameras can be seen as an unnecessary and unwarranted intrusion on the privacy of individuals. This theme was identified in the media examined. The use of technology such as speed cameras in the enforcement program, and the perceived lack of public or parliamentary control over operations appeared to contribute to this sentiment.

- Playing games: it is suggested by Blow that motorists' attempts to avoid being caught speeding by speed cameras were portrayed as part of a game with Police. Articles with this theme did not focus on the detrimental effects of speeding.

- Speed as scapegoat: the final theme identified by Blow, was the perception that governments used speed, a behaviour under control of individual drivers, to deflect criticism of government action (or inaction) in the area of road safety such as the provision of engineering treatments and improved driver education.

Anti-speed or pro-speed cameras themes emerging from the media were categorised by Blow into four key areas. The first of these, "speed kills" represented those articles that identified the role of speed in serious casualty crashes and highlighted the role of speed cameras in reducing road deaths. In addition, articles with this theme were found to detail the number of motorists caught exceeding the speed limit and the extent to which the speed limit was exceeded. The second group of articles focused on the holiday road toll and the additional speed enforcement conducted by Police during holiday periods. These articles acknowledged the role of speed in casualty crashes and presented police enforcement efforts during this period as genuinely targeted at reducing crashes and not revenue raising. The alliance between the community and police in efforts to reduce casualty crashes particularly during holiday periods was the subject of the third group of articles. The final group of articles reasoned that penalties resulting from speed cameras could be avoided by adhering to the speed limit. Further, if motorists were to stop speeding, revenue from speed cameras would not be as great. This reasoning places responsibility for the large number of speed camera fines on individual road users and does not suggest that government uses speed cameras as a revenue raising mechanism.

3.3. WESTERN AUSTRALIA

Speed cameras were first introduced in Western Australia in 1988 and have been in continued use since that time. The speed camera program currently operating in Western Australia involves a number of key agencies including the West Australian Police Service, the Ministry of Justice, the Insurance Commission of Western Australia and Main Roads WA. In total the WA Police Service operates seventeen speed cameras of which fourteen are in regular use. The current population of WA is approximately 1,951,300. Speed camera locations are selected on the basis of previous crash history at a site, road geometry and traffic volumes and there is no warning is given of the presence of a speed camera.

In early 1998, the WA government introduced a new speed enforcement program (the Enhanced Traffic Enforcement Project) to refocus efforts aimed at improving road safety. In the five-year period since the introduction of the ETEP, speed camera hours increased 580 percent and the number of infringement notices issued increased 360 percent (RSRR, 2003). At the same time as the ETEP was introduced, it was recognised through research conducted for the Western Australian government that the use of speed cameras generated significant (although not overwhelming) negative public comment. In order to address this issue, WA agencies developed a new communications strategy aimed at improving community attitudes towards the use of speed cameras. The key focus of the strategy was to highlight the demonstrated safety benefits associated with speed camera use and reduce the emphasis on the enforcement role of the cameras. The primary mechanism through which the shift in focus was to be achieved was the involvement of those affected by speed camera use (i.e. the community) in education campaigns.

From February 1998 until March 2001 five distinct education campaigns were launched to correspond with the ETEP and ran for between eight and ten weeks each. Analysis of each of the campaigns demonstrated that the following messages were delivered by the advertisements:

- Braking distances increases the faster you go
- Speeding may result in serious injury or death to other road users and the speeding driver will have to live with the guilt resulting from his/her actions
- The faster you go the worse the outcome
- Slow down on residential streets
- There is less chance to react in an unexpected situation

It is clear that these messages do not focus on the enforcement value of speed cameras but rather emphasise the dangers associated with excessive speed and the potential consequences of speeding. This is in line with the stated objective of the new communications program.

Evaluation of the education campaigns was conducted by reference to measures of public awareness, knowledge, beliefs and self-reported driving behaviour taken first in February 1998 and again in March 2001 at the completion of the five campaigns (Batini and Farley, 2001). The sample of respondents included 17 to 39 year old WA drivers only. Spontaneous awareness of speeding as a cause of death and serious injury remained unchanged over the campaign period (66%). However, those reporting that driving 10 km/h slower would reduce crash risk "a great deal" increased substantially from 18 to 45 percent. Similarly, the acceptability of driving 10 km/h over the speed limit in a 60 km/h speed zone fell from 43 to 12 percent. Finally, the proportion of respondents reporting that they never deliberately speed increased slightly and those reporting that they often exceed the posted speed limit fell slightly. It is noted that these final results were not statistically significant. On the basis of this evaluation it is apparent that measurable improvements in public attitudes resulted from the shift away from communicating the enforcement role of speed cameras and the increased focus on the potential detrimental effects of speeding.

In addition to the evaluation of the five specific community education campaigns detailed above, community attitudes towards speed enforcement were monitored at various time points since the introduction of the ETEP. The most recently available data provides information on community attitudes towards speeding in October 2000 (Community Attitude Monitor, 2000). Approximately 73 percent of respondents agreed that the severity of injuries sustained in a crash would be reduced if people drove 10 km/h slower than they do now. Approximately 90 percent of respondents stated that they support the use of speed cameras to detect and fine people who speed. Females and those aged 25 and over were more likely to report negative attitudes towards speeding than males and those aged under 25. This is consistent with the European research on attitudes towards speeding reported in section 5.

3.4. SUMMARY

The research discussed above highlights a number of key findings relevant to a consideration of public attitudes towards speed cameras. The Victorian research demonstrates that community opinion in that State supports the use of speed cameras to both raise revenue and improve road safety. However, support for the road safety benefits of speed cameras was much stronger when considering excessive speeding. This view is supported by ambivalent support for the new, lower speed enforcement tolerances and the belief by many that driving in excess of the perceived 3 km/h tolerance should be allowed.

The NSW research focuses on evaluations of fixed speed camera programs. Despite claims made by some anti-speed camera lobbyists, the majority of individuals recognise the relationship between speeding and death or serious injury. However, a large proportion of drivers report that speed camera use is a revenue raising mechanism. An even large proportion report that infringement notices resulting from speed camera use act as revenue raising mechanisms. In targeting negative perceptions surrounding speed camera use, this distinction may be relevant. In particular, research demonstrating that it is infringement notices that operate most strongly upon behaviour to reduce casualty crash rates (e.g. Cameron et al., 1992) may be useful in counteracting perceptions of infringement notices as revenue raising devices.

The dual perceived objectives of speed cameras as both road safety and revenue raising devices is also highlighted in the NSW research. Analysis of media comment on the use of speed cameras provides further information on messages sent to the public. These include the perceived revenue raising role of cameras supported by the perceived inaction by government in pursuing alternative road safety counter measures, concerns surrounding privacy and lack of public control over the process. However, during holiday periods where the road toll comes more into focus, different messages are sent highlighting the road trauma benefits of speed camera use.

Research from Western Australia shows evidence of positive outcomes following education campaigns. The relationship between speeding and death/serious injury was recognised by majority (66%) and the acceptability of driving up 10 km/h over the limit fell to 12 percent. Further 90 percent of those surveyed supported the use of cameras to detect those who speed.

3.5. CONTROVERSIES

The controversies surrounding speed camera use that have arisen in the Australian setting can be categorised into the four dilemma identified by Goldenbeld (2003).

The Victorian speed camera program has now been in operation for over a decade and the research suggests that some change in the controversies associated with the program have also taken place over that period. Initial concerns centred around credibility and social dilemmas while in more recent times significant issues reflecting legitimacy and implementation dilemmas have arisen. Similar controversies have evolved in other states of Australia such as NSW and Western Australia. The key controversies in each of these areas can be summarised as follows:

Credibility dilemmas:

- The speed camera program has dual motives of road safety and revenue raising and thus, revenue generated from the program should be directed to road safety programs rather than consolidated revenue.

- Speed cameras are placed in locations where it is "safe" to speed such as high-speed roads. Such placement is suggestive of revenue raising motives.

- Where cameras operate covertly at locations where it is unsafe to speed, drivers are not immediately deterred from speeding as there is no visible enforcement. The covert nature of operations is seen to be targeted at revenue raising rather than improvements in road safety.

Social dilemmas:

- Although recognised, the link between slight increases in speed and injury risk and severity is not applied by many to their own driving behaviour. That is, enforcement is seen by individuals to unnecessarily restrict their own safe driving behaviour even if this involves illegal speeds.

- The use of covert (hidden) cameras is perceived to be less effective at the camera location than visible cameras.

Legitimacy dilemmas:

- Speed cameras are placed in places where it is not possible to avoid speeding such as at the bottom of a hill.

- There is no opportunity to explain the circumstances of the offence.

- The penalties for speeding by less than 10 km/h above the speed limit are less fair than those for exceeding the limit by more than 10 km/h.

Implementation dilemmas:

- The accuracy of speed cameras has been brought into question and the lack of immediate notice of the offence makes it difficult to establish actual speed at the time of offence.

- The ability of speedometers to accurately measure speed within the perceived enforcement tolerances is questioned, particularly in view of the design rules that allow greater variation than the tolerances.

- There is a perceived lack of public or parliamentary control over speed camera programs.

4. GREAT BRITAIN

4.1. HISTORY OF SAFETY CAMERA USE IN BRITAIN

Enforcement cameras were first introduced in 1991 when the Road Traffic Act 1991 amended the law so that courts could accept evidence of speeding from type approved cameras accompanied only by a certificate signed on behalf of the relevant police force. This allowed speed and red traffic light cameras, collectively known as safety cameras, to be operated by police forces. The first deployment of cameras in anything like a systematic way was in West London in 1992 when 21 fixed speed camera and 12 red-light camera sites were installed and their effectiveness monitored (London Accident and Analysis Unit 1997).

In the early days the take up of automatic enforcement by police forces was modest. In 1994 there were 30 speed cameras and 54 red-light cameras but the by Spring 1996 there had been continued growth with 102 cameras servicing 700 sites (475 speed and 254 red-light camera sites). By the year 2000 there were an estimated 4,500 safety camera sites in use on British roads, the majority of these would be fixed speed cameras with a smaller number of red-light and mobile cameras.

An early evaluation of safety camera effectiveness (Hooke et al 1996) demonstrated that the net benefit of speed cameras was five times the initial investment in the first year and more than 25 times after five years. For traffic light cameras the benefits were modest but positive. However, a key barrier to more rapid deployment of cameras was one of resource. At that time the benefits from cameras did not accrue to the police forces who operate them but fine revenue went to the Consolidated Fund of the Exchequer, which is a long standing principle. The report concluded that there was a mismatch between where the costs and benefits lay. The Local Authorities typically purchased and installed the equipment but because the photographs were evidence, the police were responsible for installing and changing the film (cameras were all wet film in those days) and for processing the fixed penalty notices together with the courts. The benefits of automatic enforcement accrue to individuals and society in the reduction of injury, distress and material damage.

It was suggested that there was little incentive to reach optimal levels of camera use because greater use meant greater cost and burden on the police and courts.

4.2. THE CAMERAS AND EQUIPMENT

All equipment used in camera schemes must be type approved by the Home Office. The Association of Chief Police Officers (ACPO) lays down guidelines for camera trigger speeds (the minimum trigger speed is the speed limit plus 10 per cent plus two miles/h) although there are local variations upward on this with many forces in the early days setting trigger speeds as high as 40 miles/h within a 30 miles/h speed limit. Part of the argument was that if the trigger speed was lower they would have to change the film in the camera too often and this demonstrated a very real resource constraint on camera use.

Most fixed cameras work off radar or inductive loops in the road and detect the speed of every vehicle passing it. If the vehicle triggers the camera it takes two pictures of the **rear** of the vehicle usually half a second apart. This allows vehicle speeds to be registered by radar and calculated by distance travelled in half a second. Grids are painted on the road to assist with this calculation as a secondary check if needed. Mobile cameras are generally

laser or video. All cameras have to have current calibration certificates which the courts may ask to see.

The two main reasons for photographing the rear of the vehicle are

- Motorcycles do not have front plates
- Civil Liberties and Data Protection Act arguments apply to photographing the face of the driver

Not all camera housings have a camera present. One camera is moved between several sites and in the early days there was typically one camera for every 10 to 15 (or even 20) housings. Dummy flashes are often used at sites without active cameras to give drivers the impression they are being monitored. In the early days of automatic enforcement this low utilisation of cameras in the housings led to a perception that drivers were rather unlikely to be caught.

4.3. PROCESSING

Enforcement is through the vehicle registration system. The registered keeper of the photographed vehicle is traced through records at the Driver and Vehicle Licensing Agency (DVLA). The registered keeper is required to provide information to the police, including who was driving the vehicle. Failure on behalf of the keeper to provide details is an offence, but the keeper is not responsible for the speeding fine if they were not driving, that remains the responsibility of the driver. A fixed penalty ticket is issued which is paid by post. If the offence is contested this is done through the courts. This of course is a more expensive route and the driver, if found guilty generally finds themselves paying more than they would have done if the offence had not been contested.

However, more recently, manufacturers have developed fixed speed cameras that photograph from the front, and these have been type approved for use by the Home Office. These capture the front number plate and the bonnet of the car. In a relatively small proportion (about 20 percent) of cases the driver and front seat passengers may be seen on the film and identified but this personal evidence is not admissible in court under British law. Occasionally if there is a dispute about who is driving, the police may invite the keeper to view the film at the processing centre (it is never posted to the keepers home). Front facing cameras are relatively rare and whilst there are occasions they may have an operational advantage, their major disadvantage is that they cannot identify speeding motorcyclists.

4.4. LEVELS OF FINE AND POINTS ON DRIVING LICENCE

The fixed penalty fine for being caught speeding by a camera on a road was £40 ($67 US), it is now £60 ($100 US) and three penalty points on the licence. When twelve points have accrued within a three year period, the driver loses their licence for a period determined by the court. If the driver has been caught speeding by a margin of 30 miles/h there is no offer of a fixed penalty and the driver must attend court where the fine can be as high as £1000 ($US1700) with 6 penalty points or a driving ban for up to 6 months. The fine for exceeding the speed limit by a wide margin (i.e. travelling at 100 miles/h or more) on the Motorway is £2,500 ($US4240) and a driving ban. However, fixed cameras are rarely used on motorways except to enforce lower speed limits at major roadworks and as part of a

traffic management scheme using variable speed limits to stabilise flow during congestion. Mobile cameras are occasionally used.

4.5. THE DECISION TO ALLOW NETTING-OFF FOR SAFETY CAMERA FUNDING

The evaluation of effectiveness report by Hooke et al (1996) demonstrated that safety cameras were effective in reducing road casualties. They also noted that the deployment of more of these effective devices was hampered by lack of resources. The cameras are costly to install, operate, and maintain but these enforcement costs, where a fixed penalty notice is used, cannot be recovered directly by the police and local authorities. Only where cases are heard in court may the police and others claim their costs.

> "To address this funding problem the Government now accepts that those responsible for installing and operating cameras should be able to retain some of the fine revenue from offences detected by cameras, to cover their costs. This would enable better use to be made of existing cameras and for additional cameras to be introduced for road safety purposes. The next generation of cameras will be digital, offering greater capacity and flexibility at lower cost."

A new funding system was developed which took effect from April 2000. It enables local authorities, the police, magistrates' courts committees and other agencies involved in the enforcement process to have all of their camera enforcement costs refunded from a proportion of the fine revenue. A pilot scheme in eight police force areas demonstrated the effectiveness of partnerships using this funding system, and it is now being introduced nationally. More information about the cost recovery mechanism may be found in the report 'A cost recovery system for speed and red-light cameras – two year pilot evaluation (Gains et al 2003) on the Department for Transport website at ***http://www.dft.gov.uk/stellent/groups/dft_rdsafety/documents/page/dft_rdsafety_507639.pdf***

In order to set up the system local partnerships need to be formed. These comprise representatives from local police forces, highway authorities, and Magistrates' courts and, where appropriate, the Health Authority, and the Highways Agency (the Agency of the Department for Transport that is responsible for the strategic network of motorways and trunk roads). Some of the areas involve other local agencies recognising that a reduction in casualties has wider benefits to society. A reduction in road casualties has great positive effects beneficial to the health, ambulance and fire services.

4.6. RULES FOR SAFETY CAMERA OPERATION UNDER NETTING OFF ARRANGEMENTS

The Government's Treasury criteria for allowing a proportion of the fines and penalties to be recovered are:

- Will performance against policy objectives, e.g. crime-fighting and prevention, be likely to be improved?

- Are arrangements in place which will ensure that the activity will not lead to the abuse of fine and penalty collection as a method of revenue raising and that operational priorities will remain undistorted?

- Will revenues always be sufficient to meet future costs, with any excess revenues over costs being surrendered?

- Can costs of enforcement be readily identified and apportioned without undue bureaucracy, and with interdepartmental and inter-agency agreement where necessary?

- Can savings be achieved through the change and are adequate efficiency regimes in place to control costs, including regular efficiency reviews?

A handbook has been developed (new edition just issued to partnerships) which gives guidance about how the cost recovery system should operate. The main areas covered are given below and a summary can be found at Appendix A.

1. The effects on speed and casualties must be monitored. Camera sites must be located where there is a history of speed related accidents. Cameras cannot be located for political and/or revenue generating purposes. All sites must be monitored for before and after speeds in areas where the cameras are operating.

2. Public perception must be actively managed. All areas have to produce a robust strategy as to how they are handling local education and communication issues. The cameras must be well signed and clearly visible and their location published in local papers, local radio and on web-sites.

3. Partnerships must include all relevant local organisations. Partnerships must include police, highways authorities and magistrates' courts, the health authority should be a partner where appropriate. Each partnership should have a dedicated project manager.

All parties must sign up to a Memorandum of Understanding/Service Level Agreement – this commits each partnership at a senior level for the duration of the project.

4. Financial protocols. All capital and revenue expenditure has to be directly attributable to speed and red-light camera enforcement. For more details see Appendix A

5. Benchmarking. Partnerships should produce benchmark costs that demonstrate that unit costs are reducing

6. Signing and visibility. Partnerships must ensure that signing arrangements comply with current regulations (Traffic Signs Regulations and General Directions) appropriate for various circumstances. Fixed speed camera housings should be yellow and not hidden behind trees, signs, bridges. The minimum visibility distance should be 60 metres where the speed limit is 40 mph or less and 100 metres for all other limits.

For mobile cameras, camera operatives at the mobile camera sites should wear fluorescent clothing and abide by all Health and Safety requirements, and vehicles should be clearly marked as camera enforcement vehicles.

Camera warning and speed limit reminder signs must be placed in advance of fixed or mobile speed enforcement taking place. Ideally these should be placed within 1 km of fixed camera housings and at the beginning of a targeted route for mobile enforcement sites.

Signs must only be placed in areas where camera housings are present or along routes where mobile enforcement will be targeted.

4.7. EFFECTIVENESS OF SAFETY CAMERA OPERATION IN BRITAIN

The report of the two year pilot evaluation (Gains et al 2003), further demonstrated the effectiveness of safety cameras in reducing the number of people killed or seriously injured[2] in road traffic accidents at cameras sites by 35 percent relative to the long term trend. The effectiveness of the fixed site cameras was to reduce killed or seriously injured casualties by 65 percent at camera sites and for mobile cameras it was 29 percent.

Public acceptance was good (see Section 3.2) and speed measurements showed that vehicle speeds at the camera sites has reduced on average 3.7 miles/h.

In the light of this, the Government gave the go ahead for all authorities in Britain to form partnerships to introduce camera technology for enforcement of speed limits.

4.8. PUBLIC ACCEPTABILITY

4.8.1. The media

In the early days of camera operation the national media did not pay too much attention to them. It wasn't until netting–off of fines to pay for more activity that the media started to become interested. During the period of the trial of the netting-off process in eight areas there was an increase in the fine from £40 to £60 which encouraged the view that this was a stealth tax. There was a time, prominently reported in the press, that the Home Secretary said that the police should lay off motorists and concentrate on catching real criminals. Ministers were reported to be concerned that the increasing use of cameras could lead to failing public support.

In 2001 there was a perception that all fine revenue went to the safety camera partnerships and it took some time before the media were accurately reporting that only a proportion goes to the partnerships. This didn't stop some journalists calculating how much fine income was due to the Exchequer as the numbers of cameras increased.

During 2001 there were increasing calls by the national media and others to increase the conspicuity of cameras. The coverage in the press was a powerful lever on the opinion of the Minister. Some police forces were reported to be in favour of brightly coloured cameras as their position was that cameras are there to change behaviour to reduce death and injury through speeding. The cameras were not there primarily as a means of prosecution. It was reported that in the view of the police, behaviour change was more likely to occur if the police were open about their activities. The AA and other motoring organisations welcomed this openness.

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[2] Killed is a human casualty whose injuries result in death within 30 days of the accident

Serious is an injury for which the casualty is detained in hospital and/or fractures, concussion , severe shock requiring medical treatment, internal injuries, severe cuts and lacerations and death 30 days or more after the accident.

The media saw as draconian catching people driving at 35 miles/h in a 30 miles/h speed limit when before cameras came into operation drivers were unlikely to be caught unless they were doing 40 miles/h. This campaign, mainly by the more right wing tabloids struck a chord in the mind of drivers. The Police started to be more open about their thresholds for enforcing the speed limit which is, as a minimum, the speed limit plus 10 percent plus two miles/h, although in reality very few forces did, and still do not, enforce at levels as low as these. This side of the story was not reported by the media.

Gains et al (2003) report a survey of local press coverage in five of the eight pilot areas. During the first six months of operation the press coverage was overwhelmingly supportive (90 percent of column inches devoted to camera activity was supportive) but after this period the support dropped to about 70 percent of column inches being supportive, averaging at about 76 percent over the two years. This is a much higher proportion than for the national press which generally has not been supportive. At the height of reporting the level of press coverage was about 2600 column inches per quarter and this reduced to about half towards the end of two years.

Prior to 2000 when there were few cameras, the local press and radio did not devote much time and space to reporting camera activity and issues but as the number of partnerships has increased and their press officers started to provide information, there is more interest and more reports in the local media. These tend to be more balanced than some of the national press reports and have been generally supportive of the use of cameras. The local media seems to be more in touch with public opinion than the national press who perhaps see themselves as forming opinion.

4.8.2. Public opinion surveys

In August 2001, Direct Line, a motor insurer, published a survey of 2000 drivers and their attitudes towards speed cameras (MORI 2001). They found that 70 per cent of drivers were in favour of cameras and 70 per cent think that well placed cameras are a useful way of reducing accidents and saving lives.

Around that time there had been a spate of media reports about civil liberties and the Direct Line Poll showed that only 21 per cent of those surveyed thought that cameras were an infringement of people's civil liberties.

89 per cent said that the presence of cameras made them think more carefully about how fast they were driving. 69 percent thought that cameras should be well marked and conspicuous, although there was support from 20 percent of drivers for hiding cameras, and 13 per cent thought that some should be conspicuous and some inconspicuous. The most favoured location for speed cameras amongst two thirds of those surveyed was outside schools and at blackspots.

In June 2002, the London evening paper, The Standard, whose reporting was generally anti-camera, published the results of its own poll which found that 84 percent of those questioned in London and the South East of England thought cameras were a good thing. 69 percent reported obeying speed limits even when there was not a camera nearby and 49 percent said they had never been flashed by a camera. 85 percent believe that cameras save lives and 68 percent think that hiding them from view is unfair. There is more support for cameras amongst older drivers.

Stradling et al (2003) in their report on The speeding driver: who, how and why? asked about opinions of speed cameras and found that more females (82 percent) than males (68 percent) thought them a good thing and support for speed cameras increased with age of driver from 57 percent of 17-24 year olds to 87 percent of over 65s on favour. In reviewing the results of the surveys, Scottish Road Safety Units agree that speeding drivers, especially male drivers under 24 years and over 40 should be targeted by well planned and resourced publicity campaigns.

The AA Motoring Trust, (the charitable research and policy arm of the Automobile Association) have had questions placed in an NOP omnibus survey annually since 2001. The 2003 survey found that 88 percent of drivers were in favour of the use of cameras for red light running and speeding, but this reduced to 78 percent for speeding offences. Acceptability of cameras by those with prosecutions for speeding offences was 62 percent.

Over the three years of the survey, drivers' acceptance of cameras has remained largely unchanged despite a steady increase in those having personal experience of prosecution. In this survey like that for Direct Line two years earlier, drivers were accepting of use of cameras at blackspots and where used they should be conspicuous.

Attitude surveys were conducted locally in the eight pilot areas to gauge the effectiveness of information presented by camera partnerships that the primary motivation behind additional enforcement was to improve road safety. The results were in line with the national surveys with support for cameras for casualty reduction but there was a level of concern about revenue raising. These local surveys were undertaken before cameras became highly visible in June 2002.

The results from the surveys are consistent with each other and consistent over time. They demonstrate the relationship between conspicuity and acceptability in the minds of the driving public.

4.8.3. How drivers respond

Surveys of drivers shortly after speed cameras became authorised for use on British roads were undertaken by Corbett (1995) who found that drivers' initial reactions to the installation of speed cameras could be categorised into four types:

- **conformers**; those that reported they normally complied with speed limits so cameras would make no difference to them. They tend to be more cautious, older and more experienced drivers and the least likely of the four groups to have had a crash in the previous three years.

- **the deterred;** those who reduce their speed on roads where camera are installed. This group was somewhere between the conformers and the manipulators.

- **manipulators**; those that slow down on the approach to cameras and speed up again afterwards: and

- **defiers;** those that stated they carried on as before driving well above the speed limit.

The aim of speed cameras is to reduce the size of the proportion of manipulators and defiers. Corbett and Simon (1999) undertook a survey of 3440 drivers (four samples added together) to find out more about defiers and manipulators in order to provide information

on these groups so that effectiveness of cameras and speed management in general could be increased. The manipulators were the most calculating and sophisticated in their reaction to cameras. They tended to be younger drivers with high offending scores and who reported driving at the highest speeds on the roads before cameras were introduced. They do not approve of cameras but know where they all are and think they know how they operate which gives them the confidence to drive past them without being caught.

The defiers were more likely to drive high performance or company cars and generally denied a link between speeding and crash occurrence. They had the highest speed preference scores (i.e. they liked driving fast and usually did so everywhere) and were of the opinion that the police would not take action against them even if they were photographed. This was an attitude expressed in the early days of cameras when there were not many around and there were of the order of one camera to 10 to 15 or even 20 boxes. It was Corbett and Simons' opinion that the attitude of this group would be likely to change as cameras became more widespread and whilst they may not turn into the deterred, they would likely become manipulators.

This work is useful in allowing insights to those who deliberately speed. There will always be those conformers and the deterred who will be caught on camera during periods of concentration lapses but in the main it is those who persistently drive with higher speeds that need to be deterred from doing so. Stradling et al's (2003) recent findings on the causes and consequences of speeding in Scotland also points to persistent speeders being among those with high accident records. Their survey found that excess (80 miles/h in a 70 miles/h limit) and excessive (90miles/h in a 70 miles/h limit) speed out of town had risen over the last decade whilst excessive speed (50 miles/h in a 30 miles/h limit) in towns has fallen, partly due to the popularity of traffic calming measures. The report also identified that speeders identified in their study have a higher likelihood of crash involvement with drivers who had been stopped for speeding or had been flashed by a speed camera having double the incidence of recent accident involvement.

4.8.4. Role of pressure groups

In Britain the pressure groups have an important role to play in the democratic process. The groups that are best organised are those listed below. The first three are road safety groups who campaign for slower speeds, reduced car use and better provision for the non-motorised modes. The second four are campaigning for the motorcyclist and motorist.

The following sections contain extracts from of their respective websites.

Transport 2000

Transport 2000 is the independent national body concerned with sustainable transport. It looks for answers to transport problems and aims to reduce the environmental and social impact of transport by encouraging less use of cars and more use of public transport, walking and cycling.

Transport 2000's vision is of a country where traffic no longer dominates our lives, where many of our journeys can be made on foot, by cycle or using public transport and where you don't need a car to enjoy the countryside or city life.

Transport 2000 is also campaigning for better enforcement of speed limits. It believes speeding is just as lethal as drinking and driving, and should become equally unacceptable. It supports moves by the Government to allow more use of speed cameras, with fines recycled to pay for enforcement. The Government Speed Camera Partnership programme has now been extended to most police areas and the remaining police forces are expected to sign up by the end of 2003.

http://www.transport2000.org.uk/

Slower Speeds Initiative

The Slower Speeds Initiative was founded in March 1998 by the Children's Play Council, Cyclist's Touring Club, Environmental Transport Association, Pedestrians' Association, Pedestrians' Policy Group, Road Danger Reduction Forum, RoadPeace, Sustrans and Transport 2000.

They believe that lower traffic speeds will bring important community benefits by: improving road safety; reducing noise, stress, pollution and fuel consumption; and encouraging cycling, walking and public transport. They claim that their approach has been endorsed by 17 local authorities, over 30 national organisations and nearly 200 community groups.

The **Slower Speeds Initiative** campaigns for:

- lower and better enforced speed limits
- higher profile for speed reduction initiatives
- development of speed control technology
- changes in the law to allow conviction of speeding drivers who kill and maim

http://www.slower-speeds.surf3.net/index.htm

In March 2003, Transport 2000 and the Slower Speeds Initiative acted together to challenge in the High Court the Government's decision to paint speed cameras yellow. They sought to overturn Government guidance that came into force in June 2002 requiring all fixed speed cameras in safety camera partnership areas to be painted yellow and sited conspicuously.

Campaigners were concerned that brightly painted conspicuous fixed site cameras might not work as effectively as inconspicuous ones. They argued that if cameras are highly visible drivers will slow down when they see one but then speed up again afterwards when they see the coast is clear. If cameras are grey and less conspicuous then drivers can't see them in advance, don't know where they are and will be more likely to stay within the speed limit at all times.

Instead campaigners would like to see safety camera partnerships (incorporating the police, the local authority and others) given the discretion to enforce speed limits in the way that they think is appropriate to their local area. This would mean allowing the use of covert (non-yellow) cameras where appropriate

The judge ruled that camera partnerships could seek permission from the Secretary of State for Transport to use grey cameras, but to date none has.

Brake

Brake is a road safety charity dedicated to stopping deaths and injuries on roads through awareness-raising campaigns, including Road Safety Week and educational resources including leaflets, posters and advertisements.

They also care for people bereaved and injured on the road.

http://www.brake.org.uk/

Motorcyclists Action Group (MAG)

The Motorcycle Action Group (MAG) was formed in 1973 to campaign for voluntary crash helmet use . Since that time MAG has broadened the scope of its activities, making MAG the leading body campaigning on behalf of motorcyclists in the UK.

http://www.mag-uk.org/about_mag.html

ABD (Association of British Drivers)

The ABD (Association of British Drivers) was founded in 1992 by a group of drivers from all walks of life and from all parts of the UK. The ABD is motivated to counter the rising tide of irrational anti-car propaganda and regulations.

The objective of the ABD is to provide an active, responsible voice to lobby for the beleaguered British car driver. The ABD campaigns for:

- Recognition of the fact that roads are an essential part of the UK transport system; and that traffic is the lifeblood of the economy.
- Improved standards of driver training.
- Realistic speed limits based upon road safety requirements not political correctness.
- Improvements in road and vehicle safety.
- More of the taxes derived from motorists to be spent on roads.
- No motorway tolls, no 'congestion charging', no workplace parking tax.
- An end to the abuse of speed cameras.

http://www.abd.org.uk/

The motoring organisations; The AA and the RAC

The AA (Automobile Association)

http://www.theaa.com/

The RAC (Royal Automobile Club)

http://www.rac.co.uk/

Each organisation campaigns vigorously for its own position. The organisations are well established, respected and are part of the formal consultation process. The AA and the Slower Speeds Initiative are probably the most influential in the area of speed management.

The two largest motoring organisations are the AA and the RAC. They both represent their members across a wide range of areas. The position of each is that speed limits should be correct for the type of road and that speeding is to be discouraged. They are not opposed to speed cameras if they are correctly sited within the rules and the speed limit is right for the road. This implies that the cameras are not necessarily viewed as revenue raising if correctly sited.

The Parliamentary Advisory Council for Transport Safety (PACTS)

There is an important NGO, the Parliamentary Advisory Committee on Transport (PACTS) which is perhaps the most influential of all the groups except the AA. It has a very strong pro road safety position and its voice is listened to by Government and the Motoring Organisations.

PACTS is a registered charity and an associate Parliamentary Group. Its charitable objective is "To promote transport safety legislation to protect human life". Its aim is to advise and inform members of the House of Commons and of the House of Lords on air, rail and road safety issues. It brings together safety professionals and legislators to identify research-based solutions to transport safety problems having regard to cost, effectiveness, achievability and acceptability.

PACTS often takes the Government to task for slow progress, especially in the area of speed management where it thinks the Government could do more – not necessarily with introducing more cameras but a with wide range of speed management measures

http://www.pacts.org.uk/

Summary

There is a surprising amount of common ground between the pressure groups with the possible exception of the Motorcyclists Action Group who tend to be independent of the others, and the ABD.

The pro-road safety groups have campaigned hard for the introduction of cameras and are very supportive of their use. In some ways they do not see the Government being tough enough and this view is encapsulated by the legal challenge mounted by two of the groups. The motoring organisations are vigorous in their campaigning against covert cameras and for a review of speed limits on different types of roads. This is not a campaign to raise limits but to make sure they are appropriate. The Department for Transport is currently developing a speed management assessment framework for this purpose. This is seen as a key part of the speed management debate by all groups. The Slower Speeds Initiative see it as paving the way to justify lower speeds on most roads, especially rural lanes, the motoring organisations for matching limits to road type and function. All, except the ABD

who are opposed to cameras of any kind, are agreed that automatic enforcement has its place but on exactly what is its place they differ.

The attitudes of the various groups are consistent with attitude surveys undertaken in Europe on other issues. For example in the MASTER project (Managing Speeds of Traffic on European Roads) a survey showed that drivers wanted better information so they could make up their own minds about the appropriate speed at which to drive on different roads in town. Drivers did concede that they should slow down near schools and where there were pedestrians about. People who didn't drive or who were interviewed as pedestrians wanted traffic calming so as to 'force ' drivers to slow down. The difference between the two groups was strong and found in more than one country (Risser and Lehner 1998). The results from the speed camera studies show similar results with drivers and motorists' groups wanting more information about the camera locations (i.e. high visibility) and to have them outside schools and other acknowledged hazardous locations. On the other hand the pro- pedestrian and cyclists groups want more covert operation and more camera activity to bear more heavily on speeding drivers.

4.9. OPINION

Enforcement of speed limits by the use of speed cameras is effective but controversial. The controversy has heightened since the formation of partnerships and the retention of part of the fine and penalty revenue to fund an increase in camera activity. The heart of the issue is that both the real and perceived chance of being prosecuted for speeding have risen rapidly and are probably closer together now than they ever have been. In the early days the perceived chance of being caught was higher than the actual chance because very few fixed site camera boxes had active cameras, and mobile activity was sporadic.

It is interesting to speculate as to why the controversy about deployment of speed cameras increased since the fine income has been netted-off to partnerships. There remains a real tension between revenue raising and road safety in the mind of some sectors of the public, especially those who have been fined for speeding. More people are being convicted of speeding offences with one in five people in a recent AA Motoring Trust survey having been convicted of a speeding offence in the last three years compared with one in six people in the 2001 survey. During this period there has been a rapid increase in the number of camera partnerships with only a very few police forces not using automatic enforcement. In the first two years or so the media portrayed the cameras as revenue raising with the police retaining the fine income. Gradually over time this misperception has been corrected by partnerships' own press offices and there is now more accurate coverage on this. This, together with the publication of the results of the two year pilot study (Gains et al 2003), has demonstrated that cameras are reducing casualties and are here to stay.

The Government's position is clear. It sees speed cameras operating to reduce road traffic casualties, and therefore they operate for the benefit of society. The fact that the revenue stream from cameras is uncertain is not an issue (as compliance rises income from fines falls) as changes could be made to the mechanism for funding camera activity, and as compliance improves, camera use may be reviewed and scaled down as appropriate.

The level of controversy over camera funding is starting to fall as evidence of their effectiveness in reducing the number of casualties increases. Recent surveys indicate that over three quarters of those questioned are accepting of fixed speed cameras proving they are highly visible and sited at hazardous locations. Even amongst those who have been

fined, there is a strong favourable opinion provided the cameras are well sited at hazardous locations, fully conspicuous and the route well marked. There is an issue of a difference of perception by drivers and accident led analysis as to what is a risky location and which problems a speed camera is well placed to solve and where it will have little or no effect. This is another issue which affects acceptability as many drivers cannot see the point of some of the camera locations. A public relations exercise is needed in these situations but this will only be effective providing everything in road safety engineering terms has been done to solve the accident problem and the camera is demonstrably the best solution.

Cameras at traffic lights have never been contentious, probably because it is evident to all drivers that jumping red lights is dangerous whereas the prevailing public attitude to speed is that everyone drives a bit above the speed limit and it is only those who are exceeding the limit by a wide margin that are dangerous. The research findings do not support the public view and more effort is necessary to bridge this gap. This in itself will help to increase public acceptability.

The pressure groups, both pro and anti-camera have had an impact on shaping public opinion. The ABD in particular has access to the motoring press which is uncompromisingly pro-car and anti-camera. The big national motoring organisations take a more moderate line and see the benefits of enforcement provided it is in the right place with cameras highly visible. Their position is to try to shift the debate towards having speed limits more closely matched with the road conditions. The pro-camera lobby is campaigning for more equity in the use of the roads so that pedestrians and cyclists can travel in safety and reduced fear from fast moving traffic. The platform of some of these groups includes campaigning for a reduction in the amount of car travel.

The pro-road safety groups campaign for more covert operation of cameras because it is their view that the full potential of cameras is realised through a combined use of conspicuous cameras at hazardous locations and of inconspicuous cameras where there is a problem of excess speed and associated injury accidents spread over a long stretch of road or around a local area. The use of inconspicuous cameras is clearly not an acceptable strategy to drivers and politicians who do not want to appear anti-motorist. The view of the police lies somewhere in between the two camps. There have been concerns expressed that over reliance on automatic technology for speed reduction means that other dangerous practices are overlooked because police are taken away from traffic to other duties.

Enforcement in Britain is a partnership between the police and the public. The police enforce by consent and if they are too heavy handed and the public withdraws its consent to the level of enforcement then there is a backlash. There is a fine line to be walked by the police, safety camera partnerships, and politicians between being heavy handed in the eyes of the drivers and too soft in the eyes of the road safety campaigners. At the moment they are probably being over cautious and erring towards the soft side. But as cameras become more of a fact of motoring life, if public acceptability remains high, and especially if the rate of casualty reduction stalls, then some partnerships may choose to ask the Secretary of State for Transport for permission to use inconspicuous cameras and thereby become a little tougher.

5. EUROPE

The use of speed cameras in Europe is considerably more widespread than in North America. Despite the greater penetration of automated enforcement in Europe, public attitudes remain of interest to ensure the continued viability of enforcement programs and the mechanisms of behaviour change. Following is a consideration of key literature from this region.

5.1. KEY RESEARCH FINDINGS

A study involving the examination of the requirements for implementing an automated enforcement system for traffic offences was conducted across four European countries Muskaug (1993). A postal survey of licensed drivers and police from Ireland, The Netherlands, Norway and Spain was used to assess perceptions of traffic offences and the enforcement of them.

Respondents from the four countries were consistent in their responses regarding the relative seriousness of various traffic offences. In particular, hit-and-run crashes, drunken driving and driving with defective brakes were all considered very serious offences whereas, offences such as driving without a safety belt and parking offences were considered to be at the lower end of the scale. A significant correlation between the perceived seriousness of the offences and the likelihood of detection for that offence was identified. That is, as the perceived likelihood of detection for an offence increases the perceived seriousness of the offence also increases. However, it is not clear that it follows that were the level of speed enforcement to increase the perception of the seriousness of speeding as an offence would also increase.

The responses of drivers and police from The Netherlands, Norway and Spain were also sought in relation to the acceptance of four types of enforcement methods. These methods were:

1. Traditional police enforcement including the use of equipment such as radar speed detection devices.
2. On-site surveillance primarily involving the use of equipment which creates a permanent record of the offence such as a speed camera.
3. In-car surveillance, where monitoring equipment is installed in passenger vehicles to continuously check compliance with traffic laws
4. Fully integrated surveillance systems incorporating the use of both on-site and in-car surveillance methods.

The results of the surveys are detailed for Norwegian drivers and Police only and the responses are described by reference to a number of distinct hypotheses. One thousand drivers and two-hundred police were involved in the survey in Norway.

The first hypothesis examined was that on-site, roadside surveillance is more acceptable than in-car surveillance. The results of the survey indicated that traditional police enforcement was seen as the most acceptable form of enforcement, followed by roadside surveillance, fully integrated systems and in-car surveillance respectively. The authors note the surprising result that a fully integrated system is seen as more acceptable than an in-car surveillance system. It has been suggested that this may be due to the greater

flexibility of fully integrated system and the ability for data to be collected outside the vehicle.

The influence of age and gender on acceptance of the various types of enforcement were considered under the second hypothesis. Women were found to accept all forms of surveillance more readily than males. Similarly, the age of the driver and exposure to driving also impacted on attitudes to surveillance with older drivers and those driving less frequently expressing more positive attitudes towards surveillance.

Those who were aware of the positive effects of speed enforcement were more likely to be accepting of the types of enforcement under examination. Those who associate negative consequences with surveillance, such as a reduction in personal freedom, the misuse of information and unacceptable power vested in the police, are less likely to express acceptance of all forms of surveillance. Those who believe that, as a result of enforcement, fewer accidents will occur, the police will have more time for other police activities and all motorists will have an equal chance of being caught, were more likely to accept surveillance.

The fourth hypothesis tested whether people who consider infringements of traffic regulations unacceptable will accept traffic surveillance. The results indicate that respondents who are more likely to report committing offences and those who find the commission of offences acceptable are likely to find all kinds of surveillance unacceptable. In contrast, those respondents who reported their belief that violations lead to accidents are more likely to accept all kinds of surveillance. Similarly, respondents reported higher acceptance of surveillance and immediate sanctions when the offence is a serious one. However, it is noted that respondents did not identify speeding offences as particularly serious.

Finally in relation to this study it is noted that the attitudes of police were also assessed through the survey. Such attitudes are relevant to the continued, effective operation of automated speed enforcement programs insofar as they add credibility and support to enforcement efforts. Not unexpectedly, the study found that police respond much more positively to traditional forms of enforcement when compared to other drivers. However, police were also found to have lower acceptance of all forms of automatic surveillance when compared to other drivers. The authors suggest that the lower levels of support for automated enforcement may be due to a lack of experience with the use of these technologies.

Individual differences in attitudes to enforcement of traffic regulations have also been examined as part of the ESCAPE project through surveys conducted in 13 EU member states between 1996 and 1997 involving nearly 15,000 drivers (Cauzard and Quimby, 2000a). It is noted that the study relates to all forms of traffic regulation and is not restricted to speed enforcement alone. The study examined individual differences in attitudes to enforcement on the basis of age and sex, professional status, level of education, years of driving experience and exposure and crash history over the previous three years. First, it is relevant to note that the study found the majority of all those surveyed (66%) were in favour of, or expressed neutral attitudes towards, traffic enforcement.

Some key differences between individual drivers were identified. First, male drivers were more likely to be opposed to the enforcement of traffic regulations (39%) than female drivers (28%). Similar, differences were identified between male and female drivers when considering those in favour of enforcement. In particular, more female drivers (38%) were

in favour of enforcement compared to male drivers (28%). Differences in attitudes towards enforcement were also identified with respect to age. The proportion of respondents expressing "average" attitudes towards enforcement did not differ significantly by age however, there were significant differences in the proportion of respondents in favour or opposed to enforcement of traffic regulations. Younger drivers (<25 years), were less likely to be in favour of enforcement when compared to drivers aged 25 years or more. Similarly, younger drivers were more likely to be opposed to enforcement in comparison to drivers aged 25 years or more. Differences in attitudes towards enforcement of traffic regulations were also identified based on professional status. Respondents working for themselves were less likely to be in favour and more likely to be opposed to traffic enforcement than those who were salaried employees, unemployed or retired. No significant differences in attitudes towards enforcement of traffic regulations were identified based on level of education or family income.

Differences in attitudes towards enforcement were also measured with reference to driving experience, exposure and previous driving history (number of accidents in the past 3 years). The results based on driving experience were highly correlated with those based on age. That is, drivers who had held their licence for a short period were less likely to be in favour of and more likely to be opposed to enforcement of traffic regulations than those who had held their licence for a longer period. More particularly, 40 to 44 percent of drivers who had held a licence for 5 years or less were opposed to enforcement compared to 39 percent of those who had held a licence for 6-10 years, 35 percent of those who had held a licence for 11-25 years and 29 percent who had held a licence for over 25 years. In relation to exposure, the greater the distance travelled the less support there is for traffic enforcement. Similarly, as the number of previous crash involvements for each driver (property damage or injury crashes) increases, support for enforcement decreases.

A distinct ESCAPE project based on the same data as that examining general attitudes of European drivers towards the enforcement of traffic regulations also provides valuable information on attitudes towards speed enforcement (Cauzard and Quimby, 2000b). Drivers who reported being unconcerned by road crashes were also found to be more likely to oppose increased levels of enforcement or more severe penalties. The attitude of these drivers to speed enforcement was also negative. These drivers were found to have received more penalty notices for speeding offences in the previous three years than other drivers, were in favour higher speed limits, expected to encounter speed enforcement fairly often and were more likely to warn other drivers of speed enforcement ahead on the road. Those drivers expressing more positive views towards speed enforcement expressed contrasting views to those drivers discussed above. That is, they were more likely to accept current speed limits, did not expect to encounter speed enforcement frequently and were less likely to warn other drivers of speeds enforcement ahead on the road. Further, this group of drivers were unlikely to have received a penalty notice for a speeding offence in the previous three years.

5.2. SUMMARY AND CONTROVERSIES

The European research indicates that females are more accepting of all forms of enforcement than males. Other factors contributing to attitudes towards enforcement include age and exposure. That is, older drivers and those who drive less frequently are more likely to be supportive of enforcement than younger drivers and those who drive more frequently. Further, those drivers who are unconcerned by vehicle crashes, are more

likely to have received a speeding infringement in the previous three years and express anti-enforcement or pro-speed attitudes.

The research discussed above indicates that attitudes towards enforcement in Europe are similar to those expressed in the other jurisdictions examined, with a not insignificant minority of drivers expressing disapproval of automated speed enforcement. However, there is little literature concerning the specific controversies surrounding speed camera use in European countries.

6. DISCUSSION AND CONCLUSION

The examination of public attitudes towards the use of speed cameras as an automated enforcement tool has highlighted a number of common controversies associated with speed camera use across jurisdictions. Table 2 below synthesises the information presented in each of the previous sections and presents the controversies identified across the jurisdictions according to Goldenbeld's four dilemma.

Table 2. Controversies associated with speed camera use in each of the jurisdictions grouped according to Goldenbeld's dilemma classifications.

	JURISDICTION		
	Australia	US and Canada	Great Britain
Credibility Dilemma	• Dual perceived role of revenue raising and road safety. • Hypothecation of revenue for exclusive use in road safety. • Total revenue from speed cameras is excessive. • Inappropriate location of speed cameras in areas where it is "safe" to speed. • Overt operation of cameras is most effective in deterring speeders at unsafe locations.	• Perceptions of speed cameras as primarily revenue raising mechanisms. • Speed cameras are seen to be located on the most "lucrative" routes. • Inappropriate location of speed cameras in areas where it is "safe" to speed.	• Dual perceived role of revenue raising and road safety. • Increasing fines after implementation leads to perceptions of a stealth tax. • Overt operation of cameras is most effective in deterring speeders at unsafe locations.
Social Dilemma	• Belief that speeding slightly in excess of the limit is not associated with increased crash risk if otherwise driving safely. • Ambivalent support for reduced enforcement tolerances.	• Belief that speeding slightly in excess of the limit is not associated with increased crash risk if otherwise driving safely.	• Belief that speeding slightly in excess of the limit is not associated with increased crash risk if otherwise driving safely.

Legitimacy Dilemma	• No opportunity afforded to explain circumstances of the event. • Penalties for exceeding a speed limit by <= 10 km/h are less fair than those for exceeding the limit by more than 10 km/h.	• No opportunity afforded to explain circumstances of the event. • Automated enforcement does not identify the driver of the vehicle. • There is a delay in notification of the offence to the driver. • The process does not enable witnesses to verify the circumstances of the offences.	• The level of the enforcement tolerance is important in forming public opinion about the fairness of the measure. • Automated enforcement is perceived as an infringement of civil liberties. • Speed limits should be reviewed prior to strict enforcement to ensure that enforcement is fair.
Implementation Dilemma	• The reliability of speed cameras is brought into question when individual cameras prove faulty. • Speedometers may not be sufficiently accurate to keep detected speed within enforcement tolerances.	• Diversion of police resources away from more serious criminal offences • Reductions in road trauma are not seen to compensate for slower travel speeds.	• Review and appropriate setting of speed limits for the conditions.

In view of the controversies associated with previous or existing speed camera programs detailed above it is useful to examine key risk management strategies used to minimise negative perception of speed camera programs. Although there is little literature detailing the precise mechanisms used to manage public attitudes, elements of the speed camera programs themselves suggest some approaches directed at each of the dilemma. An example of each of these is presented below.

A credibility dilemma apparent in Australia is the direction of speed camera revenue to government, consolidated revenue. The partnership approach adopted in Great Britain and the hypothecation of speed camera revenue for use in road safety may be a mechanism through which this dilemma can be addressed in Australia. The exact impact of such a measure on overall approval for a speed camera program is unknown, however, it is expected that this would diminish perceptions of the dual role of speed enforcement.

Common to all jurisdictions is the use of media advertising and publicity in conjunction with speed camera programs. Advertising campaigns may be specific to individual speed camera programs or focus on road safety messages. The belief that speeding slightly in excess of the limit is not associated with increased crash risk if otherwise driving safely is a social dilemma that may be addressed through appropriate media campaigns. Campaigns highlighting the reduced crash and injury risk associated with lower speeds may target the social dilemma by raising awareness of the proven relationship between speed and injury risk.

The experience of the Victorian speed camera program demonstrates the importance of addressing potential implementation dilemmas. During the early years of the program there was an absence of controversies relating to implementation dilemmas. However, in recent times faulty fixed speed cameras and reduced enforcement thresholds have generated concern about the accuracy of cameras and the ability of vehicle speedometers to correctly measure speeds. Rigorous, systematic quality checks and the setting of appropriate enforcement thresholds are key mechanisms aimed at addressing these dilemmas.

The legitimacy dilemmas identified differ somewhat from jurisdiction to jurisdiction although common themes relating to the inability of the driver to explain the circumstances of the offence exist. It is not apparent from the elements of the various speed camera programs that particular action has been taken to minimise these concerns.

The discussion above focuses on a few key controversies and approaches for addressing them. However, the analysis of the long running Victorian speed camera program in Section 3.1 demonstrates that the controversies associated with speed camera use are not stagnant. Rather, as a speed camera program develops new controversies arise. Given the road safety benefits associated with speed camera programs it is important that any new controversies are appropriately addressed.

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APPENDIX A: HANDBOOK SUMMARY

Prior to the start of the pilots a handbook was developed which gives guidance about how the cost recovery system should operate. As the pilots progressed, and more was learned about best practice, this guidance has been strengthened. These are summarised in the table below.

Guidelines for pilot areas	Current guidelines for national rollout
1. The effects on speed and casualties must be monitored	
Camera sites must be located where there is a history of speed related accidents. Cameras cannot be located for political and / or revenue generating purposes. All sites must be monitored for before and after speeds in areas where the cameras are operating.	Prior to approval, partnerships must prioritise sites and have quantified evidence that those selected have the greatest casualty problems. Broadly, these should follow the guidelines in Table 10 below although there is some flexibility. In total, enforcement should aim to cover at least 10% of KSIs in an area and ideally more. Partnerships must collect data on child and pedestrian casualties and hospital bed data. Partnerships must have conducted speed surveys in advance of case approval to demonstrate that excess speed is a problem at the priority sites.
2. PUBLIC PERCEPTION MUST BE ACTIVELY MANAGED	
All areas have to produce a robust strategy as to how they are handling local education and communication issues	All partnerships are required to have a dedicated communications manager. The cameras should be well signed and highly visible. The location of the cameras should be published in local papers, local radio and on web-sites.
3. Partnerships must include all relevant local organisations	
Partnerships must include police, highway's authorities and magistrates' courts. All parties must sign up to a Service Level Agreement – this committed each partnership at a senior level for the duration of the project.	Should also involve local health authority, CPS and Highways Agency. Each partnership should have a dedicated project manager. All local authorities in an area should be part of the partnership.
4. Financial protocols	
All capital and revenue expenditure has to be directly attributable to *additional* speed and red-light camera enforcement – these were detailed in a handbook which set out the rules of the system Each partnership had a treasurer who kept the accounts	*All* costs attributable to speed and red-light cameras are recoverable rather than additional costs. No change.

Guidelines for pilot areas	Current guidelines for national rollout
Partners were paid on the basis of receipts for expenditure incurred.	No change.
At the end of the financial year, these accounts were audited by the District Auditor against rules set out by the Audit Commission (for England and Wales - Accounts Commission in Scotland)	No change. Revised guidelines are produced in conjunction with the Audit Commission (and Accounts Commission) following the end of year audit.
Failure to receive a clear audit certificate would result in the privilege to 'net off' receipts' to be withdrawn.	No change.
5. Benchmarking	
Partnerships should produce benchmark costs that proved that unit costs are reducing	Partnerships must compare favourably in efficiency with existing partnerships before being accepted on to the system. The use of new technology to reduce manual processes and, in particular, police intervention is encouraged. Chasing non-payers and making out of force enquiries is mandatory.
6. Signing and visibility	
Partnerships ensured that signing arrangements comply with Traffic Signs Regulations and General Directions appropriate for various circumstances.	Fixed speed camera housings in all but exceptional circumstances should be yellow. All camera housings (existing and new) should be visible to road users and not hidden behind bridges, signs, trees or bushes. The minimum visibility distance should be 60 metres where the speed limit is 40 mph or less and 100 metres for all other limits. For mobile cameras, camera operatives at the mobile camera sites should wear fluorescent clothing and abide by all Health and Safety requirements, and vehicles should be clearly marked as camera enforcement vehicles. Camera warning and speed limit reminder signs must be placed in advance of fixed or mobile speed enforcement taking place. Ideally these should be placed within 1 km of fixed camera housings and at the beginning of a targeted route for mobile enforcement sites. Signs must only be placed in areas where camera housings are present or along routes where mobile enforcement will be targeted.

Source: Gains et al (2003)