Speed Cameras: The Case in Favour

Speed cameras have become a topic of considerable controversy in recent months. This contribution to the debate takes as axiomatic the following premises. First, there is a strong link between speed and accident frequency and severity. Second, speed cameras are a successful (and empirically verifiable) method of reducing accidents and incidents on our roads. Third, cameras and their usage need to be seen in the wider context of speed management within which they will play a key part.

In any discussion about action taken to reduce speed-related crashes and injuries, it is important from the outset to have a clear definition of terms. In this paper, I will use two distinct definitions of speeding. The first, *excess speeding*, is speeding above the posted speed limit. The second, *inappropriate speeding*, is driving too fast for the conditions. To give an example of the latter, while it may be perfectly legal to drive at 30mph in an urban area, that choice of speed may be wholly inappropriate when children are arriving or leaving a school. Similarly, 70mph on a motorway may be legal but in thick fog is also likely to be suicidal. It is my contention that the use of speed cameras is an effective intervention in dealing with excess speeding – and, more specifically with *excessive speeding* (defined as driving 15mph or more above the posted speed limit). However, I also recognise that cameras, designed to be activated at speeds above the posted speed limit in order to satisfy police enforcement guidelines, will not catch drivers driving at inappropriate speeds for the conditions in which they find themselves.

Why should we take action on speeding? One reason is the clear link between speed and accident severity, especially involving vulnerable road users. Research undertaken by Ashton and Mackay (1979) showed very clearly the link between speed and injury severity:

> The impact speed distributions are dependent on the severities of injuries considered. The 50%ile impact speed for all severities of injury is between 20-25kmh. If, however, only non-minor injuries are counted, the 50%ile impact speed rises to approximately 35kmh, and if only fatalities are considered, to 50kmh. The corresponding 90%ile impact speeds are, for all injuries 40kmh, for non-minor injuries 50kmh and for fatalities 65kmh.

Taking action to reduce speeding is therefore essential to improve vulnerable road user safety, most notably in urban areas where the majority of crashes involving this road user group occur. In terms of severity of injury, the change from predominantly survivable injuries to predominantly fatal injuries takes place between 50 and 60kmh.

In addition, the risk and severity of injury to car occupants as impact speed rises should not be overlooked. The work of Hobbs and Mills (1984), summarised in DETR (2000), showed the probability of injury related to impact severity for belted front seat occupants in frontal impacts. At 30mph the risk of serious injury (MAIS 3 and above) to a belted car occupant in a front seat is three times greater than at 20mph and at 40mph five times greater. Reducing speeds therefore will improve the chances of survival for both those outside and inside the vehicle.

There is also a considerable body of research into the link between speed choice and accident involvement. Webster and Wells (2000) concluded that

a) more speeders are younger males, in non-manual occupations

b) company car drivers and drivers covering high annual mileages are more likely to drive faster, as are drivers travelling alone and
c) faster drivers tend to be in the younger age bracket: about 40 years of age being the transition when drivers become "less likely" to speed.

This complemented the comprehensive review by Taylor, Lynam and Baruya (2000) looking at the effects of drivers' speed on the frequency of road accidents. The starting point of this research was to substantiate the positive relationship identified in 1994 (Finch et al.) between changes in speed and accidents. This research suggested that a change of 5% in accidents was associated with a 1 mile/h change in average speed. Taylor rightly concludes that the task of understanding the impact of speed on road safety is a complex one. In the context of urban roads, therefore, it is important to look at both the average speed of traffic and the spread of speeds.

The report is a detailed survey of both road-based and driver-based studies. It looks at data available for specific road sections together with traffic and pedestrian flows and details of the road layout. It also analyses individual driver data, with over 10,000 individual drivers completing questionnaires. As a result of this, the 1 mile/h – 5% change in accidents link is concluded to be a robust *general* rule although the reduction achievable will vary according to road type and average traffic speed. Specifically, it is

- about 6% for urban roads with low average speeds
- about 4% for medium speed urban roads and lower speed rural main roads
- about 3% for higher speed urban roads and rural main roads.

The greatest potential for accident reduction in urban areas is therefore on those roads with low average speeds. These roads are typically busy main roads with high levels of pedestrian activity, wide variations in speeds and high accident frequencies. Speed enforcement on such roads, through whatever means might be appropriate, would be likely to bring the greatest benefits.

Taylor also highlights two other findings from road-based studies. The first is that the accident frequency on urban classified roads rises with the increasing proportions of drivers exceeding the limit. The second is that the accident frequency on urban classified roads rises with mean excess speed. An increase of 1 mile/h in the mean *excess* speed – if all else is held constant - would be expected to result in an increase of 19% in accidents. This figure should be compared with the range of accident savings achieved if *overall* mean speed is altered (5-7% reductions per 1 mile/h change). This leads her to conclude that targeting excessive speed may well bring greater benefits than attempts to influence the speeds of all drivers. Speed cameras are effective (as we shall see later) in reducing the speeds of the fastest drivers.

The final area that must be noted is the link between excess speeding and accident involvement. Here the work of Stradling (2003) is important. This study, undertaken for the Scottish Executive, looked at speed choice, crash involvement and speeding infringements. From a questionnaire study of over 1000 Scottish car drivers, Stradling found that 21% of drivers who had ever been stopped by the police for speeding or had been flashed by a speed camera in the past three years also reported having been involved in a Road Traffic Accident compared to 11% of drivers who had not been detected speeding.

A substantial body of research therefore concludes that there is a link between speed and severity of accidents, that the choice of speed by the driver can contribute to the likelihood of

crash involvement, and that those more likely to speed are more likely to be involved in a crash. The question, therefore, becomes: what are the most effective ways of reducing speed related crashes?

According to Winnett (1994), the first enforcement camera used in the United Kingdom was in 1987 in Nottingham to identify drivers committing red traffic signal infringements at a road junction. Two further traffic signal sites in West London were fitted with cameras in February 1989, resulting in 1000 successful cases of prosecution by June of the same year. The first speed camera was installed on the Twickenham Bridge towards the end of 1990.

A key change to the practicalities of enforcement came through the Road Traffic Act 1991. This extended the powers available to the police for the detection of speeding offenders by allowing a photograph of the speeding offence to be used in court as evidence of the offence uncorroborated by a police officer at the scene. The Home Office Circular 38/92, explaining the legislation, made very clear that the objective of the use of new technology was to improve road safety (quoted in CSS, 1993).

The most significant early trial of cameras is the West London Speed Camera Demonstration Project (Highways Agency 1997). This looked at the installation of 21 speed cameras on the trunk road network and at two periods of 36 months before and after installation. The use of control data for accident levels on comparable roads in the same area led to the conclusion that all accidents had fallen by 12.3% on the trunk road camera network of which about 8.9% was a direct outcome of the presence of cameras. More specifically, in terms of fatal accidents, a decrease of 69.4% was recorded. When tested against the control data, a reduction of 55.7% was indicated to have been directly attributable to the presence of cameras.

The first evaluation of the use of traffic light and speed cameras at national level is reported in Hooke, Knox and Portas (1996). This looked at ten police force areas using 102 cameras servicing more than 700 sites (475 speed cameras and 254 traffic light cameras). In terms of the costs of speed cameras, information was collected on both the fixed costs associated with installation and the recurrent costs of operation. The average fixed cost per site was £12.500 and average recurrent costs were just over £8,500 per annum. Benefits identified were that accidents fell by 28% at speed cameras or by 1.25 accidents per site per year and that speeds were reduced by an average of 4.2mph per site. The conclusion was that the investment of £5.3m to install speed cameras *generated a return of five times this amount* in terms of casualty prevention after one year and more than 25 times the amount after five years.

Although this report identified the potential road safety benefits arising from the use of cameras, the major problem for further expansion was lack of finance. As the research paper evaluating the two year pilot points out (DfT, 2003), camera costs were borne by local authorities and police forces until HM Treasury agreed to allow netting-off from fine receipts to fund additional camera activity, since this would help to achieve government policies to reduce road casualties, and the Vehicles (Crime) Act made these payments possible.

It is the extension of camera usage that has proved to be controversial. Critics of cameras have suggested that an over-emphasis has been placed on cameras to reduce casualties. Supporters have argued that the experience of the United Kingdom since the setting of the first target for road casualty reduction in 1987 suggests that a programme based on a mixture of education, engineering, enforcement and evaluation is the most likely to bring long-term sustainable results.

The second evaluation report published by DfT (2003) reported a reduction of 35% in numbers of people killed or seriously injured at the camera sites during the first two years compared to the long-term trend. Of equal significance, bearing in mind the link between speed choice and accident involvement outlined above, is the virtual elimination of excessive speeding which has fallen by 96% at fixed camera sites and by 55% at mobile sites. As Corbett (1997) points out, fast drivers would decrease the frequency of their speeding if the risk of being caught were to be increased. This appears to be the case in the pilot areas.

Corbett also suggests that the effect of cameras will be different for different sub-groups of drivers. She identifies four main groups and their responses:

- Conformers – drivers who always or nearly always comply with speed limits
- Deterred – drivers who have reduced their speed since cameras were installed
- Manipulators – drivers who slow down to pass the camera box and then accelerate away from it
- Defiers – drivers who have not reduced their excess speed since the arrival of cameras.

The last two categories are of particular interest to road safety policy makers. They are more likely to be violators and to be involved in road crashes. It is the amendment of both their behaviour and their attitudes that is likely to lead to safer roads for all classes of road user.

At the same time, the wider culture of road use can have an effect on levels of compliance. Evidence from Kuwait (Ali et al, reported in Webster, 2000) points out that cameras had no effect on the "undisciplined driving environment of the oil rich nations of the Middle East". Reliance on automatic cameras alone to reduce traffic violations in an environment characterised by poor driving behaviour, piecemeal driver education and inadequate law enforcement by dedicated officers is unlikely to be effective.

However, other international experience complements the casualty reductions in the United Kingdom. Collating international data, a report by the OECD (2003) pointed to a 50% reduction in casualties at camera locations across Europe and reductions of 22% in New South Wales, 30% in all crashes on urban arterials in Victoria and 34% in fatal crashes in Queensland in addition to the reduction of 35% in killed and serious injuries at camera sites in the UK.

Obviously, I do not wish to suggest that other measures are without benefit. Winnett and Wheeler (2002) conclude that vehicle-activated signs appear to be very effective in reducing speeds because they can be operated at thresholds well below normal police enforcement levels and because they can be placed in road contexts where cameras would not be justified under the current criteria such as junctions on single carriageway roads with a 60mph speed limit. Meadows (2003), in an evaluation of the speed awareness course run by Lancashire County Council, points to a positive impact of the course on drivers' attitude to speed and to self-report measures of violating behaviour. It would appear that both education and engineering have a part to play in speed reduction.

With any policy, it is always necessary to assess both the effectiveness and appropriateness of its application. The government has set criteria for the siting and operation of safety cameras and these should be monitored. In addition, given the body of research referred to above, it would be hard for anyone to deny the link between speed choice and accident involvement. The comprehensive approach to speed management set out in the MASTER (*Managing*

Speeds of Traffic on European Roads, European Commission, 1999) is central to this discussion. The final report includes an analysis of all the means available to reduce speed on a variety of road types. On automated speed enforcement, it concludes that cameras reduce speeding but that the impact is limited in time and space and that the effect can be improved by installing a number of camera boxes along the road. The effectiveness of the digital SPECS system in Nottingham city, using digital cameras to enforce a speed limit across a section of road, bears out the truth of this conclusion.

In conclusion, cameras have a place to play in a policy of speed management. Their effectiveness is likely to be site or area specific. They will need to be accompanied by educational and advertising campaigns to ensure that the benefits of cameras are made clear to all road users. The evidence from the first two years of the pilot projects is that they are successful in reducing deaths and injuries where they are installed. To suggest otherwise would appear to fly in the face of both research and reality.

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