

Speed Cameras – The Case Against

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June 2004. Version 1.1

*"Mr Garvin explained: "I actually believe in casualty reduction and trying to make the roads safer but, having looked at the accident statistics in this area, we find that if you break down the 1,900 collisions we have each year only **three per cent involve cars that are exceeding the speed limit**. Just 60 accidents per year involve vehicles exceeding the speed limit.*

"You then need to look at causes of these 60 accidents. Speed may be a factor in the background but the actual cause of the accident invariably is drink-driving or drug-driving. Drug-taking is becoming more of a problem. In 40 per cent of fatal road accidents in this area one or more of the people involved have drugs in their system."

*Many accidents were caused by fatigue, although one of the most common causes of crashes was the failure of drivers to watch out for oncoming vehicles when turning right. **"The cause of accidents is clearly something different than exceeding the speed limit and we ought to be looking at those other factors,"** Mr Garvin said." - Chief Constable of Durham, Paul Garvin, reported in The Daily Telegraph, 7th December 2003.*



Safe Speed. You can't measure safe driving in miles per hour.

Introduction

The way that speed cameras have been introduced to British roads has been shoddy in the extreme. There have been no proper trials of their effectiveness as a blackspot treatment, no investigation of their possible side effects and precious little thought about their overall effects on our worthy but fragile road safety systems.

Yet politicians, campaigners, so-called scientists and others have been keen to jump on the speed camera bandwagon and tell us that it is all for our own good – based on little more than blind faith and an oversimplified assessment of reality.

And now the country is infested with cameras. The number of speed camera fines is doubling every 3 years, yet roads fatalities are not falling at all. We have every right to expect roads fatalities to fall without assistance from government policy because both vehicle engineering and medical care are improving at a considerable pace and making similar crashes more survivable every year. These improvements in medical care and vehicle engineering are much larger than the growth in traffic.

In this document we will show how and why we believe that bad road safety policy, based on speed cameras, is actually making drivers less effective at avoiding accidents - to the dangerous extent of entirely negating the engineering and medical care improvements that we are receiving.

Sections are:

- 1) Getting to the bottom of “Speed”**
- 2) False and misleading data**
- 3) The truth about speed and accidents**
- 4) Speed camera effects**
- 5) Road safety results**
- 6) Conclusions**
- 7) Author details**

1) Getting to the bottom of speed.

Cars can be driven perfectly safely without reference to a speedometer. In fact no speedometer and no speed limit can advise a driver that a speed is safe or appropriate in the immediate circumstances. ^[1]

Choosing a safe and appropriate speed for the immediate circumstances is an absolutely fundamental component of our road safety system.

“Speeding” (exceeding a posted speed limit) is extremely commonplace ^[2], yet we have earned ourselves in the UK the safest roads in the World.

Of the accidents that do take place, very few are actually caused or contributed to by “normal motorists” exceeding a speed limit. ^[3]

The majority of normal motorists do not exceed speed limits carelessly or selfishly, instead they exceed speed limits as a side effect of their skill and responsibility at setting an appropriate speed for the circumstances. ^[4]

The Police routinely train their drivers on public roads at speeds of over 125mph. They do not do this lightly. They do it because they know full well that such speeds in the right circumstances are perfectly safe.

The clear and certain conclusion is that rigid observance of a speed limit is not an important part of the British road safety system that delivers the safest roads in the World. Instead, our road safety depends on speeds selected by road users as being safe and appropriate for the immediate circumstances.

A review of the Driving Standards Agency’s hazard perception test videos ^[5] provides a very clear indication of the ways that conflicts and accidents are routinely avoided on our roads. When there is a hazard ahead our drivers reduce speed to negotiate the hazard safely.

The sort of speed that delivers safety on the roads is not the same sort of speed that we seek to measure in miles per hour. An assumption that these sorts of speed are similar is the most fundamental flaw underlying the entire concept of improving road safety with speed cameras.

We define these sorts of speed as follows:

Appropriate speed is a speed chosen by a driver as safe and appropriate for the immediate circumstances. We say that a driver uses “safe speed behaviour” as a mental process that enables him to set such appropriate speeds by reference to circumstances and the rule that he “should always be able to stop within the distance that he knows to be clear”. Failure to observe this rule always creates immediate danger.

Numerical speed is specified by speed limits and measured by speedometers. In most practical circumstances numerical speed cannot tell us anything at all about the degree of danger. Most of our towns are covered

by a 30mph speed limit, yet 30mph is a deadly speed. If a driver chose to set his speed at 30mph regardless of hazards ahead he would not last a day before he had an accident.

Our modern road safety system, with a high degree of emphasis on numerical speed, is sending some very dangerous messages indeed to road users everywhere. It says:

- ***If you are not exceeding the speed limit, your speed is safe.***
- ***Your primary duty to road safety is to keep to the speed limits.***

It is obvious to us that the high degree of emphasis on numerical speed sends false and misleading messages to road users, and that false messages will make road users less able and less effective at avoiding accidents.

References

- [1] <http://www.safespeed.org.uk/backgound.html>
- [2] DfT: VSGB 2003
- [3] DfT figures discussed and referenced from:
<http://www.safespeed.org.uk/pr110.html> and
<http://www.safespeed.org.uk/pr112.html>
- [4] <http://www.safespeed.org.uk/why.html>
- [5] DSA Roadsense hazard perception DVD. ISBN 0-11-552494-0

2) False and misleading data

Most, if not all, of the data used to support the introduction and expansion of speed cameras onto British roads is false, misleading, inadequate or just plain wrong. ^[1]

It is beyond the scope of this document to detail every instance of false or misleading data, so instead we will explain some common errors and refer to some of the big headline claims.

The “one third lie”. ^[1]

For almost a decade the Government has been claiming that “one third of accidents are caused by speed”. This absurd claim has no foundation in scientific fact, although the TRL have disgraced themselves by attempting to justify it in print. ^[2] The truth is that a very small percentage of accidents are caused or contributed to by speed in excess of a speed limit. ^[3]

The “one mph lie”. ^[1]

Utterly absurd and blatantly false “scientific research” claims to observe that for every one mph reduction in average traffic speed we should expect to see a 5% reduction in accidents. These conclusions are contained within TRL421 ^[4] and its stable mate TRL511. ^[5]

The most basic flaw in these two studies is to make claims based on the idea that the (supposedly) observed relationship between speed and accidents is a causal one without establishing causality. ^[6] We find this leap of faith to be extremely revealing about the motivations of the authors, and had cause to write to the Chief Executive of the TRL to complain. ^[7]

But the errors and leaps of faith do not stop there. In addition we have some bizarre and meaningless subsidiary claims and a methodological flaw so fundamental that no “relationship” could possibly have been observed using the methods selected.

1) The report claims to have classified roads and by comparing accident rates with proportions of speeding on similar roads a relationship is revealed. Well, no. If the roads were genuinely similar then traffic speeds would have to be similar given that we only have one population of drivers. So there can be no valid comparison data available to put into the model. Any road that is driven at a different speed must appear different to the drivers.

2) The report makes a subsidiary claim that (for a given road type) the greater the proportion of speeders the higher the accident rate. So that leads us immediately to an easy and effective road safety improvement. If we set all speed limits to 600mph the number of speeders must reduce and the accident rate must fall.

3) There is also a massive problem with "average speed". Suppose we have 99 drivers at 35mph and one highly dangerous nutter at 90mph. We might measure the accident risk of the nutter, but altering the speed of the 99 drivers may not be relevant at all.

So we reject TRL421 and TRL511 utterly. They should never have been published.

The 35% lie. ^[1]

In the official report of the "two year pilot" ^[8] the claim is made that accidents have been reduced by 35% at speed camera site relative to long term trend.

The document is also a travesty of science. We wrote to the author. ^[9] The headline claim is completely worthless. No conclusion about camera effectiveness can be drawn from the report because insufficient data is available to eliminate massive error sources. The only useful conclusion that can be drawn is that the authors of the report should not be trusted.

The headline conclusions are entirely misleading. It is very likely true that 35% fewer accidents occurred at speed camera sites. The question is: Why?

Was it because of the beneficial effects of speed cameras or because of something else? On proper investigation, it is completely clear that all of the following are included within the 35% claim:

- County level regression to the mean benefit illusion
- Site level regression to the mean benefit illusion ^[13]
- Benefit of other (i.e. non camera) safety treatments
- Traffic reductions at camera sites
- Accidents that were too distant from the camera to be affected
- The actual effect of the cameras

Until someone properly puts percentages to all these effects, nothing whatsoever can be concluded about the effectiveness of the cameras from the report. It is highly probable that site level regression to the mean effect is strong enough by itself to produce the entire benefit. The others items are likely to be worth just a few percent each. The actual "benefit" of the cameras is probably negative even at speed camera sites.

Professor Heydecker admitted on the BBC radio show "More or Less" that no regression to the mean compensation had been applied. ^{[10], [11]}

Despite "More or Less" and despite our correspondence, the same authors in the recently published 3rd year report repeated exactly the same serious errors. ^[12] It is extremely hard to believe that these errors were anything less than wilful.

References

- [1] <http://www.safespeed.org.uk/lie.html>
- [2] <http://www.safespeed.org.uk/trlfudge.html>
- [3] <http://www.safespeed.org.uk/pr110.html> and
<http://www.safespeed.org.uk/pr112.html>
- [4] TRL report TRL421, Taylor et al, 2000
- [5] TRL report TRL511, Taylor et al, 2001
- [6] <http://www.safespeed.org.uk/trl421.html>
- [7] <http://www.safespeed.org.uk/trl.html>
- [8] Department for Transport: "A cost recovery system for speed and red-light cameras ~ two year pilot evaluation"
- [9] <http://www.safespeed.org.uk/heydecker.html>
- [10] <http://www.safespeed.org.uk/moreorless.html>
- [11] <http://www.safespeed.org.uk/moreorless.mp3> (audio recording 4.5MB)
- [12] Department for Transport: "The national safety camera programme - Three-year evaluation report"
- [13] <http://www.safespeed.org.uk/rttm.html>

3) The Truth About Speed and Accidents

We all know very well that if you “drive too fast” your risk of crashing is greatly increased. So is that what happens on the road to cause accidents?

Firstly we know from long experience and the recommendations of traffic engineers that the vast majority of drivers do not normally drive too fast. In fact, over the last 30 or more years the principal method of setting speed limits around the World has involved observing drivers and setting the speed limit at or around the speed “not exceeded by” 85% of drivers in clear conditions on that road. ^[1] This is a strong and positive recognition of:

- a) the general safe and appropriate behaviour of the majority of drivers and
- b) the ability of drivers to observe the road conditions and select an appropriate speed.

Accident frequency data

With 32 million drivers and 250,000 injury accidents each year, the average driver goes 128 years between injury accidents. If “speeding” accounts for 3.75% of accidents ^[2] our average driver goes over 3,400 years between speeding related injury accidents. Much of the time, our average driver will be exceeding the speed limit. ^[3] Yet if his speed were truly inappropriate for the conditions he would be unlikely to last a week without a crash.

It follows directly that speeding behaviour present every day is extremely unlikely to distinguish an event that takes place once in 3,400 years. (1.2 million days)

Accident severity data

In the real world there are a few ways of implying average accident severity within speed limit zones, or across the whole road network. We soon find that average impacts are a very long way away from the “assumed” model of crashes taking place at speed limit speed or above.

1) If we normalise impact speed (more precisely crash delta v) to 30mph applied across the number of car drivers who crashed in 2002 we find that we would have expected the actual number of car driver deaths to be 42 times greater than it actually was. Since 30mph is just about the lowest speed in widespread use on British roads, it follows that “something” intervenes and reduces impact speed very significantly.^[4]

2) If we estimate the number of child pedestrians who were NOT killed in incidents involving drivers who exceed the speed limit we find that 99.92% survived while Ashton and Mackay 1979 warns us to expect that over 50% would die. Again it follows that “something” intervenes to reduce the severity of the accident outcomes by a factor of over 100. ^[5]

3) If we compare ratios of accident severity we find a surprising “log” scale of severity. This scale is well known to health and safety people who sometimes describe it as the “risk triangle”. In our judgement it is impossible to recreate the log ratios observed with a physics model of accident causation or severity. Instead, one needs a psychological model of accident causation where degree of road user error maps to severity of outcome.^[6]

4) If we compare ratios of accident severity by speed limit zone we cannot find the predicted 4th power relationship of speed and probability of death. Instead we find an under-linear relationship. Although accident severities in higher speed limit zones do tend to increase, they do not show the degree of increase that would be predicted by a physics model.^[7]

5) Since we know that near misses outnumber accidents by a ratio of between 5:1 and 30:1, it follows that the average impact speed of an incident is a small fraction of free travelling speed. For example, if nine out of ten incidents are mitigated to near misses, and the tenth takes place at free travelling speed, we know that the average impact speed is just one tenth of free travelling speed.

These five views of the real world data all point to one absolutely inescapable conclusion. Potential accidents on our roads are mitigated in severity by road user response to danger. We slow down in the presence of hazards, and we brake before impact. These behaviours are absolutely fundamental to the way our road safety systems work. We entirely depend on them to save hundreds of thousands of lives each year on the roads.

The speed limit and the speed of vehicles in miles per hour is a far smaller factor to the point that it approaches complete insignificance.

None of the above examples have removed “reckless behaviours” from consideration. But “reckless behaviours” play an important part in some real world excessive speed crashes. It should be no surprise that a joyrider in a stolen car pursued by Police at 80mph through town is quite likely to kill or to be killed. Such behaviours are comparatively commonplace and distort the averages.

References:

- [1] <http://www.safespeed.org.uk/speedlimits.html>
- [2] <http://www.safespeed.org.uk/pr110.html>
- [3] <http://www.safespeed.org.uk/pr120.html>
- [4] <http://www.safespeed.org.uk/12mph.html>
- [5] <http://www.safespeed.org.uk/proof.html>
- [6] <http://www.safespeed.org.uk/ten.html>
- [7] <http://www.safespeed.org.uk/percentages.html>

4) Speed camera effects

Speed cameras have not changed drivers' speeding behaviour much or even at all after a decade. This is amazing considering the number of fines. We believe that drivers' apparent determination to speed reveals their determination to select an appropriate speed according to the conditions. Far from being a problem, this is a vital road safety behaviour. ^[1]

But speed camera effects are not limited to altering vehicle speeds. They also have a huge range of side effects. We maintain an 18 point list of ways in which speed cameras can have a negative influence on our road safety systems. ^[2]

Some of these negative effects bear directly on the process of safe driving. For example, drivers are very likely indeed to pay extra attention to their speedometers ^[3], and to the possibility of a speed camera around the next bend. Attention given to speed cameras and additional attention given to the speedometer necessarily implies less attention given to the road ahead.

It is important to recognise that speed cameras alter the way that drivers think. We believe that these alterations in drivers' thought processes are likely to be dangerous. ^[4]

It is beyond the scope of this document to list every effect and mechanism, but further information is available. ^[5] These effects are so wide ranging and so significant that we have dubbed speed cameras "weapons of mass distraction".

References

- [1] <http://www.safespeed.org.uk/why.html>
- [2] <http://www.safespeed.org.uk/dangers.html>
- [3] <http://www.safespeed.org.uk/speedo.html>
- [4] <http://www.safespeed.org.uk/tiger.html>
- [5] <http://www.safespeed.org.uk/effects.html>

5) Road safety results.

From the earliest available data the British roads fatality rate has fallen steadily and reliably. At about the same time that speed cameras were introduced to British roads the fatality rate reductions began to tail off.

Anyone standing in 1993 would have looked at the former trend in the roads fatality rate and predicted that by 2003 road deaths would have reduced to between 2,000 and 2,500 per annum. ^{[1], [2]} Instead we have a serious loss of trend and roads fatalities have been “stuck” at about 3,400. Partial and provisional figures for 2003 appear to indicate a substantial rise in roads fatalities.

The difference between the expected trend and the actual trend through the speed camera decade has been termed “the fatality gap” ^[2] and has yet to receive an official explanation. The fatality gap represents approximately 6,000 lives lost on UK roads over ten years, with a thousand or more lives now lost annually.

The size of the fatality gap is extraordinarily well correlated to the number of fines issued by speed cameras. ^[2]

But simple correlation does not imply causation. In order to work towards establishing that modern speed camera policy may have caused the loss of trend in the fatality rate, we need to consider and perhaps eliminate other potential causes. We have done a lot of work in this area and most of the potential causes can be quickly eliminated with a high degree of confidence. ^{[1], [3]}

Then we need to investigate possible mechanisms whereby speed cameras policy could affect road safety for the worse. There are many. We maintain an 18 point list. ^[4]

It is presently a matter of judgement rather than fact but I am now very certain that the loss of trend has been caused by speed cameras and the policies that support them. The evidence is sufficiently compelling to demand an immediate cessation of all speed camera operations pending a full scientific investigation.

This viewpoint is strongly supported by other observations throughout this document and on the Safe Speed web site. In particular it is worthy to note that we achieved the safest roads in the world without a high degree of emphasis on speed limit compliance and with the vast majority of motorists exceeding the speed limit frequently.

The failure of roads fatalities to show an improvement has finally been recognised by government as a problem. However the government recently falsely claimed that “this effect was present all over Europe”. In truth the UK now shows the poorest rate of road safety improvement of any European

country (for which figures are available), according to the government's own preferred indicator. ^[5]

The recorded data for serious casualties on our roads is behaving very strangely. The interim conclusion must be that the serious accident series is not reliable or suitable for comparison purposes at least until there is a proper explanation of the behaviour. Yet government targets and road safety conclusions are founded almost entirely on the behaviour of the serious accident figures. ^[6]

Finally, it is known that "excessive speed" is recorded more frequently as an accident contributory factor in high severity and particularly in fatal accidents. It follows that the best place to expect to find a benefit from speed cameras where excessive speed accident might have been reduced is in fatal accidents. ^[7] But fatal accidents are not showing any improvement at all.

References

- [1] <http://www.safespeed.org.uk/fatality.html>
- [2] Dr Alan Buckingham 2003, <http://www.safespeed.org.uk/buckingham.pdf>
- [3] <http://www.safespeed.org.uk/effects.html>
- [4] <http://www.safespeed.org.uk/dangers.html>
- [5] <http://www.safespeed.org.uk/pr113.html>
- [6] <http://www.safespeed.org.uk/serious.html>
- [7] <http://www.safespeed.org.uk/problem.html>

6) Conclusions

We have seen how speed cameras are supported only by poor science and false assumptions. We have seen that only a small proportion of accidents are caused or contributed to by normal motorists exceeding a speed limit.

We have seen that road user response to danger is a fundamental component of our road safety system. We have given references that describe a wide range of negative side effects resulting from large scale automated speed enforcement.

And we have seen that our overall road safety results have been far worse in the speed camera decade than anyone would have predicted ten years ago.

It follows directly from the above that:

- a) There is no proper basis for expecting speed cameras to be good for road safety.
- b) There is every reason to expect a range of negative side effects resulting from large scale automated speed enforcement.
- c) We do not have many accidents caused or contributed to by normal motorists exceeding a speed limit – and these are the only accidents that speed cameras can potentially address.
- d) We appear to have forgotten the basic principles that gave us the safest roads in the World in the first place.

Speed cameras are probably the worst road safety idea that we have experienced in the UK. They have caused huge loss of life indirectly and they must all be scrapped immediately. It is most urgent that we return to the sound and proven policies that gave us the safest roads in the World in the first place.

Recommended further reading:

- <http://www.safespeed.org.uk/tiger.html>
- <http://www.safespeed.org.uk/speedo.html>
- <http://www.safespeed.org.uk/hgv40.html>
- <http://www.safespeed.org.uk/roadsafety.html>
- <http://www.safespeed.org.uk/smeed.html>
- <http://www.safespeed.org.uk/rules.html>
- <http://www.safespeed.org.uk/speedlimits.html>

