

26/10/2005. Chapter to be published in *Clumsy Solutions for a Complex World: Governance, Politics and Plural Perceptions*, Marco Verweij and Michael Thompson (eds), Palgrave Macmillan, 2006

The Failure of Seat Belt Legislation¹

John Adams

*Letter to **The Times**, 13 July 1908
from Colonel Willoughby Verner*

Dear Sir,

Before any of your readers may be induced to cut their hedges as suggested by the secretary of the Motor Union they may like to know my experience of having done so.

Four years ago I cut down the hedges and shrubs to a height of 4ft for 30 yards back from the dangerous crossing in this hamlet. The results were twofold: the following summer my garden was smothered with dust caused by fast-driven cars, and the average pace of the passing cars was considerably increased. This was bad enough, but when the culprits secured by the police pleaded that “it was perfectly safe to go fast” because “they could see well at the corner”, I realised that I had made a mistake. Since then I have let my hedges and shrubs grow, and by planting roses and hops have raised a screen 8ft to 10ft high, by which means the garden is sheltered to some degree from the dust and the speed of many passing cars sensibly diminished. For it is perfectly plain that there are a large number of motorists who can only be induced to go at a reasonable speed at cross-roads by consideration for their own personal safety.

Hence the advantage to the public of automatically fostering this spirit as I am now doing. To cut hedges is a direct encouragement to reckless driving.

Your obedient servant, Willoughby Verner

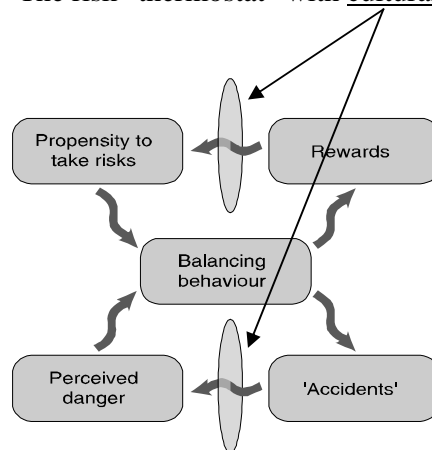
From the earliest days of motoring up to the present day it has been obvious that people modify their behaviour in response to perceived changes in risks to their personal safety. This phenomenon, now widely known as *risk compensation*, seems to most people mere common sense. Figure 1 Illustrates how it works. The model postulates that

- everyone has a propensity to take risks
- this propensity varies from one individual to another
- this propensity is influenced by the potential rewards of risk taking
- perception's of risk are influenced by experience of accident losses - one's own and others'

¹ This is a lightly edited version of chapter 7 in John Adams' book *Risk*, UCL Press (now Routledge) 1995.

- both propensities and perceptions are formed out of information that succeeds in getting through cultural filters
- individual risk taking decisions represent a balancing act in which perceptions of risk are weighed against propensity to take risk
- accident losses are, by definition, a consequence of taking risks; the more risks an individual takes, the greater, on average, will be both the rewards and losses he or she incurs.
- Safety interventions that do not alter the setting of the thermostat (propensity to take risks) will be frustrated by behaviour that seeks to restore the balance to its pre-intervention state.

Figure 1 The risk “thermostat” with cultural filters



About the only area where the idea of risk compensation still meets resistance is in the work of people with a professional interest in safety. This resistance can be found at its strongest in the debate about seat belts. Seat belt legislation provides a classic example of the cultural construction of risk. The strength of convictions about what this legislation has achieved is remarkably independent of objective evidence.

Around the world hundreds of millions of motorists are now obliged by law to belt up. The seat belt law, with minor national variations, probably affects more people than any other single piece of safety legislation. The first seat belt law came into effect in the state of Victoria in Australia in 1970 and by 1991 over 80 jurisdictions world wide had laws compelling drivers and some passengers to wear seat belts (Evans 1985). It is now a “truth” *almost* universally acknowledged that these laws have saved many thousands of lives. It is a “fact” endlessly repeated, not only on television and in the popular press, but in the scientific literature. Seat belts feature routinely in discussions of safety as an example of a measure that yields enormous benefits for minimal cost. The “success” of seat belt legislation in saving large numbers of lives is frequently cited by advocates of other public health measures as an example of the way legislation and regulation can reduce risk.

In a British parliamentary debate about seat belts in 1979 William Rodgers, then Secretary of State for Transport, claimed
“On the best available evidence of accidents in this country - evidence which has not been seriously contested - compulsion could save up to 1000 lives and 10,000 injuries a year” (*Hansard* 22 March).

Although the magnitude of the savings attributed to seat belts around that time varied, the claims made in the scientific literature prior to the passage of the British seat belt law in 1981 were consistently large. A report by the Transport and Road Research Laboratory shortly before the parliamentary debate in 1979 concluded “seat belts reduce deaths of car occupants by at least 40 per cent” (Grime 1979). Hurst, also in 1979 (Hurst 1979, 27-33), more than doubled this estimate: “belt use reduces the chances of fatal injury by about 83 per cent for drivers and about 80 per cent for front seat passengers.” The Royal Society for the Prevention of Accidents produced a campaign pamphlet (Royal Society for the Prevention of Accidents 1981) which claimed that “... for belted occupants the deaths were reduced by 77 per cent in full frontal crashes and 91 per cent in roll overs.” The pamphlet concluded “no other single practical piece of legislation could achieve such dramatic savings of lives and serious injuries.” In the 1981 parliamentary debates which preceded the passage of the law the claim that 1000 lives and 10,000 injuries a year would be saved was repeated frequently, although some influential supporters of the law advanced even larger claims; David Ennals (*Hansard* 13 January, 1981), a former Secretary of State for Health informed Parliament that not wearing a belt increased six-fold a motorist’s chances of being killed in an accident.

Britain and the United States were among the last of the world’s highly motorised countries to implement seat belt laws. Most other countries had done so in the early and mid-seventies. In 1978 in the United States frustrated seat belt campaigners were presenting similar claims for the life saving benefits of a seat belt law to a Congressional Inquiry (DoT 1978).

- “Mandatory safety belt usage ... [holds] the potential to save 89,000 lives on the highways over the next ten years.”
- “The potential for saving lives right now is tremendous with estimates ranging from 10,000 to 20,000 lives a year.”
- “French police have estimated that seat belts have reduced fatalities in France by 63 per cent.”
- “Two separate studies [in Sweden] ... found that seat belts reduced fatalities and serious injuries by 50 to 70 per cent, minor injuries by 20 per cent.”
- “The [German] government estimates that 1700 deaths and 30,000 injuries are prevented annually by the use of seat belts.”
- “Occupant restraints is the largest highway safety issue that we have ever had since the automobile came on the scene. It is more important than the safety aspects of the Interstate, more important than getting drunk drivers off the road. In my opinion, it is the number one issue, and I base that on the profound benefits that can be obtained from occupant restraint.”

By the time of the vote in Parliament in 1981 the seat belt law had acquired an impressive number of influential sponsors: the British Medical Association, the Royal Society for the Prevention of Accidents, the Royal College of Surgeons, the Royal College of Nursing, the Royal Scottish Automobile Club, the Society of Automotive Manufacturers and Traders and the Automobile Association. In the House of Lord's debate Lord Avebury (11 June 1981) offered this list of sponsors as compelling evidence for legislation. "Why, after all," he asked, "would these institutions seek to mislead the public?"

The answer, it appears, is that they misled themselves. At this time none of these institutions appeared to be aware of risk compensation and the possibility that there might be a behavioral response to the compulsory wearing of seat belts. The possibility had not been investigated in any of the studies they cited. Their support for a law rested on two sorts of evidence: the effect of seat belts in crashes, and the effect of legislation in Australia. Britain's Transport and Road Research Laboratory had published a review summarising the available evidence (Grime 1979). It presented abundant evidence that the wearing of a seat belt improves a car occupant's chances of surviving a crash. But it contained a significant caveat; it said that "for direct evidence on death, however, it is necessary to rely on recent Australian data." The Laboratory's review did not mention the possibility of risk compensation. None of the prestigious institutions cited by Lord Avebury, and none of the countries that followed the lead of Victoria in passing a seat belt law, produced any compelling new evidence. The law's supporters all cited the original Australian evidence, or other people citing the Australian evidence, or other people citing other people etc.

There was other direct evidence of the effect of legislation that could have been consulted, but the Laboratory did not explain why it chose to ignore it. This other evidence did not support the claims made for the law and, as we shall see in a moment, Australia was a particularly unfortunate example on which to rest their case. By 1981 there was evidence available from thirteen countries that had passed seat belt laws. Figure 6.1 compares their road accident records with those of a "no-law" group of four countries that had not at that time passed a law. Together these 17 countries constituted an impressive sample; they contained over 80 per cent of the world's car population. The bars on the "law" graph indicate the dates at which seat belt laws were implemented, beginning with Australia and ending with Denmark, West Germany and Switzerland in January 1976. Around this time all 17 countries with the exception of Australia and Spain, experienced marked decreases in their road accident death tolls. *Collectively, the group of countries that had not passed seat belt laws experienced a greater decrease than the group that had passed laws.*

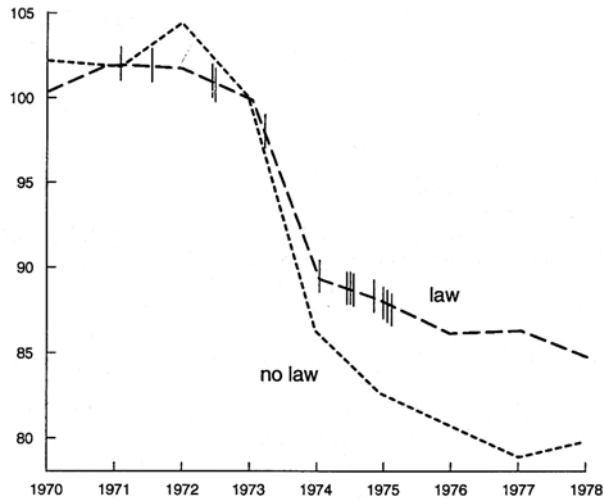


Figure 2 The effect of seat belt legislation. Indices of road accident deaths for countries with seat belt laws and without. Indices are set to 100 in 1973 – the year of the “energy crisis”. Bars indicate the dates at which laws came into effect in the “law” group. Source: (Adams 1982, 2824-38).

The decreases shown in Figure 2 occurred in the aftermath of the 1973/74 energy crisis when the whole world was anxious about the adequacy of energy supplies, and was being subjected to advice about the energy saving benefits of light-footed driving. The country that experienced the greatest decrease in the mid-1970s was Denmark, *before* its law was passed. As can be seen in Figure 3, after its law road deaths increased slightly.

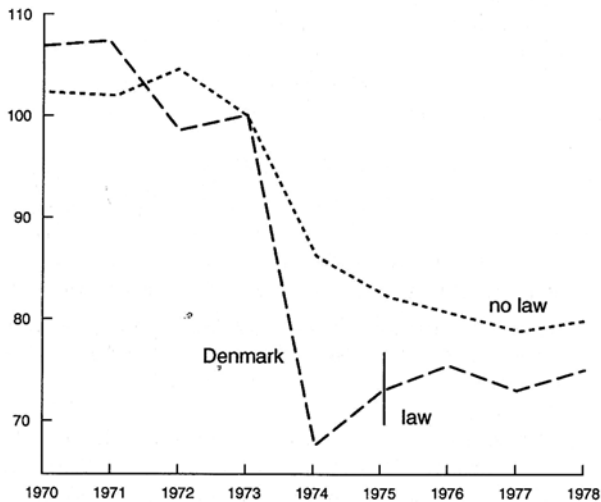


Figure 3 The effect of the seat belt law in Denmark. Source: (Adams 1982, 2824-38).

Australia, the case that provided the main justification for most of the world's seat belt laws, stands out as the country whose road death toll varied the least between 1970 and 1978. The analyses that led to the seat belt claims all assumed that the rising trend of the 1960s would have continued, but for the seat belt law. Figure 6.3 is typical of these analyses. But, as Figure 6.4 shows, Australia when compared with most other countries was exceptional in *not* enjoying a substantial decrease in road accident deaths in the 1970s. Figure 6.3 is interesting for another reason; it also contains the first suggestion that less careful driving by belted motorists might displace risks to other road users, mainly cyclists and pedestrians. Although the evidence summarised in Figures 2 to 5 was available before the British Parliament passed its seat belt law, the Department of Transport continued to insist that the only country whose road accident statistics constituted “direct evidence on death” was Australia, and that this evidence provided compelling support for a British seat belt law.

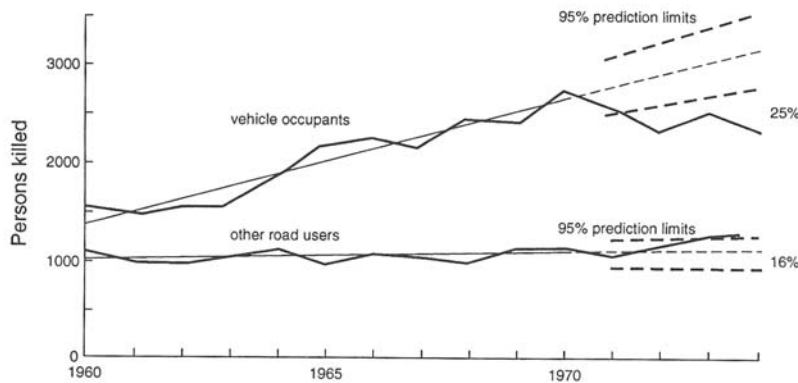


Figure 4 Road accident deaths in Australia; the beginning of the myth of seat belt effectiveness. Source: (Adams 1982, 2824-38).

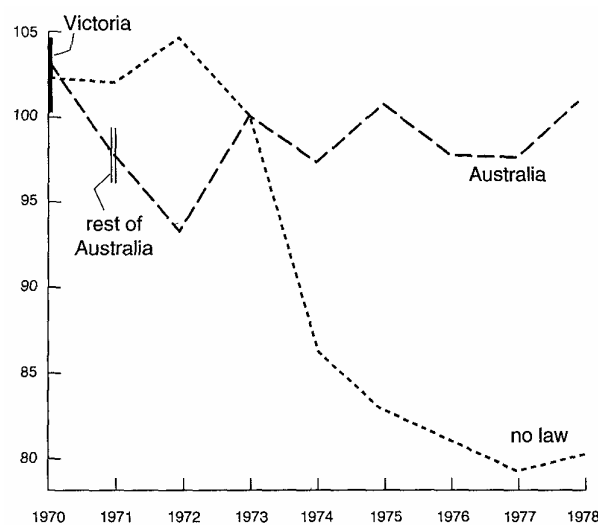


Figure 5 Australia's record compared to that of countries without seat belt laws. Source: (Adams 1982, 2824-38).

Now, over ten years later, with laws having been passed in over 80 jurisdictions one would expect the evidence in support of the claims for seat belt legislation to be voluminous, but oddly it has shrunk dramatically. The claims now all rest on the experience of only one country, the United Kingdom. After surveying the global evidence Evans (1991), in a comprehensive and widely acclaimed book on road safety, reaches the following conclusion:

“The highest precision evaluation is for the UK’s law, where belt use rose rapidly from 40% to 90% in a large population of affected occupants. The law reduced fatalities to drivers and front-seat passengers by 20%. For smaller use rate increases, and for smaller populations (that is, in nearly all other cases), it is not possible to directly measure fatality changes. They can be reliably estimated using an equation based on the known when-used effectiveness of the belts together with a quantification of *selective recruitment* effects² - the tendency of those changing from non-use to use to be safer than average drivers” (p. 278).

In other words, out of the more than 80 jurisdictions with seat belt laws only in the UK, according to Evans, was there a fatality reduction effect that could be measured directly. In all the other jurisdictions the life saving benefits were too small to register in the casualty statistics. (Evans does not name the exceptions to the “*nearly all other cases*” to which he refers, and with respect to the Australian claims he simply says “some estimates now seem to have been clearly too high”; he does not indicate what estimates he would now accept for Australia.) The claims made for seat belt laws in all these other jurisdictions rest on a deduction which *assumes* no risk compensation effect. Evans says “there is no evidence in the literature of measurable user responses to interventions that influence only the outcome of crashes, such as the use of safety belts or motorcycle helmets” (p. 387). (In Chapter 8 of *Risk* I discuss evidence from Evans’ own research that undermines this contention (Adams 1995).)

I do not dispute Evans’ evidence concerning the life-saving benefits of seat belts *if one is in a crash*. The evidence that the use of a seat belt improves a car occupant’s chances of surviving a crash is convincing. That a person travelling at speed inside a hard metal shell will stand a better chance of surviving a crash if he is restrained from rattling about inside the shell is both intuitively obvious and supported by an impressive body of empirical evidence. Evans has calculated that wearing a belt reduces one’s chances of being killed, *if in a crash*, by 41%. He assumes that this benefit has been enjoyed by all those in the 80 plus jurisdictions who belted up in response to a

2.. The evidence referred to by Evans concerning the ‘when-used effectiveness of belts’ is based on crash testing using dummies, and on paired-comparison studies which examine the injuries suffered in crashes when one occupant was belted and another unbelted. ‘Selective recruitment effects’ must be allowed for because the timid and cautious are most likely to belt up voluntarily, while the wild and reckless are most likely to defy a law.

law, and the laws therefore can be given credit for saving large numbers of lives. But it does seem curious that with such a large effect, the only jurisdiction that he feels he can cite with confidence to demonstrate directly measured fatality reductions is the UK.

Doubt was first cast on the international evidence for seat belt laws in a paper of mine in 1981 (Adams 1981); Figures 2 to 5 above were first published in this paper. Britain's Department of Transport commissioned an internal critique of my paper. This critique, entitled *Seat Belt Savings: implications of European statistics* (Isles 1981), concluded that there was no foundation for the Department's oft-repeated claim that a seat belt law would save 1000 lives and 10,000 injuries a year. It found what I had discovered, and what Evans found ten years later in his review of the evidence world wide - that there were no directly measurable reductions in fatalities that could be attributed to seat belt laws. It said

“Available data for eight western European countries which introduced a seat belt law between 1973 and 1976 suggests that it *has not led to a detectable change in road deaths* [my emphasis] ... The results are not compatible with the Department's "1000 plus 10,000" estimates ...”

The author of this report was aware of the risk compensation hypothesis, and hence aware that evidence concerning the effectiveness of seat belts in crashes did not constitute satisfactory evidence about the likely effect of a law compelling people to belt up. He insisted that “international comparisons provide the only information about the effect of compulsory seat belt wearing, both on car occupants and on other road users.” Furthermore this report also noted that in all eight countries, as in Australia, the number of pedestrians injured following the passage of a seat belt law increased. Individually none of the increases was statistically significant, but collectively this result was highly significant.

By the time the report was completed (it was dated 9 April 1981) the Department of Transport was already committed to a seat belt law. The report was suppressed and was not permitted to inform the Parliamentary debate which led, a few months later, to the passage of Britain's first seat belt law. The existence of the suppressed report was revealed by *New Scientist* almost four years later (7 February 1985). A leaked copy of the report has circulated widely since then despite never having been published, and its conclusions were authoritatively, if belatedly, confirmed eight years later by an independent analysis by Janssen (Janssen 1989) which concluded

“Time-series analysis was performed on car driver (and passenger) fatality rates for eight Western-European countries that passed seat belt legislation in the seventies. *There was no discernible effect of seat belt legislation on the fatality rate* [my emphasis].”

Janssen (Janssen 1991) also conducted what is at the time of writing the only experimental test of the hypothesis that seat belt wearing alters driving

behaviour in realistic traffic conditions³. He identified habitual wearers and non-wearers of belts and then, under the guise that they were participating in an experiment concerned with seat belt comfort, had them drive an instrumented car on a circuit including public highways and an off-road obstacle course. The habitual non-wearers drove the circuit belted and unbelted. None of the habitual wearers agreed to drive without a belt and Janssen did not attempt to persuade them. Janssen concluded that his experiment “yielded evidence both for selective recruitment and for adaptation effects in connection with seat belt wearing; [habitual] non-wearers drove faster than [habitual] wearers with the belt on; and [habitual] non-wearers showed a speed increase when they wore a belt.” Other studies have attempted to measure differences in the driving behaviour of belted and unbelted motorists in traffic, but none of them constitutes a valid test of risk compensation. In none of these other studies were potential risk compensation effects separated from selective recruitment effects, with the result that they are all inconclusive - the risk compensation hypothesis suggests that people drive more dangerously when belted, while the selective recruitment hypothesis suggests that the safest drivers are the most likely to belt up voluntarily.⁴

Thus despite the fact that hundreds of millions of motorists all around the world are now compelled by law to wear seat belts, there has only been one small experiment (by Janssen 1991) to test whether or not their behaviour is altered as a result. The original Australian claims are no longer accepted, and only one jurisdiction, the United Kingdom, is considered by those who

³ The experience with motorcycle helmet law has been similar to that with seat belts (see Adams 1995, chapter 8). For motorcyclists the only direct test, comparable to Janssen’s with seat belts, of which I am aware was conducted in January 2003 by *Bike*, Britain’s best selling motorcycle magazine. It undertook a modest test of the risk compensation hypothesis that compared the driving behaviour of riders with different levels of crash protection. The rules for the test were simple: “ride as fast or as slow as feels comfortable in various states of dress, from full leathers, through jacket and jeans, to just underwear.”⁴ Their insurers did not allow them to coax readers to take part in the test, so it was conducted with four staff volunteers. They were timed over two courses: 1.7 miles on a “sleepy B-road”, and 0.8 miles in a town centre. Helmets were worn on all runs “to stave off attention from the fuzz”, a concern that clearly did not impinge on their speeds, shown in the table below.

Excessive speed is the principal cause of loss-of-control accidents. On the B-road the average top speed in underpants was 29% lower than the average top speed in full leathers. It is not possible to say whether the extra protection afforded by full leathers offset the added risk of having an accident and the higher impact speed, although it seems unlikely. But clearly the “fully-protected” bikers posed an extra risk to other road users.

	Top speeds, in mph, reached with different levels of protection			
	B-road		town	
	leathers	pants	leathers	pants
Steve	126	92	36	28
Hugo	115	84	38	27
Luke	124	105	35	29
Maria*	120	65	31	25

* Maria wore pyjamas instead of underpants

have examined the evidence to have produced an effect that is directly measurable in the accident statistics. Given the significance that is now attached to the United Kingdom result, I now look at it more closely.

The UK seat belt law

Unusually, as a concession to the doubts that had been raised at that time, Britain's first seat belt law was passed for a trial three year period. It came into effect in January 1983, but was not made permanent until another vote in Parliament in January 1986. By this time the claim for lives saved had been reduced in a Department of Transport press release (15 October 1985) from 1000 a year to 200. This figure was described as a "net" reduction; the decrease in the numbers of people killed in the front seats of cars and vans in 1983 was partially offset by an increase in the numbers of pedestrians, cyclists and rear seat passengers killed. This shift in fatalities was consistent with the risk compensation hypothesis that predicted that the added sense of security provided by belts would encourage more heedless driving, putting other road users at greater risk. But despite this implicit acknowledgement of risk compensation, the evidence on which Parliament relied when it confirmed the law in 1986 was fundamentally flawed. It ignored the effect of drunken driving.

Figure 6a shows what happened to road accident deaths in 1983, the first year of the law. Nothing remotely approaching the originally promised saving of 1000 lives a year can be seen. There appears to have been a small, temporary drop below a well established downward trend. Most of the analyses presented to Parliament for the 1986 debate assumed that the slight upturn in the graph in 1982 represented a new *upward trend* that would have continued into 1983 and beyond, but for the beneficial effect of the seat belt law. The claims for the effect of the seat belt law are thus inflated by this assumed "ski-jump effect"; the actual fatalities were compared to the number expected on the assumption that 1982 represented the beginning of a new trend. However, it can be seen in Figures 6b and 6c that all of the increase in fatalities in 1982 was between the hours of 10 at night and 4 in the morning - the time known in the road safety literature as the "drink-drive hours". During the other hours the established downward trend continued. Figure 7 pinpoints the 1982 increase even more precisely; almost all of it occurred in non-built-up areas and was associated with drivers who had been drinking.

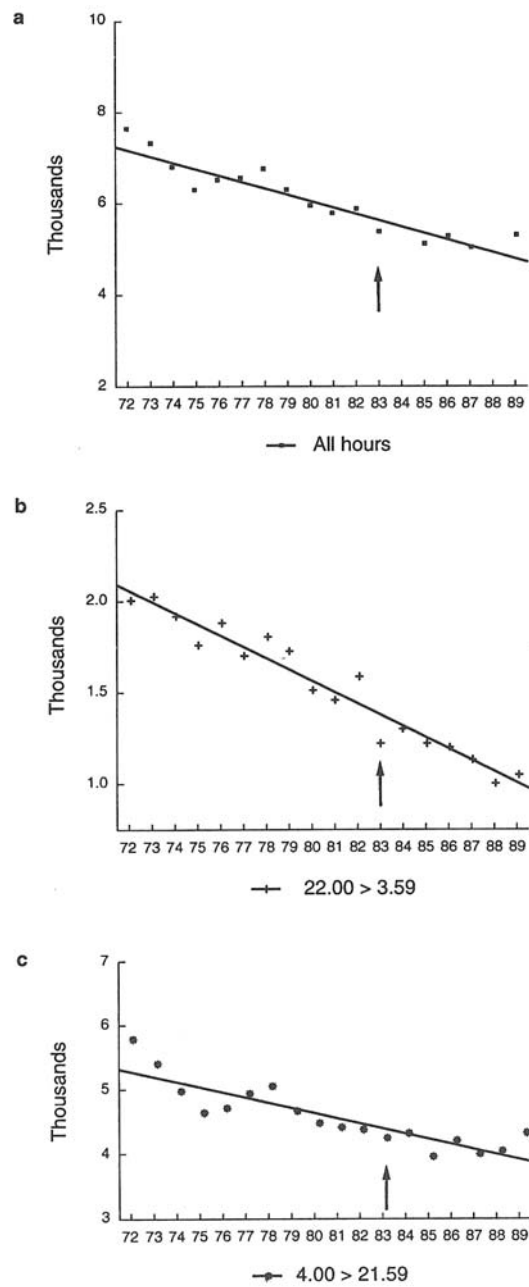


Figure 6 Great Britain road deaths by time of day. Source: *Road Accident Great Britain*, HMSO, published annually.

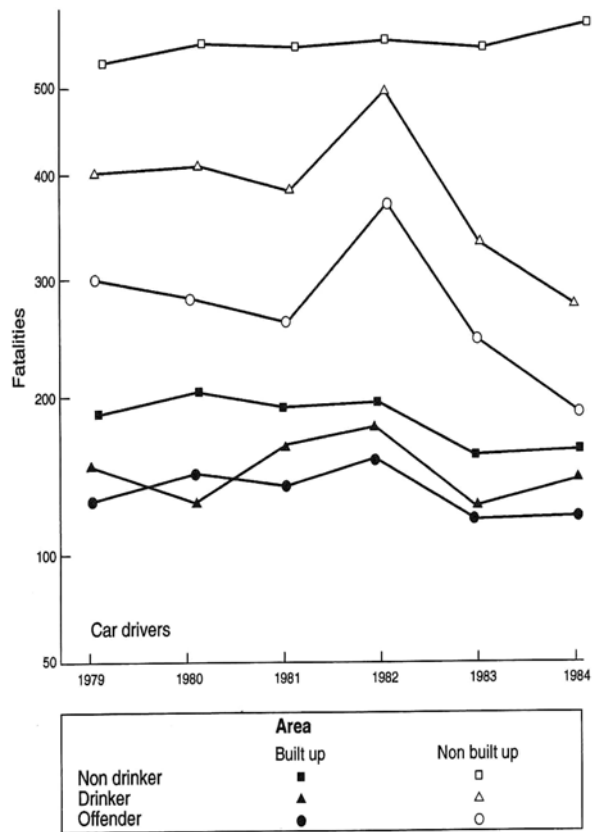


Figure 7 Great Britain driver deaths by place and alcohol level in dead driver. Source: (Broughton and Stark DC 1986).

The decrease in fatalities in 1983 was clearly related to the campaign against drunken driving. In that year

- “evidential” breath testing was introduced,
- unprecedented numbers of breath tests were administered,
- the number of motorists successfully prosecuted for drunken driving increased by 31%.
- the decrease in road deaths between 10 at night and 4 in the morning was 23%, while in all other hours it was only 3% - in line with the prevailing trend,
- the percentage of dead drivers who were over the legal alcohol limit dropped from 36% to 31%.

But the 1982 “alcohol blip” has never been satisfactorily explained. The sharp increase in that year in drink-related road accident deaths in non-built-up areas remains a mystery. According to a Transport and Road Research Laboratory Report (Broughton & Stark 1986) “the series for drinking car drivers in non-built-up areas shows an increase in 1982 which cannot be related to available explanatory variables.”

In advocating the retention of the law in the Parliamentary debate in 1986 the Department of Transport relied most heavily on the analysis of two

statistics professors, James Durbin and Andrew Harvey from the London School of Economics. The time-series models developed by Durbin and Harvey for their analysis of the seat belt effect were impressively sophisticated, but none of them contained alcohol related variables. They attributed all of the decrease in fatalities in 1983 below the projected trend to the beneficial effect of the seat belt law, and none to the campaign against drunken driving. Durbin and Harvey presented their work to a Royal Statistical Society Seminar, and the discussion was published along with their paper. They acknowledged that their analysis had taken no account of alcohol and said “the study of the effects of alcohol is clearly an important area for future research” (Harvey and Durbin 1986, 187-227).

But no studies have been done so far to explain why, after the seat belt law came into effect in Britain, seat belts have been so extraordinarily selective in saving the lives only of those who are over the alcohol limit and driving between 10 at night and 4 in the morning. It is a question that the Department of Transport has declined to pursue. A subsequent report from the Department on seat belts by Tunbridge (Tunbridge 1990) still disregards the alcohol effect and claims all of the credit for the reduction in fatalities in 1983 for seat belts. It compounds this error of omission by disregarding the established downward trend of the data. It bases its conclusion, that the law saved lives, mainly on a comparison of data for three years before the seat belt law (1980, 1981, 1982) and two years after (1983, 1984). A glance at Figure 6 suggests that the established downward trends before 1983 continued. On the basis of these trends one would have expected fewer fatalities in 1983 and 1984 regardless of any safety measures introduced in 1983. In the Tunbridge report this trend effect is claimed for seat belts.

Further, the report cites Durbin and Harvey in a misleadingly selective way with respect to the effects of the seat belt law on pedestrians. Tunbridge says “they [Durbin and Harvey] concluded that there was no significant increase in the numbers killed and seriously injured subsequent to legislation.” What Tunbridge fails to note is that the fatality statistics and the serious injury statistics tell different stories (see Figure 5.2 in (Adams 1995)). The KSI (Killed and Seriously Injured) statistical series is dominated by the much larger, but less reliable, injury numbers. Tunbridge does not cite the evidence from Durbin and Harvey with respect to the much more accurate fatality data on their own. Durbin and Harvey estimated that the increases in pedestrians and cyclists killed were 8% and 13% respectively. They also estimated an increase for rear seat passengers, to whom the law did not apply, of 27%. Interestingly, the number of pedestrians and cyclists killed by heavy goods vehicles and public service vehicles (categories not covered by the seat belt law) *decreased* following the law. Using these categories as controls, the estimated increases in pedestrian and cyclist deaths following the law rise to 19.6% and 40%, although the small control numbers render these estimates unreliable.

The risk compensation hypothesis, and the historical time-series data on cyclist and pedestrian deaths both suggest that the increase in cyclist and pedestrian fatalities following the seat belt law is likely to be a temporary

transitional effect. Over the longer term cyclists and pedestrians have responded, and are likely to continue to respond, to the increasing threat of motorised traffic by withdrawing from the threat (Adams 1988, 344-52), (Adams 1988, 407-28), (Hillman et al. 1990).

In summary there were two major road safety measures introduced by the British Government in 1983: the seat belt law and the campaign against drinking and driving. Figures 6 and 7 suggest that in 1983 there was a small, temporary, drop in road accident fatalities below the established trend. The evidence with respect to seat belts suggests that the law had no effect on total fatalities but was associated with a redistribution of danger from car occupants to pedestrians and cyclists. The evidence with respect to alcohol suggests that the decrease in fatalities in 1983 during the drink-drive hours is accounted for partly by the still-unexplained rise above the trend in 1982, and partly by the drink-drive campaign in 1983. The evidence from Britain, which has been singled out as *the only jurisdiction in the world* in which it is possible to measure fatality changes directly attributable a seat belt law, suggests that the law produced no net saving of lives, but redistributed the burden of risk from those who were already the best protected inside vehicles to those who were the most vulnerable outside vehicles.

Three Postscripts

1. In 1986, five years after the British seat belt law was passed by Parliament, risk compensation was effectively enshrined in the road traffic law of West Germany. Coaches fitted with seat belts now have a permitted top speed of 100 km/h, while those without are restricted to 80 km/h. The Royal Society for the Prevention of Accidents (RoSPA), a staunch believer in the life-saving benefits of the British seat belt law, when reporting this development in its journal *Care on the Road* (March 1987), unwittingly presented a classic example of the trade-off that routinely takes place between safety benefits and performance benefits:

“In Germany coaches with belts are allowed to travel faster than those without, thus allowing drivers to cover more miles in the hours they are allowed.”

2. In September 1989, inspired by the “success” of the law compelling people to wear seat belts in the front seats of cars, the British Government made seat belt wearing compulsory for children under 14 years old in the rear seats of cars. Figure 8 shows the outcome measured in accident statistics. Comparing the year before (1988) with the year after (1990) there was an increase of almost 10% in the numbers of children killed in rear seats, and of almost 12% in the numbers injured; in both cases these increases were greater than the background increases.

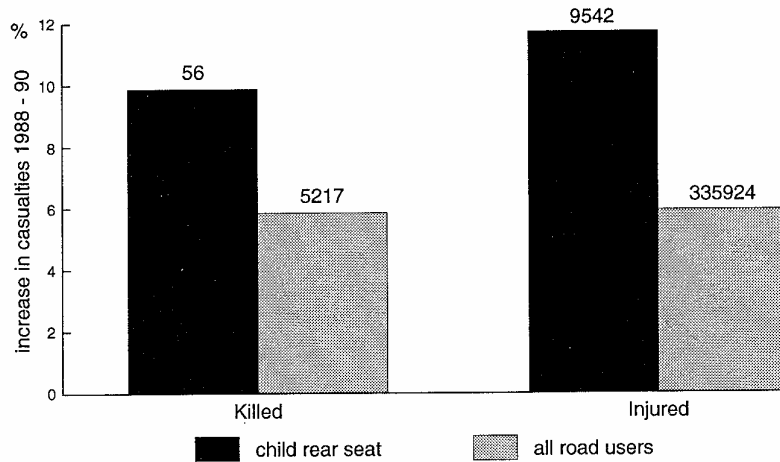


Figure 8 Rear seat belts for children; the effect of compulsion in 1989.
Source: *Road Accidents Great Britain 1992*.

3. On 10 November 1993 10 people were killed in a coach crash on the M2 in Kent. Before any detailed information about how they were killed became available there was an immediate chorus on television and radio and in the press demanding that seat belts be made compulsory for coaches. The writers of editorials demanding seat belts in coaches, the authorities cited in the news reports, and the authors of letters to editors all had one thing in common: they rested their case on the “fact” that seat belt laws had saved enormous numbers of lives. It is highly unlikely that any of the “safety authorities” belonging to the chorus had any first-hand working knowledge of the statistical evidence. The vehemence with which they argued their case was rooted in a sincere belief in the efficacy of seat belt legislation. This belief is now so wide spread, profoundly held, and insistently repeated that it is difficult to imagine any way in which it might be altered. The contrary view is routinely filtered out. I offer a personal example. On 11 November I had a long discussion with a journalist on a major national newspaper, and sent him a fax containing a summary of my view of the evidence which included Figures 6 and 7 above. His lengthy article appeared the following day. I had been edited out. He offered, when taxed with this omission, two not wholly consistent explanations. The first was that his article had been cut because of lack of space. The second was that no one else he had spoken to agreed with me.

The original claim that a seat belt law would save 1000 lives a year in Britain was made at a time when there were about 200 billion kilometres travelled every year by unbelted motorists. The promise of the legislation was, in other words, that it would reduce the chance of death by one in 200 million per kilometre travelled. The change in behaviour required to offset the promised benefit would be equally small, and very difficult to measure directly - perhaps slightly faster or more aggressive driving, or the occasional extra lapse of concentration every few million kilometres. The promised reduction in risk was accompanied by a major advertising campaign to persuade people that a seat belt would make them very much safer.

Most readers of this chapter will now be habitual users of seat belts. You are invited to consult your own experience. Might you drive a little bit more carefully if you were deprived of the protection of your seat belt? Some readers will be parents who insist on protecting their young children with rear seat belts or child restraints. Might you brake slightly more gently or corner a wee bit more slowly if your children were not safely secured in the back seat? The changes in your driving necessary to offset the loss of the protective benefits of seat belts are so small that accurate and reliable measurement by behavioral observation or introspection is extremely difficult. But all the world's seat belt laws assume that the answer to these questions is a resounding "no".

Cultural Theory

All this is fertile ground for Cultural Theory. The hundreds of thousands of people killed world-wide every year in road accidents constitute a large problem. Large problems and inconclusive information make people uncomfortable. The debate about seat belt laws appears to be as far as ever from resolution despite more than two decades of experience and volumes of statistical evidence. Cultural Theory suggests that in the face of such uncertainty the informational vacuum will be filled with *contradictory certitudes*; belief and conviction serve as substitutes for factual knowledge. Cultural Theory further suggests that these beliefs and convictions assume distinctive and predictable forms depending on their adherents.

Up until 1981 in Britain the seat belt debate in Parliament had become almost an annual event. It was a debate between the *defenders of life* and the *defenders of liberty*. The principal actors in these debates appear to have come from Cultural Theory's central casting department. The defenders of life were played with great conviction by *hierarchists*, and the defenders of liberty with equal passion by *individualists*.

The hierarchists believed that a law would save large numbers of lives and prevent even larger numbers of injuries. Their belief was conveniently rounded to 1000 lives and 10,000 injuries a year. They argued that they had a duty to save people from themselves. If people were too ignorant, lazy or foolish to act in their own best interest, the state should intervene to ensure that they did. The hierarchist's research establishment produced abundant evidence to support the belief.

The individualists opposing legislation were heavily out-numbered. They had no supporting research organisation and their campaigning support, such as it was, came largely from "right-wing" organisations such as the Institute for Economic Affairs. Their rhetoric was also consistent with the expectations of Cultural Theory. They were not opposed to the wearing of seat belts, they were opposed to the *compulsory* wearing of seat belts. They were supporters of law-and-order in so far as the law enforces contracts and protects private property, but they were opposed to criminalising self-risk. Risk taking is after all an essential ingredient of the private enterprise system in which they believe. Their epithet for a government seeking to impose a seat belt law

was “the Nanny State”.

They did not challenge the accuracy of the official estimates of 1000 lives and 10,000 injuries a year to be saved, they dismissed them as irrelevant. They argued that once the state began to criminalise self-risk there would be no logical stopping point; it would have to pass laws prohibiting rock climbing, cycling, drinking, smoking and eating too many cream buns.

Fatalists and egalitarians did not initially take much part in the debate. The fatalists never engage in debate about such matters because they cannot see the point. The egalitarians were indifferent because they did not see an issue that interested them. They had no reason at the time to question the validity of the claimed life-saving benefits of a seat belt law, and the law did not challenge the egalitarian way of life in any obvious way.

However, once risk compensation became an issue and the validity of the statistical basis of the benefits was challenged they began to get involved. Once it became apparent that the law might shift the burden of risk from the rich and powerful and well-protected - those in cars - to the poor and/or vulnerable - those on foot or bicycle - they began to see a cause worthy of their attention. Organisations like Friends of the Earth, the Pedestrians Association and various cycling organisations began asking sceptical questions, and some came out in direct opposition to the law.

Their scepticism and opposition was rendered ineffectual by their late entry into the debate. It was also undermined by the nature of the evidence available to them. Like the individualists they lacked research and publicity resources with which to counter the stream of confident assertion about the benefits of the seat belt law emanating from the hierarchy, a stream that continues to the present day.

As in many other cases the cause of the fatalists was appropriated by the egalitarians who see it as their duty to defend the interests of the weak and vulnerable. The fatalists also received some tongue-in-cheek support from the individualists. Ronald Bell, a Conservative Member of Parliament well known for his right-wing views, was one of the most persistent campaigners against the law. Citing the precedent of an earlier law that exempted turbaned Sikhs from the requirement to wear motorcycle helmets, he proposed a religious amendment to the seat belt bill exempting “all Calvinists and other believers in predestination.” The voting on the seat belt law found well-known left-wingers such as Michael Foot (egalitarians) and right-wingers such as Enoch Powell (individualists) together in the opposition lobby.

Cultural Filters

The Hans Christian Andersen fable of the emperor’s new clothes is a good description of the way a cultural filter works. The Emperor and all his courtiers and all his subjects - with one exception - participated in a grand conspiracy of self-delusion. With the help of a pair of dubious tailors they persuaded themselves of the exquisite textures and intricate patterns and beautiful colours and overall magnificence ... of something that had no objective existence. The fable suggests that once an idea, however preposterous becomes accepted by, and espoused by, established authority it

can become very difficult to dislodge. The idea becomes self-reinforcing. Authorities cite prior authorities, until the idea accumulates an authoritative pedigree. The idea acquires its own defence mechanism. Anyone incapable of seeing the Emperor's new clothes is "unfit for his station, or unpardonably stupid". The fact that large numbers of others believe the idea, can become sufficient reason for believing. After a while evidence is no longer required.

The evidence justifying the original seat belt law in Victoria initially seemed very convincing. Detailed studies of accidents, and experimental evidence with dummies, both supported the idea that *in an accident* a car occupant's chances of emerging unscathed would be dramatically improved by the wearing of a seat belt. The statistical evidence from Victoria, after its law was implemented, appeared to provide ample justification for compelling people to wear belts. The rising trend of 1960s in the numbers killed on the roads levelled off. The life-saving abilities of seat belt legislation became *fact*.

This fact became an integral part of the cultural filters of legislators all around the world, and became the basis of seat belt campaigns that culminated in the passage of laws in over 80 jurisdictions. In each country, a central plank in the case for a seat belt law was the list of other countries that had already passed one. As the list grew longer the plank grew stronger. The failure of the countries following Australia's lead to replicate its life-saving success did not appear to matter. Cultural filters become more efficient the more they are used, and the belief in the law was so deeply entrenched that the disappointing statistical results did not present a serious challenge. The "confounding variables" theory was invoked to explain away the results; one influential and exasperated researcher said "I just cannot accept that there is a sudden switch in driver behaviour just because the wearing of seat belts is made compulsory" (Mackay 1981). If one rules out the possibility of a behavioral change in response to the implementation of a safety measure, then any apparent lack of beneficial effect becomes evidence of the work of confounding variables; some other factor or factors *must* be at work masking the effect that you know to be there.

Pressure to conform can be intense. Norman Fowler, the British Secretary of State for Transport at the time, was publicly accused at a British Medical Association conference of being "an accessory to mass murder" for his opposition to a seat belt law. My research casting doubt on the claims for seat belt legislation was denounced in a Parliamentary debate by a succession of MPs as "spurious", "eccentric", "preposterous" and "bogus". (see (Adams 1985), Chapter 9; (Davis 1993), Chapter 4 and (Irwin 1985) also contain illuminating accounts of the conduct of the seat belt debate at this time.)

Research into the subject arouses strong emotions for entirely honourable reasons. Most researchers would claim to strive to establish the truth from a position of detachment above the fray. But if a researcher uncovers a truth with implications for the well-being of the public, he may see it as his duty as a citizen to pursue these implications into the realm of public policy. The fact that safety research involves matters of life and death creates a sense of urgency in both researchers and public policy campaigners. These are often one and the same, and as a consequence attitudes more appropriate to the

latter sometimes intrude into the domain of the former.

Gatherings of road safety researchers tend to have an evangelical atmosphere. For example, in 1981, the American Association for Automotive Medicine and the Ontario Ministry of Transportation and Communications jointly sponsored a conference on seat belts (AAAM 1981). The papers presented to the conference were “scientific” papers supposedly devoted to examining the effectiveness of methods of restraint and the medical significance of such methods. But the *purpose* of the conference, summarised in the conference agenda, was to highlight “the need for physician commitment to influence public policy, research and education aimed at increased usage of occupant restraint devices.” In 1984 the American Association for Automotive Medicine, this time jointly with the Society of Automotive Engineers, sponsored another scientific symposium entitled “Advances in Seat Belt Restraint Systems” (SAE 1984). The chairman’s foreword declared the symposium’s purpose to be “bringing recognition to the gravity of the crash injury problems and the benefits of seat belt use. A second foreword by Lee Iacocca, president of Chrysler, declared that “seat belts are the most effective device ever developed for saving lives and preventing injuries.” And the leading scientific paper presented to the conference urged America to emulate Australia and make the wearing of belts compulsory, insisting that “a simple act of political courage would save countless American lives in road crashes.” Although both conferences purported to consider scientific evidence about the efficacy of legislation, their real and publicly proclaimed purpose was to win adherents to their cause. Clearly evidence which cast doubt upon the wisdom of this cause would have been unwelcome at these conferences. No such evidence was presented; it was filtered out before the conference.

The atmosphere in which the research is conducted can be morally intimidating. Anyone who cannot see the dramatic effects of road safety regulation risks being labelled by the *American Journal of Public Health* as an “ignorant nihilist” who is “symptomatic of a sick society” (Yankhauer 1981, 797-8). Lord Underhill in the House of Lords debate on seat belts (11 June 1981) declared “it would be terribly dangerous if credence were to be given to any arguments against the benefit of wearing seat belts.” The danger that both Underhill and the editor of the *AJPH* feared was that if people had their faith in seat belts undermined they might stop wearing them. Truth, it has been said, is the first casualty of war; such is the passionate conviction of some safety campaigners that their campaigns can become crusades. In crusades heretics are not treated gently.

Such pressures can lead to a bias in the selection of the evidence that is published. Such a bias would seem to be the only way to reconcile the numerous small scale studies which appear to show a safety benefit following legislation, with the aggregate national statistics which do not. For example, one much cited study of casualty admissions to 16 hospitals in Sweden reported a decrease in admissions following the Swedish seat belt law of 29% (Adams 1982, 2824-38). The fact that in Sweden as a whole after legislation the number of deaths and injuries to car occupants *increased* indicates that it

must have been possible to find other sets of hospitals which showed an opposite result; but such a result has yet to be published.

Such selective pressures also appear to have been at work in the analyses of the effect of the British seat belt law that were presented to Parliament before it voted to confirm the law in 1986. Why was the effect of the campaign against drinking and driving omitted entirely from the analyses? Why was all the credit for the drop in road accident casualties attributed to seat belts? At least part of the explanation may lie in the fact that the seat belt law was on trial in a way that the drink-drive measures were not. The seat belt law had been passed for a trial three year period and would have lapsed had it not been confirmed by Parliament. The proponents of seat belt legislation feared that an important life-saving measure might be lost.

Knowing that publication of findings which could undermine public confidence in a safety measure is likely to invite the charge of dangerous irresponsibility, can lead to an editorial filtering of evidence. I have personal experience. In 1985 the Chief of Health Legislation for the World Health Organization commissioned me to write a review of the published analysis of the UK seat belt law for the WHO quarterly *International Digest of Health Legislation*. The contents of the review were a greatly abbreviated version of the story told above. The editor decided that it would be best if his readers remained in ignorance of the story. The review was rejected “for editorial reasons”, reasons upon which the editor declined to elaborate further. The editor was concerned that his publication should not be seen to be associated with the review in any way. I was told that the WHO “would have no objection to the review being submitted by you for publication elsewhere, subject to the proviso that no mention is made of the fact that the review was commissioned and an honorarium paid by WHO.” Such pressure is also likely to encourage self-censorship by researchers in a way that can mislead. Convictions often masquerade as statistical hypotheses. If a research finding is consistent with the researcher’s expectations and supports the (seat belt) campaign, he is likely to rush into print with the support of like-minded editors. Where a finding is contra-hypothesis, and would, if published, leave one open to charges of undermining public confidence in a measure believed to be effective, the researcher is likely to scratch his head and try again. The road safety literature is full of articles in which levels of statistical significance are dutifully reported. But what does it mean to say that some relationship is significant at say the 5% level? It means that you might get a test statistic as large as the one you got by chance one time in twenty, even if there is no relationship between the variables tested. So if you sit a large enough number of monkeys in front of computer terminals working out correlation coefficients for sets of numbers taken from a random number table, and then publish the best five per cent, you are in danger of seeing significance where none exists. One in twenty is probably a very conservative estimate of the fraction of statistical tests done that actually get published; the mesh of the statistical/cultural filter through which most road safety studies must pass is almost certainly much finer.

Introspection

The above history of the seat belt debate is the version of one of the participants. More suspect still, it is a version from the losing side, or at least up until now. Cultural Theory exempts no one from bias. The complete detachment of the hermit is an ideal state of mind to which a researcher aspires without hope of ever completely achieving it. Self-knowledge is more difficult than knowledge of others, or certainly feels so.

My earlier work on the seat belt issue preceded my acquaintance with Cultural Theory. Reviewing the seat belt debate for this chapter has stimulated much introspection, and contemplation of my own cultural filter. I conclude that my biases are context-dependent; *depending on circumstances*, I am capable of assuming all of the earthly personas of Cultural Theory. Sometimes I can see a role for government (hierarchical) action; I believe that it would be desirable to curb the depredations of the motor car. Sometimes, when confronted with extremes of power and vulnerability, I respond with an egalitarian's sense of injustice. Sometimes I am an individualist, resentful of the interference in my life of an overweening State bureaucracy. Sometimes, when contemplating the inevitability of my own mortality, I am a fatalist. As a dutiful researcher I strive for truth, detachment and objectivity, aware that I can never capture them.

Research, policy and action in the field of road safety are all hierarchical monopolies, or nearly so. Government and government-funded researchers decide which statistics to collect, and do most of the collecting and analysis. They filter most of the available evidence. They are predisposed to the view that it is possible and desirable to intervene in human affairs to reduce risk. They expect their interventions to work, and they believe their successes can be measured by accident statistics. Having examined the evidence from a position of as much detachment as I can muster I believe the case for seat belt legislation to be fatally flawed. I see gross distortions in the evidence that has passed through an extraordinarily efficient hierarchical filter - so efficient that it has persuaded majorities in most of the world's legislative assemblies to pass seat belt laws.

Am I biased? Yes, inevitably. The seat belt law offends my individualist sensibilities; I see it as an unwarranted intrusion of state power into a realm that ought to remain the preserve of the individual. By shifting the burden of risk from those who are most powerful and best protected on to those who are weakest and most vulnerable, it offends my egalitarian instincts. But, perhaps most damning of all, it brings the hierarchy into disrepute. Far from curbing the depredations of the car, as its advocates maintain, it amplifies them. By its spectacular failure to deliver the safety benefits it promised, it has weakened hierarchy's authority to act in areas that are its proper domain. It must remain for the reader to decide whether my biases have undermined the validity of my argument.

Seat belt laws now rarely feature in debates about road safety. The myth of their efficacy appears to be unshakably established.⁵ A current focus

⁵ The feeding of the myth continues. On 31 January the Department for Transport put out a press release celebrating the 20th anniversary of the seat belt law. It claimed that over the last

of controversy is the question of whether the wearing of bicycle helmets should be made compulsory. In this debate one can find recycled versions of most of the arguments that featured in the seat belt debate, espoused with the same passion by the same people, or their cultural descendents.⁶

The clumsy solution: repeal seat belt laws

There are many problems that do not have clumsy solutions; everywhere from Middle East wars to battles over motorway by-passes, contradictory certitudes and conflicting self-interests often preclude the possibility of agreed solutions. But the seat belt problem belongs to a category of risk in which all the usually contending rationalities and self-interests should be able to agree on the answer: where risks are voluntarily assumed by mentally competent adults all rationalities can agree that their management should be the responsibility of the individual risk taker.

As we have seen, both individualists and egalitarians oppose the compulsory wearing of seat belts, for different reasons: the former see them as infringements of individual liberty, the latter as unfair measures that redistribute the burden of risk from the best protected to the most vulnerable. Seat belt laws are *misguided* hierarchist measures – misguided because they are imposed in ignorance of the effect of risk compensation. Their failure to achieve the promised saving of lives calls attention to a realm of human activity where the hierarchist writ cannot run.

This realm extends far beyond the issue of seat belt legislation. There is convincing evidence now available about the harmful effects of many activities, such as smoking, drinking to excess, and the taking of various drugs, yet many people still do these things – strongly suggesting that, for those who indulge, the perceived rewards outweigh the adverse consequences. Attempts to criminalise voluntary self-risk have a dismal record. The main effect of prohibition, whether of drink or drugs, has been the spawning of vast criminal empires.

New-born infants have all their risk-management decisions taken for them by their parents or guardians. The process of development involves a progressive handing over of these responsibilities until the child reaches the age of responsibility. Whenever the state intervenes to over-ride decisions made by adults about risks to themselves that they freely choose to take, it fairly earns the title “the Nanny State”. If only Nanny could appreciate her limitations she would be able to agree with her adult individualist and egalitarian charges that attempts to make people safer than they choose to be will be at best futile, and at worst counterproductive.

20 years the law had saved 50,000 lives, an average of 2500 per year. This is far higher than any previous claim. Calls made to enquire about the source of the number were not returned.

⁶ For an example see the exchange in *Injury Prevention* (2002; 8) between the advocates of compulsion - D C Thompson, R S Thompson and F P Rivara - and J Adams and M Hillaman opposing. Available online at <http://ip.bmjournals.com/cgi/content/full/8/2/e1>.

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