Chapter 4
Legislation, Enforcement and Education for Traffic Safety: A Brief Review of the Current State of Knowledge

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4.1 Introduction

This paper is intended to give a brief overview of the current state of the art with respect to the effects of legislation, enforcement and education as road safety policy instruments. Key questions addressed in the review include:

What types of road user behaviour are regulated by means of legislation? What types of behaviour remain unregulated?
What can we learn from the history of road safety legislation with respect to changing road user behaviour and reducing the number of accidents and injuries?
How do legislation, enforcement and sanctions interact in bringing about changes in road user behaviour and in traffic injury?
Why are laws never one hundred percent effective in solving a problem and what can be done to make them one hundred percent effective?
What are the effects of educating road users? Why have most educational measures had limited success and how can they be made more effective in improving road safety?

The review starts by discussing legislation and continues by discussing enforcement. Education is discussed at the end of the review.

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4.2 Legislation—Some Examples and General Lessons

Current legislation designed to promote road safety has developed during the last 40–45 years that is mostly after the peak in the number of traffic fatalities was reached in most highly motorised countries. Before this peak was reached, many forms of behaviour were not regulated by laws the way they are today.

Norway has always had strict road safety legislation. Speed limits on all public roads were first introduced in 1912 and have remained in force since then. For a long period, however, speed limits were raised as cars and road improved. The last time general speed limits were raised in Norway was in 1965. The general speed limit in urban areas was then raised from 40 to 50 km/h. In rural areas, the general speed limit was raised from 70 to 80 km/h. These speed limits remain in force today and are comparatively low by international standards. However, exceptions from the general speed limits are increasingly made, in particular on motorways. Motorways got a speed limit of 90 km/h in the late nineteen-sixties (there were very few motorways in Norway at that time). In 2001, this was raised to 100 km/h and in 2014 to 110 km/h on the best motorways. This still remains low by international standards.

Until the energy crisis in 1973, quite a few European countries did not have speed limits at all, at least not in rural areas. Today, few people believe that this could really be the case, but it was. There was a free choice of speed. In many countries, until about 1970, there was also a free choice about whether to drink and drive. Well, strictly speaking, drinking and driving was not allowed, but the legislation made effective enforcement almost impossible. In the first place, the police could normally only stop a driver if they suspected him of drinking and driving. If there was nothing peculiar about driving behaviour, there was no legitimate reason for suspicion. In the second place, the police had to prove that the driver was impaired. This involved various assessments of behaviour that were often contestable in court. The police might say, for example, that the driver could not walk a straight line. The driver would protest, and unless there was other evidence, it was word against word and a driver with a good attorney might get acquitted. Today, this sounds like a tale from the past, as indeed it is. Nowadays, the freedom of road users to make their own choices has been circumscribed, and many motorised countries have legislation that lays down:

- Permitted driving speeds. There are speed limits everywhere, except on German motorways.
- Use of protective devices. Wearing seat belts is required in very many countries. Using motorcycle helmets is still voluntary in some places (see below).
- Drinking and driving. All highly motorised countries have per se laws, i.e. laws stating that a driver is regarded as drunk if blood-alcohol concentration exceeds a certain value (0.05% is the most common).
- Use of daytime running lights. Some countries require motor vehicles to use headlights at all times.

Over time, legislation has expanded and included more and more aspects of road user behaviour. Since the expansion of legislation can be regarded as curtailing

freedom, it is important to determine if legislation does accomplish its stated objective of improving road safety. Below, a few examples are reviewed in order to answer this question.

Figure 4.1, taken from Ross (1982), captures the history of legislation regarding the use of motorcycle helmets in the USA. Following the creation of the National Highway Traffic Safety Administration in 1966, many safety initiatives were launched and states were encouraged to make the use of crash helmets mandatory for motorcyclists. Most states complied. As can be seen from Fig. 4.1, there was a dramatic decline in the number of fatalities per registered motorcycle. After a few years, opponents of these laws gained the upper hand and several states started to repeal the laws. Helmet wearing declined and motorcycle fatalities increased. Most of the safety benefits of mandatory helmet wearing were lost.

There are two main lessons to be learnt from this example:

1. Introducing a law can lead to a large improvement in road safety.
2. If the law is repealed, a large part of the safety improvement may be lost.

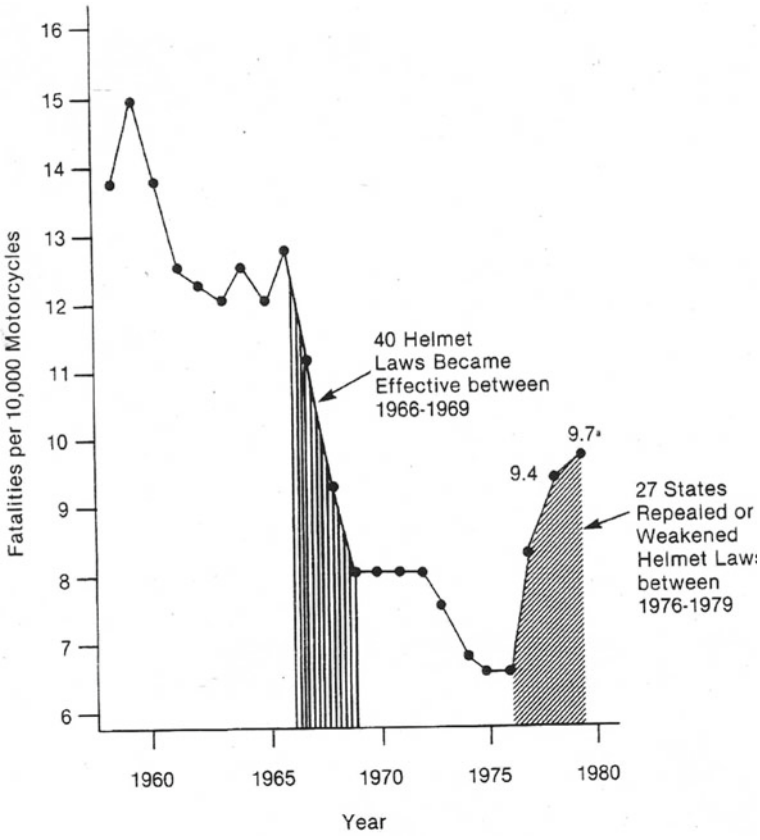

Fig. 4.1 Laws on helmet wearing by motorcyclists in the USA. *Source* Ross (1982)

Laws do, therefore, not necessarily lead to learning or to changes in behaviour that are sustained permanently. As soon as motorcyclists were allowed to take off their helmets, many did so, although both scientific and anecdotal evidence should have convinced motorcyclists that wearing helmets improve their chances of surviving an accident or getting less seriously injured.

The next example is given in Fig. 4.2, also taken from Ross (1982). It shows changes in the number of fatal and serious injuries during weekend nights (between 10 P.M. and 4 A.M.) before and after the per se law on drinking and driving was passed in Great Britain in 1967. This law made it illegal to drive with a blood alcohol concentration above 0.08%.

It is seen that the number of fatalities and serious injuries dropped sharply when the law took effect. It is also seen that there was a rather quick rebound. The number of fatalities and injuries started to increase again almost immediately after the sharp drop. The increase did not quite eliminate the initial safety effect. It did, however, reduce it considerably. As Ross (1982) shows later in his book, the most likely explanation for the rebound is that there was too little enforcement. Drivers soon discovered that the risk of being detected was low. The effect of the law then eroded. The lesson from this, which is the third lesson from using legislation to improve road safety is

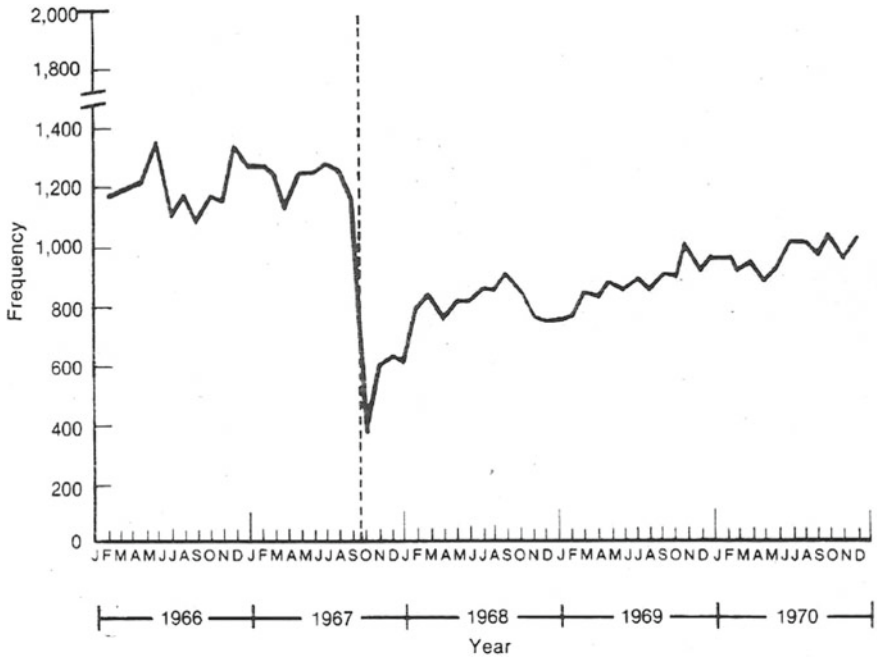

Fig. 4.2 Number of fatalities and serious injuries during weekend nights (between 10 P.M. and 4 A.M. Friday/Saturday, Saturday/Sunday) before and after the per se law for drinking and driving took effect in Great Britain. *Source* Ross (1982)

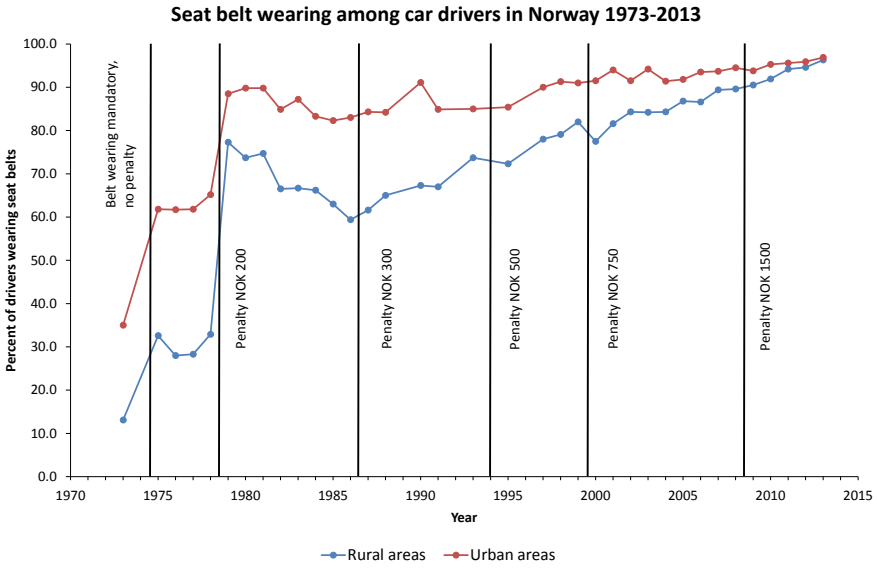

Fig. 4.3 Seat belt wearing among car drivers in Norway 1973–2013

3. To sustain the effects of a law in the long term, it must be effectively enforced.

Enforcement is, however, not always possible or at least not very effective. How can that be? It sometimes happens that laws are passed that cannot be effectively enforced, either because there are no sanctions for violating the law or because only secondary enforcement is possible. An example of the first type of law is the law requiring seat belts to be worn in Norway. The law was passed in 1975. However, until October 1979, those who violated the law were not punished in any way. All the police could do was to give drivers and passengers a friendly reminder of the law. Figure 4.3 shows seat belt wearing among car drivers in Norway from 1973 to 2013.

When the law passed, there was an increase in seat belt wearing. But then, in the next year, seat belt wearing remained unchanged at about 60% in rural areas and about 30% in urban areas. In 1979, a fixed penalty of NOK 200 (1 NOK = 0.12 US Dollars in July 2015) for not wearing seat belts was introduced. Wearing then soared to almost 90% in rural areas and around 70% in urban areas.

The fixed penalty was not changed until 1987. In the meantime, as shown in Fig. 4.3, there was a downward trend in seat belt wearing, in particular in urban areas. This trend was turned around when the fixed penalty increased from NOK 200 to NOK 300. Subsequent increases in the fixed penalty have also been associated with an increase in seat belt wearing. An evaluation by Elvik and Christensen (2007) found that increasing the fixed penalties for not wearing seat belts was associated with increased seat belt wearing.

A similar story can be told about legislation regarding seat belt wearing in the USA (Shults et al. 2004). Many states were reluctant to make seat belt wearing mandatory.

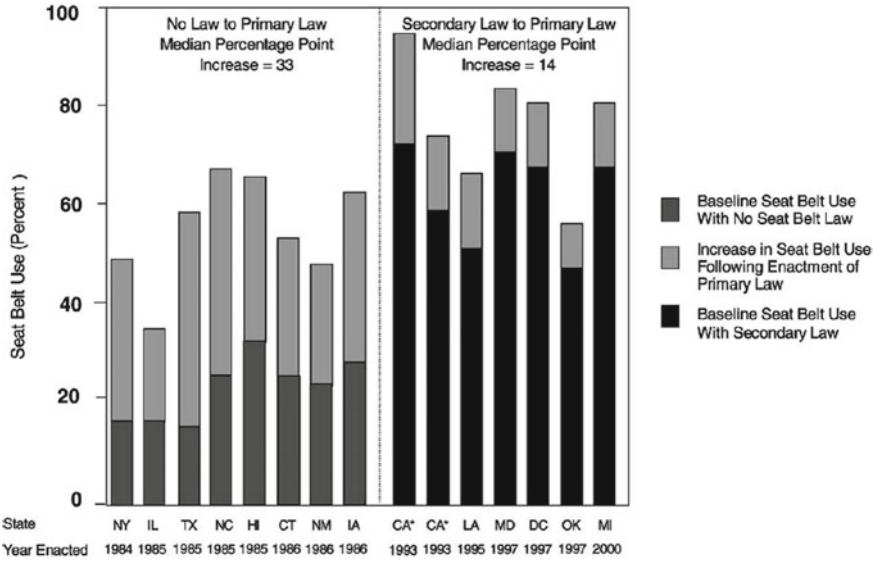

Fig. 4.4 Effects of primary and secondary enforcement on seat belt wearing. *Source* Shults et al. (2004)

A compromise chosen by many states was to pass a law, but only allowing secondary enforcement of it. Secondary enforcement means that a driver could only be given a traffic ticket for not wearing a seat belt if another offence had been committed. The police were not allowed to cite drivers if their only violation was not wearing seat belts. Secondary enforcement was, predictably, not very effective. Figure 4.4, taken from Shults et al. (2004) shows that primary enforcement is more effective than secondary enforcement. The following lessons can be learnt (the numbering of lessons continues consecutively):

4. For a law to be effective, there must be a sanction for violating the law. Without a sanction, the law cannot be enforced.
5. For a sanction of violations of a law to be effective, it must be possible to apply the sanction whenever the law is violated. Sanctioning should not depend on having violated a different law.

As shown in Fig. 4.3, seat belt wearing among car drivers in Norway is now more than 95%. It is tempting to conclude that virtually all of the safety benefits from using seat belts have now been harvested and that there little point in trying to bring seat belt wearing closer to 100%. This is wrong. Although seat belt wearing in general traffic has exceeded 95%, it remains low among car occupants who are killed in road accidents (Haldorsen 2015). Figure 4.5 illustrates the relationship between seat belt wearing in traffic and among killed car occupants in Norway during the period from 2005 to 2013.

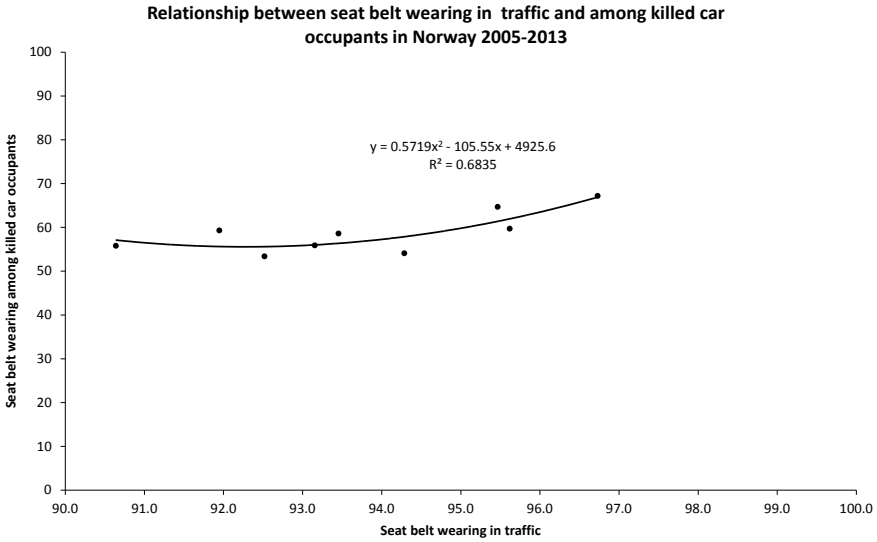

Fig. 4.5 Seat belt wearing in traffic and among killed car occupants in Norway 2005–2013. Based on Haldorsen (2015)

During this period, seat belt wearing in traffic increased from about 90.5% to close to 97%. In other words, the non-wearing of seat belts was greatly reduced, from close to 10% to a little more than 3%. During the whole period, however, seat belt wearing among killed car occupants remained at about 60%. Only a weak tendency can be seen for seat belt wearing among killed car occupants to increase as seat belt wearing in traffic increased. There is therefore still a quite large potential for reducing traffic fatalities in Norway by increasing seat belt wearing. A very similar, even more extreme, pattern is found in Sweden (Trafikverket 2015). In Sweden, 98% of car drivers in traffic wore seat belts in 2014, i.e. only 2% did not wear seat belts. Among killed car drivers in Sweden in 2014, 34% did not wear seat belts. How can such a dramatic difference be explained? Why does it arise?

A full explanation cannot be given, but a study by the Norwegian traffic police (Pasnin et al. 2009) shows that a high percentage of drivers involved in fatal accidents have a criminal record. The criminal record included not just traffic offences, but other types of crime, like burglary, violence, rape, drug offences and so on. While not all drivers involved in fatal accidents had a criminal record, it is clear that they were hugely over-represented. This leads to the sixth and final lesson about road safety legislation

6. No law is ever 100% effective. Every society has a group of hard-core criminals who will not comply with laws. This group is likely to be over-involved in accidents.

4.3 Enforcement—Key Lessons

As noted above, laws do not enforce themselves. Indeed, were that the case, the laws would not be needed, as road users would then adopt safe behaviour without being forced to do so by means of law. Enforcement is therefore very important for maintaining the effects of laws. What do we know about the effects of enforcement on road safety?

One lesson that was learnt many years ago is illustrated in Fig. 4.6. It is taken from the book by Ross (1982) and shows effects on accidents of enforcing the per se law on drinking and driving in New Zealand. A publicity campaign was first conducted. This was associated with a reduction in the number of accidents. Then there was

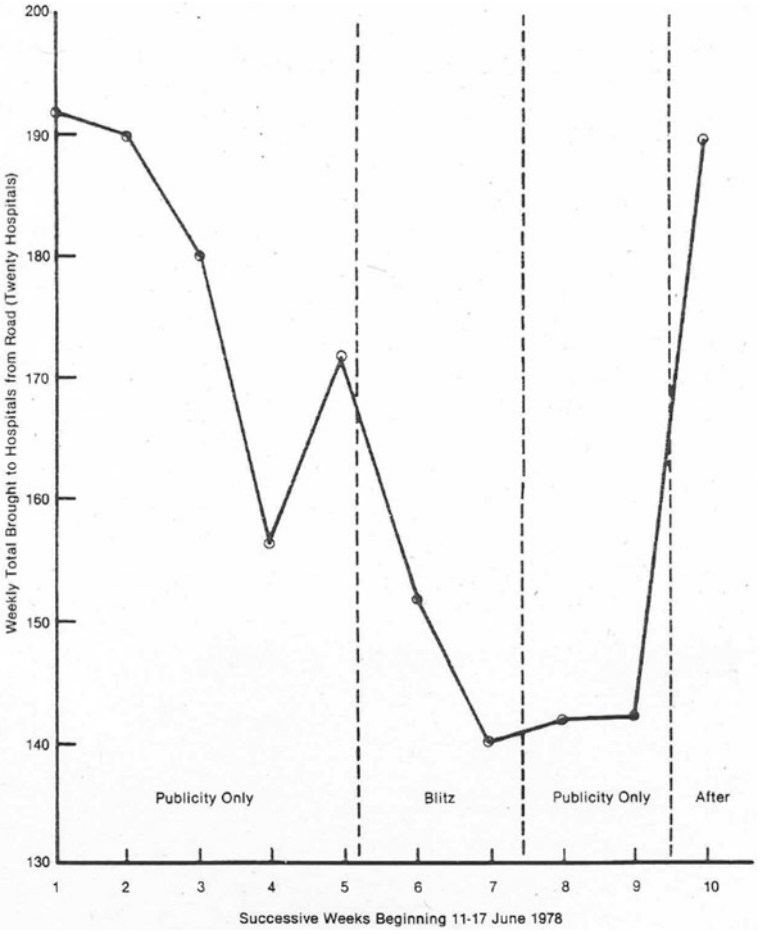

Fig. 4.6 Effects of enforcing the per se law on drinking and driving in New Zealand. Based on Ross (1982)

an enforcement blitz. This was associated with a large reduction in the number of accidents. The reduction lasted a couple of weeks after the blitz. Then accidents reverted to their original level. Several similar figures are given in the book by Ross. Lesson number one about enforcement is therefore

1. The effects of enforcement are transient. When enforcement ceases, its effects disappear quickly.

Road users adapt their behaviour to even minor changes in enforcement. This is shown in data collected in a recent Norwegian study (Elvik and Amundsen 2014). The study collected data for ten years on speed enforcement. During these ten years, examples could be found both of increases in enforcement and reductions of it. Using annual change in the rate of speeding (kilometres driven while speeding as a percentage of all kilometres driven) as dependent variable, 54 data points were identified by combining years (9 annual changes), urban or rural area (2 values) and three levels of speeding (3 values). These data points are shown in Fig. 4.7. Although the data are somewhat noisy, there is still a tendency for speeding to go up as enforcement is reduced and go down as enforcement is increased. Figure 4.8 shows the relationship more clearly. It is based on a review of a large number of studies of speed enforcement for the purpose of developing accident modification functions describing the effects of enforcement (Elvik 2015a).

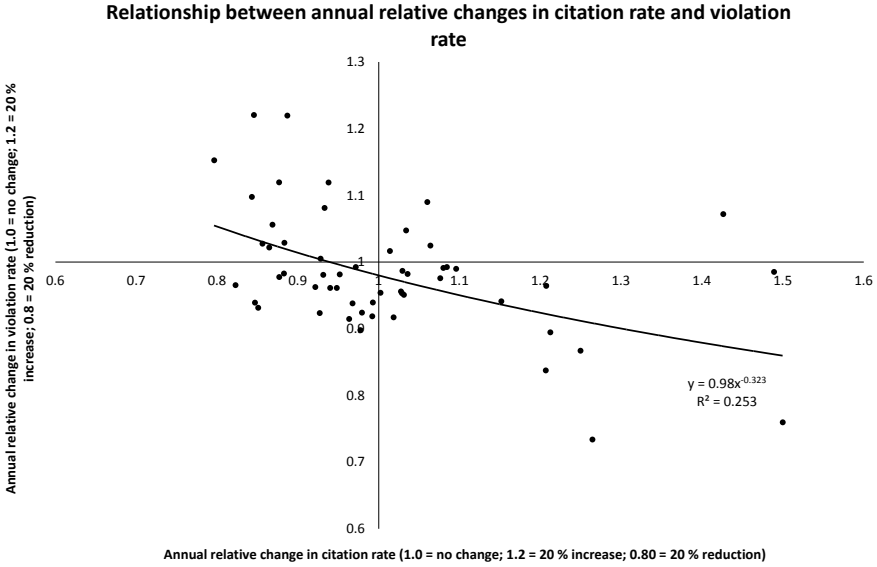

Fig. 4.7 Relationship between changes in speed enforcement and changes in speeding in Norway. Based on Elvik and Amundsen (2014)

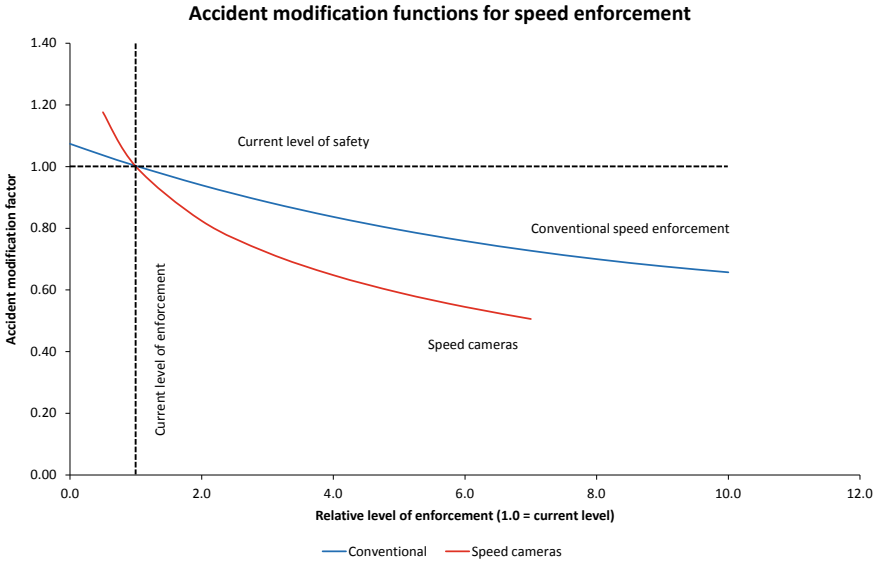

Fig. 4.8 Accident modification functions for speed enforcement. Based on Elvik (2015a)

Based on Figs. 4.7 and 4.8 and the studies underlying them, the following lessons can be learnt:

1. The current level of enforcement maintains the current level of safety.
2. When enforcement is reduced, violations and the number of accidents increase.
3. When enforcement is increased, violations and the number of accidents are reduced.
4. Road users react to even small changes in the level of enforcement.
5. There are greater changes in behaviour and accidents when the risk of apprehension is high than when it is low. This explains why speed cameras are more effective than traditional police enforcement (steeper curve in Fig. 4.8).

In Norway, the risk of apprehension when speeding is very low, close to 10 per million kilometres driven while speeding. An average driver in Norway drives about 13,000 kms per year. On average, therefore, a driver could be speeding continuously on every trip, all the time, for almost 8 years before, statistically speaking, he would be caught speeding. It stands to reason that even after a huge increase in speed enforcement in Norway, the risk of getting caught would remain low.

At speed cameras, the risk of getting caught is very much higher. Although not all cameras are operated all the time, at least not in Norway, they are operated often enough that most drivers do not gamble on the camera being turned off when they approach one. As can be seen in Fig. 4.8, the curve for speed cameras is steeper than the curve for traditional speed enforcement.

The advantage of speed cameras is that they can be operated continuously. The disadvantage is that the effects are very local. It is possible to connect several speed

Table 4.1 Game-theoretic model of the interaction between drivers and the police in determining the level of enforcement

		The police			
		Enforce		Not enforce	
Drivers	Violate speed limit		– 10,000		– 20,000
		– 300		50	
	Not violate speed limit		– 10,000		0
		– 50		– 50	

cameras with one another, in the form of section control. The cameras would then calculate the mean speed of driving over a certain distance of road. Section control may thus enlarge the area where speed cameras have an effect. However, section control is not feasible or practical everywhere. If the road has many junctions, there will be many cars entering and leaving the road and thus passing only one of the speed cameras. Installing and operating cameras are expensive. Section control would therefore be most effective on roads with a high traffic volume.

It is therefore difficult to believe that section control by means of speed cameras could ever be used on more than a small fraction of all roads in a country. Until vehicle technology monitoring and possibly regulating speed (ISA-systems; Intelligent Speed Adaptation) becomes more widely used, traditional enforcement performed by police officers will be the most important form of enforcement. This leads on to the final lessons regarding enforcement. These lessons concern the interaction between road users and the police in determining the level of enforcement.

A game-theoretic model of this interaction was proposed many years ago by Bjørnskau and Elvik (1992). The model can be explained by reference to Table 4.1.

In Table 4.1, driver has a choice between violating the speed limit and complying with it. The police have a choice between enforcing or not enforcing. The choices made by drivers will depend on what the police do and vice versa. The numbers given in the table are intended to illustrate the consequences of the various choice; in game theory, these are often referred to as "payoffs". The payoffs to drivers are shown in the lower left corner of each cell of the table, and the payoffs to the police are shown in the upper right corner of each cell of the table.

If we start in the upper left cell, it can be seen that drivers can improve their payoff (from −300 to −50) by complying with the speed limit. This will result in a move to the lower left cell of the table. However, once drivers comply with speed limits, it is seen that the police can improve their payoff (from −10,000 to 0) by not enforcing. This results in a move to the lower right cell of the table. From that cell, it is seen that drivers can improve their payoff (from −50 to 50) by speeding. This results in a move to the upper right cell of the table. However, when drivers are speeding, the police can improve their payoff (from −20,000 to −10,000) by enforcing. This brings the game back to the upper left cell where it started, and the circle can go on forever. The game, in other words, has no solution in pure strategies.

It does have a solution in mixed strategies. A mixed strategy is to choose between the pure strategies with certain probabilities. Thus, with the payoffs used as example in Table 4.1, the police should enforce with a probability of 0.2857 and not enforce with a probability of 0.7143. Drivers should speed with a probability of 0.50 and not speed with a probability of 0.50. See the paper by Bjørnskau and Elvik (1992) for details regarding how the mixed-strategy solution was obtained.

Recently, an attempt was made to test the model empirically (Elvik 2015b). It was supported, although the results regarding how the police adapt to changes in violation rate were not statistically significant. Still, the lessons are clear, both from this and other studies

1. Enforcement will never be one hundred percent effective, in the sense of eliminating violations.
2. The police always apply a certain tolerance margin when doing enforcement. This means that a certain level of minor violations is tolerated.
3. If violations go down, the police will tend to reduce enforcement.

4.4 Education—Key Lessons

Education is a very broad concept and includes many measures taken to enhance the knowledge and skills of road users. It is therefore not possible in this paper to review all studies that have evaluated the role and effects of education in improving road safety.

One of the road safety problems that has proven difficult to solve in all highly motorised countries is the high accident rate of young drivers, in particular male drivers. Elvik (2010) discusses why this problem has proven difficult to solve and offers the following remarks on it:

> It has long been the hope of educators that novice drivers can learn not just the skills needed for safe driving, but also acquire an understanding that these skills develop slowly and have not been fully learnt by the time a driver is licensed. However, teaching young people not simply to acquire certain skills, but also to correctly assess the limits of their skills is an almost impossible task. It is, so to speak, impossible to teach people that they do not know anything, or that what they know is only a very small part of what they need to know. Gregersen (1996) reported a very interesting experiment that shows this. He compared two groups of novice drivers. One group had been given skills training to make the driver as skilled as possible in braking and performing an evasive manoeuvre. The other group had been instructed that this task was very difficult and that they could not necessarily be expected to perform it successfully. The two groups then performed an evasive manoeuvre on a test track. Actually, the group that had been taught to master the skill and who erroneously believed that they did in fact master the skill, did a little worse on the task than the group who had been taught to have more modest expectations about their own performance.
>
> Novice drivers regularly overestimate their competence. A recent study shows that 30–40% of young drivers in Finland and the Netherlands rated their competence as better than driving licence examiners did (Mynttinen et al. 2009). Those who overestimated their competence (rated their competence higher than the rating given by the licence examiner) failed the

driving test more often than those who slightly underestimated their competence. Overestimating driving skills is hazardous, as it can make the driver accept a higher level of risk than he or she would if skills were understood more correctly.

As far as deliberate risk taking is concerned, Evans (2006) proposes the hypothesis that it can be caused by hormonal factors, in particular the high level of testosterone in young males. While introducing biological explanations of social phenomena is controversial and not always taken seriously, the data presented by Evans at the very least indicate that his hypothesis is plausible, although these data do not confirm it. Support for the hypothesis that testosterone levels influence risk taking comes from a study of financial risk taking and career choice, although in that study the largest effect of testosterone was found among women (Sapienza et al. 2009; both sexes produce both male and female sexual hormones, but in different mixtures).

The Handbook of Road Safety Measures (Elvik et al. 2009) summarises many studies that have evaluated the safety effects of basic driver training. Although the results of these studies vary, on the average no effect on safety has been found. It would obviously be unscientific and overly pessimistic to suggest that a successful way of teaching young people to drive more safely can never be found. It does, however, seem to be a challenge.

A closer look at different types of training shows a pattern in effects that may guide future efforts in a direction that gives more grounds for optimism. Several studies, summarised in the Handbook of Road Safety Measures, show that training advanced skills can be counterproductive. Possibly the best known example of this is skid training, i.e. training on driving on slippery road surfaces and learning how to control the car when it skids. There has been extensive programmes of skid training in the Nordic countries, where slippery roads in winter makes driving more difficult. Skid training normally takes place on a driving range, in low speed and under controlled conditions. In their original form, the skid training courses involved first teaching drivers how to produce a skid, then how to regain control of the car after it started skidding. After a few attempts, most driver mastered this skill. And it was fun. Producing a skid and then controlling it gives you a wonderful feeling of control.

The dangers of this kind of training should have been obvious. It is one thing to be able to do something at low speed and under controlled conditions, something entirely different to do it at high speed when the skid is not something you are prepared for, but something that just suddenly and surprisingly happens. Besides, it was a skill a driver very rarely needed to practice. It is therefore prone to be forgotten by the time you need to practice it. What many young drivers did not forget, however, was the joy of feeling that they were in control. Some drivers may erroneously have thought that after a few hours on a driving range, they really knew how to drive fast on slippery roads, while still being in full control.

The results were predictable. Skid training increased in the number of accidents by making drivers overconfident.

A different approach has been taken in the USA. There, graduated driver licensing has become the norm. Rather than teaching drivers advanced skills, the philosophy underlying graduated driver licensing is that novice drivers will simply not master advanced skills and should therefore not be driving in conditions when such skills are called for. In a graduated licensing system, a novice driver will therefore first be

given a restricted license. Common restrictions include a prohibition on night-time driving, a ban on carrying same-age passengers and a zero blood-alcohol limit. If a driver complies with the restrictions, a full license can be acquired after a period of one to two years. There have been very many evaluations of graduated driver licensing. Vaa et al. (2015) summarise the results of these studies. There are many versions of graduated driver licensing programmes and not all are equally effective. The best programmes are associated with a reduction of accidents.

Another promising initiative is lowering the age when a driver can start training on the road. This was done in Sweden (Gregersen et al. 2000). The minimum age for starting driver training was lowered from 17½ to 16 years. The idea was to give young drivers more time to practice driving before taking the license test. Youngsters were encouraged to drive with parents, older siblings or others who could guide them. It was found that the number of kilometres driven during driver training increased considerably. This was associated with a lower accident rate after the driving license test had been passed.

Based on these studies, the following lessons are proposed with respect to driver training:

1. Training novice drivers advanced skills that are rarely practised in traffic may generate overconfidence that increases the number of accidents.
2. Imposing restrictions on novice drivers, which prevent them from driving in difficult conditions is associated with a reduction of the number of accidents.
3. Lowering the age for driver training, permitting novice drivers to drive more kilometres before getting licensed may reduce the number of accidents.

In general, learning is very influenced by motivation. If something does not interest you, or if you think, correctly or not, that you already know it, you will not make the effort to learn more. An important part of the task of any teacher is therefore to make learning fun.

Another motivating factor is that you clearly see the benefits to yourself or someone you love from learning something. You may dislike going to the gym at first, but once you see that you can run faster, lift heavier and perhaps become more good-looking, you will feel it was worth the investment and start to enjoy it. One very clear example of how education can be effective when the motivation to learn is strong is teaching parents to correctly install child restraints in cars. One may assume that most parents care about protecting their children and therefore want them to ride as safely as possible in the car. Two recent studies (Tessier 2010; Brown et al. 2011) found that educating parents about how to correctly install child restraints in cars was associated with large increases in the share of parents who correctly installed the child restraints. The lesson is

1. If there is motivation, education can be highly effective in producing safe behaviour.
2. The source of motivation may vary, but would often be that a person experiences an immediate personal benefit in learning the safe behaviour.

4.5 Concluding Reflections

It is clear that legislation, enforcement and education can all contribute importantly to improving road safety. Yet, it is also clear that these policy instruments may not always be as effective as their proponents are hoping for.

Laws can be repealed if they do not have popular support. Laws requiring motorcyclists to wear helmets survived only for a few years in many states in the USA. The national maximum speed limit of 55 miles per hour, introduced as an energy conserving measure in 1974, survived until 1987. States were then allowed to raise speed limits to 65 miles per hour. In 1995, the national speed limit was abolished entirely, and states could set any speed limit they wanted, including no speed limit at all. There is, therefore, no guarantee that even highly effective legislation can be sustained in the long term.

It is important that laws regulate important risk factors, not risk factors that make small contributions to accidents or injuries. Current legislation is not entirely consistent with such a principle.

Legislation is never one hundred percent effective. In all societies, there are individuals who are more or less delinquent, who live their lives more or less as criminals and who are difficult to influence.

Legislation will not be very effective without enforcement. Enforcement is effective, but only when and where it takes place. As soon as enforcement ceases, violations tend to increase. Current enforcement technology, in particular speed cameras, is highly effective but cannot entirely replace enforcement performed by police officers.

Educating road users to behave more safely is difficult, a lot more difficult than regulating their behaviour by means of laws and their enforcement. Laws and enforcement are often viewed as repressive policy instruments. They are negative. They tell people what they should or should not do. They command rather than encourage.

Proponents of education have therefore long argued that laws and enforcement reflect an impoverished view of human nature, that these policy instruments do not recognise the positive capabilities of humans to learn, help each other, love each other and excel in sports and academic performance. Would it not be better to educate road users, to use positive policy instruments that foster human development, proponents of education ask.

Modern road traffic is an advanced system in which you cannot travel safely without being, in a wide sense of that term, highly educated. However, this does not mean that road traffic offers great opportunities for education in the form of formal instructions or lectures delivered in classroom style. In the first place, the system is remarkably self-instructing and forgiving. It normally allows a margin for error and thereby for learning all by yourself. To put it elliptically, safe driving can certainly be learnt, but it cannot be taught. It is all about learning by doing, learning by trial and error, learning by imitation, learning from mistakes, etc.—all of which a driver can do entirely on his or her own. The technical skills needed to drive a car are easy to learn. Any teenager can learn it in a few hours. The danger is that when the technical

operation of a car has been learnt, the driver may erroneously think that he or she can drive.

In the second place, road users are remarkably reliable in behaving in ways that prevent accidents. Given the very many opportunities there are for accidents to happen, extremely few of these opportunities result in an accident. There is, in other words, little room for improvement. There is little to learn. Most road users know everything they need to know to travel safely.

This does not mean that human factors do not contribute importantly to accidents. They obviously do. The driver is the problem. The solution is therefore to abolish the driver, not try to reform him, which is in most cases a hopeless project. Self-driving cars are rapidly being developed and hold great promise for improving road safety.

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