

## **RISK AND CHOICE ON ROADS AND IN THEIR USE**

By the mid-1960s the people of western Europe were leaving behind the austerity that followed the second world war and the economies of their countries were growing strongly. Among the majority who were by then more or less adequately housed, the proportion who chose to own a car was rising rapidly, and for many others this was their next material ambition. Construction of modern roads and updating of historic roads and streets were widely called for and welcomed.

But we were still in the early phase of growth in ownership and use of cars in which that growth was accompanied by rapid growth in the numbers of people per year being killed or injured on the roads and in the damage and other material costs associated with collisions. This did little to dampen enthusiasm of the public for the advantages of availability of cars, or of business for that of vans and lorries, but it was a matter of growing public awareness and of deep concern to government and to relevant professions. In numerical terms, by 1966 the annual number of deaths from traffic on the roads of Great Britain reached what was to be its peacetime maximum of almost 8000, or about 150 per million population, and showed at the time no sign of stopping rising. The risk of death per hour spent using the roads was, on average over the whole population up to pensionable age, about 15 times the risk per hour in the rest of everyday life.

What had become known as the issue of *road safety* did not come as a surprise: it had manifested itself clearly by the 1920s and had begun to be addressed in the 1930s. Early attention to it in Britain after the second world war is exemplified by the distribution of a booklet entitled *The Highway Code* to every household by the summer of 1946. It became the subject of growing research internationally, led in Britain by the Traffic and Safety Division of the then Road Research Laboratory under Dr Reuben Smeed. The foundations of systematic recording by police and road authorities of motor vehicle collisions involving injury were laid. With the help of his team and his awareness of research in other high-income countries, Smeed estimated (1964) that two-thirds of the deaths then occurring on the roads of such countries could be prevented by applying knowledge that research had already yielded. But the effort needed to achieve this was to be prolonged, taking in Britain until 2008.

In the face of the numerical reality of the mid-1960s, it was understandable that the challenge was seen rather starkly in terms of casualty reduction in the face of increasing motor traffic. Fifty years later, with deaths per year from traffic on Britain's roads clearly fewer than 2000, or about 30 per million population, and the risk of death per hour using the roads in Britain now about 3 times that in the rest of everyday life (Allsop 2018), people rightly look for a more critical and nuanced addressing of what still remains a challenge. Let us reflect on the evolution in thinking about risk and choice on the roads and in their use that has accompanied and contributed to this half-century of change.

In the aftermath of the second world war, approaches to casualty reduction may well at first have been piecemeal, but by the mid-1960s collisions on the roads were coming to be seen as failures of a system comprising road users, vehicles and the road environment. Interventions in relation to road users were seen in terms of education, regulation and visible enforcement,

and those in relation to vehicles and roads in terms of engineering and less visibly enforced regulation.

Construction of motorways and other roads also engineered with reduced risk of collision as well as traffic capacity in mind offered the prospect of longer-distance motor traffic with fewer collisions, and urban planning offered the prospect of separation of motor traffic from other road use in built-up areas, one of whose effects should be to reduce risk, but the economic reality was that most road use would continue to be on the inherited network of roads, streets and footways.

Road authorities became responsible for investigating the occurrence of collisions and injury in their areas and taking steps to reduce them. This enabled the effects of interventions upon the numbers of collisions to be investigated and statistical issues in doing so began to be explored. New forms of pedestrian crossings appeared on urban streets. Speed limits, already widespread on built-up roads, were extended to rural roads and motorways, and limits on the level of alcohol in the blood at which driving was permitted were introduced. Safety helmets for motorcyclists and seat belts for car users were developed and their use began to be encouraged. Cars were starting to be designed with strong and rigid passenger compartments to protect the belted occupants, but crushable front and rear ends to reduce the forces imposed on occupants in the event of collisions. Use of heavy goods vehicles was being increasingly regulated. The sources of some of the largest numbers of casualties were being addressed by interventions like these during the 1970s. Because of this and helped by the fuel crisis of the early 1970s and by more questioning attitudes to the role of motor traffic in high-income societies, numbers of deaths and severely injured casualties on the roads of high-income countries were beginning to fall.

By the early 1980s, safety features in the design of roads and vehicles were becoming familiar, and increasing regulation of their use was gaining acceptance, if not yet necessarily accompanied by high levels of compliance. But efforts to reduce risk were by no means uncritically accepted. Changing longstanding habits of speed choice and drink driving might be matters of time and improved enforcement, but a range of questions were being asked. Steps were being taken to protect the occupants of cars, but what of the pedestrians and cyclists that were struck by them? Road safety engineering to reduce risk by means of modest changes to the layout of roads was shown to be effective in reducing casualties, but why were these reductions at first mainly among motor vehicle users rather than among pedestrians and cyclists? Need these changes to the roads be intrusive in appearance and detract from the quality of streets as places, as they sometimes were and did? Need they make walking and cycling less congenial and convenient, as they sometimes did. Reductions in casualties among pedestrians and cyclists came more from reductions in walking and cycling than from reduction in the risks associated with doing so. Wearing of helmets by cyclists offered appreciable protection from head injury but was widely unpopular. This raised the question whether encouragement of their use might so discourage cycling that the health benefits thus foregone might outweigh the reductions in deaths and injuries from collisions and falls that encouragement to wear, or perhaps requirement to wear, might yield.

Such specific questionings helped to draw attention to more profound issues. In free societies, acceptance might be gained for regulation to prevent citizen A from imposing risk upon other citizens B and C or upon citizens in general, but how acceptable is regulation to prevent citizen A from accepting risk to themselves in return for some satisfaction offered by an activity that brings with it risk? Many activities in life involve some risk in the course of

giving satisfaction or pleasure, and it makes sense to try to reduce risk, but how far should we strive to do so at the cost of satisfaction and pleasure? The writer has offered this maxim:

*Safety is for living: living is more than just keeping safe,*

and thus in choices about use of the roads, reduction in risk may not be the first priority in the mind of every user.

A more tangible but also far-reaching distinction is between repairable and life-changing consequences of collisions and indeed of safety interventions. Most material consequences are repairable at a price – though there are exceptions, like the destruction of a valued possession or the felling of a tree that is important to people – but the spectrum of physical and mental injury ranges from those from which recovery is complete, or more or less so, within a reasonable time, through those which are in some way life-changing for the injured and their associates, to the fatal. In trying to reduce injury, it makes sense to give greater priority to reducing life-changing and fatal injury than to reducing repairable injury, but the borderline is not well-defined, and our means of categorising and recording injury do not yet enable distinctions to be made that would enable policy for road safety interventions to take proper account of the spectrum.

Nor are we yet good at counting the people injured on the roads, those whose numbers we are trying to reduce. In Great Britain we can claim to count all the deaths which involve a vehicle – pedal cycles included – but we do not count as transport deaths those that result from falling while walking on footways or carriageways without a vehicle being involved. Nor do we count injuries arising in this way as transport injuries. And we fail to count among ‘reported road casualties’ many injuries to pedestrians and cyclists in collisions where only one vehicle is involved. The importance of addressing these gaps in counting is increased by the development of policies to encourage active travel in the interests of public health.

By the 1980s the time was therefore ripe for more systematic approaches to risk and choice on roads and in their use in the form of management of the range of policies and their implementation to reduce collisions, falls, injury and damage whilst affording people an equitable freedom of choice in their use of the roads. This became known as *road safety management* and addresses the technical interaction between interventions of various kinds, their effects on people’s choices about use of the roads including effects on access and mobility, the equity of their effects among different people, or at least among different broad groups of people, and how to use economics to weigh the reductions in risk achieved by interventions against their cost, both financial and in terms of quality of life, for example through their impact on the liveability of the urban realm. Not all issues like those mentioned in the previous two paragraphs have yet been fully addressed, but they are recognised and being worked on.

Contributions to more systematic approaches came from throughout the world, but these approaches were most clearly articulated in north-west Europe and Australasia. In particular, the ground was prepared in Sweden for the adoption of an inspiring vision, backed by action, for road transport with altogether lower risk, in The Netherlands for a particularly coherent approach to the widespread adaptation of the road network and its use on foot, on bicycles and in motor vehicles, and in the United Kingdom for a cross-governmental approach to casualty reduction expressed in terms of an ambitious medium-term national target. During the 1990s the first two of these became widely known as *Vision Zero* and

*Sustainable Safety*. The British approach, being more pragmatic, attracted no such epithet, but by the turn of the century the efforts of these three countries were achieving, by different mixtures of interventions, reductions in annual numbers of road deaths per million population to very similar numbers that were lower than were being achieved anywhere else in the world. Research was undertaken at the turn of the century to investigate just how this had come about and how other countries could benefit from that knowledge. The research team called Sweden, the United Kingdom and The Netherlands the SUN countries (from SE, UK and NL).

Awareness of the possibilities for reducing risk was growing and the range among European countries in the annual numbers of road deaths per million population was wide. In this context in 2001 the European Union (EU) set an aspirational target to reduce the annual number of deaths on the roads of the EU by 2010 to half the number in 2001. With the help of the economic difficulties stemming from the financial crisis of 2007, this target was nearly achieved by the 15 Member States who had set it, and was quite closely approached by all 27 countries that formed the EU by 2010, even though the newer Member States had not embraced the target until 2004 or 2007. Across the EU of 27 countries, the number of road deaths between 2002 and 2010 was roundly 100,000 fewer than would have been the case if their annual numbers had remained as they were in 2001. In 2010 a similar target was set for 2020, but progress towards it has not so far matched the achievement of the previous decade.

Experience from around the world of approaches to road safety management was brought together by the International Transport Forum (ITF) in 2008 in a report entitled *Towards Zero* (ITF, 2008), and this has been supplemented by another, entitled *Zero Road Deaths and Serious Injuries* (ITF, 2016). These two sources contain a wealth of sound advice and together they describe an approach known as *Safe System* that can be regarded, indeed is regarded by the writer, as the current state of the art in road safety management. Its essentials are that

- people make mistakes that will continue to lead to collisions;
- the human body can withstand only limited forces in collisions without death or life-changing injury resulting;
- those who design, build, manage or use roads and vehicles or who provide post-collision care all share responsibility for preventing collisions resulting in death or life-changing injury;
- road safety management should be aligned with wider economic, human and environmental goals;
- road safety interventions should be shaped to meet chosen long term road safety goals; and
- different elements of protection for road users should be managed holistically to reinforce one another and minimise the consequence of failure of any one element.

*Safe System* owes much of its inspiration to *Vision Zero*, as adopted by the Parliament of Sweden in 1997. This envisages road transport from which the risk of death or life-changing injury has been removed on the basis that life and health should not be allowed to be traded off against the benefits of the road transport system, such as mobility. Notwithstanding that this basis is at odds with realities of the experience of individuals and society, *Vision Zero* is rightly credited with inspiring fresh ambition for road safety in many countries, and its assertion of the joint responsibility of system providers and road users for safety on the roads has become a cornerstone of *Safe System*.

Visions can inspire, as *Vision Zero* has manifestly done, but they can also delude, and the two ITF reports show the inspiring ambition to eliminate death and life-changing injury from road transport as evolving into being expressed as an ultimately achievable goal – even though it is not known whether, let alone how, it can be achieved, even with autonomous vehicles and related technology. This lack of knowledge casts doubt upon the ethics of advocating elimination or zero as a goal of policy when the possibility of achieving it may be a delusion. The writer has set out his reservations about this elsewhere (Allsop 2016 briefly and 2018 more fully). These cause him concern for the longer term, but should not be misinterpreted as giving reasons for holding back the adoption of *Safe System* in the short term.

This half-century of evolution in thinking and practice has stimulated and been sustained by a widening range of research spanning many disciplines. The challenge to reduce exposure to the risk of collision and falls and to reduce the forces imposed on those involved in collisions whilst allowing society to benefit from the availability of road transport has called for research into road infrastructure, vehicles, people's behaviour as road users, the interactions between these, and the management of these interactions, as well as into the mechanisms of injury and minimising its consequences through rescue and trauma management.

Adapting road infrastructure to influence the number and severity of collisions and falls, along with the quality of the public realm and of access and mobility afforded to people using the roads, calls for research in a number of branches of engineering and design, and into the behaviour of users.

Adapting the characteristics of vehicles and their equipment to influence the occurrence of collisions and injury, both directly and by helping drivers and riders to choose safer vehicles and use them more safely, calls for research not only in various branches of engineering and computer science, but also in the biomechanics of injury and in the workings of the market for vehicles.

Road user behaviour influences the number and severity of collisions and falls through choices that people make about their use of the roads – when and where to go and how to get there – and through their manner of walking, riding and driving. All aspects of behaviour are open to influence by education, training and public information and are subject to sensory, mental or physical impairment. This calls for research in the fields of behavioural psychology, education and communication as well as aspects of public health, pharmacology and addiction.

Road safety management by achieving synergy among efforts of many kinds and by imposing and enforcing regulation calls for research by engineers and by behavioural and social scientists, including investigation of the workings of the police and the judiciary. Delivery of rescue and trauma management after serious injury in collisions and falls calls for research in medical and clinical science and into provision of emergency services.

Road safety management also requires information, notably about use of the roads, the occurrence of collisions, falls, injury and damage and the costs of changes to infrastructure, vehicles and measures to influence behaviour. Resolution of differences of opinion and decisions about regulation and enforcement can also be usefully informed by monetary valuation of items that do not have a market price, such as prevention of death or injury, or restrictions on choice. Availability and interpretation of information of all these kinds calls for research into gathering and analysis of data and in relevant aspects of economics.

The scope for research of these various kinds is continually evolving, and this overview has already mentioned several areas in which fresh research is required soon, or even overdue. We need to find reliable ways of counting all the deaths and substantial injuries that result from any kind of use of the roads. To inform the equitable and economic targeting of efforts to reduce risk, we need practicable ways of distinguishing life-changing injuries from those from which the injured person can largely recover, and in either case ways of estimating the social and economic costs of injuries of different kinds. We need more systematic investigation of just how injury, especially fatal or life-changing injury, arises, with a view to prevention or mitigation, as distinct from attributing blame or liability. Alongside concerns about injury and material damage, we need greater understanding of ways in which risk on the roads leads to other kinds of harm through limitation of choice about access and mobility. This overview has referred only very briefly to autonomous vehicles and technology to assist driving and for communication between vehicles or with traffic control systems. Development of these clearly requires ongoing technological research, including research into achieving reductions in risk, but implementation of these technologies also brings the need for behavioural and social research related to risk and choice. How will the behaviour and exposure to risk of drivers and other road users adapt to an evolving mix of levels of autonomy, connectedness and driver assistance in the available fleet of vehicles? And how will patterns of motor vehicle use and active travel respond, and what will be the implications in terms of risk? We shall all have much to learn.

Research relevant to risk and choice on roads and in their use finds publication in a wide range of journals, including several that are explicitly devoted to matters of safety and from time to time *Transport Reviews*, and is also disseminated in substantial grey literature from responsible agencies and road safety research institutes. Readers whose research has been concerned with aspects of roads and their use but has not yet addressed risk explicitly may like to consider whether their work may have as yet unexplored relevance to the reduction of risk, injury and damage on the roads, and to related choices made by road users.

## References

- Allsop R (2016) Vision Zero is flawed, but we should harness its spirit to keep driving down deaths. *Local Transport Today* **704**, 18
- Allsop R (2018) Zero deaths and serious injuries on our roads – is this a prospect safe system should offer? Universities Transport Study Group Conference, University College London, January 2018
- International Transport Forum (2008) Towards zero: ambitious road safety targets and the safe system approach. Paris: OECD Publishing
- International Transport Forum (2016) Zero road deaths and serious injuries: leading a paradigm shift to a safe system. Paris: OECD Publishing
- Smeed R J (1964) Methods available to reduce the numbers of road casualties. Proceedings of 7th International Study Week in Traffic Engineering

Richard Allsop  
Centre for Transport Studies  
University College London