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ROAD SAFETY: DEFEAT, COMPLICITY AND THE BANKRUPTCY OF SCIENCE

JOHN WHITELEGG
Department of Geography, University of Lancaster, Bailrigg, Lancaster, LA1 4YR, England

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Abstract—Road traffic accidents (RTA's) continue to be a serious problem. The paper argues that much research and effort to minimise this problem is locked into a fundamental misconception in so far as it assumes that blame, responsibility or engineering inadequacies can explain RTA's. The whole system of motorised transport, mobility patterns, land uses, governmental intervention and large company support has deprived society of realistic alternatives to the motor car and bequeathed a deficient technology with several societal disbenefits. Long term solutions to the problem of RTA's involve basic change to this systems design. Anything less will continue to reinforce the present trajectory.

Road safety as an important area for research and action programmes has received a great deal of scientific attention in recent years. Progress has been made on several different fronts but in one area there would appear to be a serious lack of interest or, at the very least, a paucity of published information and informed debate. This area concerns the degree to which our thinking and hence our solutions are locked into a particular view of technology and society and thereby condemned to produce incremental improvements but no radical alteration in the magnitude or structure of the problem itself. In the case of road safety it can be argued that solutions which build on the acceptance of the motor car as a major and immutable technology will reinforce that position and generate a primary paradox: solutions designed to reduce a major negative effect of motorised transport contribute to the perpetuation of the circumstances which lead to road traffic accidents. The lack of policy suggestions outside of this "predominant technology" framework leads to great confusion in road traffic accident research. There is confusion about objectives, especially when these relate to the straightforward reduction of accident occurrences but conflict with resource constraints or with the interests of car users themselves who in many different ways have the power to nullify policies which appear to reduce the advantages or convenience of the privately owned motor car. Problems of conflict between interest groups and the scientific "urge" to provide objective, technical explanations for complex problems are sources of confusion in road traffic accident research and a proper understanding of the nature of the problem itself.

In the U.K., the 1967 Road Safety Paper—A Fresh Approach [Cmnd 3339] identified people, vehicles and roads as the key dimensions of road safety policy and this rough categorisation has served to differentiate between major areas of research and professional responsibility. This in itself is a source of some of the difficulty surrounding road traffic accident research. The progress which has been made in areas as diverse as road pavement design, vehicle engineering and studies of driver/pedestrian behaviour has not been matched by advances in our understanding of the role and function of the transport system as a whole and of the needs and susceptibilities of different groups and individuals for whom movement in cities and elsewhere is an integral part of normal existence. Road safety hazards which may in some matter of detail be well understood (though remedial action may not be forthcoming) are not understood at all well as part of a general malaise which renders daily activity patterns more troublesome and difficult for many groups in scattered locations.

It is of little value to point to the advantages of motorised transport in terms which are sometimes held to explain or excuse some of the disadvantages because there is no adequate mechanism for ensuring a fair distribution of benefits and disbenefits in society. The road traffic accident is a disbenefit (which has been given a monetary value) whose distribution vis a vis the distribution of benefits is simply not known.

The accelerated development of detailed research (e.g. on the psychological attributes of

driver behaviour) has also served to confuse some more general points which are quite fundamental. A road traffic accident as an event in space and time is the result of several different factors in interaction and it is possible to view this situation as some kind of breakdown in a loosely defined system resulting from the failure of one or more components. The component which has failed usually defines the range of interest of the professional researcher and the orientation for subsequent analyses. The approach carries with it a strong implication that the original "design" (if it is possible to use such a word in this context) is without major defects and the answer to component failure, therefore, lies in some aspect of quality control amongst component suppliers—people, roads or vehicles. Since accident researchers are concerned with some aspect of component quality control, and these are relatively well understood, it will be necessary to expand a little on the design of the system itself.

The system was, of course, never designed. It is instructive to read a general history of transport such as that of Dyos and Aldcroft[1969] to see just how pragmatic its development has been and to follow this up by Plowden[1971] on the motor car and politics and Lewis Mumford[1961] on the city in history for an intelligent, valued perspective on life and the motor car. It is not possible to understand the context of road traffic accidents without the insights provided by the painstaking research of Plowden[1971] into all the official commissions of inquiry into the motor car and the subtle and not so subtle communality of interest between motor vehicle manufacturers and central government. The same points (in a rather more aggressive context) have been made by Ralph Nader[1965] and the essential features of the link between government, motorised transport, and its disbenefits documented once again in Wardroper[1981].

The development of motorised transport in the U.K. and its associated accident toll in the period 1968–1970 took place against a background of consistent government misunderstanding of what was going on and the development of strong manufacturing and trading interests achieving considerable success in their links with government. Their successors are still active today and provide a powerful lobby for the maintenance of those aspects of the system which contribute to road traffic accidents. The significance of car manufacturing in terms of employment and taxation revenues and strong consumer demand for the product have convinced many governments of the inexorable logic of the system as it was developing. There has been little sign in the U.K. in transport policy documents of the period 1968–1981 of any trend towards basic questioning or evaluation of contemporary societal organisation based on motorised transport. In fact very much the opposite has taken place with an emphasis on traffic forecasts and transport planning to meet the needs of projected increases in traffic. This single-minded devotion to the pursuit of one technological option has dominated governmental thinking [Wardroper, 1981] at a time when evidence has accumulated on the decline of personal mobility amongst many groups in society [Hillman and Whalley, 1976]. The loss of services resulting from concentration and rationalisation has affected both rural and urban areas and lack of access to private transport is strongly associated with incidence of deprivation. Motorised transport has undoubtedly made possible a more dispersed society where walking and cycling is less likely to achieve specific goals. This is a fundamental design feature of the motorised age which stimulates a demand for more of the same. The demand for infrastructure in general is stimulated as suburban sprawl generates the need for services of many kinds and investment in urban road construction. Harvey [1978] has related the development of suburbs to the needs within a capitalist society for large profit earning investments in the private sector linked to substantial state investment in basic infrastructure. The development of the motorised age is a clear illustration of his thesis.

We can now list some of the basic design features of the system which produces road accidents (amongst many other disbenefits). There is the development of a large manufacturing and service sector which develops in symbiosis with consumer demand. The sector defends and develops its interests in communion with government in a complex manner which ranges from the direct lobbying and influencing of the law making process through gaining additional road funds, supporting the industry itself with funds and influencing attitudes towards items like company cars which underwrite a large proportion (70%) of the market for new cars[Whitelegg, 1981].

The car, because of the way it influences the form of the built environment and shapes the

whole lifestyle of different groups in society creates a subtle dependence on itself. In many parts of the U.K., both urban and rural, it is not possible, or only just possible if supported by ideological conviction, to reject car ownership after a period of adaption in terms of housing and job location and the development of social, recreational and retail buying habits. The car is at the centre of a complex web of lifestyle organisation which sets it apart from many other consumer durables. In conjunction with continuing processes of change in the built environment and re-sorting of opportunities which takes place simultaneously with land use evolution, the car rapidly becomes an essential ingredient in the pursuit of the "good life". Consumer demand for cars in many different societies cannot be adequately understood outside of an appreciation of state support for motorised transport and changes in the built environment which generate further demand for car ownership.

The rise of car ownership has taken its toll of public transport systems, a paradox, given that the latter is an inherently safer mode of transportation. Smith [1981] in his examination of accident statistics in the U.K. shows that in 1979 bus and coach operators carried their passengers 52,000 million km with 3 driver and 31 passenger fatalities. Every time the same distance was travelled by car 329 car occupants died. In the same year buses and coaches killed or seriously injured 715 pedestrians; every time the same distance was travelled by car 1750 were killed or seriously injured. Trains have an even better accident record. British Rail and London underground carried their passengers 36,000 million km in 1979; 45 passengers were killed (mainly falling out of carriages) and 100 seriously injured. Every time a similar distance is travelled by car, 230 occupants are killed and 3050 injured. Accidents to people along the route also show a much better performance. Passenger trains run down and kill less than 210 people p.a.; the same distance by car produces 1250 killed or seriously injured. Smith found the relative risk of being killed on a journey by a car, train or bus as 10.5 : 2.3 : 1.0 (respectively). It has been calculated in Canada that per passenger mile travelling by train is approximately thirty times safer than travelling by car [Wilde, 1976].

One of the most through pieces of research to point to the safety advantages of public transportation is Williams [1980] of the U.K., Transport and Road Research Laboratory. Based on 1977 data she concludes:

> "The classes of road user most often injured were pedestrians, riders of two-wheeled vehicles and car occupants; the most dominant interactions leading to casualties were:
>
> Pedestrians in conflict with cars (15% of casualties in single and two-vehicle accident).
>
> Motorcycle riders and car occupants in single-vehicle accident (3 and 12% respectively).
>
> Two-wheeler casualties in two-wheeler/car impacts (17%).
>
> Car occupants in car/car impacts (21%).

There are many useful tables in this excellent publication. Table 1 summarises some of this salient information.

Ordinary life then, by which I mean those daily and repeated tasks which form a large proportion of activity patterns, is heavily constrained by the simple presence or absence of options (in some cases probabilities rather than simple presence or absence). Is it possible to walk to school or to the shops? Is it possible to cycle to work? Is it possible to live in a rural village without a car? Is it possible tc get the children to and from the swimming pool before going on to another meeting later in the evening? Answers will vary depending on ownership and access to vehicles. The decision to own one or more vehicles will have been taken in line with problems of this kind which stem directly from a physical environment moulded and created by individual decision and planning action/inaction. The decision may have been made for us in the U.K. by the owners of the 1 million plus company cars, a subject dealt with in greater detail elsewhere [Whitelegg, 1981, 1982], responding to the fiscal advantages conferred by that system. In both cases there are other models and other possibilities but because they have not been pursued someone will end up in their vehicle driving a child to the swimming pool when something happens to "cause an accident". Of what relevance is the cause of component failure in comparison to the system design which has robbed those it is meant to serve of basic choices in the

Other vehicle or person involved	Pedestrian	Moped	Pedal Cycle	Motor scooter or cycle solo/ comb.	Car/Taxi	PSV	Goods	Other	Total
Pedestrian	0.1			0.2	0.2				0.4
Pedal cycle									0.2
No.other vehicle or pedestrian		0.4	0.4	5.4	13.8	0.5	1.6	0.3	22.6
Moped	0.1								0.2
Motor scooter or cycle solo/comb.	3.8		0.2	0.4	0.3				4.9
Car or taxi	23.7	0.7	2.4	6.1	12.0	0.2	0.6	0.2	46.2
PSV	2.3	0.1	0.1	0.4	1.2	0.1	0.1		4.4
Goods	5.6	0.3	1.1	2.9	7.1	0.2	0.9	0.2	18.5
Other motor car or van Motor vehicle	0.9		0.2	0.4	0.5				2.1
TOTAL	36.5	1.5	4.5	16.2	35.2	1.0	4.0	0.8	100

Pedestrian casualty numbers account for 36.6% of fatalities, two thirds of which (23.7% of all fatalities) are pedestrians involved in collision with cars. Cars and taxis between them are involved in accidents which produce 46.2% of all fatalities.

Table 1. Distribution of fatal casualties in one vehicle, one vehicle and pedestrian or two vehicle accident in 1977 (U.K.)

drive or not drive, walk or cycle, shop and recreate locally? The absence of choice fuels car ownership and usage, feeds the demand for road space, concentrates facilities, increases average mileages, affects frequencies of journeys and influences the daily activity patterns of many millions of individuals. It also seriously deprives many individuals and groups of basic ordinary experiences associated with mobility. Hagerstrand[1973] has drawn attention to the gap between the mobility rich and mobility poor and we have yet to comprehend the significance of this basic maldistribution of goods in contemporary industrialised societies.

Like all road safety research this particular perspective on the problem has clear implications for the sort of policies which could be expected to reduce the number of road traffic accidents. Road safety as a research area is an area where there is a direct policy application and an uncontentious and clear objective: to reduce the number and seriousness of injuries resulting from road traffic accidents. There are of course some substantial problems... are 3500 fatalities per annum 'acceptable' when 7000 are not? What is an 'acceptable' level of fatalities and serious injury in road traffic accidents? There is, of course, no simple answer to this and the question is usually dodged by the application of rudimentary cost yardsticks. The current level of resources deployed is much less than the 'cost' of road accidents, though both sets of calculations must be heavily qualified [there is a huge literature on this subject, e.g. Adams, 1981; Mooney, 1978]. Presumably there would be some logic in equating the two sums and then adding a bit more to prevention as a mark of respect for human life and dignity but, again, this is a no-mans-land of disciplinary argument. It is probable that "sophisticated" costing exercises will defeat the object and serve to confuse the issue further and it is for this reason that I prefer the very unprecise and pragmatic (but very realistic) process of deciding on an objective and setting out to achieve it. The decision on objectives may well fall squarely within the realms of the "political" in every sense of the word but something as important as long term societal goals in road safety cannot be left to experts. Such a course does put into some confusion the role of the expert but there is nothing in the history of expert advice which suggests confidence in its ability to "solve" the problem. The problem in this sense in not too dissimilar from that experienced in the medical profession over serious matters of life and death discussed by Ian Kennedy[1981], in his Reith lectures.

Policies are filtered by governmental agencies and Wardroper has clearly shown how a "departmental view" emerges in government and directs the course of argument, policy and ultimately legislation. It is not possible to replicate Wardroper's[1981] analysis in the particular context of road safety (his theme was the impact of the lorry) but we do have the 1967 U.K. White Paper, and subsequent publications from the Transport and Road Research Laboratory (U.K.). The dominant theme in these publications is the tripartite divisions of road accident incidents into "elements" or "factors". They are:-

(i) The vehicle.

(ii) The environment in which the vehicle moves.

(iii) The road user.

In the words of the official handbook for Road Safety Officers[1980] "one or more of these elements accounts for the accident". This theme of accountability or responsibility has been developed in the Accident Investigation Division (Safety Department) of the Transport and Road Research Laboratory (U.K.) and made particularly clear in a research report [Sabey and Taylor, 1980] where one conclusion states that the greatest potential for accident reduction lies in influencing human behaviour. The road safety officers handbook quoting from an earlier Transport and Road Laboratory (TRRL) study concludes that the dominant contributory factor in road traffic accidents is "road user error". It would seem, therefore, that the departmental view focusses on the component in the accident, constrained by cost and overwhelmingly dominated by the view expressed in the concluding sentence of Sabey and Taylor[1980].

> "In the short term the lowering of risks can best be achieved by application of low cost road engineering measures and some legislation. In the long term it must rely on behavioural changes brought about by education and dissemination of information in the broadest sense".

This position is contrary to that taken up in this paper but is consistent with a view which ignores inbuilt design features of the traffic and transport environment. The TRRL view of road traffic accidents is perfectly consistent with the general governmental stance adopted towards the motor car in the period covered by Plowden[1971]–1896–1970. As the arbiter, legislator and

provider of the motor age it would be inconsistent with its role to connect road traffic accidents with built-in design flaws or even to seek to ameliorate the worst consequences of these flaws by some kind of balanced transport policy which restored choice and reduced dependence on a major villain of the piece—the privately owned motor car. The only logical and blameworthy component in a system (a system which is itself beyond reproach) is the human component. It is possible, therefore, to talk in terms of fault, blame, responsibility and so on but it is less likely that the whole collection of artefacts-objects, activities, purposes, needs, scales, times and places, will be analysed for its percentage of contributory negligence.

In policy terms there are several major areas where administrative, legal and fiscal changes have the potential to bring about major improvements in road safety. Unlike more detailed and specific road safety improvements they are also capable of producing benefits across the whole range of environmental, energy and community issues which an integrated transport policy is capable of achieving. These areas include:-

(1) *Land use and transport planning*

The existing framework of structure planning (in the U.K.) could be used as a mechanism for the achievement of a spatial form which minimises the demand for movement and travel while maximising accessibility and mobility. There would be associated costs but benefits could be measured in reduced accident rates as well as energy savings. Such a policy would operate at several different scales ensuring that local neighbourhood accident rates did not increase as a result of a reduction in medium length trips. Policies would be necessary across the whole range of educational, health and retail service provision. The woonerf is an application of these broad principles at a particular spatial scale (the neighbourhood level).

(2) *Fiscal incentives for small services*

As a counter to concentration tendencies and a support of locally based services, taxation thresholds could be introduced to give small dispersed services an additional boost. This would apply to shops, sub-post offices, pharmacies, garages and a wide range of community initiatives [Woollett, 1981] which have an effect on reducing the spatial separation of households and facilities and hence the propensity for accident causation.

(3) *Lorries and freight transport*

The arguments are well rehearsed in Wardroper[1981]. Any reduction in the transport of goods by heavy goods vehicles will produce benefits in accident reduction as well as direct economic return to the community at large. Lorries are encouraged by a wide range of policies just as railways (safer) are discouraged.

(4) *Company cars*

It has been shown elsewhere [Whitelegg, 1981] how support in the U.K. for this system acts as a powerful policy inducement for increased car usage and mileage—a policy clearly at variance with a road safety object of reducing dependence on motorised transport. Changes can be made in the fiscal incentives for company cars in a very short time with immediate results.

(5) *Public transport support*

An inherently safe mode has suffered real decline over the last 20 years. There are a large number of policies which can set this process in reverse, reduce dependence on the private car, restore choice in urban and rural areas alike and produce a direct economic return to the community. In the U.K. there have been major gains in those areas where public transport fare levels have been kept low—either frozen as in the case of South Yorkshire or substantially reduced as in the case of London up until the Denning judgement of late 1981 which brought the low fair policy of the Greater London Council (G.L.C.) to a premature end. In both cases (and in other metropolitan authorities) public transport ridership has increased, congestion decreased and, it is argued, accidents decreased. G.L.C. research has predicted an increase in accidents (including 30–40 fatalities p.a.) with the ending of its "fares fair" policy. Conventional economic research and accident research has not been well geared to the calculation of benefits across a wide spectrum to compare with the costs of such policies for any meaningful answers

to emerge. Nevertheless it is quite evident in the U.K. experience and in other countries (particularly Germany and the cities of Munich, Bremen, Hamburg and Berlin) that public transport support can produce substantial improvements to townscapes, quality of life and the advancement of modes of transport with far safer accident records.

(6) *Attitudes to speed, road construction, cycling and walking*

Illich [1974], amongst others, has drawn attention to the relationship between speed, energy expended and work actually done. Translated into policy terms it is likely (though little explored) that expenditure on improving track suitable for pedestrians and cyclists will (in conjunction with land use policies) produce great benefits in terms of energy savings, accident reduction and reduction in health budgets as the health of an exercised population improves. On various time budget calculations the loss of speed advantages would be more than offset, by time saved in not having to "service" vehicles (in the widest sense of the word). The study of time budgets, telecommunications trade-offs and changes in work and leisure has much to offer in understanding the design inefficiencies of our accident prone traffic and transport system.

CONCLUSION

Road safety research and the application of solutions to relieve road safety hazards show clear long term policy components. Road traffic accidents are a relatively recent phenomenon in historical terms and yet the technological basis from which the hazard is derived is widely regarded as a fixed and immutable facet of daily life in contemporary industrialised societies. There has been a marked lack of interest amongst researchers and practitioners in the possibility of deviating from this technological norm and designing a transport system which is measured primarily against performance criteria which put a strong emphasis on road traffic accidents. The lack of long term policy objectives and the failure of the research community to put road traffic accidents into a wider context of societal development, technological monopoly and the extinction of choice is a major obstacle to the success of the short and medium term policies which concentrate on the vehicle and the highway. There is an urgent need for research into long term policy goals and the identification of different routes which will lead to the achievement of these objectives. Without such effort and without serious comment on the possibility it is entirely reasonable to conclude that the bulk of current road accident research continues to support a transport system which is structurally determined to eradicate choice in our environment and to perpetuate a system which in spite of significant gains will continue to be destructive of human life and talent. Dependence of any sort is usually unhealthy. Dependence on the motor car to the degree evident in our industrialised societies is especially unhealthy and disguises the true extent of slavish addiction to a form of vehicular propulsion which fails to meet so many modest requirements.

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