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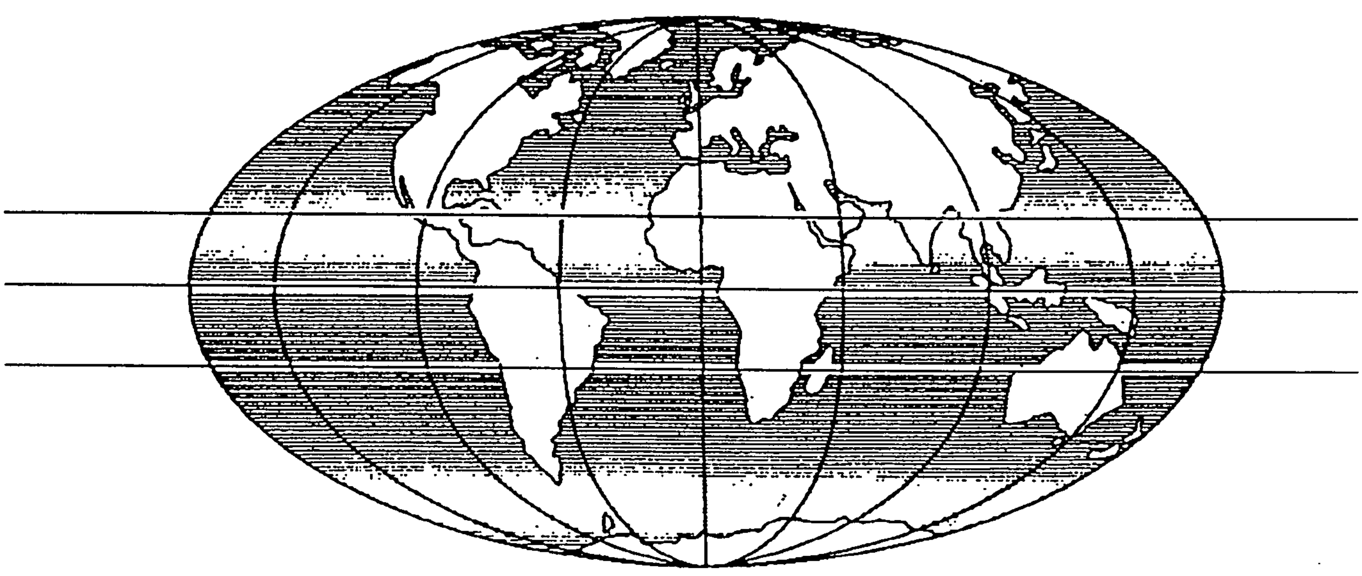

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TRAFFIC ACCIDENTS - A WORLDWIDE PROBLEM

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INTRODUCTION

The World Health Organisation estimates that nearly 600,000 people lose their lives each year as a result of traffic accidents, and over 15 million suffer injuries. The majority - some two-thirds - of this worldwide total is borne by the non-OECD countries, predominantly those economies which the World Bank classifies as low or middle income. In the high income economies road accidents are now one of the leading causes of death in the 5 to 44 year age group, typically accounting for 15% of mortality, and the injuries - which include a high proportion of brain and spinal cord damage - account for some 15% of hospital bed occupancy and 30% of out-patient care.

Whereas the situation is slowly improving in the high-income countries, the global gains are more than off-set by trends in the developing and rapidly industrialising ones. As infectious diseases are brought increasingly under control, road deaths and injury rise in relative importance. In Thailand, for example, more years of potential life are lost through road accidents than from tuberculosis and malaria combined; in Mexico, accidents as a cause of death rose from 4% in 1955 to 11% in 1980, with traffic accidents playing the leading role. Is this the price that has to be paid for the mobility of people and goods which is the hallmark of an industrialised society?

Many of the papers in this conference will be looking at aspects of personal behaviour which affect road safety. In what follows I shall be taking a more global perspective, looking at worldwide accident behaviour as reflected in the rates and trends of national states, and some of the lessons these hold for the future. I shall also stress the importance of knowing the structure of these national pictures, and understanding the individual behaviour which help to determine the collective outcome. I shall then look briefly at the potential offered by mechanistic ways of influencing behaviour through planning and engineering, stressing the advantages for rapidly growing countries with small budgets, albeit within the framework of a coherent national safety policy.

GLOBAL BEHAVIOUR

Any overview of the international road safety scene has to start with national statistics. This is far from ideal, as from a scientific point of view the individual nation state is hardly the natural building block. Nevertheless, safety and transport policies, and the budgets required to service them, are national matters, as are the economic and social frameworks in which they have to be effected.

Countries vary enormously in the range and reliability of their safety statistics. The single most reliable indicator of absolute safety is the number of fatalities, although even here there is some ambiguity as not all countries have adopted the UN definition of a fatality as *"any person who was killed outright or who died within 30 days as a result of the accident"*. Fatality figures also disguise the trend of a growing number of serious injuries developing alongside a falling fatality rate which is currently being observed in many of the higher income countries. The following table records some recent fatality figures:-

COUNTRY		POP^{n} (M)	VEHICLES(M)	FATALITIES
Ethiopia	(1989)	49	0.06	1,052
India	(1989)	811	14	49,690
Tunisia	(1989)	7.9	0.5	1,172
S. Africa	(1989)	30	5.1	10,877
Poland	(1990)	38	7.8	7,333
Turkey	(1990)	56	3.3	6,286
UK	(1990)	56	23	5,373

Table 1 - SOME RECENT NATIONAL STATISTICS

To enable countries to be considered as a global group some allowance must obviously be made to account for the large differences in country size, and number of vehicles. Two basic viewpoints of the severity of the national situation are possible; one is the level of personal risk, which can be defined as the number of fatalities per head of population, and the other is the fatality risk with respect to the amount of traffic. The latter is usually favoured by the transport planner, the former by the public health agency. In what follows I shall examine the fatality rate per vehicle as a function of the level of motorization in the country, expressed as the number of vehicles per head of population. Ideally, exposure would be treated in terms of vehicle kilometres, rather than by vehicle numbers, but such data does not exist for many of the low and lower middle income countries.

Even allowing for the large differences in numbers of vehicles in the countries of the world, the fatality rate per vehicle spans nearly three decades, descending from several hundred per 10,000 vehicles in countries with single figure vehicle ownership per 1000 inhabitants to single figure fatalities per 10,000 vehicles in countries where the motorization level is rapidly approaching one per inhabitant. In the former category we find the poorest countries of sub-

Saharan Africa and the large, low income countries of Asia. At the other end of the spectrum we find the industrialised countries of the West, with the United States of America in the lead. In between we find the more numerous middle income countries and many of the countries currently undergoing fairly rapid motorization. If this global collection of figures shows any clear pattern, it is of a falling fatality rate (per vehicle) as motorization increases, the rate of fall being greater for the most motorized countries. As the level of motorization increases with national wealth - although not in a linear way - the fatality rate per vehicle can be related directly but inversely to the wealth of the country expressed as GNP per capita.

Two caveats must be made immediately. The first is that even this simple analysis is a statistical one; it shows a correlation that cannot, by itself, prove causality. The second is that a single data point is a gross simplification when applied to a country with wide differences, for example, between rural and urban areas, or between different states within a federated country. For example, the local fatality rate in the major Indian cities is almost an order of magnitude greater than the national average, which is affected by the large rural areas of that country where vehicle ownership per head of population is much lower than in the cities.

Despite the broad assumptions and the uncertainty in this crude data, it is worth looking a little further at the general shape of the correlation. Despite the three orders of magnitude through which the two variables sweep in this analysis, the fatality rate per head of population lies within much narrower bands. Figure 1 shows that the very low income countries typically approach 30-50 fatalities per one million population, whilst the more motorized are nearer to 200 fatalities per one million people. Only the more advanced industrialised countries have fallen back again to around the 100 fatalities per one million mark. (On a double logarithmic plot of fatalities per vehicle against vehicle per person the downward sloping diagonals represent lines of constant fatality rate per person. On the scales used in Figure 1 the central diagonal line represents a rate of 100 fatalities per one million people, and the curve which represents general global "behaviour" in the same diagram can be assessed relative to it).

NATIONAL BEHAVIOUR

The picture presented so far is for the majority of nations at a given point in time. However, if the safety record of a particular country is tracked over many years during which its motorization has altered, it tends to follow a very similar path. In Figure 2 the data for the United Kingdom are shown for the past 80 years. It can be seen that the current fatality rate per person is virtually the same as it was at the end of the Second World War (1945), despite a ten-fold increase in the level of motorization. However, between those dates there was an increase in the fatality rate which peaked around the late 1960's and early 1970's (in absolute terms at nearly 8,000 fatalities per year). This upsurge and subsequent decline was shared by many western countries, and indicates an underlying cause which, if it could be verified and understood, could guide future policy. In particular, it could have valuable lessons for those many countries in the middle band who are experiencing relative rapid rates of motorization and who may be asking themselves whether there is any way of avoiding this modest peak as (hopefully) their economies expand and the real purchasing power of their individual citizens increases.

A simple interpretation of the absolute fatality count for a given country over a period of decades sees it as the product of the amount of travel (in vehicle kilometres) and the fatality rate per vehicle kilometre. The first of these is typically a sigmoid curve, starting at a low level but rising rapidly in the middle income band until it saturates at the higher levels. This growth depends not only on the number of vehicles but on the average distance they travel - itself often a complex function of the way a society evolves and its economy develops. We shall see in the following section that both vehicle ownership and use are related, non-linearly, to average income, but the rapid growth in the middle of the band seems to be a common feature. Similarly, most countries exhibit a falling fatality rate as the "system", in its most general sense, adapts to motorization. In this simple view, the same wealth which produces greater travel also provides the means to counteract the unwanted side effect of increased accidents, but the shape of the two curves is such that there is a maximum, even if only a slight one, in the middle of the range.

This type of analysis has been improved considerably in recent years, most notably by Dr Koornstra at the Dutch Road Safety Institute. His team has shown that the fatality rate is closely connected with the rate of change of mobility, with a time-lag of about a decade. Combining this with short term fluctuations has produced a model which gives remarkably good retrospective fit for the actual fatality patterns of the major western countries. It forecasts rises in fatalities following high rates of change of overall travel; this is particularly ominous for the countries of Central and Eastern Europe and within the European Community itself, where the removal of trading barriers will see a marked increase in trans-continental freight traffic. In a similar way, the creation of a freer trading zone between the USA, Canada and Mexico could lead to increases in both national and trans-border traffic which will have both an immediate and a longer term effect on accident rates.

This last example illustrates how road safety cannot be considered in isolation, but only within a social and economic context, both in terms of understanding the direction it is likely to go and also the nature of the measures which will be most effective in containing it.

ECONOMIC AND SOCIAL FORCES

The World Bank groups the national economies of the world into four bands, according to 1990 GNP per capita values expressed in US dollars. These bands are low income (less than $610), lower-middle-income ($611-$2465), upper-middle-income ($2466-$7619) and high income (greater than $7620). The populations of countries which fell into these bands in 1990, and the average GNP per capita, are shown in Table 2, together with the average annual growth in GNP over the previous 10 years, and the longer term growth in GNP per capita over the previous 25 years.

INCOME BAND	POP^n (M)	GNP/C (US $)	AV ANNUAL GROWTH	
			GNP 80/90	GNP/C 65/90
LOW	3058	350	6.1	2.9
LOWER-MIDDLE	630	1530	2.6	1.5
UPPER-MIDDLE	460	3410	2.4	2.8
HIGH	820	19590	3.1	2.4
WORLD	5280	4200	3.2	1.5

Table 2: GLOBAL ECONOMICS 1990

This table is a reminder, if any were needed, that the majority of the world's people live in poor countries. However, average real wealth has been increasing slowly over the past decades. Incidentally, Mexico, with a 1990 population of 86 million had a 1990 GNP per capita of $2490, making it the first country in the ascending upper-middle-income band. The population figures for the low-income group are dominated by the giant countries of China and India, which with a combined population of 1,980 million, represent nearly 40% of the world's population.

These figures are given some geographical substance in the next table, which shows a similar set of figures for all but the high income countries but broken down by region. The table also shows the average annual growth in GNP per capita over the last 10 years, and the World Bank's projections for the last decade of this century.

REGION	POP^n (M)	GNP/C (US $)	AV ANNUAL GROWTH	
			GNP/C 80/90	GNP/C 90/00
S. ASIA	1148	330	3.1	3.1
S-S AFRICA	495	340	-0.9	0.3
E. ASIA AND PACIFIC	1577	600	5.1	4.8
M. EAST AND N AFRICA	256	1790	-2.5	1.6
L. AMERICA AND CARIBBEAN	433	2180	-0.5	2.2

Table 3: REGIONAL VARIATIONS - 1990

Two features immediately stand out; the declining economic performance of sub-Saharan Africa over the past decade and the poor forecast for the future, and, in stark contrast, the high growth rates expected in East Asia and the Pacific. The figures for the Middle East and North Africa, as with those for Europe (not shown) have been unduly influenced by the Gulf crisis and events in Eastern Europe. The longer term outlook is still one of modest annual growth.

We can therefore expect to see continuing rapid growth in the number of vehicles, as there is considerable evidence that vehicle ownership per capita grows faster than GNP per capita, even at very low and modest level of incomes. Indeed, the rate of growth at these levels is higher than in the more motorized countries, and some nations in Asia and the Far East have seen per capita ownership increasing at twice the rate of income. Combined with population increases of around 2% per year to the year 2000, we can predict a continuing rapid rise in the number of vehicles in South Asia, South East Asia and the Pacific, and a continuation of existing trends in the middle and higher income countries. It is a sobering thought that even if the world as a whole were to follow the constant fatality per population line of Figure 1 population growth alone would produce an almost 20% increase in overall fatalities by the end of the century; in reality, because the majority of countries which will experience the greatest growth are on the increasing side of the curve real increases are going to be considerably higher.

Age Structure

The overall increase in the world's population, which is estimated at an average of 1.6% per year until the end of the century, will affect different countries unequally. This average spans an increase of 2.0% per year in the lower-middle-income countries and only 0.5% for the high-income countries. Of equal importance is the age structure, which is indicated in the following Table:

INCOME BAND	0-14 YRS %	15-64 YRS %	> 64 YRS %	D YRS
LOW	35	60	5	62
LOWER-MIDDLE	38	58	4	65
UPPER-MIDDLE	34	61	5	68
HIGH	20	67	13	77
WORLD	32	61	7	66
MEXICO	37	59	4	70

Table 4: AGE STRUCTURE - 1990

The importance differences between what may be loosely called the developing and developed countries lie at the extremes of the age spectrum. Children form a significantly higher proportion of the population in the poorer countries, and they duly appear as proportionately higher fatalities and injuries than their more fortunate opposite numbers in the developed world. Clearly children have to be one of the prime targets for training and similar countermeasures, but it must be remembered that it is a growing and constantly changing target group.

At the other end of the age scale, we can see that there is far less numerical justification in the majority of countries for the concern over accidents to the elderly which is a feature of safety work in the industrialised world.

Education

Targeting children for training is most effectively done through the formal education system, so it is worth recalling that secondary education is only enjoyed by the majority of young people in the higher income countries. The table below shows that most middle income countries, including Mexico, have about half the young people eligible registered for secondary education, and for the low income countries the figure falls to 38%. It is, however, growing almost universally, and all governments at least claim in the official statistics to have complete primary school attendance.

INCOME BAND	ELIGIBLE REG[D] PER AGE RANGE %		
	PRIMARY	SECONDARY	TERTIARY
LOW	105	38	N/A
LOWER-MIDDLE	101	54	17
UPPER-MIDDLE	104	56	17
HIGH	105	95	42
WORLD	105	52	16
MEXICO	114	53	15

Table 5: GLOBAL EDUCATION - 1989

These facts have to be borne in mind when grand international plans are laid for training and other measures for influencing behaviour such as posters and highway codes. It also has to be remembered that in the low income countries some 40% of the adult population is illiterate, where illiteracy is defined as being "unable, with understanding, to read and write a short simple statement of their everyday life". (The figure is 52% for females).

Urbanization

Another worldwide feature which strongly affects transport patterns, and hence safety, is the continuing drift of rural populations to urban areas - coupled with intrinsic growth of the urban population itself. In industrialised countries, nearly 80% of the population is now urban, 30% living in cities with more than one million inhabitants. The situation is similar in the upper-middle income band of countries, but with the important difference that the average growth rate over the past decade has been 3.2%, rather than the 0.8% of the high-income countries.

INCOME BAND	% POP^n IN URBAN	GROWTH 80/90	% POP^n IN CITIES > 1M
LOW	38	(3.5)	9
LOWER-MIDDLE	52	3.6	21
UPPER-MIDDLE	71	3.2	30
HIGH	77	0.8	29
WORLD	50	4.5	16
MEXICO	73	2.9	32

Table 6: **GLOBAL URBANISATION**

Rapid growth of urban areas is essentially a "developing country" phenomenon; twenty years ago, there were some 20 urban areas with over 5 million inhabitants shared almost equally between the developed and developing countries. By 1985 the total had grown to 30, with 20 in the developing countries. By the year 2000, it is estimated that there will be 45 such areas, but 34 of them will be in the developing countries. Some of these urban areas are so large that they almost resemble small states within a country, complete with their own internal networks of motorways and arterial roads. Mexico City provides a good example, as it contains over 30% of the Mexican urban population, itself nearly three quarters of the total population of the country.

There are two opposing effects on safety. Evidence from the industrialised countries suggests that urban arterial roads with their mixed traffic and frequent intersections are considerably more dangerous than their rural counterparts, even though the latter often have higher speed limits, and both are inferior in performance to "protected" rural highways and motorways. The table below draws on information from the Netherlands, and includes data from their very low speed protected residential areas which are carefully designed to give priority to pedestrians.

TYPE	SPEED	MIXED TRAFFIC?	INJURIES/10^{6} V-KM
PROTECTED	<30	YES	0.20
RESIDENTIAL	50	YES	0.75
URBAN ARTERIAL	50	YES/NO	1.33
RURAL	80	YES/NO	0.64
RURAL MAJOR	100	NO	0.11
M-WAY	~120	NO	0.07

Table 7: SAFETY & ROAD TYPE
(Data from the Netherlands)

On the other hand, urban accidents are generally less severe, because of the lower speeds, and the victims are nearer to rescue services and hospitals. Urban areas are also often more successful in receiving funds for improved traffic layout and traffic control, usually to reduce traffic congestion but with improved safety as an important by-product. Finally, it is often only in the largest urban areas that there is the considerably safer travel alternative for passengers of an underground or segregated light rail system.

GROUP BEHAVIOUR

Having looked at the general statistical behaviour of complete countries, I would now like to turn to an example of the generalised behaviour of a significant group of actors in road safety - namely car drivers. I have chosen this because the lessons from it are probably universal, and because it demonstrates the value of a systematic piece of research which has an understandable message for both the research professionals and the ordinary members of the public.

The research project I am going to recount investigated accident liability of car drivers ie their expected accident frequency, a quantity which is known to depend on many factors. The research aimed to establish the relationship between the accident liability of a typical driver and his or her age, driving experience, exposure (annual mileage, road type), sex and socio-economic group. National injury accident data could not be used because the national system in the United Kingdom does not record non-injury accidents, nor is information available on the accident histories of individual drivers, on exposure nor on the number of years driving experience.

A self-completion questionnaire was therefore used covering the number of accident involvements in the last 3 years, mileage in the last year, percentage driving on 3 different road types and the proportion of time spent driving in dark conditions, the age and sex of the respondent, the number of years since passing the driving test and various questions which enabled the socio-economic grouping of the driver to be defined. The data from 18,500 responses was then modelled to express accident liability as a function of the various factors.

The detailed form of this final equation need not concern us here, but the following were the main implications of the analysis.

i) Accident liability depends mainly on total annual mileage, the driver's age and driving experience measured as the number of years since passing the official driving test. The proportion of driving done in the dark and on different types of road also affects accident liability, but to a lesser extent than age and experience.

ii) Predicted accident frequencies are <u>not</u> directly proportional to annual mileage. Accident liability decreases quite markedly as annual mileage increases.

iii) The form of the age effect means that the proportional change in liability with increasing age is larger for younger drivers than for older drivers ie there is a diminishing benefit as age increases.

iv) The learning curve is steep; accident involvement falls rapidly after passing the test, and a similar, but reduced, reduction occurs at whatever age the test is taken.

v) There was little influence of socio-economic grouping on the results, but young female drivers could expect to have 35% fewer accidents than male drivers covering the same annual distance. This difference between the sexes rapidly declines with increasing age and experience.

First add up the scores associated with your annual mileage, age and time since passing the driving test:

Annual mileage:	under 2000	2000-3499	3500-6999	7000-12999	13000+
Score:	1	2	3	4	5

Age:	17-21	22-29	30-46	47 or older
Score:	4	3	2	1

Time since passing test:	<8 months	8-20 mths	21-59 mths	5-16 years	over 16 years
Score:	5	4	3	2	1

Now read off your chances of having an accident:

If your total score is:	12+	11	10	9	8	7	6	5 or less
Your chance of having an accident this year is:	1 in 2.4	1 in 3	1 in 4	1 in 5	1 in 6	1 in 8	1 in 11	1 in 14

Table 8 ACCIDENT LIABILITY

In addition to guiding policy, these findings are of considerable interest to individual drivers. For popular consumption, a "point" system was devised which simplified the complicated non-linear relationships within the mathematical expression for accident liability and enabled the average driver to assess his chances of having an accident in the coming year. He or she simply noted in which of five bands their annual mileage score fell, in which of four bands their age, and in which of five bands their time since taking the test. A simple chart then related total score to accident liability, which ran on an eight point scale from a chance of 1 in 2.4 to a chance of 1 in 14 - the kind of language immediately understood by anybody who had ever placed a bet.

Clearly the detailed findings of this piece of research depend on the conditions prevailing in the United Kingdom in the late 1980s, and it would be a significant step to global road safety knowledge if similar surveys can be conducted in other countries and at other times. But the general form of the relationships is probably universal, as remarked earlier, and could be borne in mind when formulating national road safety plans.

BEHAVIOUR AND THE HIGHWAY

The cumulative experience from road safety activity throughout the world is that an approach which concentrates on one single 'sector' is unlikely to succeed. Accidents arise from complex interacting contributory factors,and countermeasures have to match them. Programmes need to embrace measures which prevent accidents, and those which reduce their effects. In the first category we find long-term actions to reduce exposure, and more immediate measures to reduce risk. The second category encompasses measures effective during the accident itself (such as occupant protection), and post-crash emergency and longer-term medical care.

It may therefore be perverse to single out the highway in this section and offer some thoughts on the effectiveness of highway and traffic engineering countermeasures. My justification for this is

(i) the role of the highway as a contributory factor is often overlooked by police investigators, who are trained to look for human agents on which to fasten 'blame'

(ii) whilst it is undeniable (and almost a tautology) that poor behaviour is implicit in all accidents, it does not follow that it is the most amenable to improvement

(iii) engineering improvements have an immediate effect, can usually be reversed if unsuccessful, and - within broad bands - do not increase in cost according to the volume of traffic affected

(iv) many engineering features and remedies are low-cost and transferable internationally across cultural and social barriers. Good standards of design often cost no more than bad ones.

There is currently considerable professional concern worldwide over the state of the nations' highways, specially in the low and middle-income countries. This is partly a realisation that maintenance has often been neglected, and partly a recognition of the need to take hard investment decisions to cope with ever-growing traffic volumes, a trend exacerbated by the almost global shift from rail to road. The table below summarises the results of a World Bank survey into the condition of paved roads; the corresponding data for unpaved roads was worse, particularly in South Asia and West Africa. Recent information from Central and Eastern Europe suggests that there is a backlog of some $15 Bn worth of maintenance and rehabilitation work.

REGION	GOOD	FAIR	POOR
S. ASIA	19	45	36
E & S AFRICA	42	32	26
W AFRICA	52	23	25
E ASIA/PACIFIC	20	59	21
L AMERICA & CAR^{n}	44	32	24
UK (TRUNK)	85	12	3
MEXICO (FED)	85	10	5

Table 9: MAIN ROAD CONDITION - PAVED

Whilst this concern is largely one of economics and vehicle operating costs, if it is transferred into investment it will provide the opportunity to improve safety, particularly spot improvements at junctions. The economic models used to optimise the maintenance plans can be used to take account explicitly of safety benefits, whilst the maintenance management systems on the ground can be integrated with accident location and data storage systems. Both are set to take increasing advantage of the power and cost-effectiveness of PC technology.

The significance of having a larger proportion of traffic on higher quality roads - in safety terms - can be appreciated by referring back to Table 7; an upgrading of an ordinary rural road to a motorway has the potential for a ten-fold reduction in the injury rate. At the other end of the cost spectrum, there is a wealth of low-cost measures which can be taken with very high economic returns. There is no space to go into details, but in the past few years several guidelines have been produced. My own organisation has produced a compendium of useful hints and tips, gathered from around the world, and aimed particularly at the less-industrialised countries. It has been a pleasant surprise to find it in considerable demand from many high-income countries as well.

CONCLUDING REMARKS

Most high income countries have had nearly half a century to learn to cope with the problems of ever-increasing motorisation. The less wealthy nations have had less, and for many the pace of change has been much greater. Over the years there has been no shortage of ideas, stratagems and actions, so it is tempting to ask whether our combined safety efforts are working, and whether the world is learning any general safety lessons.

On the first I am personally optimistic. In many industrialised countries the fatality figures are being driven down (although injuries remain stubbornly high). In the rest of the world there will undoubtedly be higher accident totals, but many of the safety tools and the knowledge for their use are there to be used. The effort needed is greater; any pessimism comes from whether we have the political will to make the necessary impact. There are opportunities for the safety 'profession' to take advantage not only of investments in highway maintenance, but of the growing concerns over urban traffic congestion and over vehicle pollution. There are long-term forces pressing for less travel, lower speeds and greater use of public transport which should be powerful allies.

On the second it is instructive, and a little sobering, to look back over the last decade at the various safety calls and the lists of guidelines and priorities drawn up for the coming decade. The following checklist is typical, particularly slanted towards the lower and middle-income countries:-

(i) Adapt a scientific, quantitative basis for road safety policy. Establish data systems, research centres and integrate with transport policy.

(ii) Create an institutional focus for national plans and actions, which must be multi-disciplinary. Found road safety councils, establish targets.

(iii) Press for long-term land-use and transport policies to reduce the use of the more dangerous modes and mixes of traffic.

(iv) Highways: plan well-defined hierarchies of use, increase highway 'readability' and reduce the unexpected. Institute safety audits, low-cost remedial works and low-speed/pedestrian priority areas in cities.

(v) Behaviour and training: target young road users. Legislate against and control drink (and drug)/driving. Improve targeted enforcement.

(vi) Vehicles: priority to seatbelts, and to helmets for two-wheelers. In lower-income countries target public and parastatal freight and bus fleets (for general vehicle condition as well as other measures).

(vii) Improve emergency medical services for those who survive the first few minutes after a crash but die within the next few hours (often two-thirds).

(viii) With all measures, adopt, experiment and evaluate - and let the results be known and transferred on a national and inter-national basis.

This last call is worth stressing today. We are better equipped technically than at any previous time in road safety history, and there are many international institutions through which collaboration is possible. (I would note in passing that the new president of the Permanent International Association of Road Congresses is a vice minister from your own Ministry of Communications, and that PIARC has just established a new permanent committee dedicated to road safety). Taken together, the list above gives useful global pointers which are standing the test of time; they can guide any particular nation in its policies regardless of its place in the economic hierarchy

ACKNOWLEDGEMENT

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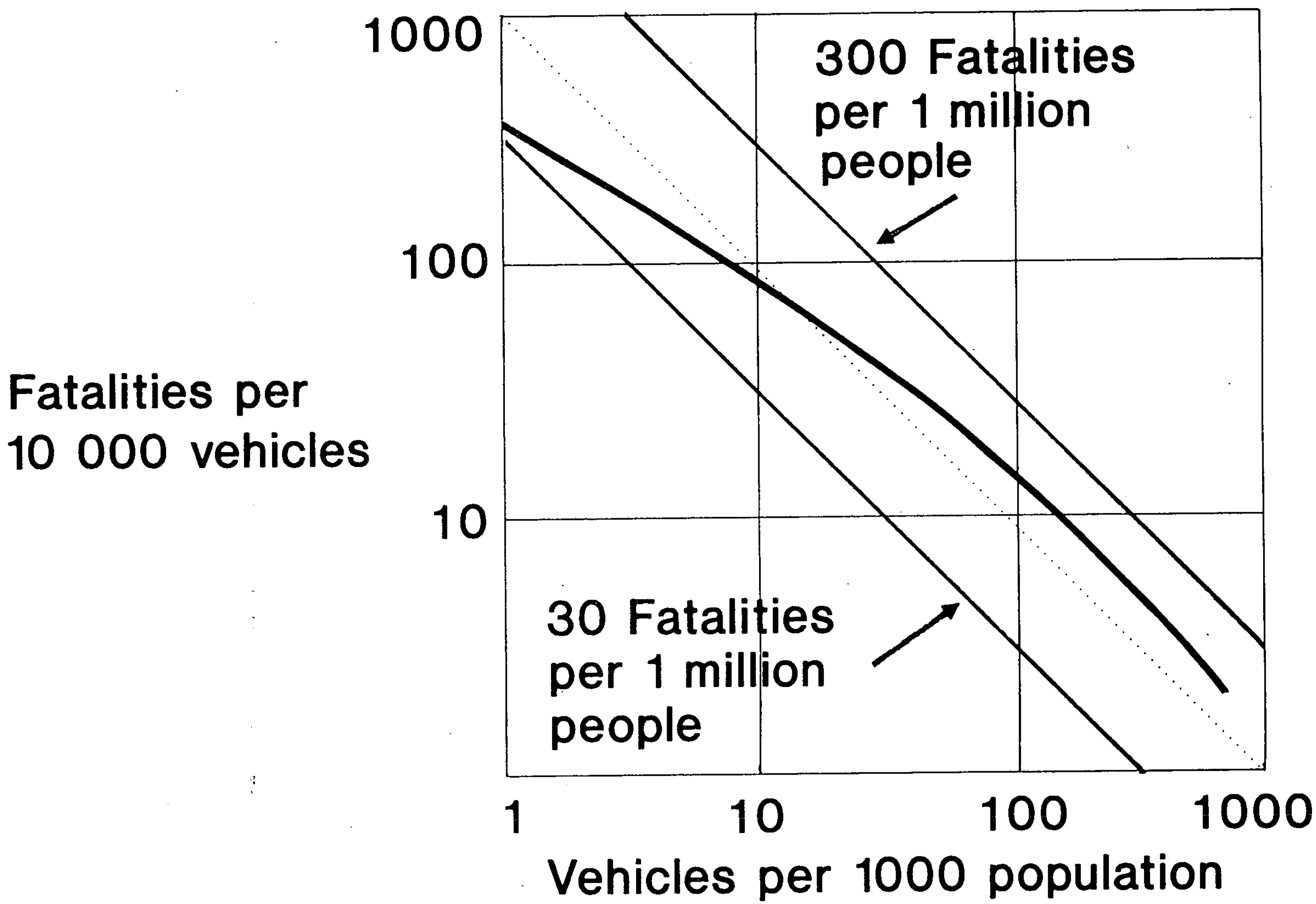

Fig.1

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FATALITY RATES AND MOTORISATION, GREAT BRITAIN 1910 - 1990

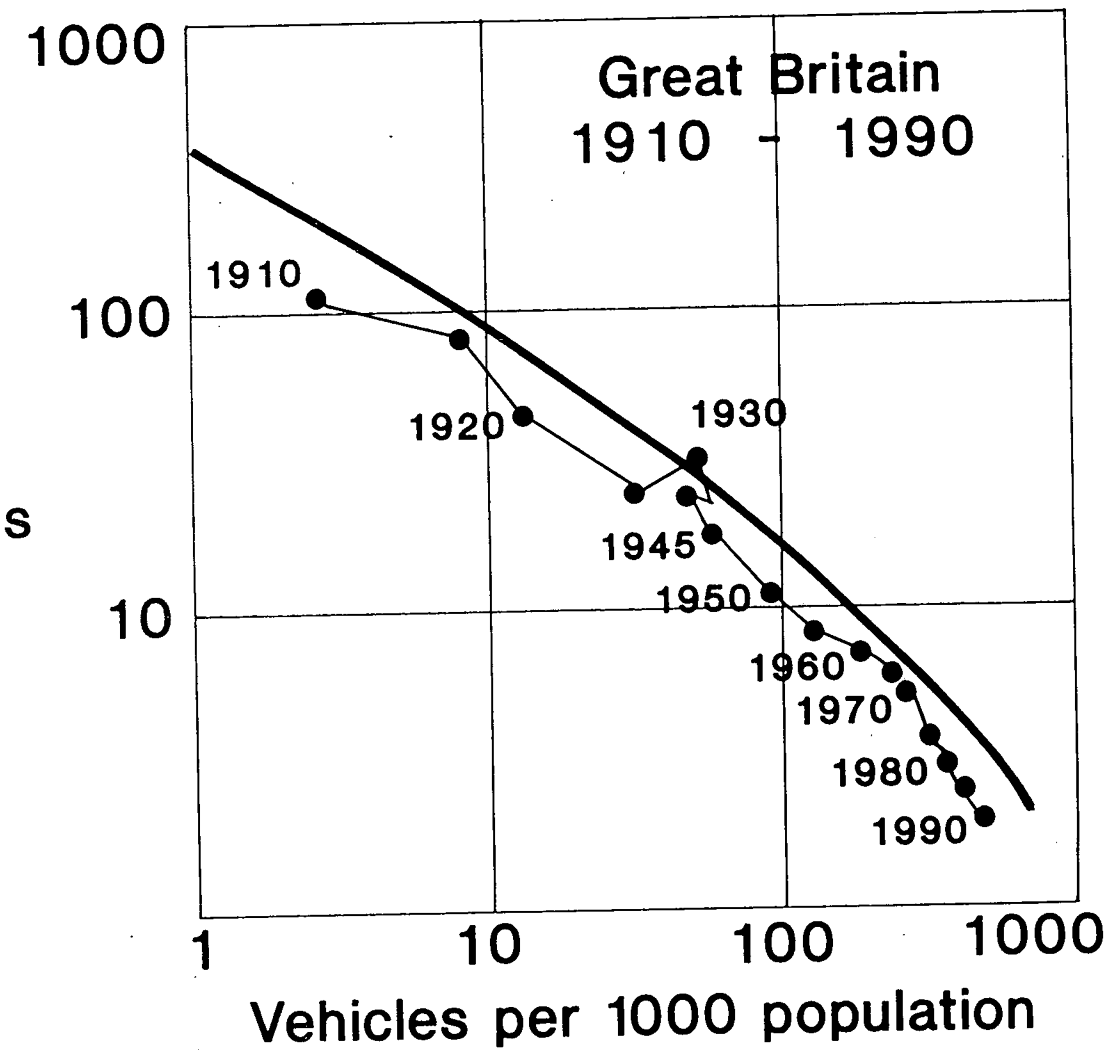

Fig.2

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