



Transport: The New Realism

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Transport Studies Unit, University of Oxford.

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TRANSPORT: THE NEW REALISM

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Phil Goodwin, Sharon Hallett¹, Francesca Kenny, and Gordon Stokes

Transport Studies Unit, University of Oxford

Report to the Rees Jeffreys Road Fund
for discussion at the
“Transport - The New Realism” conference,
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¹*Sharon Hallett is now named Sharon Cullinane*

Transport: The New Realism (2012 re-release)

Transport: The New Realism was originally published on 21 March 1991 at a conference in London. It was only ever available as a report by the Transport Studies Unit, University of Oxford (reference as Report 624), though in that format it has been widely circulated, and sold more copies than is often achieved by properly published books). It was written before electronic copy was produced as a matter of course, and therefore was never available in web format.

The initial electronic copy was prepared by UCL Centre for Transport Studies with permission from the Transport Studies Unit, University Oxford. Conversion from raw text extracted from a photo-pdf to this formatted version was done by Gordon Stokes, now (again) an Associate of Transport Studies Unit, University of Oxford. The aim is to make it freely available in electronic format, for historical reference. There is a reference on page iv of the report to a 'Volume 2'. This referred to the collection of 26 separate contributory reports written by commissioned authors during the period 1989-1991, and is not at present available in electronic form.

The formatting recreates the original, but some minor changes had to be made for reasons of practicality and readability:

- The page numbering is correct except where re-formatting to Word style fonts meant that page throws would be interrupted, with hanging paragraphs etc. What was at the bottom of some pages has been moved to the following page, and vice versa. This is unlikely to affect any references to page numbers from other publications, but may do in one or two cases.
- Tables have been reformatted to fit modern word processing styles.
- Notes for tables have been changed to italics.
- In some cases abbreviations have been changed to full words for ease of reading (e.g. "bn" to "billion")
- Spellchecking and re-reading showed up some minor typographical errors. These have been corrected.

In addition the following limited changes have been made (identified in dark blue, as used on this page):

- A short note, overleaf, has been added giving readers pointers to other related follow up work to the report.
- A fuller table of contents has been placed after the original contents list.
- Diagrams have been generally redrawn to aid reading.
- The original page numbering ignored pages which had only diagrams. This has been followed here, but means that there are some blank pages so that 'odd' numbered pages remain on the right hand side, in case anyone is profligate enough to want to print it.
- Table 2.1 contained percentages that added up to less than the total and corrected figures have been inserted in brackets.

Nowhere has the meaning of the original been altered or updated. Some errors may have crept in or been overlooked during reformatting, and any such are mine.

Gordon Stokes – October 2012

The impact of Transport: The New Realism

This is not the place for a retrospective assessment of the report, but readers may note that it was widely thought to have had a significant impact on the discussion of transport policy, and indeed on transport policy itself. Discussions of its theses and impact, including on the UK Transport White Paper of 1998 (DETR 1998) are included, among others, in Owens (1995), Banister et al (2000), Richardson (2001), Vigar (2001), Bulkeley and Rayner (2003), and several works by Docherty and Shaw (most recently 2011). It should be noted that a core part of the argument stemmed from official road traffic forecasts of 1989: in the event, in the UK (as in many other developed countries) the outcome increase in car traffic in the 23 years up to 2012 has been much less than expected, a phenomenon of great importance whose reasons are still discussed (Stokes and Goodwin 2013).

Banister C, Turner J, Richardson T, Young S (2000) *Unravelling the transport web. Delivering the new transport realism in a complex policy environment - a report on the wider policy conflicts that exist in the transport web*, ISBN 1-899650-14-8 Landor Publishing Limited, London

Bulkeley H & Rayner T (2003) New Realism and Local Realities: Local Transport Planning in Leicester and Cambridgeshire, *Urban Studies* 40 (1) 35-55 January

Department of the Environment, Transport and the Regions (1998) *A New Deal for Transport: Better for Everyone*, Cmnd 3950, The Stationery Office, London

Docherty I and Shaw J (2011) The transformation of transport policy in Great Britain? 'New Realism' and New Labour's decade of displacement activity *Environment and Planning-Part A*, 43(1) 224 – 251

Owens S (1995) From 'predict and provide' to 'predict and prevent'? Pricing and planning in transport policy, *Transport Policy*, 2 (1) 43-49, January

Richardson T (2001) The pendulum swings again: in search of new transport rationalities, *The Town Planning Review* 72 (3) 299-319 July

Stokes G and Goodwin P (editors) (2013 forthcoming) Special Issue on 'Peak Car', *Transport Reviews*

Vigar G (2001) Implementing Transport's 'New Realism'? The Dissemination of Demand-management Policies in UK Transport Planning, *The Town Planning Review*

Prof. Phil Goodwin, October 2012

Transport - The New Realism

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Rees Jeffreys Discussion Papers

The Discussion Papers remain free-standing statements of the authors' personal views and treat the specialist topics in more depth.

Together they constitute Volume Two of this report¹.

- | | | |
|----|---|---|
| 1 | Banister, D. | The Reality of the Rural Transport Problem. |
| 2 | Mogridge, M | Interaction Between Road and Public Transport Policy in Urban Areas |
| 3 | Jones, P. | Restraint of Road Traffic In Urban Areas: Objectives, Options and Experiences. |
| 4 | Plowden, S. | Present and Potential Role of Appraisal Techniques in Achieving a Balanced Transport Policy. |
| 5 | Roberts, J. | User-Friendly Cities - Lessons for U K Transport Policy from Mainland Europe Restraint Methods. |
| 6 | Wright, C. & Huddart, K. | Strategies for Urban Traffic Control. |
| 7 | Hills, P. | Automated Variable Pricing for the use of Roadspace: An Idea Whose Time has Arrived. |
| 8 | Hillman, M . | The Role of Walking and Cycling in Transport Policy. |
| 9 | Hibbs, J. | Using the Market to Achieve Optimal Transport Systems (Both Private and Public) in Urban Areas |
| 10 | Hass-Klau, C. | The Theory and Practice of Traffic Calming: Can Britain Learn from the German Experience? |
| 11 | Starkie, D. | The Private Financing of Road Infrastructure. |
| 12 | Nash, C.A. | Role of Rail in Future Transport Policy. |
| 13 | Mackay, M . | Effective Strategies for Accident Reductions. |
| 14 | Hallett, S. | Drivers' Attitudes to Driving, Cars and Traffic. |
| 15 | Cooper, J. | Freight Needs and Transport Policies. |
| 16 | Hill, E. & Rickard, J. | Forecasting Public Transport Demand: The Demographic Dimension |
| 17 | White, P, & Doganis, R. | Long-Distance Travel within Britain. |
| 18 | Buchanan, M . | Urban Transport Trends and Possibilities. |
| 20 | Crow, G. & Younes, B. | The Rochester Way Relief Road. An Appraisal of the Operational, Environmental and Economic Impacts. |
| 21 | May, A. | Integrated Transport Strategies: A New Initiative, or a Return to the 1960s? |
| 22 | Headicar, P. | Activity, Development and "Transport Need". |
| 23 | Silverleaf, A & Turgel, J. | Transport Safety and Security - Principles and Practices. |
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| 25 | Holman, C , Fergusson, M . & Mitchell, C. | Road Transport and Air Pollution. |
| 26 | Tyson, B. | Transport Policy: Constraints and Objectives in Metropolitan Areas. |

(Discussion Paper 19 was a draft of the line of argument for the final report, and is superseded by the report itself)

¹ See note on page ii. These are not available in electronic format.

REES JEFFREYS ROAD FUND TRUSTEES
ACCEPTANCE OF
TRANSPORT STUDIES UNIT REPORT
‘TRANSPORT - THE NEW REALISM’

The Trustees of the Rees Jeffreys Road Fund were mindful that no overall view of the place of Transport in Society had taken place since 1963, when Colin Buchanan produced his treatise entitled ‘Traffic in Towns’. This clearly recognised the future problems that the unrestricted growth of personal travel would cause. Today, some three decades later, despite action that has been taken massively to increase the supply of road space and other transport capacity, and great advances in the field of traffic management, society faces many major problems in meeting its seemingly insatiable demand for passenger travel and the movement of goods. The loss of life and injury caused by vehicle accidents is at an unacceptable level; the levels of congestion in many places give rise to great inconvenience and economic costs; and rather belatedly has come the recognition of the role of traffic in the generation of atmospheric pollution and other environmental degradation. A new and wide ranging report on the subject was clearly timely.

The Trustees believe they are more than vindicated in deciding under their constitution to commission a substantial review under the heading ‘Transport and Society’. In accepting the Report of the Transport Studies Unit of Oxford University, the Trustees wish to congratulate the Unit and their many expert collaborators, for the professional manner in which they approached the task. Many diverse organisations have already lent their support to the findings of the report. It was most gratifying to the Trustees to find the meeting of minds that took place during the course of the study, of transport providers and users, road builders and environmentalists - perhaps this one aspect of the study holds out the greatest hope for the future.

Having read and studied the report the Trustees are convinced that its message is of vital importance to all in society - be they individual road users, industrial concerns, local or national government or other interest groups. Of course, there is no single panacea for the problems and different locations will require different solutions. But the clear message of the report is that a new balance between the expressed demand for transport and the sensible and affordable level of supply must be found to ensure that one of man’s greatest freedoms, namely the freedom to travel, remains.

That freedom, however, will henceforth have to be exercised with more thought, more care and more economic and environmental awareness.

The Trustees believe, like the Report’s authors, that this responsibility is already being taken very seriously by more and more people. That is why the report can justly bear the title “The New Realism”.

We commend it vigorously to all those who care to think about the future of our society; to turn the diagnosis into treatment of the current thrombosis of our transport arteries will require an effort of will from every individual, and society as a whole, to accept change and a greater discipline.

M. Milne
Chairman
March 1991

List of Contents

1	Genesis of the New Realism	1
2	The Current Importance of Transport	5
3	The Growth of Traffic	23
4	Transport Problems	41
5	Two Streams of Thought	63
6	The Watershed - 1989 and after	75
7	The Effect on Transport Thinking	85
8	Components of the New Realism	113
9	Concluding remarks	143
	References	151
	Executive Summary	163

Detailed list of contents (added 2012)

1	Genesis of the New Realism	1
	The Transport and Society project	1
	Elements of the New Realism	3
2	The Current Importance of Transport	5
	Introduction	5
	The current scale of transport	6
	Percentage of consumer expenditure	6
	Energy used in transport	7
	The amount of movement	8
	Where is the movement?	10
	Distribution on road types	11
	Regional differences	12
	Reasons for travel	15
	Who is travelling	16
	Freight transport	19
	The link between freight and passenger transport	21
3	The Growth of Traffic	23
	Features of growth in personal travel	25
	Journey purposes and trip lengths	25
	Gender and age related trends	27
	Changes in freight traffic	28
	Modal split	28
	Road freight	29
	The reasons for traffic growth	31
	Land use, economic and social development	31
	Personal and household factors; income growth, car ownership and travel	33
	Dependence on the car	36
4	Transport Problems	41
	Congestion	41
	Cost of congestion	41
	Contribution of lorries to congestion	43
	Public transport and congestion	44
	Safety	46
	The scale of the problem	46
	What causes accidents?	47
	Problems of the environment	48
	The local environment	48
	Global environmental issues	50
	The elements of the ecological problem	51
	Global warming (the greenhouse effect)	51
	The depletion of the ozone layer	52
	Other pollutants	52
	Social effects	55
	The nature of the problem?	55
	Transport deprivation	58
	Wider implications	59

	Personal security	59
	Entrapment	60
5	Two Streams of Thought	63
	The policy dilemma	63
	The British tradition of moderation of car use	63
	Providing for the car	69
	The public transport dimension	73
6	The Watershed - 1989 and after	75
	Car traffic	76
	Freight traffic	78
	Constraints on demand increases	80
	Road capacity	80
	Parking capacity	82
	The NRTF caveat	83
7	The Effect on Transport Thinking	85
	The response of the institutions	85
	Professional institutions	85
	Local government organisations	88
	The motoring organisations	89
	Industrial organisations	92
	Rees Jeffreys discussion papers	93
	Comprehensive approaches	93
	Alternatives to traffic growth	94
	Road building	97
	Road pricing	98
	Safety	99
	Consensus	100
	The public response to the changing situation	101
	Attitudes to measures to combat traffic problems	102
	The impact of environmental concerns	104
	The effect of switching to public transport	107
	Government thinking	108
	The Common Inheritance (Environment White Paper 1990)	109
	A 'Balanced policy'	110
	Principles of the new consensus	111
8	Components of the New Realism	113
	Land use planning	114
	Traffic calming	114
	Road pricing	117
	A balanced transport policy with road pricing	120
	A balanced transport in the absence of road pricing	120
	Traffic control	121
	Traffic management	121
	The potential for road traffic informatics	122
	Public transport	124

Information	124
Light rail	125
New bus designs	125
Ticketing methods	126
Bus priorities	127
Park and ride	127
Personal security	128
Non urban areas	129
Financing of public transport	129
Walking	130
Cycling	131
Private cars	133
Cars and safety	134
The link with traffic calming, speed limits and safety	136
Lorries, deliveries and freight	136
Emergency services and other priority users	137
New Roads	138
Institutional and financial implications	139
9 Concluding remarks	143
Would people change their behaviour?	145
Transport in society	148
References	151
Executive Summary	161
1 Current patterns of movement	162
2 Traffic growth	162
3 Problems of traffic growth	163
4 Two streams of thought	164
5 The watershed: National Road Traffic Forecasts in 1898	164
6 Elements of the new realism	165

CHAPTER 1

GENESIS OF THE NEW REALISM

The 'Transport and Society' Project

The Rees Jeffreys Road Fund is an independent charitable trust whose founder (1872-1954) was a road engineer of vision, dedicated to the development of a road system which would be efficient, adequate, safe and a pleasure to use. The eight Trustees have a background in national and local government, universities and industry.

After many years of supporting lectures, scholarships, sponsored posts, roadside amenities and a wide range of research projects, the Trustees in 1988 started to address a new and wider problem, arising from a concern that traffic growth might have consequences that were beyond the means of currently accepted policies to solve. In particular, there was a manifest conflict between the provision of transport facilities and the trends in transport demand. They set up a new project - a much broader one than they had previously supported - which would be entirely independent of Government and transport interests and would seek to look at the fundamental characteristics of traffic growth and the policy solutions which might be available. The project brief stated:

“The insatiable demand for personal travel and the movement of goods has to be balanced with the inevitable limitations of land space and the environmental desires of people - as travellers, dwellers and pedestrians.”

The Transport Studies Unit, at the University of Oxford, was appointed to coordinate the study, together with contributions from some three dozen of the leading writers and researchers in the field and cooperation from many of the relevant professional institutes and interested organisations.

At the start of the study - before the publication of the revised National Road Traffic Forecasts, before global questions of environmental change were widely appreciated in a transport context, before work started on the White Paper 'This Common Inheritance' - we had a sense of how the project might develop. Its core would be a detailed study of the trends and statistics of travel demand. Sufficient work had already been done to indicate that expected growth in demand would cause strains in the transport system. It seemed likely that there would be a limit in the extent to which such strains could be relieved by new infrastructure, especially road construction. Therefore the project might find itself with the delicate task of casting doubt on some very well-established assumptions in transport planning. Experience of previous exercises in which such assumptions had been queried suggested that the arguments would be highly controversial and need very careful and prolonged discussion if we were to avoid the danger of being marginalised by bringing uncomfortable tidings at the wrong time.

It did not develop in that way at all. From the start, early intimations of the way in which we felt our line of argument was developing were received with warmth and enthusiasm, though not always unanimity. Participation in seminars, conferences and discussions organised by the professional and other institutes enabled us to contribute to and benefit from an unprecedented degree of activity and rethinking among those whose business is transport. In effect, the same social processes that had led the Rees Jeffreys Road Fund to appreciate the importance of this issue, had led many other bodies along a similar path.

The turning point was the publication of the National Road Traffic Forecasts (NRTF) by the Department of Transport in April 1989. These revised forecasts were considerably greater than the earlier expectations (traffic growth having already exceeded the upper bounds of the previous forecast) and postulated that in the first quarter of the next century traffic levels would, overall, be of the order of double the 1988 figures. The first announcement of these forecasts was seen as not much more than appearing to give added support to the Department of Transport in bidding for funds from the Treasury for an expanded road programme and indeed approval for the programme was quickly secured. But as the implications of the forecasts started to sink in, the entire nature of the debate about transport policy was transformed. Month by month, local transport planners were working out the consequences for their own area and professional institutes were considering the effect on their own discipline and role. They were led to focus on exactly those principles of demand growth and its effects that were the subject of our research. The NRTF figures were a catalyst.

Policy thinking does not wait on the results of a research schedule. Our own work and that of many other bodies, found that the time was right to consider many new ideas in transport policy - and reconsider many old ones, which now could be seen in a new light. In this, an

international dimension became more important than, perhaps, had ever been the case before, due to the world-wide nature of environmental problems and to the greater range of different policies for which real experience was available in other countries. This widening of international horizons was also accompanied by a broadening of the topic area, with a re-awakening of the long known, but ignored, appreciation that transport has to be seen in the context of land-use, economic and social developments.

It quickly became apparent that certain policy themes were the ones which seemed most closely to correspond with the needs of the time. In particular, there was a movement away from the concept of providing road capacity to match forecast traffic levels and more interest in traffic restraint, traffic calming, public transport and use of market mechanisms especially pricing. We shall have more to say on these later.

In this ferment a line of argument emerged, attempting to give shape to the debate as a whole and find linkages among its separate elements. This line of argument, for reasons which will be discussed later in the report, we term 'The New Realism'.

Elements of the New Realism

Realism is sometimes a label used when moving from now abandoned ambitious aims to more modest and achievable targets. In terms of infrastructure monuments, some elements of that may be true here. But overall the argument that emerged was not at all an unambitious one, since it sought to divert one of the major social trends of our time and re-examine basic assumptions about what sort of places we want to live in. In origin it is eclectic, borrowing from British, German, Dutch, Scandinavian, French, Asian and American traditions and combining them in the pragmatic British manner. The argument, as rehearsed in many discussions over the last two years, focuses on the problems of transport in towns:

1. There is an intolerable imbalance between expected trends in mobility and the capacity of the transport system.
2. This is causing problems to industry, to the environment and also to the ability of people to lead comfortable and fulfilling lives.
3. The main problem is the growth in reliance on car use, which no longer succeeds in realising its own objectives.
4. It is not possible to provide sufficient road capacity to meet unrestrained demands for movement.
5. It is necessary to devise systems of managing demand which are economically efficient, provide attractive possibilities for travel for both car owners and non-car owners and give priority to 'essential' traffic (including emergency services, freight, buses and limited categories of need).

6. Policies to accomplish this are technically possible, provided they are properly harmonised. They will include land use planning, extensive use of traffic management especially priority systems, substantial improvements to the scale, reliability, comfort and cost of public transport, traffic calming schemes both at the local and strategic level and consistent charging and financing of all modes perhaps by road pricing. Expansion of road infrastructure will not be the core of transport policy.
7. Institutional arrangements must enable a coordinated and consistent treatment of all the different parts of the transport system and a 'level playing field' in planning and implementation.

Probably not one single sentence of this outline could command complete unanimity. But our proposition is that the argument as a whole is close to attracting a degree of consensus that has not previously been part of the transport scene, on any policy: and that this has happened in an unprecedentedly short space of time.

Our objective in this Report is to address the questions:

- What are the characteristic features of travel in our time? How do we see the dynamics of change and the problems - economic, environmental, social - that they cause? How does this relate to the sort of policy objectives that are implied in such an approach?
- Where did the new approach come from? Is it consistent with the available data, statistics, surveys, studies and practical experiences in this country and abroad?
- Is it firmly rooted? Does it have a consistent underlying basis, intellectually and historically? What degree of support does it have, among interested parties, researchers, policy makers and the public; and why?
- Is the approach internally consistent and feasible? What are the necessary conditions to make it work, in terms of political support, finance and institutional arrangements?

In other words, what we are trying to do is develop a framework in which we can understand the situation in which transport finds itself, putting otherwise separate policies and initiatives into a general context where they can be useful.

CHAPTER 2

THE CURRENT IMPORTANCE OF TRANSPORT

Introduction

It is difficult to imagine our society without transport. Raw materials are mined in one place, transported to other sites for linking with other materials in the production of goods and people travel in order to carry out work in this process. Nearly everything we eat or use has involved transport.

From a personal point of view, nearly everybody travels by foot, by car, or by other means. Most people travel in order to work, shop, see friends and to spend some of their leisure time. The only completely immobile are those whose lives are confined by devastating physical or psychological disability, or have had their freedom to move taken away in an act of great social disapproval.

Transport is thus pivotal to life. But it is unlike many other fundamental human activities in that in most cases movement is a means to an end, not an end in itself. There are exceptions, such as a pleasure cruise, or walking the dog, but for most day to day trips we do not really want to travel at all - we want to participate in some activity in a different place and transport is simply something we have to do to enable this. It is for this reason that the most important statement in transport policy is "Accessibility is more important than mobility". It is also the reason why so much money and ingenuity has been invested over the centuries in attempting to increase travelling speeds - not because of the inherent attractiveness of speed (or not primarily for that reason), but because increased speed means we can spend less time on travel, or reach a wider range of different destinations.

Therefore an increased amount of travel may bring real and worthwhile benefits, but it is not in itself something to aim for, as an indicator of prosperity or success.

Transport is subjected to economic analysis in the same way as most commodities are. We have to emphasise as a fundamental question of definition that 'transport' is not a single commodity at all, but a general label for a wide range of different commodities that fulfil radically different needs and have different economic characteristics. A journey to work in London by train is barely recognisable as being related to a family Sunday tour of a Scottish loch by car. Indeed, it is quite difficult to grasp what 'the commodity' is, since a journey is produced by the consumer; it exists only in the act of consumption itself; it is instantly perishable and geographically specific. In many cases it is treated as having disutility, rather than positive utility, being endured only for the sake of the benefits to be obtained at the journey's end.

THE CURRENT SCALE OF TRANSPORT

In this report we are concerned with surface transport problems within the United Kingdom. Most of the book is concerned with road transport, although reference will be made to other modes including rail, but not water and air transport, though many of the problems we discuss also have a relevance to these modes. First we consider the scale of resources spent and then the patterns of movement that these resources are used to produce.

Percentage of consumer expenditure

According to the United Kingdom National Accounts, households spent £19,500 million on vehicle purchase, £21,300 million on running vehicles in 1989 and £10,700 million on other travel. This amounted to 16.2% of people's total expenditure. The proportion of total spending on transport has been rising, from 11.0% in 1963 through 14.6% in 1981. Table 2.1 shows the make up of expenditure in 1989. Most spending is on buying and running motor vehicles.

Table 2.1 - Household expenditure on transport, 1989

Category of expenditure	£ per week	% of transport expenditure
Purchase of vehicles, spares and accessories	4.83	44.1 (32.7)
Vehicle maintenance	6.26	57.2 (42.4)
Railway fares	0.55	5.0 (3.7)
Bus and Coach Fares	0.61	5.6 (4.1)
Other travel and transport including purchase of boats etc	2.51	22.9 (17.0)
All transport and vehicles	10.94 (14.76)	100.0

In the original version the percentages did not add up to 100, since the total was less than it should have been. Figures in brackets are recalculated ones.

Source Central Statistical Office (1990a)

Energy used in transport

Transport is one of the largest energy consumers - a fact that is becoming of increasing importance in transport policy. Table 2.2 shows the energy consumption for 1989 of different fuels by different modes.

Table 2.2 - Energy consumption of transport modes

	Petroleum (million tonnes)	Electricity ¹ (terawatt hours)
Railways	0.65	3.17
Car taxi, etc	22.11	n/a
Goods vehicles	10.48 ²	n/a
Buses and coaches	1.11 ²	n/a
Water	1.25 ²	n/a
Air	6.59	n/a
All United Kingdom transport	42.54	3.17
All United Kingdom consumption	57.77	261.11

¹ *In heat terms 1 terawatt is equivalent to 0.08 m tonnes of petroleum. It would take 0.26 m tonnes of petroleum to generate 1 terawatt.*

² *Figures calculated from estimates made of proportion of Derv and Motor spirit used for different vehicles from notes on Table 1.26, Transport Statistics 1979-1989*

Source - Department of Transport (1990a)

Transport as a whole accounted for 32% of all energy used in the United Kingdom in 1989. Transport accounts for nearly 70% of all petroleum use. Road transport uses about three quarters of transport energy consumption and about two thirds of this is for cars.

The amount of movement

When we come to the amount of movement, the number of trips (which measures, crudely, participation in activities) and the mileage travelled (related to the location of those activities) give quite different pictures. Similarly for freight (where the 'number of trips' has no exact parallel) the tonnes moved and the tonne-miles and vehicle miles are each of a different significance; this will be considered later.

For passenger transport, the biggest major omission from the earlier tables which has to be corrected was the absence of walking since walking uses little expenditure or fossil energy. Table 2.3 summarises the various ways in which we can look at the different modes to see how important they are.

Table 2.3 - Importance of transport modes using different measures

Percentage of attribute accounted for by each mode

	¹ Trips per week 1985/86	Vehicle Distance 1989 ⁵	Passenger distance 1989 ⁵	⁶ Users' expenditure 1989	⁷ Time spent per person per week 1986/86	⁸ Energy consumption 1989
MODE	%	%	%	%	%	%
CAR	51	² 70	83	⁸ 53	52	63
LORRY	*	³ 14	*	41	*	30
BUS	9	1	7	3	12	⁴ 3
RAIL	2	9	6	3 (passenger) 1 (freight)	6	3
BICYCLE	3	1	1	*	2	*
WALKING	35	5	3	*	28	*

¹ Percentages calculated using figure for journey per person per week, all modes and all journeys including those of less than 1 mile; National Travel Survey figures 1985/86

² Cars and taxis included

³ HGV's and light goods

⁴ Bus and coach

⁵ Except for walking, figures for which refer to 1985/86

⁶ Percentage calculated using total expenditure for all road and rail transport

⁷ Calculated using data from National Travel Survey 1965/86 including journeys less than one mile

⁸ All motoring including taxis and hire cars

* Not included

Sources - Transport Statistics 1979-89, National Travel Survey 1985/6 and Family Expenditure Survey 1989

It can be seen that car travel, which most see as the dominant mode of travel, is indeed so when we measure it in terms of distance travelled and energy used. But when we look at the number of journeys or the time involved, a different picture emerges where walk becomes one of the most important methods of personal travel. In all these public transport remains smaller.

A very large proportion of all personal travel is short distance. This is seen in Table 2.4¹

Table 2.4 - Lengths of journeys by different modes

	Journeys per person per week for journeys of different lengths			
	Under 1 mile	1-5 miles	5-10 miles	Over 10 miles
Car driver	0.5	3.2	1.3	1.2
Car passenger	0.3	2.0	0.8	0.7
Rail and Tube	-	0.1	0.1	0.2
Bus	0.1	1.2	0.3	0.1
Walk	5.3	1.4	0.0	0.0
Bicycle	0.2	0.3	0.0	0.0
Total	6.4	8.2	2.5	2.2

Source - Department of Transport (1988a)

Where is the Movement?

The car is not the only kind of vehicle on the road, but it is the dominant one, both in numbers and usage. This can be seen in Table 2.5.

¹Note that in this table the class intervals are of different width, i.e. the 'under 1 mile' category only has journeys of 0-1 miles, but the '1-5 mile' category includes journeys from 1-2, 2-3, etc, added together. There are fewer 5 mile journeys by car than 1 mile journeys, not more, though of course the mileage travelled on them is greater.

Table 2.5 - Traffic Levels in Great Britain, 1988

	Billion Vehicle Kilometres		Proportion of total
	1988	1989 (Provisional Estimates)	
Cars and Taxis	305	327	81
Light Vans	32	35	9
Other Goods	28	30	7
Bus and Coach	4.3	4	1
Motorcycles	6	6	1
Pedal Cycles	5	5	1

Source - Department of Transport (1989a)

Cars (including taxis) are by far the biggest users of the road network accounting for over 80% of all vehicle km in Great Britain.

Distribution on road types

Vehicle use is not uniformly distributed across the network however, being heavily concentrated on the higher capacity roads and in urban areas. Table 2.6 shows the distribution of traffic and road length in Great Britain in 1988.

Figure 2.6 - Distribution of Traffic and Road Length by Type of Road and Area, Great Britain, 1988.

	% of vehicle km	% road length
MOTORWAYS	14.3	0.8
BUILT-UP AREAS		
Trunk	2.8	0.5
Principal	17.3	3.5
B and C	9.9	5.8
Unclassified	14.7	31.8
NON-BUILT-UP		
Trunk	14.0	3.1
Principal	13.5	6.4
B and C	11.4	25.3
Unclassified	2.1	22.9

Source - Department of Transport (1990a)

Regional differences

Car ownership is also not evenly distributed throughout the country. In fact there is quite a north-south divide, with a higher proportion of households in the north than in the south having no car at-all and a higher proportion of households in the south (except London) than in the north having two or more cars, as is evidenced in Table 2.7. Some, but not all of the disparity between regions is accounted for by income differences, as household incomes are higher in the south than in the north.

Table 2.7- Car Ownership by Region, 1988

	No Car	Percent of households	
		One Car only	Two or more cars
South			
South-East (excl. London)	24	45	31
London	40	43	17
South West	25	49	26
East Anglia	27	48	25
Mean	29	46	25
North and Midlands			
North	46	41	13
Yorkshire & Humberside	43	41	16
East Midlands	31	46	22
West Midlands	35	43	22
North West	39	42	20
Mean	39	43	19
Wales	32	50	17
Scotland	47	39	14

Source - Department of Transport (1990a)

Between counties the differences are more marked. In 1989, against an average Great Britain figure of 355 cars per thousand people, Berkshire and Hertfordshire had over 486 cars per thousand, while Strathclyde and Tyne and Wear had roughly half as many at under 250 per thousand.

Whether households are in a rural or urban location has a major influence on car ownership patterns. Sixty per cent of households in urban areas have cars compared to seventy eight per cent in rural areas and this difference remains even after allowing for income, household size, socio-economic grouping and tenure of households. The additional distance travelled by those living in rural areas can be viewed as a manifestation of the greater need to travel, by those located in more remote areas. The average distance travelled per week by people living in rural areas is 133 miles compared to 95 miles for people in urban areas. There is very little difference in the number of journeys made by area, but average length of journey is much longer for those living in rural areas. Some of these differences are shown in Table 2.8.

Table 2.8- Urban and Rural Differences in Travel 1985/6

	Urban Areas	Rural Areas
Proportion of households with cars(%)	60	78
Access to car as main driver (%)	30	42
Travel distance per week (miles)	95	133
Average length of journey (miles)	7.3	9.6
Car travel per week (miles)	72	113
Public transport travel per week (miles)	13	11

Source - Department of Transport (1988a)

However, this division between ‘urban’ and ‘rural’ travel has to be treated with some caution.

Public perception of congestion is that it occurs in two situations - in cities and on motorways. Cities are seen as having congestion because they are central places where there is demand for many people and goods to travel to. Motorways are seen as having congestion because they should be the quickest way from A to B, but too many people wish to use them. This perception of congestion reflects the view of a society with well defined centralised towns and cities and rural areas in between. However, in the last twenty years or so urban structure has changed radically. Much urban style residential development has occurred outside cities and many of the functions associated with towns and cities (especially industrial and retail) have been allowed to develop on the edges of cities and adjacent to motorways. Transport surveys carried out now find that a much higher proportion of journeys outside cities are not ‘rural’ or ‘interurban’ but what would have been described as urban some years ago.

As Banister (1989) (Discussion Paper No. 1) says:

“The simplicity of the rural-urban dichotomy is misleading as there is a continuum of development with as much variation within rural areas as there is between rural and urban areas.”

He argues that while accessibility in rural areas used to be regarded as poor because people and facilities were dispersed, accessibility and travel times for those with cars living in rural areas, are now better than for their urban counterparts. The roads are faster and there are high quality facilities located on the edges of cities; people have access to a wider range of job opportunities within a commuting driving time. This is true as long as they are fairly close to fast roads and urban centres.

“...Accessibility for car drivers in rural areas is better than that for their urban counterparts. The problem of rural access so frequently cited in the literature seems to have been overstated as door to door travel times for car drivers may well be less than

those in urban areas. The real problem of rural inaccessibility relates to those with no or limited access to the car.”

“Transport cannot be considered in isolation as other more fundamental changes have been taking place in society. Rural areas are no longer primarily agricultural areas, dependent upon local networks and local accessibility Transport may have facilitated these changes and the car may have been the crucial determinant of the new mobility.”

An additional interaction between urban and rural traffic is the travel generated by urban residents in visiting, rather than passing through, the country. Some rural areas of importance for tourism can virtually become temporary towns.

Reasons for Travel

It is convenient to classify journeys into three major purposes: work and education; personal business; and leisure. On average, the number of journeys made per week is divided fairly evenly between the three groups. However when weekly mileage by journey purpose is considered, leisure journeys on average are longer than work and education journeys which in turn are longer than personal business trips. As a result leisure is the most important type of journey measured by total weekly distance, accounting for 42% of the weekly mileage. Leisure trips are also the trips most likely to be made by car (72%), as is shown in Table 2.9.

The number of rail journeys is small except for work purposes. However, the average length of a rail trip is 25.5 miles compared to the average road journey of 7.7 miles as a car driver, or 3.7 miles as a bus passenger (NTS). Rail is therefore an important mode for longer trips.

Table 2.9 - Journey purpose by mode of transport, 1985/86.

	Work & Education	Personal Business	Leisure	All purposes
Car	63%	71%	72%	69%
Local bus	13%	13%	8%	11%
Rail	5%	1%	1%	2%
Walk	8%	10%	12%	10%
Other	11%	4%	6%	7%

(Walk journeys under 1 mile excluded)

Source - Department of Transport (1988a)

Who is Travelling?

The amount of travel people do and the importance of the different reasons, is related to the sort of person they are and the type of life they lead. Table 2.10 shows that men are travelling longer distances than women overall and for most journey purposes.

Table 2.10 - Distance travelled per week by journey purpose and gender.

	Miles	
	Men	Women
To or from work	54.8	19.8
In course of work	28.2	3.7
Education	1.9	1.8
Escorting to work	2.0	1.7
Escorting to education	0.6	1.5
Shopping	11.3	14.8
Other personal business	12.1	9.8
Social or entertainment	37.6	32.0
Holidays/day trips/other	14.8	15.2
All purposes	163.2	100.2

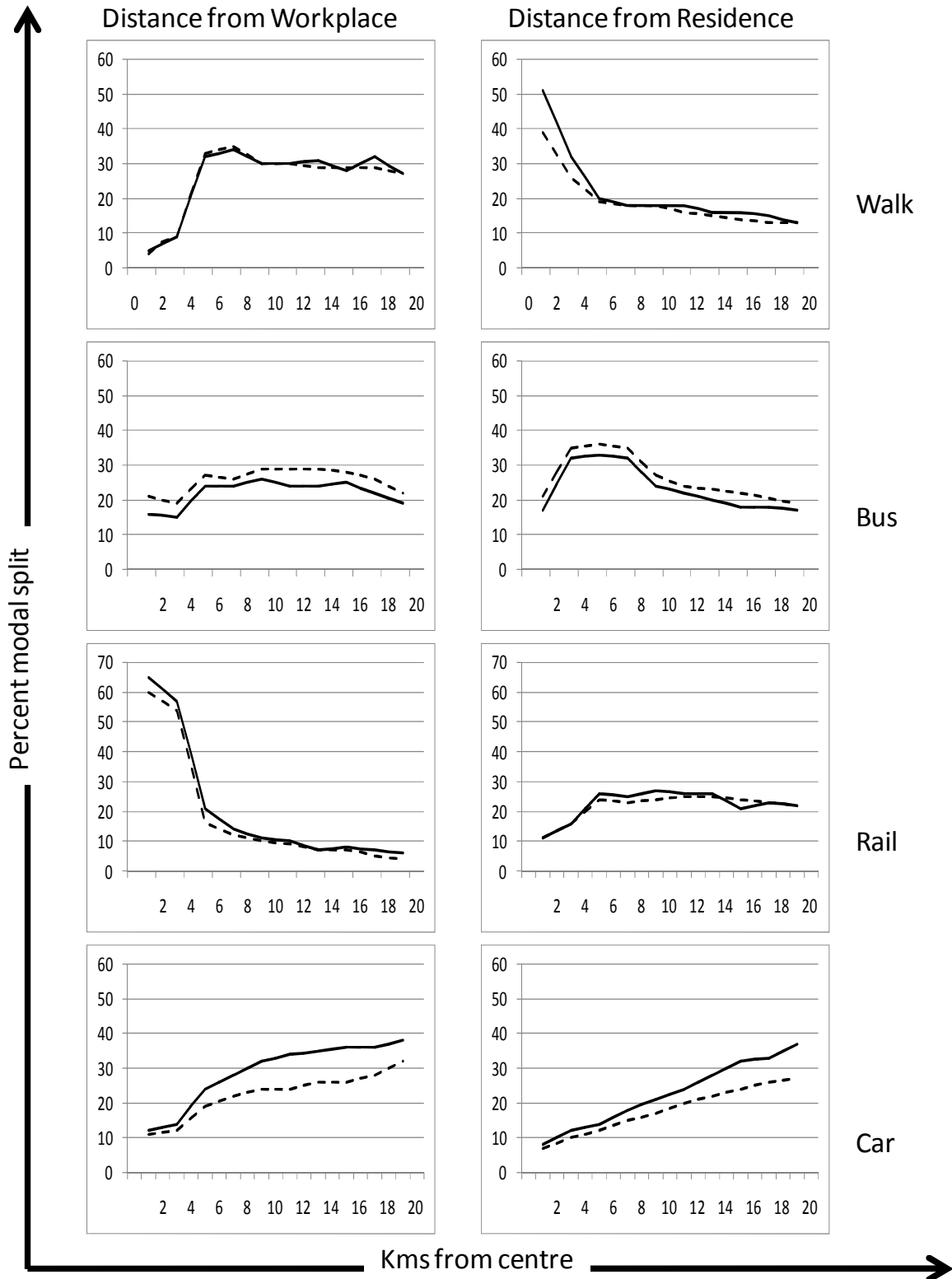
Source - Department of Transport (1988a)

Men do over half their weekly mileage in connection with work compared to a figure of 23% for women. Social or entertainment journeys account for the largest proportion of mileage for women. The only category where women do significantly more mileage than men, is shopping. It is not only the amount of travel which is different, but its nature deriving from differences in life-style and responsibilities. Grieco et al (1989) provides eleven case studies arguing that:

“ women’s employment, unlike that of men, is undertaken in the context of and in combination with, a complex set of domestic and household responsibilities.”

As a result, women’s travel needs and patterns were different, with typically more complex scheduling problems, but with the facilities to solve them being less adequate and a tendency for specific aspects like security, bus design and access to local employment to be ignored. Other differences in travel patterns between men and women are shown in Table 2.11.

Figure 2.1 – Modal Split 1966 and 1971



Source Mogridge, M. (1990) Interaction between road and public transport policy in urban areas. Rees Jeffreys Discussion Paper no 2

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Table 2.11 - Gender Differences in Mobility Statistics

	Women	Men
Travel per week (miles)	100	163
Work journeys by bus (%)	19	7
Bus journeys per week (number)	2.0	1.3
Access to car as main driver (%)	29	61
Car journeys per week (number)		
as driver	5.5	11.8
as passenger	4.6	1.9
Driving licences (%)	41	74

Source - Department of Transport (1988a)

Thus women travel less than men and are more reliant on both public transport and other car drivers.

Just as men and women show different travel patterns, so do different age groups. Old and very young people understandably make very few work journeys, but also do less travel as a whole than other people.

Table 2.12 - Journeys per week - Related to Age

	Car Journeys	Bus Journeys	All Journeys
Children	5.6	1.8	9.8
Men (16-59)	13.7	1.3	18.0
Women (16-59)	10.1	1.9	14.5
Elderly	5.4	1.8	8.6

Source - Department of Transport (1988a)

Use of public transport is highest at either end of the age spectrum. Also women make greater use of public transport than men throughout most of their lives, the difference being greatest in the age range 60-64 when 55% of women use buses at least once a week compared to only 23% of men.

Table 2.13 - Percentage of people using a bus at least one day per week percentages

	16-19	20-29	30-59	60-64	65-69	70-74	75-79
Males	49	31	19	23	39	44	52
Females	70	47	39	55	53	57	50

Source - Department of Transport (1988b)

The differences are striking. In general they arise from the natural development of the life cycle. Berger and Berger (1976) discuss the various aspects of life cycle and earlier TSU studies have applied this to travel behaviour - Dix et al (1983) on car use, Jones et al (1983) on the relationship with activity patterns and Stokes (1990) with particular reference to public transport use by the young and old. In summary we can distinguish:

- Very young children who impose complex travel constraints on adults, but have relatively few travel needs of their own and are dependent on others to meet them. In later childhood travel to school is required and much other travel is associated with other family members. In adolescence personal travel desires increase especially for recreation and leisure and during the teenage years children become independent in travel.
- Married couples without children: often both working, with a high level of mobility have good access to work and activity profiles rather similar to each other, e.g. work journeys in morning and evening (perhaps with a shopping trip typically by the wife - at lunchtime) and shared evening social trips.
- Families with young children: it is the age of the youngest child which has most effect on the adults' travel patterns. Classically the husband would keep to his former pattern, but the (non-employed) wife would tend to have a larger number of short day time trips, for shopping and other purposes, constrained by the child's meal times. As the children get older, an increasingly complex pattern of escorting them to and from school or social activities may develop.
- Families of adults: as the children approach adulthood, they lead more independent lives and the various members of the household tend to make more separated travel arrangements.
- The retired: in these households leaving work has enabled substantial opportunities for daytime travel, which are taken up by the 'younger' and fitter groups, but with decreasing mobility in the later years.

Freight Transport

The primary measure of the amount of freight transport is the weight of goods moved, though it should be said that this can be misleading in a period when heavy bulky goods are tending to be replaced by higher value manufactured goods. Table 2.14 shows the weight of goods transported by the main methods of transport and also (multiplying the weight by the average length of haul) the amount of goods movement.

Table 2.14 - Freight Transport by Mode 1988

	Road	Rail	Water	Pipeline	Total
Goods lifted (Million tonnes)	1807 (83)	143 (6)	155 (7)	71 (4)	2176
Goods moved (M Tonne kms)	137 (62)	17 (8)	58 (26)	9(4)	222

Figures in brackets are percentages.

Source - Department of Transport (1990a)

From these figures we can see that road transport is responsible for over 80% of the tonnes moved and 60% of the tonne-miles. The difference arises because modes other than road carry their loads for longer distances. The average length of haul for road vehicles is 76km compared to 119km for rail, 374km for sea and 127km for pipeline. Despite road being the dominant mode of transport overall, there remain a few products for which other modes are more important. Especially, for solid mineral fuels (including coal and coke), rail is dominant.

In 1988, £30,500m was spent on transporting road freight compared to £711m on rail freight.

Taking road freight, Table 2.15 shows the proportion carried by heavy goods and light goods vehicles.

Table 2.15 - Traffic and Goods Moved by Light and Heavy Good Vehicles

	Light Vans and Lorries	Heavy Goods Vehicles
Traffic - Billion Vehicles kilometres per year	35.1	29.7
Goods - Million tonnes lifted	103	1704

Source - Department of Transport (1990a)

Light vans and light goods vehicles (under 3.5 tonnes unladen) account for over half the traffic in these classes, but only 6% of goods lifted. Many light vans are not engaged in freight transport, but in service and building industries.

As in the case of passenger transport, it is not always realised how dominant are the fairly short distance movements.

Table 2.16 - Goods Lifted by origin and destination of goods, 1987. Million tonnes.

Destination Region	Origin region											Total
	NW	N	YH	EM	EA	GL	SE	SW	W	WM	S	
NW	117	5	11	6	2	1	5	2	7	8	2	166
N	4	65	7	2	0	0	1	0	0	1	3	86
YH	10	7	121	12	2	1	2	1	1	3	2	162
EM	5	2	9	89	5	2	6	1	1	7	1	127
EA	1	1	2	5	52	2	8	1	1	1	0	73
GL	2	0	1	3	3	53	29	2	1	3	0	98
SE	5	1	3	10	8	24	183	11	3	7	1	255
SW	2	0	1	2	1	1	9	92	3	4	0	117
W	4	1	1	1	1	1	2	4	66	5	0	85
WM	9	1	4	9	2	2	5	4	5	100	1	143
S	3	5	2	1	0	0	1	0	0	1	124	138
Total	162	89	163	140	76	86	251	118	88	140	135	1450
% of total within region	72	73	74	64	68	62	73	78	75	71	92	73

Code to table: NW=North West; N=Northern; YH=Yorkshire and Humberside; EM=East Midlands; EA=East Anglia; GL=Greater London; SE=South East; SW=South West; W=Wales; WM=West Midlands; S=Scotland.

Source - Department of Transport (1987a)

As can be seen from the left-right diagonal in Table 2.16, much of the freight lifted is set down within the same region, ranging from 92% in Scotland to 62% in Greater London. The major origin and destination region is the South East, noting that this includes the Southern ports and therefore a high proportion of imports and exports.

The Link Between Freight and Passenger Traffic

Passenger and freight travel are usually treated separately, as they have been here. But in many ways they are two ends of the same process. Freight travel is concerned with the distribution of goods and a large part of personal travel is related to the production and consumption of the same goods.

The link is particularly strong when considering shopping trips, which in one sense can be viewed as the final stage of goods transport. Lorries deliver by far the majority of goods to the shops, from where people take them home in their cars, buses or by foot. Smaller shops are often serviced by smaller vehicles and customers buy smaller quantities. Large superstores are usually serviced by heavier lorries and customers buy larger quantities. Each shop, therefore, generates its own traffic.

The relative importance of lorries and other vehicles for moving these goods may be seen in the case of a supermarket run by a major United Kingdom chain. Goods come from all over the United Kingdom and are consolidated in warehouses. Stock for the store is replenished on a daily basis and is taken from the local warehouse in a fleet of 38 tonne articulated vehicles. The outlet receives seven 38 tonne lorries a day. Each vehicle holds 26 tonnes of goods, so the total daily delivery to an outlet is 182 tonnes.

The average customer takes away approximately 23kg of goods. This means that nearly 8000 people are responsible for taking away the deliveries made in seven HGVs. About 70% of their customers drive to the store. So, about 5500 cars are responsible for taking away the goods brought by seven HGVs.

The average distance of a vehicle shopping trip is approximately 8km (and this includes shopping trips made by bus, which are shorter than those made by car) (NTS,1985/6). The 5500 car drivers, therefore, drive nearly 90,000 km in the course of visiting this one outlet in one day.

These calculations are intended only to give an idea of the orders of magnitude involved - clearly each specific case will depend on local circumstances. But the general proposition remains that the total amount of traffic generated by the final stage in the transport of goods from factory to home, by car, is likely to be many times greater than that involved in moving them by lorry at earlier stages. This final stage also largely takes place in urban conditions. It also points to the fact that the location and size of facilities, can have important implications for both freight and personal travel.

CHAPTER 3

THE GROWTH OF TRAFFIC

Having described the overall patterns of movement in Chapter 2, we now go on to consider the characteristics and causes of the phenomenal growth in the amount of movement - a greater growth in absolute terms than at any previous stage of human history.

Table 3.1 shows the change in a number of travel characteristics over the thirty seven years prior to 1988. (The period of thirty seven years is chosen because it is the same as the period of 1988 to 2025, to which the National Road Traffic Forecasts apply, but it also corresponds with the main transition to mass car ownership. The comparison will be discussed in Chapter 6).

Table 3.1 - Changes in travel patterns 1951 - 1988

	1951	1988	change 1951 1988
Number of vehicles	4.7m	23.3m	x 5.0
Number of cars	2.4m	18.4m	x 7.7
Kilometres per veh	12597	15584	x 1.2
Kilometres per car	12316	16029	x 1.3
Traffic - all vehs (bn vehicle km)	58.9	363.1	x 6.2
Traffic - cars (bn vehicle km)	29.3	295.4	x 10.1

Source - Department of Transport (1989a)

Thus the number of vehicles, mostly cars, has increased five fold and the average usage by 24%, so that overall traffic levels have increased by a factor of six and car traffic by a factor of ten.

By comparison, in 1951 there were 185,000 miles of road in Great Britain, and by 1988 this had increased by 18% to 218,000 miles, of which some was in roads serving new developments. Some of the increase, however, was in motorway and dual carriageway mileage which increases the capacity much more than is reflected in the increase in the length. Also, because of the improvements in vehicle and road design and improvements in driving skills, the effective capacity of the road network has increased more than the 18% suggests. What is clear, however, is that the increase in the size of the road network has not been remotely of the same scale as the increase in the amount of traffic - nor could it conceivably have been so, with implications we shall return to later.

First, we look in more detail at the changes in passenger and freight transport over a shorter period. Table 3.2 shows how traffic in each of the main categories changed in the previous ten year period.

Table 3.2 - Road traffic composition, 1989

Type of vehicle	bn vehicle km	Percentage of total	Percentage change in mileage since 1979
Cars and Taxis	327	81	+ 62.
Motor Cycles	6.3	2	- 1.1
Larger Buses and Coaches	4.5	1	+ 34
Light Vans	35	9	+ 57
Heavy Goods vehicles	30	7	+ 33
Total	403	100	+ 56

Source - Department of Transport (1990a)

Much of the increase in road traffic has been on motorways. In 1980, mileage by cars and taxis on motorways accounted for 9% of their total mileage. By 1987 this figure had increased to 14%. The same is the case with heavy lorries which, in 1980 did 23% of their mileage on motorways and in 1987 did 32%.

Features of the Growth in Personal Travel

Journey purposes and trip lengths

The national average number of trips made per person per week in a car increased from 5.3 in 1965 to 9.1 in 1985/86 (National Travel Survey) - an increase of 72%.

The number of journeys per person per week for work and education has decreased since 1965, whereas they have increased for personal business and leisure. In terms of the average length of trip, this has increased for all journey purposes but those for work and education have increased the most. Table 3.3 combines the changes in trip numbers and trip lengths and shows that it is in the personal business category where the biggest increase in mileage has occurred.

Table 3.3 - Mileage per person per week, by journey purpose (all modes).

	1965	1985/86	% change, 1965- 1985/86
Work and education	27.0	34.8	+29
Personal business	10.5	22.6	+ 115
Leisure	32.6	42.0	+29
Total	70.1	99.4	+42

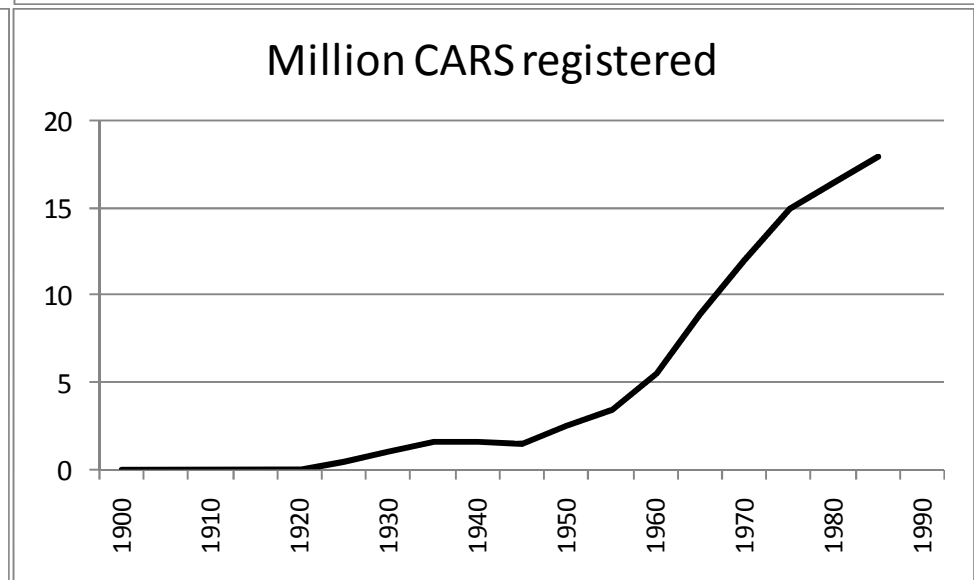
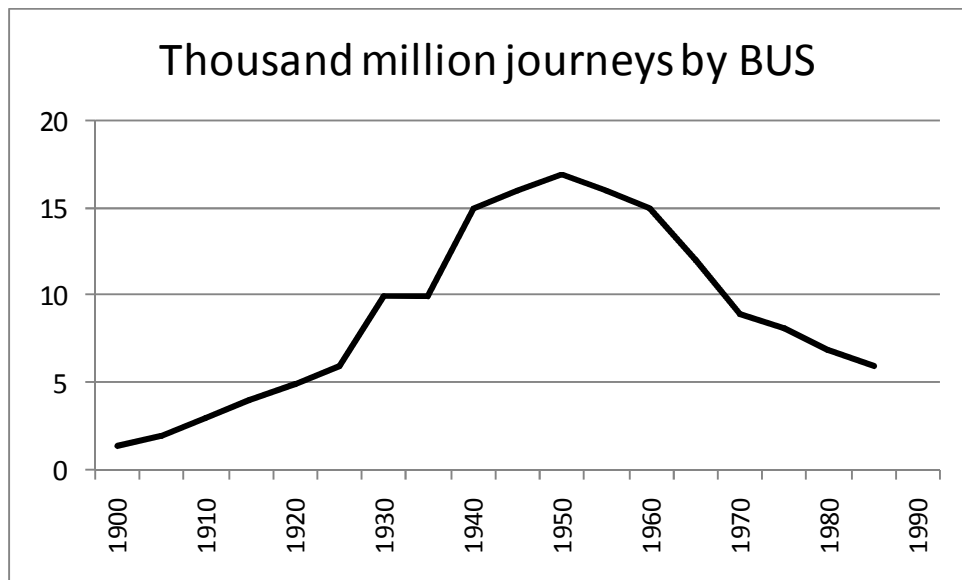
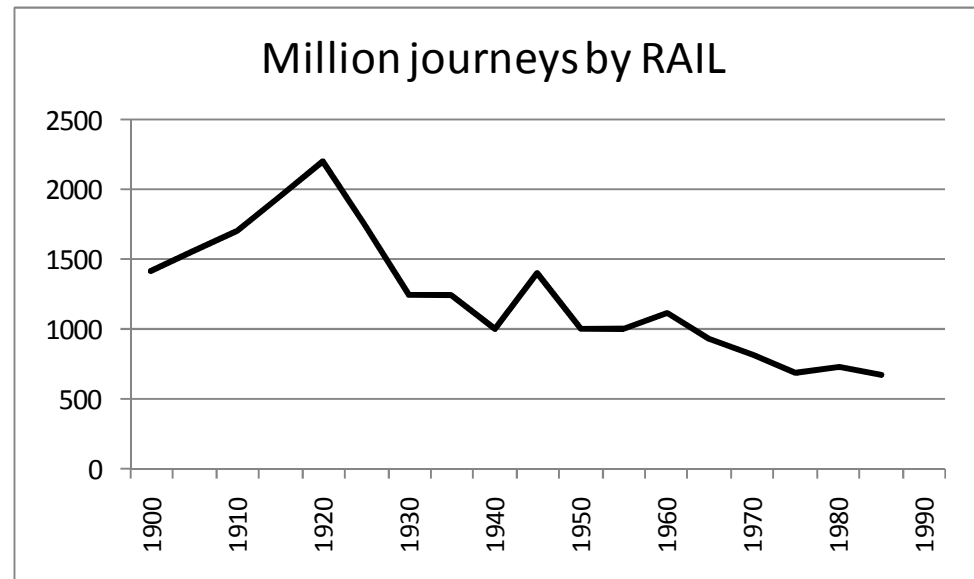
Source - Department of Transport (1988a)

Although the average trip length has increased over the twenty year period under consideration, there has been an increase in the proportion of shorter trips made. Thus, in 1965, 55% of journeys made by car were less than five miles whereas this had increased to 61% by 1985/86 (National Travel Survey).

The increase in vehicle mileage by cars is accounted for by a combination of factors. First, there has been an increase in the number of cars licensed; second, an increase in the number of journeys made by car; and third, an increase in the length of journeys made by car. Considering vehicle numbers first, in 1979 14.3 million private cars were licensed in Great Britain; by 1989 this figure had increased by 35% to stand at 19.3 million. The increase in the number of private cars licensed has again occurred as a result of a combination of a number of factors:

- The percentage of households with no car has decreased from 43% to 35% over the period 1978 to 1988.
- More importantly, the percentage of households with two or more cars increased from 12% in 1978 to 21% in 1988. This obviously has consequences for household mileage. A household with two (non-company) cars does not on average do twice the mileage of a household with one car, because the first car is used for the most important journeys and will have been used to drive other members of the household to their destinations. Nevertheless, the average weekly mileage per person in a household with one car in 1985/6 was 104.5 miles, compared to 162.7 per person in a household with two cars (Department of Transport 1988a).
- The absolute number of households increased by 8% over the period. This occurred despite a population growth of only 2% over the same period and is a result of the diminishing size of households. In 1987, 25% of households were single person households compared to 12% in 1961 and 21% in 1976. Conversely, whilst 8% of households had five people in 1976, this had been reduced to 6% by 1987 (CSO 1989a).

Figure 3.1 – National trends in the use of rail, bus and car, from 1900 to 1985



Source – Goodwin (1980) and Transport Statistics 1978-1988

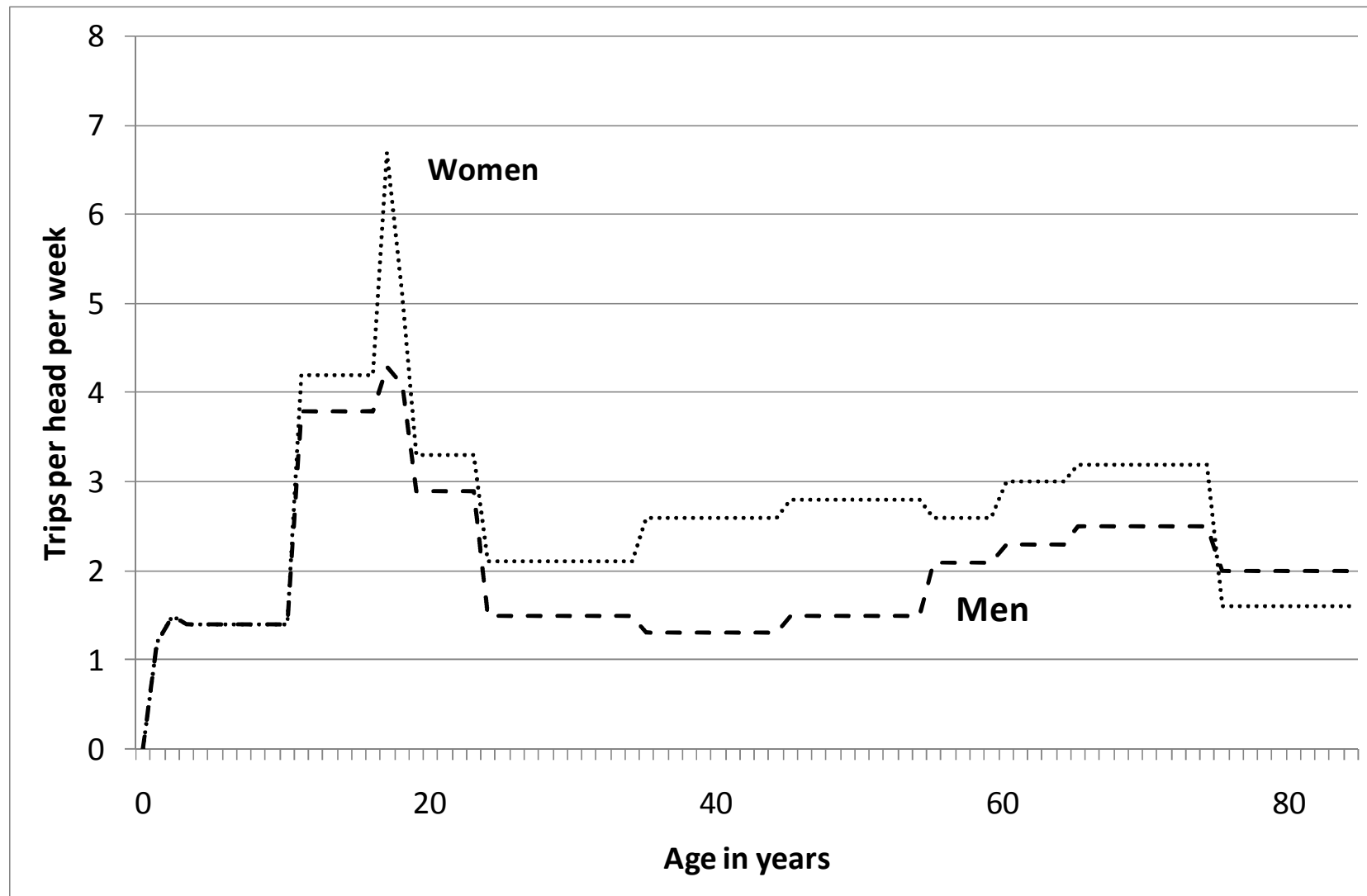


Figure 3.2 – Local bus use 1978/9 – Trips per head per week

Source – Hill, E. And Rickard, J. (1990) Forecasting public transport demand: The demographic dimension Rees Jeffreys Discussion Paper No. 16

Gender and age related trends

We noted in Chapter Two that men travel longer distances than women. However, when we consider the changes, there is some indication of a convergence: the differences are getting less.

The gender difference in public transport usage is influenced partly by the difference in the number of male and female car driving licence holders. Obviously, without a car driving licence, the opportunities for driving a car are denied and, therefore, the need to use other forms of transport, e.g. bus, is greater. In the age range 30-39, whilst 86% of males have driving licences, only 62% of females have them. The disparity is decreasing, as is witnessed by the fact that whereas in 1972, 31% of males and 12% of females in the age range 17-19 had licences, by 1986, this had changed to 31% of males and 25% of females. In fact there has been a doubling of the percentage of females who have licences in all age categories over the fourteen year period (Department of Transport, 1990a). However, it is still the case today that in every age category, a higher percentage of men have licences than women.

There has been a steady decline in both male and female use of bus transport for work over the period 1972-86. Thus, for females, bus transport decreased from 38% of work transport in 1972 to 19% of work transport in 1986 whilst for males it declined from 15% to 7% (CSO 1989a).

Understanding age effects is much more complex than gender effects, because there are two quite separate methods of analysis and they often get confused. First, we can divide people up into different broad age groups and see what differences there are. Secondly, we can follow what changes people make in their behaviour as they get older. The two methods do not give the same results.

There are two different explanations for the lower mobility of the elderly. Consider their lower level of car use. We could say that this is because, being retired, they no longer need to make work journeys and, being old, they are more likely to be infirm or ill or indisposed to travel much anyway. With that explanation, future generations of the elderly will also show similar patterns. Alternatively, we could say that the reason they make fewer car journeys is because they grew up in the pre-war years when car ownership was much less common and they never got into the habit. In that argument, the current middle-aged car owners would be expected to keep their cars and maintain higher levels of mobility when they retire.

Something of this effect is seen in Table 3.4, from Department of Transport (1989a).

Table 3.4 - Percentage of some Age Groups with Driving Licence

Age	Male		Female	
	1972/3	1985/6	1972/3	1985/6
17-19	31	31	12	25
20-29	70	72	31	53
60-69	52	72	9	24
70+	21	51	2	11

Source - Department of Transport (1989a)

Comparing two surveys, one carried out in 1972/3 and the other in 1985/6, we see that the growth in car licences tends to work its way through the population, with little change for young men, but very rapid increases for young women and for older men. There are two different trends, working in opposite directions.

First, people do make some genuine reduction in their travel as they get old and infirm. Secondly, as they get older they are caught up in the general increase in mobility, especially car ownership and use, that takes place year by year. The net result is that future generations of the elderly will not show such big apparent decreases in their travel.

Changes in Freight Transport

Modal Split

Over the decade from 1979 to 1989 total tonnage lifted increased by 15% and freight lifted by road vehicles increased by 22%, as is shown in Table 3.5.

Table 3.5 - Freight Transport by Mode – Goods lifted (million tonnes)

	Road	Rail	Water	Pipeline	Total
1979	1487 (79)	169 (9)	140 (7)	85 (5)	1881 (100)
1989	1807 (83)	143 (7)	155 (7)	71 (3)	2176 (100)
Change 1978-88	+22%	-15%	+ 11%	-16%	+ 16%

Figures in brackets are percentages.

Source - Department of Transport (1990a)

Table 3.6 - Freight Transport by Mode – Goods Moved (billion tonne kilometres)

	Road	Rail	Water	Pipeline	Total
1979	102.3 (54)	19.9 (11)	55.5 (30)	10.3 (5)	188.0 (100)
1989	137.4 (62)	17.3 (8)	57.7 (26)	9.4 (4)	221.8 (100)
% change 1979-89	+34%	-13%	+4%	-9%	+ 18%

Figures in brackets are percentages.

Source - Department of Transport (1989a) ,

Looking at Tables 3.5 and 3.6 the shift towards road freight can be seen. By 1989 83% of tonnes lifted and 62% of tonne miles was road. During this period the amount of rail and pipeline transport was actually falling. Virtually all the increase was accounted for by road freight.

Road Freight

Table 3.7 shows how tonnes lifted and tonnes moved have changed over the decade and from these two statistics, how the average length of haul has changed.

Table 3.7 - Activity statistics of HGVs, 1978 and 1988.

	1978	1988	% change 1978-1988
Goods lifted (million tonnes)	1420	1653	+ 16.4
Goods moved (m tonne km)	96400	124800	+ 29.5
Average length of haul (km)	67.9	75.5	+ 11.2

Source - Department of Transport (1989a)

While the amount of freight moved increased, the number of rigid HGVs fell from 385,000 to 357,000 and the number of articulated HGVs remained the same at 105,000 (with some fluctuation around this number during the period). Thus, overall, the number of HGVs actually fell by 5.7% over the decade.

Table 3.8 - Heavy Goods Vehicle Traffic, 1977 - 1987

	billion vehicle km		
	OGV1 (lighter HGVs)	OGV2 (Heavier HGVs)	All HGV
1977	12.8	4.3	17.1
1987	10.6	8.1	18.7
% change 1977-1987	-17.2%	+87.5%	+9.2%

Source - Department of Transport (1989b)

The major trend in vehicle weights over the past decade has been the move towards the use of heavier vehicles, particularly since the introduction of the 38 tonne vehicle in 1983. The effect of this weight increase can be seen in Figure 3.9.

Figure 3.9 - Number of vehicles in weight categories

	'000s vehicles					Total
	Tonnage					
	3.5-7.5T	7.5-16 T	16-24T	24-32 T	32-38T	
1983	142	87	84	50	75	436
1988	162	58	93	59	90	462
% Change	+14	-32	+ 11	+ 19	+20	+6

Source - Freight Transport Association (1990)

The five year period saw a small overall increase in the total number of HGVs and a shift away from the use of medium weight vehicles (between the weights of 7.5T and . 16T) towards the use of heavier vehicles. No HGV licence is required to drive the lightest category, which has shown an increase.

In terms of goods lifted there have been similar changes. Within the articulated category, vehicles between 33 and 38 tonnes lift and carry more goods than the rest of the articulated vehicles put together. Some idea of the efficiency of vehicles over 33 tonnes is gained from the fact that although they constitute 14% of the total number of HGVs, they lift 20% and move 40% of the total goods moved by HGVs.

Thus the practice is of increased freight traffic, with more goods being carried, for longer distances, by fewer but heavier lorries. Overall, the increased vehicle miles on the road is substantially due to longer average hauls, not to the increase in goods carried.

The Reasons for Traffic Growth

Land Use, Economic and Social Development

It is helpful to start with a much longer term view, in which it is clear that transport, land use and economic development have always been closely related. Agrarian economies were fairly diffuse, comprising isolated settlements or villages packed closely for group defence. In most societies there were those who were not in the subsistence sector of the economy (traders, craftsmen, intellectuals, rulers and some form of public servants) who may have lived in small densely populated towns. Local travel was on foot and long distance travel was carried out mainly by horse, or water.

Early industrialisation opened employment opportunities in certain places (e.g. where there were raw materials or favourable conditions for production, or near ports) and led to the expansion of towns and the setting up of other settlements such as coal mining villages. Walking was still the dominant mode of travel. Canals allowed for an expansion of the

industrial economy by opening up possibilities of bulky and heavy goods transport to new areas, but did little for personal travel.

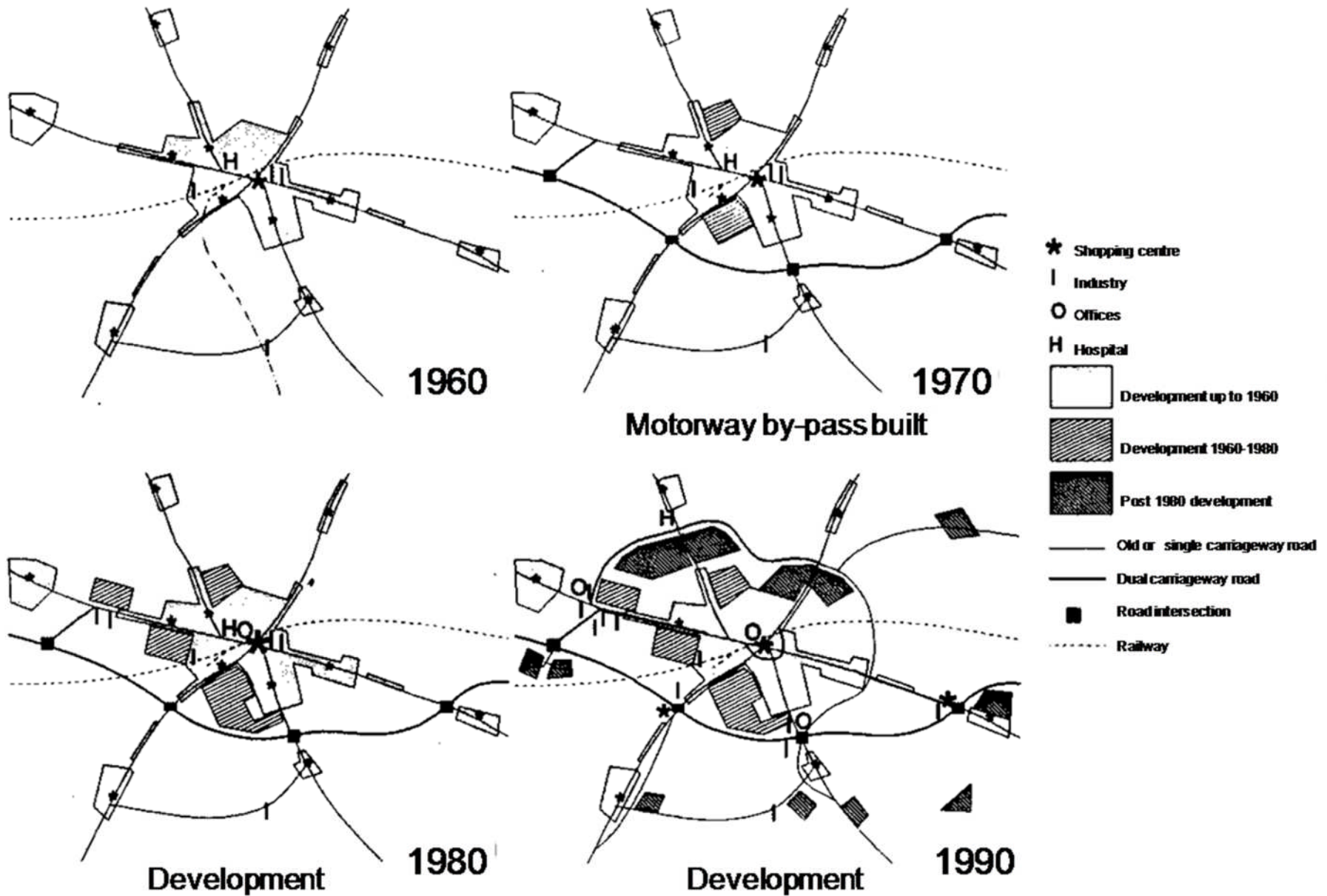
Rail was the key to change in urban structure. Relatively fast travel allowed settlement around stations with people travelling to more specialised central areas. In the early days rail freight transport assisted in the creation of large factories: the commuting potential of rail expanded later. With high urban densities cities could have large populations, but still have a radius of a few miles allowing walking to work; rail enabled an expansion of the catchment area for workplaces, which could then be larger. Rail commuting was also associated, especially for managerial and higher paid employees, with an escape from the unpleasantness of city living. City structures could have a high density centre and inner suburbs, with pockets of development along rail lines. Horse drawn and then motorised buses and trams allowed further expansion.

Even so, there were limits to the alteration of industrial location and distribution patterns. Industry tended to stay centralised because the bulk of workers needed to reach central places and the bulk of primary goods distribution was carried out by rail so industry had to be near railway lines and with a ready labour market. Of course, in many instances, towns were built specially because of industrial location (e.g. mining villages). Retailing remained generally local since walking was the predominant mode for shopping, except for the growth of specialist and department stores in town and city centres.

The increasing ownership of private cars from the 1930s started to encourage ribbon development along existing roads between centres and pressures for such development were reinforced by the much bigger growth of car ownership in the 1950s and 1960s. At first, this mainly confined to the higher income groups. Also after the second World War, although some new town development planned for relatively high levels of car ownership, there were substantial developments of dense public housing and flats for lower income residents with low car ownership. There was no overwhelming accessibility benefit to be gained by moving out of cities and they maintained their position.

Pressure for changing urban structures increased in the 1970s with the realisation that road haulage along the new motorways, as well as the expanded markets of fast roads and increasing car ownership, made locations on motorways and bypasses very attractive for industry and retailing. In some areas planners restricted such attempts at large scale developments, especially in the retailing sector, for fear of longer term consequences. With the relaxation of planning controls in the 1980s, industry and retailing were more frequently allowed to move where they wanted and so were housing developers. Housing development mainly took the form of large private housing estates on the edges of smaller towns in the South East of England, but also the building of extensions to villages and individual houses in formerly rural areas. Industrial development mainly took the form of development close to motorway junctions and other fast roads. Multiple car ownership allowed richer households to make decisions to live in previously inaccessible locations, while at the same time having access to a wide range of high quality retail outlets, workplaces and other facilities.

Figure 3.3 – Idealised map of development of “Southeastown” 1960 to 1990



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At the same time cities were perceived to be decreasingly attractive places suffering from traffic congestion, poorer quality schools, pollution and increasing perceptions of crime. The relative attraction of city centres for suburban residents became less as more easily accessible (by car) facilities opened up on the edges of cities. While some traditional distinctions of class within society were broken down, a new geographical distinction emerged between those whose income enabled them to choose where to live and afford cars and those who could not.

Personal and Household Factors; Income Growth, Car Ownership and Travel

Within these general social developments, individuals and households make decisions which they do not base on theories of land use, but on their own specific needs and desires.

Much research has been carried out into the factors which influence the amount and style of travelling that people do. The seminal paper on factors influencing the number of trips (at that time confined to vehicle trips, i.e. excluding walking) was by Wootton and Pick (1967). Their approach was as follows:

“A family is a closely knit but independent unit. It also happens that the majority of journeys begin or end at home and that most journeys are dependent on the family’s needs and leisure. It is convenient therefore to consider a household as the fundamental unit of the trip generation process and to assume the journeys it generates depend on the household’s characteristics and its location relative to the facilities (workplace, shops, etc.) it demands.”

Using data from surveys in the West Midlands and London, results in round terms showed that there were three trips per household per day for households without cars, six for households with one car and eight for households with two or more cars. Part of this was due to an income effect: for each car ownership class higher income households made up to twice as many trips as low income households. And households with two or more employed members, made about two more trips per day than those with one employed member.

In all such analyses, one of the most important factors influencing trip rates has been household car ownership and car ownership itself has been explained primarily by income. This has been a recurrent finding throughout the entire history of car ownership forecasting. Brunner (1928) used the intuitive notion of an income threshold for car ownership (£400 a year), but modified by family circumstances, company cars, the quality of roads and competitive modes so that not everybody in receipt of more than the threshold income would acquire cars:

“...A number of single men with incomes of less than this may become car-owners, but, on the other hand, a very large number of married men in receipt of salaries

higher than this figure will not be able to afford to run cars, or will prefer, for the sake of economy, to run motorcycles. A relatively small number of people will have more than one car and a number of cars registered as private vehicles are no doubt used by commercial travellers and others earning less than £400 a year for business purposes.”

Sixty years and many research studies later, the discussion in the latest Department of Transport (1989b) report on forecasts is very similar in style and conclusions:

“Many factors are likely to influence the growth in car ownership and use. They include income, the cost of buying and running cars, journey requirements (work and non-work), quality of public transport services and the way people’s expectations and preferences about car ownership change over time It seems likely that car ownership will eventually reach a limit - or “saturation level” - as a larger proportion of the population acquires cars. Since no country appears to have reached this limit yet, the level of saturation must be assumed. For these forecasts, saturation has been assumed to occur when 90% of the driving age group of 17-74 year olds own a car; (100% car ownership is unlikely because some people will be prevented or deterred by disabilities or other factors).”

There is a great similarity in the underlying logic of these two approaches, separated by more than half a century. But whereas Brunner expected an ultimate car ownership level of one million (or about 25 cars per 1000 people), the Department of Transport expects the ultimate or ‘saturation’ level to be 650 cars per thousand people, in which case over thirty million cars would be owned by 2025. In both calculations (and most in between), by far the greatest part of the increase derives from income growth, with much smaller effects expected from other factors.

We can see the scale of these effects by looking at the relationship between income and the level of car ownership.

Table 3.10- Car Ownership and Use for Selected Income Groups

Household Income £	Persons per household	Cars and Vans per person	Vehicle kms. per year/ household
£2000-£4000	1.7	0.1	1700
£8000-£10000	2.8	0.3	9500
£13000-£15000	3.0	0.4	17000
£20000-£25000	3.3	0.5	24000

Source - Department of Transport (1988a)

Thus, the higher income households have more cars in total¹ and more cars per person (i.e. after allowing for the fact that wealthier households also tend to be bigger). As a consequence, total vehicle mileage is also higher, although average annual vehicle kilometres per vehicle stabilises at around 15,000 kilometres in the two highest income groups in Table 3.10.

In early years, this income effect meant that car ownership was predominantly seen as limited to the ‘upper’ classes. It is still true that the wealthiest 25% of households own some 45% of the cars and cause more than half of the car traffic. But broadly speaking, now the middle 50% own half the cars.

Table 3.11, from the 1988 Family Expenditure Survey (CSO 1989b) shows transport items as a percentage of total expenditure for some selected income groups near the bottom, middle and top of the scale. This shows that the total expenditure on travel increases sharply as a percentage of income, though with a fall at very high incomes (a long-noticed but little understood phenomenon). Goods on which the proportion of income spent increases as income grows are often defined as luxuries.

Table 3.11 - Transport as a Proportion of Total Expenditure

Income £/week	Expenditure on		
	Motoring %	Bus and Coach %	Total Transport %
45-60	2.3	1.2	4.1
60-80	4.2	1.3	6.5
200-250	11.5	0.6	13.5
250-300	14.4	0.7	16.5
400-450	16.9	0.4	19.1
450-525	13.8	0.5	16.5
All	12.4	0.6	14.8

Source - CSO (1989b)

¹This is, however, a static analysis. From dynamic analyses of car acquisition and disposal, we observe that the mean threshold income for first purchasing a car is significantly higher than the point at which a household gives up owning a car suggesting an adaptation in lifestyle around the car which makes it difficult to relinquish even when times are hard.

However, the total is dominated by expenditure on car purchase and running costs (each being approximately half of the expenditure on motoring). Expenditure on bus transport, which is at a much smaller absolute level, is clearly relatively much more important to the poor than the rich. It is partly for this reason that a number of local authorities (particularly South Yorkshire and London) used fares subsidies in the 1980s as a tool to ensure adequate levels of mobility to disadvantaged groups.

The picture described above may be summarised as follows. There is a chain of relationships in which income determines car ownership levels and car ownership dominates the amount of travel. Within this, there are important, but smaller modifications due to employment status and family size. The results are influenced by (and in turn appear to support) the treatment of a 'household' as a single entity, receiving household income, spending it on a household car and making household travel arrangements.

Such an approach has been heavily criticised. One set of criticisms came from an approach sometimes called 'Activity Analysis' (Hagerstrand, 1973, Jones et al, 1983) whose origins were in geography and sociology rather than economics. The argument was that travel was not an end in itself, but derived from a pattern of non-travel activities constrained by spatial and especially temporal opportunities. The activities a person wishes or needs to engage in, the location of those activities in relation to the individual, the type of transport available to the person and the way they can allocate their time for travel are seen as the prime determinants of actual travel. In this scheme of things income and money are important as far as they determine the type of transport available to a person, but the journeys themselves are subordinate to the activities.

The importance of this approach is the emphasis on accessibility rather than mobility. If transport is a derived demand, what is of interest is not how easily travel is made, but how easily people can carry out the activities they wish to participate in, or how easily industry can gather together its raw materials, and distribute its products.

Transport is one vital element of accessibility - having a car in general increases potential travel speed, and therefore increases accessibility - but just as important are home location relative to shops, schools, and work, and in some ways as important are factors such as the time those facilities are open or usable. An example of an increase in accessibility, other than by more and faster travel in recent years, has been the longer opening hours of many, especially smaller, grocery shops in towns. An example of a decrease in accessibility has been the closure of shops caused by the location of supermarkets on the periphery of towns and cities.

Dependence on the Car

It is clear that the car has always been a desirable commodity to many people. It is above all useful. Quite apart from the advantage of speed (in the absence of congestion) it is able to offer door-to-door convenience; privacy and security from

attack; an easy method of transporting awkward or heavy personal goods, shopping or children and control over space and time unimpeded by public transport timetable or fixed routes.

The inherent attractiveness of the motor car was recognised in the Buchanan Report (Ministry of Transport, 1963):

“There are so many advantages in a fairly small, independent, self-powered and highly manoeuvrable means of getting about at ground level, for both people and goods, that it is unlikely that we shall ever wish to abandon it.”

The motor and supporting industries are now a major sector of the economy and a strong economic and political influence; the economic health of the motor industry and of a country in general are often seen as inter-related. The motor industry (as any other) wants to sell its products and uses advertising to do so. Therefore, to the ‘natural’ advantages listed above can be added market-driven desires stimulated through advertising - status arising from larger, more expensive or newer models; hints of power, sex, family or social responsibility, intelligence and pleasure. These find a ready response in the pride of possession and mastery of a challenging, but not very difficult technical skill.

Winning back people from cars, by public transport improvements has proved difficult. Fullerton et al (1985), for instance, showed that when the Tyne and Wear Metro opened, people from the area switched modes from buses to metro more than they did from car to metro. The number of people making the latter switch was very small. Also, Dasgupta et al (1985) when comparing modal choice decisions in Manchester and Sheffield found that ‘the main impact of Sheffield’s low fares policy seemed to have been to reduce the decline of public transport use for the work journey, but mainly at the expense of car sharing and the use of minor modes (such as foot and two wheelers)’. On the other hand, our own work (Goodwin et al, 1983 and Stokes, 1990) suggested that there was an effect on car use, but a longer term one. Hopkin et al (1988), found that car use also was much higher in urban areas with a poor bus service. Jones and Tanner (1979) found that second car ownership was particularly dependent on the level of public transport service.

But in all studies it is clear that car use is resistant to attractions from competing methods of transport. Many people find it difficult or impossible to envisage life not built around their car. This is shown in a comparison of five opinion surveys, reported by Jones (1991), which asked questions about how essential respondents considered their cars to be. In broad terms,

around 60% to 70% of drivers regard their lifestyle as being fully dependent on car ownership.

Table 3.12 -Degree of Dependence on Cars Reported by Drivers in Five Opinion Surveys

“I would find it very difficult to adjust my lifestyle to being without a car”	Agree 1988	84%
	1989	82%
	Disagree 1988	12%
	1989	14%
“The car is too much of our lifestyle to consider giving it up”	Strongly/ Tend to agree	74%
	Strongly/ Tend to disagree	21%
“A car is essential to our lifestyle and we would not want to be without one”	Agree	69%
“A car is not essential to our lifestyle but we would not want to be without one”	Agree	19%
“Is having a car an absolute necessity, or could you and your family get along without one if you had to”	Absolute necessity	58%
	Could get along	41%

Source -Jones (1991)

It is important that this effect seems capable of being influenced by external circumstances: Analysis of our own survey (Hallett, 1990a -Discussion Paper 14) found that households in rural areas were twice as likely to view a car as essential as an urban household; and that people in households where total car mileage is more than 30,000 miles per year are nearly five times more likely to regard a car as essential as households where cars do less than 5,000 miles per year.

For many people cars are part of their lifestyle. Marsh and Collett (1986) argued:

“People have relationships with their cars...we humanise them. We give them personalities...and naming is a particular strong way to announce our attachment to something which is more than just an object.”

The idea of dependence on the car is seen in a different form in the common phrase the ‘love affair with the car’. Cars are not merely ‘products’ like many other goods; nor are they just a mode of transport. Rather, they are often seen as an extension of the person or household who owns them.

Cars are also an important feature of the environment of many children. Children are introduced to cars at a very early age. Car rides are recognised as being a good way of inducing sleep in babies and ‘car’ is one of the first words that many children learn.

Cars are big, often bright coloured and move fast. A trip around children’s shops illustrates that about half the toys available concern transport. Children appear to be fascinated by fire

engines, ambulances, police cars, helicopters, ordinary cars, buses (especially big red ones), trains, dumper trucks and road diggers. It is interesting, however, that toys 'for girls' do not include as many references to transport.

Story books and films feature cars in a way that portrays them almost as human. Films/stories/television shows like Chitty Chitty Bang Bang, Whacky Races, Postman Pat and many others all show cars in a magical light. Other television shows/films feature characters with cars that do unusual things which make the cars seem very exciting and help provide hero status for the main characters. Examples here are Lady Penelope in Thunderbirds, James Bond and Batman.

Apart from toys, mobile machines for children outside some shops often take the form of a car. Fairs also feature dodgems where the driver of one dodgem is enabled to knock into other dodgems in the knowledge that he will not be hurt. Children may get their first opportunity of driving in a Go-kart.

Parents also provide positive reinforcement. Children will see their parents preening the car (washing it) and providing it with 'tender love and care' and little boys in particular will want to copy daddy in driving. They also hear their parents boasting about their car, relative to someone else's and this gets taken up by the child who uses it in arguments or contests to show his superiority at school {"Your Dad's only got a Metro; mine's got a Cavalier and it's newer than your Dad's!"}. So to the child, the car becomes an object which denotes social status.

There is also the added factor for the young teenager that driving and owning a car is one of the few positively viewed things that they are not allowed to do and learning to drive is recognised as one of the more important rites of passage in modern societies.

For older teenagers, there is a host of factors which make the car seem attractive and which provide positive reinforcement for the car. Films, particularly American films, feature the car as a symbol of freedom and rebelliousness. In them, the characters who own the cars are often viewed as the heroes of the film and those without are viewed as wimps. There are many films along the lines of "Grease" in which the whole of youth culture revolves around the car; the (male) teenagers spend all their time in them; use them for picking up girls; going to the beach: making love in the back of the car.

In general therefore, it can be argued that from a very young age, children learn to like cars. But as well as the effects of socialisation into a car culture there are other psychological reasons cited for attachment to cars. Barry Richards (1990), cites two major reasons for the level of attachment to cars. The first is concerned with the development of the individual. In early years mobility away from the mother by crawling and then walking is encouraged and the return is a big step. It is personally willed and executed. These experiences are confirmed by car driving. Later in childhood agility and surefootedness is important, which is mirrored by the emphasis on speed and performance and 'driving skill'.

“The car taps into powerful sources of feeling and not just to revive in the adult some of the pleasures of earlier development, but to redeploy on an adult scale the feelings associated with the achievement of mobility.”

Adult relationships also stress freedom as opposed to slavery. To a large extent, freedom has been associated with being free to move. The contrast between the mobility provided by any conventional public transport and that provided by the private car in terms of this freedom is large. Richards concludes that

“If the movement to reduce the ecological damage done by the car ignores these psychological benefits, or writes them off as unnecessary expressions of an unwholesome individualism, it will be failing to understand the problem we face”.

CHAPTER 4

TRANSPORT PROBLEMS

We have observed that the growth in movement, primarily by car, has been associated with the major changes of our time; increasing incomes, new patterns of living, working land-use and with psychological and social undercurrents. This trend has brought many advantages. It has also brought costs and in this chapter we consider four of them: congestion, accidents, environmental damage and social impacts.

Congestion

Cost of Congestion

Congestion is a characteristic of all heavily used transport systems. Its essential feature is that users impede each other's freedom of movement. It is not just limited to motorised road traffic in recent years. It has been cited as a problem for bicycles in China, horse carriages in London in 1900, pedestrians in shopping streets, trains approaching busy stations and junctions and aeroplanes at airports.

It was over thirty years ago, at a seminar presented to the Institution of Civil Engineers, that Glanville and Smeed (1958) produced what is now the classic method of calculating the cost of congestion. They said:

“The calculated total cost of delay depends on what is regarded as a reasonable speed for traffic. Under light traffic conditions on good roads the average speed of traffic is about twenty-five mph in built-up areas and forty mph in non-built-up areas. Taking these as standards, calculations give a cost of £125 million in urban areas and £45 million in rural areas, making a total of £170 million per annum.” (Glanville and Smeed 1958)

Had the calculation been based on the present formula for relating the value of nonworking travel time to the wage rate, then the figure at that time would have been about £300 million. This provides a useful basis for trying to calculate whether things have got better or worse in the intervening period. In 1988 the British Road Federation did a similar calculation using a similar method. They concluded:

“The additional cost over and above that experienced in free flow conditions is defined as the congestion cost. This amounts to £3 billion per year in the conurbations alone.” (British Road Federation 1988)

The Confederation of British Industry, using a different type of data source, suggested £15 billion nationally. Allowing for inflation the Glanville and Smeed figure would come to about £3 billion per year for the whole country now, which is the British Road Federation’s figure for the conurbations alone. The figures indicate around a 400% increase in congestion costs. On the face of it three decades of transport policy seem to have made things worse, not better.

At this stage it is necessary to introduce a note of caution in the argument. Congestion is bad, but journey times have in no way increased by 400% in 30 years. Some speeds have actually increased and those that have gone down have only done so by 20% or thereabouts. The most informative record of journey speed measurement has been carried out in London, where since 1962 the time taken for twenty five random point to point journeys has been measured at fairly regular intervals. Mogridge (1990) points out how stable travel times have remained on this set of journeys and how similar they were to those measured in the Road Research Laboratory’s London Traffic Surveys between 1947 and 1966 (Turner and Crawford, 1966). Over a period of about 40 years there has been a slight slowing of traffic speeds.

Traffic jams on roads outside cities are not a new phenomenon either. Several small towns were noteworthy for traffic jams before the building of by-passes and motorways (e.g. Newmarket, Reading, Exeter). By-passes to these bottlenecks soon became jammed and jokes about the need for an Exeter by-pass by-pass were common currency in the 1960s.

The contradiction between calculations of increasing congestion costs and relatively stable speeds is partly because congested conditions are more widespread, rather than slower. But it also derives from a logical inconsistency in the whole concept of total congestion cost; which is defined as:

$$\begin{aligned}
 & (\text{Time at 'target' speed}) - (\text{Time at actual speed}) \\
 & \quad \text{multiplied by} \\
 & \quad (\text{Amount of Traffic}) \\
 & \quad \text{equals} \\
 & (\text{Total Congestion Delays})
 \end{aligned}$$

What this means is that if the target speed is raised, or the amount of traffic increases (either because there are more vehicles or they travel longer distances), congestion costs as calculated gets worse even if nobody is actually any worse off.

To some extent target speeds have increased. Smeed and Glanville's target was twenty-five miles an hour in built-up areas and forty miles per hour in non-built-up areas. Current targets (defined as the free-flow speeds used in a Department of Transport computer model) can be as high as fifty miles per hour for some classes of urban roads. Traffic travelling at twenty miles per hour on a fifty mile per hour road would be defined to have worse congestion costs than traffic travelling slower, at fifteen miles an hour, but on a twenty-five mile per hour road. The method of calculation also implies that if traffic increases, congestion costs can appear to get worse, even if there is no reduction in speed and even, indeed, if speeds increase.

The conclusion of this discussion is that, although there is widespread agreement that 'traffic congestion is getting worse', this is not simply a question of objective measurement. It is influenced directly, inevitably and by definition by the expectations that professionals and the public have of the transport system.

Contribution of lorries to congestion

Another problem of perception arises in attributing blame for congestion to particular classes of vehicle and a motorist stuck behind a large lorry will naturally tend to focus on that rather than the more numerous, but less prominent cars like his own. In fact there is some technical basis for this. Heavy goods vehicles contribute disproportionately to congestion because of factors such as their length, manoeuvrability and acceleration differences. Although HGVs do much of their mileage on motorways they usually start and finish their journeys in towns and cities using smaller, more heavily used roads and this is where the main problem of congestion exists.

In urban conditions a heavy goods vehicle may on average be equivalent to two passenger car units (pcu). This means that if lorries are 15% of the number of vehicles, say, they will be 26% of the number of pcus and their contribution to congestion will be correspondingly greater than their number. Moreover, it is clear that in certain circumstances, the allocation of two pcus is too small. A standard drawbar HGV can be up to 18m long, whereas a car is very unusually over 4m. HGVs are also considerably wider than the standard car. In many urban

streets with cars parked on one or both sides, this can again cause much more than double the congestion caused by a car in these circumstances.

With the proposed increase in maximum draw bar/ road train weights, the problems of lorry led congestion could get worse. At present, draw bar combinations are not particularly popular in the UK, partly because of the fact that their maximum weight limit is 32.5 tonnes. Road trains, however, are allowed to be 18m long. Passing these vehicles will be much more difficult on many types of road. Apart from the direct effect of lorries on congestion, they also have a more indirect effect. Lorries are responsible for much of the road damage which leads, amongst other things, to motorway lanes being closed for repair. Motorway congestion is frequently caused by lane closures due to repair work. As more and more heavy lorries use the roads and as even heavier lorries are allowed on to the road in 1999, this situation will deteriorate.

On the other hand, over the past few decades, speeds and acceleration characteristics of HGVs have increased because of improved vehicle technology. This has offset much of the congestion problem except in very built-up areas.

But all these points are dwarfed by the difference in the actual numbers of lorries and cars on the roads and in their relative growth rates, as shown in Chapter 3. Congestion, essentially, is cars.

Public Transport and Congestion

External costs (those which are not met by the consumer who causes them) are inherently high compared with internal costs and they are higher the closer to road capacity one reaches. In congested traffic situations each extra car adds proportionately more to the overall congestion. What this means is, that in typical peak period conditions in towns, the delays imposed on all other road users by a driver's decision to make one trip are typically greater than the amount of time he is expecting to spend himself on that trip. At 5 mph, he is imposing about ten times as much delay on other people as he is actually taking himself.

Buses generally get caught in the same congestion as cars, but a bus can carry many more passengers in a smaller road space, so would be a much more efficient way of using road space. Studies from Smeed and Wardrop (1964) onwards have shown that speeds would increase if fewer people used cars and more used buses.

It is reasonable to expect that people will, in general, do what seems to be in their own best interests. But this does not in practice bring about a transfer from car to bus use, because in all normal circumstances a journey by bus, for any one individual, takes longer than by car.

Table 4.1 - Conflicts between personal and public advantage

What should happen	What does happen
Buses are more efficient users of road space than cars	A bus journey takes longer than the equivalent by car
If more people travelled by bus instead of car, overall speeds would increase	Each traveller with a choice opts for car. Traffic speeds go down
Buses, cars and lorries would all go faster. Everybody saves time.	Buses, cars and lorries all go slower. Everybody wastes time.

Source: Stokes et al (1991)

The problem is not the average bus user or the average car user, but the smaller number of people who actually switch one way or the other. In the 1960s, calculations were done of what door-to-door journey times would be with different proportions of car and bus use, for a random sample of journeys to central London. The results are shown in Table 4.2.

Table 4.2 - Effects of shifting bus journeys to car or car journeys to bus

If 5% of travellers shift from bus to car, speeds go down		
Car users	lose	5.5 minutes
Bus users	lose	6.2 minutes
Overall average	lose	4.8 minutes
But the 5% of shifters <i>gain</i> 3.7 minutes		
If 5% of travellers shift from car to bus, speeds go up		
Car users	gain	4.3 minutes
Bus users	gain	5.0 minutes
Overall average	gain	3.7 minutes
But the 5% of shifters <i>lose</i> 16.1 minutes		

Source - Goodwin (1969)

The consequences of this for an efficient city plan are pointed out by Mogridge (1989) Discussion Paper No 2) who writes:

“The car or other individual vehicles are far less efficient users of space in the centre of our cities than communal transport in its various forms. But although they play very little part in moving people around the centre, they are a dominant user of road space in the centre. This mismatch must gradually lead to a realisation that such individual transport must be restricted in order to improve the efficiency of the transport system in, to and from city centres.”

Hence, the rapid growth in car ownership and use has happened in part because the correct relative costs of car and public transport use have not been paid by the motorist.

Safety

The scale of the problem

In 1896 at Crystal Palace in London, Mrs Bridget Driscoll made history by becoming the first person to be killed by a car in Britain. At her inquest the coroner said that he hoped that such an event would never happen again. Now, road traffic accidents, amount to more than 6 million in the world each year, resulting in more than 250,000 people being killed and 13 million people injured, of whom 3 million are classified as seriously injured. In addition there are an estimated 50 million further accidents classified as 'damage only' and many more which are never reported.

Before 1900, such deaths were very much a novelty. Now, they are taken for granted and are often seen as inevitable, the price that people are willing to pay for the benefits associated with travel. It is also interesting that the lethal consequences of vehicle use are referred to as 'accidents', a dispassionate term which evades the concept of responsibility.

Overall figures of casualties hide significant variations between types of road users and between age groups, as well as considerable national differences. Silverleaf and Turgel (1990) (Discussion Paper No 23) report that relating casualties to population age groups shows for example, that school-age pedestrians and young motorcyclists are particularly vulnerable, while casualty rates for car users decrease with age. Relating casualties to some measure of exposure gives a better indication of relative risk. For example, casualty rates related to distance travelled show that motor cyclists and pedal cyclists are more vulnerable to death or injury than occupants of private cars, while professional drivers and their passengers are less vulnerable.

Recent yearly figures from countries in the European Community reveal that 15% of all road traffic accident casualties have been pedestrians, almost 10% pedal cyclists, 15% motor cyclists and about 55% car drivers and passengers. In the UK in 1989 32% of those who died as a result of a road accident were pedestrians.

However, studies in Britain investigating the national under-reporting of road accident casualties classed as serious, have shown substantial variations by type of road user. For example, Mackay (1990) (Discussion Paper No 13) suggests the actual number of seriously injured cyclists is nearer 12,000 than the official number of 4,851.

In most industrial countries fatalities from road traffic accidents over the past twenty years have decreased; Germany from 20,000 to about 8,000; U.K. from 8,000 to 5,000; France

from 15 000 to 11,000; Japan from 20,000 to 12,000. In the US figures have remained practically unchanged. In Spain and Soviet Union there has been an increase.

However, in almost all countries the total road traffic over this period has increased. A more detailed international comparison can be seen in Table 4.3 which shows that accidents tend to increase as motorisation increases, but not so quickly. Thus the accident rate per vehicle tends to be lower, in high car ownership countries, but the accident rate per person does not show the same pattern. By this standard Britain has a lower overall accident risk rate than many other countries.

Table 4.3- Personal safety, traffic safety and vehicle ownership

COUNTRY		Deaths	Deaths per	Vehicles per
Listed in descending order of		per100,000	10,000 vehicles	1,000 population
motorisation		population		
1.	USA	19.1	2.7	711
2.	Canada	15.8	2.8	561
3.	New Zealand	21.1	3.9	545
4.	Australia	18.6	3.4	540
5.	F.R. Germany	13.1	3.0	440
6.	Kuwait	27.1	6.7	408
7.	Japan	10.3	2.6	403
8.	Sweden	10.0	2.5	397
9.	Norway	10.7	2.7	397
10.	Netherlands	11.3	3.2	355
11.	Finland	10.7	3.2	340
12.	Denmark	13.0	3.9	335
13.	U.K.	10.3	3.2	322
14.	Spain	16.4	6.9	239
15.	Greece	21.1	12.0	176
16.	Hungary	17.1	11.7	146
17.	Singapore	11.4	8.3	138
18.	S. Africa	30.5	24.8	123
19.	Malaysia	23.9	21.5	111
20.	Chile	13.3	17.9	74

Source - Mackay (1990)

What Causes Accidents?

The causes of road accidents are normally attributed to three main factors, namely vehicle defects; the road environment (slippery roads, animals on the road etc); and human factors (driving too fast, fatigue, alcohol, inattention, aggressive or frustrated behaviour). An example of such a comparison is seen in Table 4.4,

Table 4.4 - Contribution of design and driver characteristics to accidents in the UK and Switzerland

	UK	Switzerland
	(%)	
Vehicle Factors	3	1
Road Factors	13.3	3.13
Human Factors	83.3	95.8

Source - Terlouw (1990)

The analyses indicate at face value that road quality in the UK is responsible for more accidents than Switzerland. Most significantly though the table shows how much human behaviour contributes to road accidents and indeed, in one sense virtually all accidents are caused by human factors, in the sense that driving behaviour does not correspond with the external conditions.

Problems of the environment

The local environment

“But how serious is it that elderly people should be frightened of crossing the road, or should feel confused or even dazed by the close passage of heavy vehicles? What weight should be attached to the anxieties of parents when their children are out on the road? Does it really matter that conversation on pavements and even inside buildings, should be virtually impossible in many places on account of traffic noise? ... And when it comes to the visual intrusion of the motor vehicle is there any evidence that this worries more than a very few people?” Ministry of Transport (1963)

Standards for the design of new roads have contained elements of visual design and factors such as parking levels in streets have been taken into account in the granting of planning permission for new buildings. Regulations concerning parking on pavements have the visual environment in mind as well as the obstruction of walkways.

In recent years the scope of such environmental thinking has widened. Video mock-ups of how a new road will appear from viewpoints are shown at public inquiries for new roads and design may involve the use of banks or barriers to shield both the view of the road and to cut down the noise levels.

Despite such an awareness of these environmental impacts, many people perceive a serious problem from traffic. These problems of noise and visual intrusion are largely subjective, which has meant that they do not comfortably fit into appraisal techniques such as cost benefit analysis. They are often considered more seriously by those who will not benefit directly from roads than those who make use of the roads and the view and experience from inside a vehicle is very different from that outside. Thus public reaction by local people to a road proposal in their neighbourhood may be very different to their sympathies for people with such a proposal in another area.

The following two quotes from group discussions reported in Jones (1990a) illustrate extremes of views on pedestrians:

“Pedestrians are generally very inconsiderate. If it wasn’t for the considerate motorists they’d be shovelling them off the road every day. It’s only the motorist that keeps the pedestrian alive.”

“Where I cross the road in the morning it hasn’t got a pelican crossing and it’s an extremely dangerous situation. The whole time you’ve got cars coming... Cars coming from opposite, turning left, or rushing straight across or coming from the back... It’s quite frightening.”

It is likely that these two respondents have very differing views on the quality of street environments. As Roberts (1990) (Discussion Paper No 5) points out:

“It is often said that when a car driver sheds his/her armour and becomes a pedestrian, then he or she responds as a pedestrian - feeling at risk, affronted by the aggressive instinct of motorists, demanding a better share of the movement space. The reverse holds, of course. A society with a high car ownership level tends to be oblivious of the visual impairment of streets lined with parked cars”

However, in spite of this, the negative perceptions of the traffic environment have increased in recent years as traffic levels have risen. It is such problems that have been behind the thinking to promote traffic calming.

Research also suggests that there is a link with individual stress, related to heart rate and blood pressure levels. Here there are two main reactions: some people experience anger and aggression; others experience fear and worry. Little is known about the mechanisms causing different reactions, but the level of control over the situation is thought in general, to affect strongly, the response to stress. Thus drivers of cars tend to be more likely to experience anger, while pedestrians and timid drivers would be more likely to experience fear. Levels of felt stress relating to road transport also interact with other factors such as work and home related stress levels.

The kinds of situations leading to increased stress include:

- Crossing busy roads with children in pushchairs, especially where parked cars obscure vision,
- Crossing roads, by the elderly and people with disabilities,
- Waiting for unreliable buses,
- Unexpected traffic jams when driving,
- Aggressive driving behaviour by other drivers when driving.

All these relate to increasing traffic levels and congestion.

In comparison with visual intrusion and traffic nuisance noise can be analysed in fairly objective ways. Rules exist for the noise levels of vehicles which are monitored in annual road checks on vehicles (the MOT test). Indices of likely noise nuisance exist, such as the level of noise exceeded for 10% of the busiest eighteen hours of the day.

While the worst effects are physical and can affect deafness, as with visual intrusion the common effects are perceived and will vary from person to person. Felt stress levels can be affected by noise. A general background level may be a nuisance to one person, while another will accept a high background level, but be bothered by short bursts of louder noise.

In recent years engine design has ensured that engines can be made quieter and factors such as road surface and driving behaviour are likely to be as important factors in noise level as the number and type of vehicles.

Global environmental issues

The current wave of concern for the future of the environment as a whole, had its precursors in the early 1970s with the publication of reports (which were at the time seen as alarmist) and the setting up of pressure groups such as Friends of the Earth and Greenpeace who sought to bring environmental matters to the forefront. The growth of sympathy for such outlooks was fairly rapid, but it was not until the 1980s that the broader issues became subjects of international attention at Government level, especially in relation to problems such as acid rain that could be caused in one country, but had an Impact on another.

A turning point was the discovery of the 'hole in the ozone layer' over the Antarctic and the apparent close relationship with the use of CFC (Chloro-fluoro-carbons) gases in aerosols and polystyrene packaging. International agreement was reached very quickly to reduce and finally stop the production and use of CFC gases. The speed of agreement was eased in this case by the knowledge that they could be replaced by other much less harmful gases at little extra cost. Even so, success assisted the development of an international forum about the environment and a feeling that the world could now have concerted action on environmental

issues. The actual level of action has been low, but ecological considerations are near the forefront of arguments concerning most issues - from local transport to the effects of wars.

Leaded petrol was shown to cause health problems, especially in the development of children and action was taken to encourage the use of unleaded petrol, by reducing tax levels in the UK. 'Green' then also became a marketing concept. Advertising encouraged people to 'go green' and buy 'green cars'. It may not be coincidence that the Green Party won an unexpected 15% of the UK vote in the 1989 European Parliamentary Elections while the switch to unleaded petrol was in full swing, but its share of the vote soon fell back again.

The elements of the ecological problem

Research seems continually to find previously unrecognised ways in which human activity causes problems for the environment, but at the time of writing the following are the main issues of recognised concern:

Global warming (the Greenhouse effect). A greenhouse allows heat from the sun in, but the glass reduces the ability of that heat to escape. Gases in the atmosphere have similar effects in absorbing escaping heat. Various gases have different greenhouse 'strengths'. Table 4.5 shows the main gases and their relative importance. The gas causing the biggest problem is carbon dioxide, which is produced as a necessary result of burning all carbon based fuels. In addition, destruction of forest and other plant life reduces the extent to which carbon is reabsorbed.

Table 4.5 -Contribution of different gases to the greenhouse effect

	Global warming potential	Parts per million in atmosphere	Rate of increase per year	Relative contribution to problem
Carbon dioxide	1	350	0.4	56%
Methane	21	1.7	1	14%
Nitrousoxide	290	0.31	0.3	7%
Chlorofluoro carbon 11(CFCs)	3500	0.00026	5	
Chlorofluoro carbon 12 (CFCs)	7300	0.00044	4	23

Source -Department of the Environment (1990)

Motorised travel contributes to the global warming problem, accounting for between about one fifth of carbon dioxide emissions.

The depletion of the ozone layer. The ozone layer is an important filter for ultraviolet rays. Its depletion allows more radiation in, adding to the greenhouse problem and causing skin burning and cancer. It should be pointed out here that while ozone is regarded as beneficial in the upper atmosphere (in the ozone layer) its presence at ground level is harmful to humans and that ozone at ground level does not find its way to the ozone layer. Chlorofluorocarbons are the main problem here, which are not significantly used in transport. But other gases caused by burning fossil fuels do also help to destroy the ozone layer.

Other pollutants. Besides producing carbon dioxide the burning of fossil fuels also produces other pollutants, introducing gases such as carbon monoxide and nitrogen oxides and particles such as small pieces of lead and soot. Many of these are directly dangerous to humans and other life, both in terms of their immediate inhaled effects and more distant effects such as acid rain caused by the reaction of sulphur and nitrogen with rain.

Table 4.6 shows the contribution of road transport to each of the main pollutants.

Table 4.6- The contribution of transport to pollution levels and the effects of the major pollutants.

Carbon Monoxide	82% to 85%	Toxic. Deprives body of oxygen leading to drowsiness
Nitrogen Oxides	42%	Form ground level ozone and acid rain. Cause increasing susceptibility to viral infections and irritate the lungs
Hydrocarbons	28%	React with Nitrogen Oxides to form ground level ozone. Some e.g. Benzene are carcinogens
Carbon Dioxide	17% to 22%	Global warming
Particulates and black smoke	17% to 30%	Some are carcinogenic, others cause respiratory problems. Air quality
Sulphur Dioxide	1%	Acid rain
Volatile organic compounds	28%	Help build up of ground level ozone
Ozone	Combination of pollutants	Respiratory problems. (Does not add to ozone in 'ozone layer')

Source Department of the Environment (1990), OECD (1990) and Holman et al (1991).

Road transport is by far the greatest producer of carbon monoxide and is also a major cause of particulates and pollutants leading to ground level ozone. It is produced by the reaction of sunlight on pollutants, especially during still, high pressure periods. This pollution is sometimes visible as a photochemical smog.

The basic message of ecological research is that the burning of fossil fuels results in unwanted outputs. Transport is a major and increasing user of fossil fuels, as is shown in Table 4.7 below.

Table 4.7 - Transport's share of energy use - 1983 to 1989

	Transport's share of total energy use in UK	Transport's share of total petroleum use in UK
1983	27%	63%
1989	32%	74%

Source - Holman, Fergusson and Mitchell (1990)

During the 1980s the contribution of transport to the share of energy and petroleum used rose dramatically and in fact accounts for most of the increase in energy use. Howard (1990) shows that land transport is the fastest growing sector with an increase of 20% between 1984 and 1989, while the average increase was 10.4%.

Table 4.8 shows how the total energy use of transport is split between the various elements of manufacture and running of vehicles. When these extra elements are included the energy use is seen to be about half as large again.

Table 4.8 - Vehicles' use of energy in manufacture, maintenance and use.

	% of total fuel use
Direct energy use in operation	65.7
Manufacture	6.6
Raw materials	4.5
Maintenance	4.0
Infrastructure	1.4
Generation of energy used	17.8

Source - Howard, 1990

But different modes use different amounts of energy as is shown in Table 4.9. The car is relatively inefficient especially when not fully laden.

Table 4.9 - Energy requirements of transport modes

	Energy used (MJ per passenger mile)	
	Assuming average load	Fully laden
Average Petrol Car	3.21	1.20
Average Diesel Car	2.96	1.11
Intercity 125 train	0.95	0.57
Suburban Elec. Rail	0.70	0.42
Double Decker Bus	0.83	0.28
Minibus	1.15	0.57

Source Howard (1990)

For freight, calculations have been made of the relative cost to the environment of carrying the same amount of freight by road as by rail and the results are shown in Table 4.10 below.

Table 4.10 - Freight emissions of road and rail

	Road Freight (grams per tonne kilometre)	Rail Freight (grams per tonne kilometre)
Carbon Dioxide	220	50.0
Nitrous Oxides	3.60	0.22
Carbon Monoxide	1.58	0.07
Hydrocarbons	0.61	0.05
Soot (respirable particles)	0.27	0.03
Sulphur Dioxide	0.23	0.33

Source - Howard, 1990

When we look at current trends in energy use some disturbing findings appear. Table 4.7 showed overall energy use trends in transport and Table 4.10 shows the energy used per passenger kilometre and per freight tonne kilometre. While passenger transport efficiency has only increased by some 5% that for freight has worsened by over 30%. Howard (1990) notes trends towards smaller engined private cars in the early 1980s reversed towards larger engined cars later in the decade and the trends towards larger and more powerful freight vehicles. The effects of this growth are shown in Table 4.11.

Table 4.11 - Trends In energy use of vehicles, 1978-1988

	Passenger Transport Energy (Kwh) per 1000 passenger kilometres	Freight Transport Energy (Kwh) per 1000 tonne kilometres
1978	507.0	501.2
1983	498.2	574.4
1988	492.4	679.9

Source - Department of Transport (1989a)

Table 4.12 Growth in various pollutants from road vehicles: 1978-1987

Carbon Monoxide	114	Hydrocarbons	112
Nitrogen Oxides	116	Sulphur Dioxide	85
Carbon Dioxide	127	Lead	41

Source - Department of Transport (1989a)

Concern has been voiced about the likely trends of energy use in the future on a global scale. Adams (1990) points out there are “*almost twice as many cars in Greater Los Angeles than in the whole of China, India, Indonesia, Pakistan and Bangladesh put together*”. What will happen if economic development in other countries leads to a demand for cars on a level similar to the western industrialised countries? Many in the, less developed countries point to the West’s consumption of a disproportionate quantity of the earth’s resources; they are unlikely to be sympathetic to being told that they are not allowed to use resources in order to save the planet if the West continues to do so. Adams comments:

“In 1985 there were 7.7 cars for every 100 people in the world. This might be called the ‘preaching level’; no country above this level is entitled to preach to any country below it about ecological virtue. Brazil, ... with an ownership level of 7.2 per 100 population, is currently being castigated for its mistreatment of its rain forests by countries who are making a far greater contribution to the greenhouse effect than it is.”

Social Effects

The nature of the problem?

The difference in accessibility afforded to those who use cars and those who do not is the key to the social problems caused by increasing car use.

In the early 1970s, many transport planners found themselves increasingly uncomfortable about the social and equity effects of the increasing reliance on car use. Hillman et al (1973) and Plowden (1972) and in the US Schaeffer and Sclar (1975) for example, contested the technical and economic efficiency of the process and described car ownership forecasts as 'self-fulfilling' (i.e. the policies built from the forecasts made the forecasts come true). The social implications of the demographic factors noted above were highlighted, with the observations that:

- Even when household car ownership was high, it was not universal.
- People in car owning households did not have access to a car for all their journeys.
- The people who lost most from the switch to car were those who already had the greatest travel problems, namely children, the elderly, the poor and women; together these formed a majority not a minority.

In Chapter 3 we discussed the importance of income in car acquisition. Although many other factors are important in the decision to own a car, having the money to buy and run one is a prerequisite. Thus, it has always tended to be richer people who have access to cars. When this was confined to a very low level of car ownership the market ensured that public transport catered for non-car owners' transport needs and that facilities could be reached by walking or public transport. People with cars had an accessibility advantage over others, but that did not reduce the absolute level of accessibility of the others.

The problem of accessibility for those without cars arose when the proportion of car owners became high enough to influence the provision of other modes and the location of facilities.

Economies of scale leads to larger facilities being cheaper to operate, or goods and services being cheaper to buy. But economies of scale have to be matched against ensuring that people can reach the facility. In the past, town and city centres were the only locations which could support large facilities, since there was a large population in close proximity and public transport links were good. But traffic congestion and parking difficulty means that the potential advantages of the car cannot be used. Thus, many saw an advantage in locating facilities, especially shops, in peripheral locations.

The number of grocery outlets in the UK fell from about 140,000 in 1960 to about 55,000 in 1980 (Nielsen, 1991). Since then the fall has been much slower, to about 50,000. In the 1980s the trend has been towards very large establishments. The number of superstores (over 25,000 square feet) increased from 284 in 1983 to 644 in February 1990 (Nielsen, 1991). Data on smaller independent shops is hard to come by, but it appears from the above data that the rate of closures has slowed. However the rate of concentration has increased in terms of sales with the top five multiple companies accounting for 28% of grocery trade in 1979, but

60% in 1987. It seems that since 1980, although people are nearly as likely to have a grocery store nearby as they were, more are choosing to shop in the large superstores.

Shops were not the only facilities to be relocated. Pressures on public spending have led to larger public facilities, especially schools and hospitals. Closures of smaller schools and hospitals have increased the distance many have to travel. Table 4.16 shows the number of schools of different sizes from 1970 to 1990.

Table 4.13 - Numbers of schools in the United Kingdom 1970 to 1990

	1970/71	1979/80/81	1989/90
No. of Nursery schools	723	1236	1312
No. of Nursery children '000s	50	89	100
No. of Primary schools	26799	26764	24344
No. of Primary children '000s	5,902	5,171	4,792
No. of Secondary schools	6010	5571	4894
No. of Secondary pupils '000s	3,555	4,606	3,551

Note school numbers are for 1970/71, 1979/80 and 1989/90

pupil numbers are for 1971, 1981 and 1991

Source CSO (1990b)

Apart from nurseries, the numbers of schools has reduced, partly due to falling numbers of children and partly to the growth in larger schools. The transport implications are of increasing journey lengths. It is also notable that between 1971 and 1981 (during which the school leaving age was raised from 15 to 16) the number of secondary pupils rose, but the number of schools fell. This was during the time when large comprehensive schools were being built.

Whitelegg, Adams and Hillman (1991) report that over a ten year period from 1980 to 1990 the proportion of children who walked to school on their own fell from 80% to 10% in Great Britain.

Schaeffer and Scalar (1975) noted that child development psychologists before the 1950s were able to use 'independent travel' (by bus) as a measure of 8-14 year old children's ability to orient and master space. As bus services disappeared from American suburbs, even the affluent young could leave their immediate neighbourhood only if someone would chauffeur them and independent travel was delayed until they were old enough to get a driving licence and access to a car. The whole process of pre-adolescent and adolescent development of independence was modified and this test dropped out of use by the psychologists who had designed it.

Transport deprivation

Many people are relatively disadvantaged in a variety of ways and transport cannot be regarded as a social problem which has automatic priority over other problems of the world. People do not die and seldom go hungry for lack of a car. Often people can adapt, for example, to the withdrawal of bus and train services: the Department of Transport (1971), commented.

“Clearly people have adapted to the absence of a bus; those who could not, presumably left some time ago. Those who have moved in, including retired people, have cars.”

A study by Donald and Pickup (1989) of the effects of the deregulation of buses in Merseyside on low income families found that the major effect on people had been large bus fare rises. Fares had been subsidised before deregulation, but the areas concerned were areas of high bus patronage, so after deregulation services were commercially registered, with higher fares and were almost certainly cross-subsidising services to other areas. People had adapted by travelling shorter distances to local centres rather than Liverpool and by ‘saving up trips’ until buying a one day travelcard allowing them to make several necessary trips on one-day. The authors conclude:

“In a society where the reliance on access to cars continues to increase, the reduction in the mobility of low income families identified by this study is disturbing. The potential implications of this trend for the social isolation of these peripheral areas were underlined by the comments of local community workers interviewed.”

In an urban situation reasonable access can normally be gained to facilities by those who are healthy and are not in the lowest of income brackets. Britain has not reached the situation where urban bus services have disintegrated, or all everyday facilities are not available within town centres, but the changes that occur tend to make things worse for people without cars.

The problem of those without cars is more obvious in rural areas. Not having a car combined with bus services which are likely to be poor will lead to accessibility problems. Banister (1990) (Discussion Paper No 1) sees the problem as a serious one demanding solutions at the policy level:

“The polarisation of opportunity between those with and without access [to a car] is manifest in rural areas and on every dimension this difference seems to be increasing. It is here that distributional and equity concerns must be responded to by the local authorities, whether it is within a planned or market economy.”

So far we have given the impression that it is only non-car owners who suffer when car ownership levels reach high levels. But a car is an expensive item in many people’s budget,

with most estimates suggesting annual costs well in excess of £1000 per year. Thus, to those on low incomes who have a car the expense can be great.

Wider implications

The social problems of transport are also linked in with other social problems. As was seen from the Merseyside study the problem was one of budgeting a low income. Bus fares had risen rapidly and were seen as a contributory factor, but the rises had to be seen in the context of other changes. In a similar way there are a host of other problems affecting our cities and society for which some, but not all of the blame could be placed on our transport system. Problems discussed for example by Short (1988) include:

- Increased alienation from other people. Personal interaction between motorists is limited. The increased stress caused by driving tends to make such interaction hostile.
- Increased isolation. In modern housing estates interaction between all but immediate neighbours is kept to a minimum by the location of cars in driveways and the location of facilities reducing the number of walk journeys.
- The car has allowed those working in cities to live in the country and lead an urban way of life in the country. This phenomenon was recognised by Pahl (1965) and is of benefit to those who can do so, but has increased rents and property prices in many rural areas, making life more difficult for people living and working in rural areas.
- Increased isolation for those without cars in certain situations. There are fewer people walking and using public transport. The most obvious aspect of this has been the implications for personal security.

Personal security

Public perception of violence has grown rapidly in recent years. There were 177,000 reported cases of violence against individuals recorded in 1989 compared with 47,000 in 1971 (CSO 1991a). Furthermore, it has been suggested that only 37% of assaults are reported to the police and only 20% of 'wounding' crimes. Numbers of prosecutions for rape have risen from about 600 in 1983 to 1300 in 1988. Much of these increases are reputedly due to an increase in reporting rates, but this does not affect the public perception of an increasingly violent society.

Most people have not had personal experience of violence against them, but it is during travel (usually either walking, cycling, or using buses or trains) that people generally feel vulnerable to assault - particularly in the dark. An additional recent area of fear has been concerned with car breakdowns on motorways and isolated roads and the use of badly designed and badly lit car parks.

Although fear of assault affects most people at some time or other, certain groups are particularly vulnerable. These groups include women, ethnic minorities, the elderly and people with minor disabilities. These are the very groups with lower than average access to a car (regarded as the most secure form of transport). It is the walking and waiting, rather than being on the bus or in a car itself, which often worries people. A study of women in London in 1984-86 (Greater London Council, 1985) found that only 37% of women felt safe catching a bus after dark. Furthermore, only 15% felt safe walking after dark. A similar study in Southampton in 1986 by Lynch and Atkins (1987) found that 59% of women felt unsafe walking and 22% felt unsafe using the bus after dark. A survey by West Yorkshire PTE (Hamilton and Jenkins 1987) showed that although very few women had been victims of violence or knew others who had been, a much higher proportion had suffered verbal abuse leading them to believe that they might be attacked. It is these kinds of fears which discourage people (especially women) from travelling on public transport in the evenings, forcing them to use a car wherever possible. In the GLC study, women reported feeling so unsafe that 63% said that they avoided going out alone at night completely. Violence against men should not be ignored. Although this is a less well studied area, it is clear that fear of attack or verbal abuse can also deter men from walking and using public transport after dark. Violence against men is more likely to involve mugging or assault by a 'gang' and is more likely to take place in more public places.

The fear of violence is a vicious circle. The more people fear violence outside the home the less they go out; the quieter the streets become and the smaller the strength in numbers of those who fear violence. Thus many towns become almost deserted by night and feel more threatening.

Entrapment

In Chapter 3 we discussed the way in which psychological factors reinforce the comparative advantages of cars. Marsh and Collett (1986) describe our relationship with the car as being of a symbiotic nature; that is a relationship founded on some form of dependence in which one or both partners profit from the association.

“We have reached the stage when our entire livelihood depends on cars and in unconscious recognition on this fact we repay our automobiles by garlanding them and making them objects of our devotions. We reveal the extent of our psychological dependence on the automobile as graphically as our predecessors symbolised all that was essential for their continued existence.”

It has been suggested that if public transport were to be dramatically improved and made more sophisticated then there would be a substantial modal switch from the car to mass transit systems. However most surveys in Britain have failed to reflect this behaviour. It might be the psychological and not the practical aspects of car ownership which are affecting this attitude towards public transport. People prefer their cars for the spontaneity of travel

they provide and as an object of expression. Public transport does not provide opportunities for self expression and requires the passenger to engage in forward planning. More importantly however, the car gives individuals the impression of having full control over their own destiny. Within the constraints of speed limits, traffic signals and so on, drivers are practically free to do what they please.

“They can drive quickly or slowly, take risks or play safe. They can determine their own level of emotional arousal, express their personality through the car they own and the manner in which they drive it, act out fantasies and gain rare opportunities to dominate others.”

The cause of that attachment is generally described as being due to the freedom and independence that the car offers to its owner.

But as congestion increases that freedom and independence disappears. There is no freedom in a traffic jam on the M25 or any other motorway. There is no independence in the knowledge that every possible route to work will involve delays due to congestion.

With the decline of public transport and the relocation of people and facilities based around car ownership the choice of other modes has gone for many people. In order to go to work they must use their cars. There is also the growing feeling that new roads will not solve the situation and do away with the jams. People can only see the situation getting worse. In some circumstances, what was a freedom has become a prison. The psychological impact of such a realisation can be serious. We have discussed the love affair with the car - the love was with the freedom offered. Recently, for some, the sense of being trapped by the relationship has emerged.

A quote from a commuter into Oxford shows the changing view:

“I’ve got three ways of getting to work. The bus, the car and the bike. If I go by car I know that if I leave between about 7:15 and 9 o’ clock I’ll get stuck in a jam and there’s no way round it. And then I’ve got to find somewhere to park. If I go by bus, well the bus runs every 30 minutes and it gets stuck in the same jams, except for the bit with the bus lane. But if I go by bike it takes about the same time as the car for seven miles, I get exercise, I don’t have to wait anywhere and, I know I shouldn’t, but I get this smug feeling when I overtake all the cars in the traffic jams. You talk about the car as a symbol of freedom and independence - for me that’s my bike, not the car!”

CHAPTER 5

TWO STREAMS OF THOUGHT

The Policy Dilemma

There have been two parallel streams of argument on what to do about the relationship between the car and the infrastructure it uses. One view has been to control, moderate or tailor car use so that it is in some way kept within bounds defined by broader objectives of traffic or social efficiency. The other has been to accept its growth as inevitable and provide the road capacity necessary to accommodate it.

This is not a new argument. Tripp in 1936, for example, outlined techniques of ‘traffic calming’ long before the phrase was coined. Buchanan argued persuasively for this approach in his own books and the logic also underpinned parts of ‘Traffic in Towns’, though with some ambiguity. But at each period the dominant argument has been that it is proper to provide capacity to match the traffic levels, even though those traffic levels have arisen in the context of costs of transport which have been distorted.

The British tradition of moderation of car use

“Without doubt Britain has its own strong tradition of traffic calming. It could be argued that the spectrum of traffic calming ideas has been wider and more interesting than in Central Europe. Why, one could ask, has Britain, which was one of the leading

countries in developing ideas on traffic calming, fallen back relative to its Central European neighbours?" Hass-Klau (1990a) (Discussion Paper No 10)

The Garden City movement was developed from an idea by Ebenezer Howard (published in 'Garden Cities of Tomorrow' in 1902, available as Howard, 1946), who wished to build a town with the benefits of the country and the benefits of the town, but with the disbenefits of neither. Contained in this idea was the notion of 'quality of the environment' as we would call it today, as well as a vision of the planning of a whole town or city. That tradition has stayed as a force in planning thinking ever since.

But at the time that Howard wrote, the car had only recently been invented; rail and walk were thought of as the two major modes of travel. By the time the second Garden City (Welwyn) had started in the early 1920s the design had been adapted with the car in mind, but the current day problems of the motor car had been little felt.

An early recognition of the differing needs of cars and pedestrians was in the use of the 'Radburn layout' which was an American adaption of the ideas of the garden cities. It involved the building of cul-de-sacs around which houses were built. Road traffic was thus reduced in residential streets and channelled on to distributor roads around the edges and between housing estates. Footpaths went between the cul-de-sacs allowing easy pedestrian movement and allowing for the creation of green space between houses. Thus a large area is created which is free from traffic. The idea was first put into practice in the British Garden Cities of Letchworth and Welwyn but it was in 1928 that Clarence Wright and Henry Stein used it in Radburn, New Jersey from where the name has been adopted. It has become standard practice in most lower density housing developments since then, although the idea of the pedestrian network is not always used.

In 1936, Alker Tripp, the Assistant Commissioner of Police for London, wrote that "*motor traffic will never and can never mix safely with pedestrians and pedal cycles*" and that since it would take a long time to separate the modes "*a civilised degree of safety can only be achieved by definite restriction of freedom of movement*" One of his main ideas was to keep activities apart; to separate, in particular, shopping and vehicles. In later years Tripp (1951, first published in 1942) advanced ideas which are akin to present day traffic calming ideas. He put forward the idea of 'precincts', which were residential, shopping, or industrial areas served from the outside by arterial and sub-arterial roads. In some cases gates would stop traffic entering, but in others

"the road layout within the precinct may have to be altered in such a way as to make it deliberately obstructive. ... The broad idea will be to give the traffic a really free run on the sub-arterials and a very slow and awkward passage if it attempts to take a short cut through the precincts."

In some ways the work of Alker Tripp can be regarded as being part, or even the start of a tradition in British thinking which has been one of moderating car use. But from a modern day perspective the measures proposed also involve the redesign of town and city centres to accommodate the car and, in contrast, to current traffic calming measures, the relegation of pedestrians to subways and bridges.

This was the first attempt to come to grips with the issues of conflicts between the two types of road user. Towns and cities had not been designed for motor vehicles. What Alker Tripp describes as the problem is a 'free for all' where all roads, whatever their width or route are freely used by all traffic, pedestrian or motorised. He suggested the segregation of cars and pedestrians and although it is surprising by present day standards he calls his approach 'traffic control'. Nowadays such a phrase implies an engineering approach and something more akin to 'measures to increase traffic flow'. In Alker Tripp's time the aim was twofold; 'restrictive measures' to 'maintain public safety by legal prohibitions' and 'constructive measures' to 'make the vehicle-tracks as well adapted, fenced and arranged for high speed, without danger to the general public, as the railways are'.

Colin Buchanan, best known for his lead authorship of 'Traffic in Towns' (Ministry of Transport, 1963) also wrote other works in which there is a strong argument in favour of controlling the car. Hass-Klau (1990b) interprets Buchanan, (1960, 1961) as follows:

He started off by saying,

"Much of our future happiness and well-being depends on the extent to which we can control the motor vehicle,"

He saw urban areas as *"becoming horribly uncivilised places under the influence of motor traffic"* and he continued by emphasising that *"our whole urban tradition"* was at stake and that the *"motor vehicle operates strongly against urban quality"*

With reference to traffic congestion in urban areas he was of the opinion that the solution was not to construct and improve a few main arterial roads or to build urban motorways. He was doubtful about such road building and wrote *"It might make matters worse by stimulating travel and building up an even worse terminal problem"*

Similar ideas were expressed in other articles written before 1963. He wrote a very prophetic sentence concerning public transport which was to become very true for his own country in 1961:

"The consistent lesson from other countries seems to be that where they have neglected public transport in favour of the car they have come to regret it."

In return Buchanan interprets 'Traffic in Towns' in a foreword to Hass-Klau (1990a) (Discussion Paper No 10)

“So perhaps the best way to describe the relationship between traffic calming and 'Traffic in Towns' would be to say that traffic calming was written between the lines of 'Traffic in Towns' and it was German reading that brought it out for public consumption thereby filling a crucial gap in the environmental management technique.”

Yet other writers interpret the report in quite a different light. Hillman (1983) criticises it on the grounds that,

“A primary error in the Report stemmed from the belief that the term accessibility could be interpreted to represent the freedom to use private motor vehicles from the origin of any journey to its destination without restriction and that if the planning of our towns and cities were directed to allowing this, it would solve the great majority of travel needs”

and

“...the-central conclusion that, if it can be afforded, it is desirable to restructure our towns and cities to come to terms with the new motor age.”

The question that arises, is how could such different interpretations be made? The answer seems to be that an ambivalence is built into the structure of 'Traffic in Towns' which is repeatedly nearly, but not quite resolved. First, the production quality is very high, with some 200 black and white photographs, several coloured graphic charts, many coloured maps and some 'artists impressions' of possible schemes. The most powerful visual impressions are of maps with large road schemes superimposed over them.

The text consistently refers to a choice between two alternatives:

“... so the choice will be either to match the investment in vehicles with an equivalent investment in works, or to invest less in works and curtail the usage of vehicles. It is questionable whether anything will curtail the acquisition of the vehicles by the public. The great danger for the future would seem to lie in the temptation to seek a middle course by trying to cope with a steadily increasing volume of traffic by means of minor alterations, resulting in the end in the worst of both worlds - poor traffic access and a grievously eroded environment.”

(Ministry of Transport (1963), p79)

Figure 5.1 – An Existing Town Layout and New Plan From ‘Town Planning and Road Traffic’ by Alker Tripp (1942)

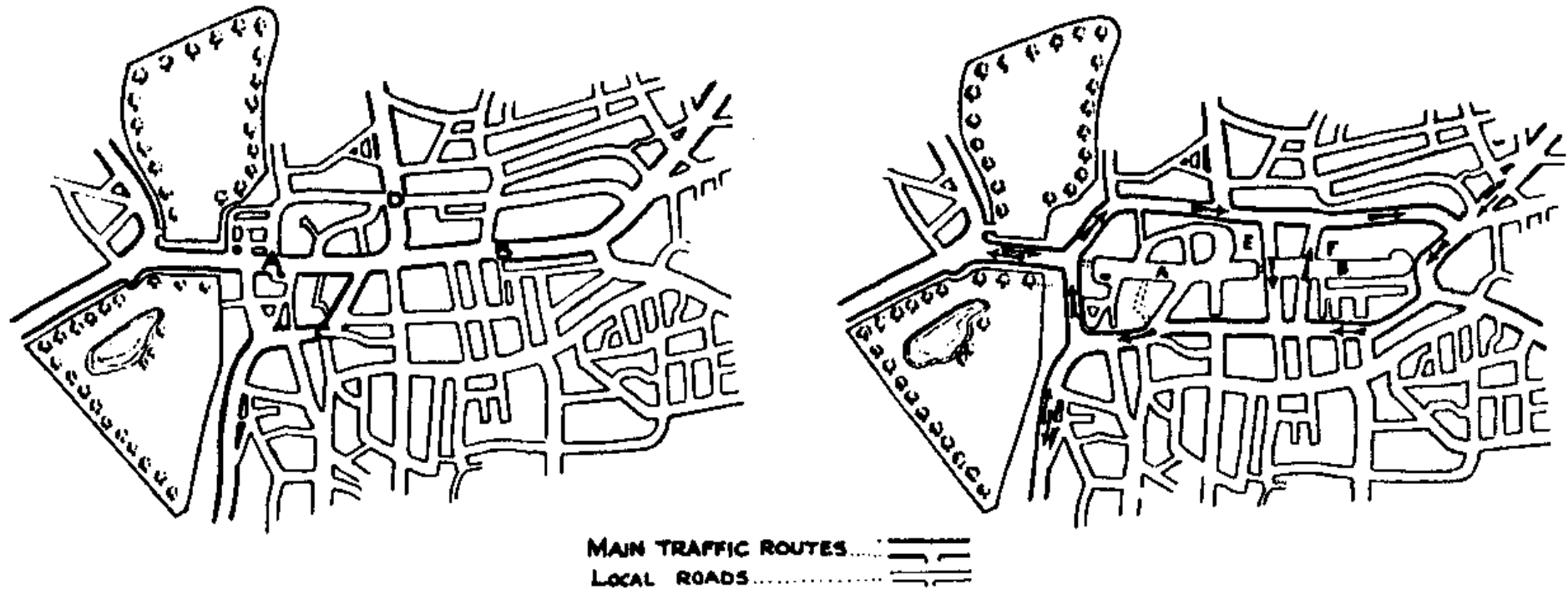
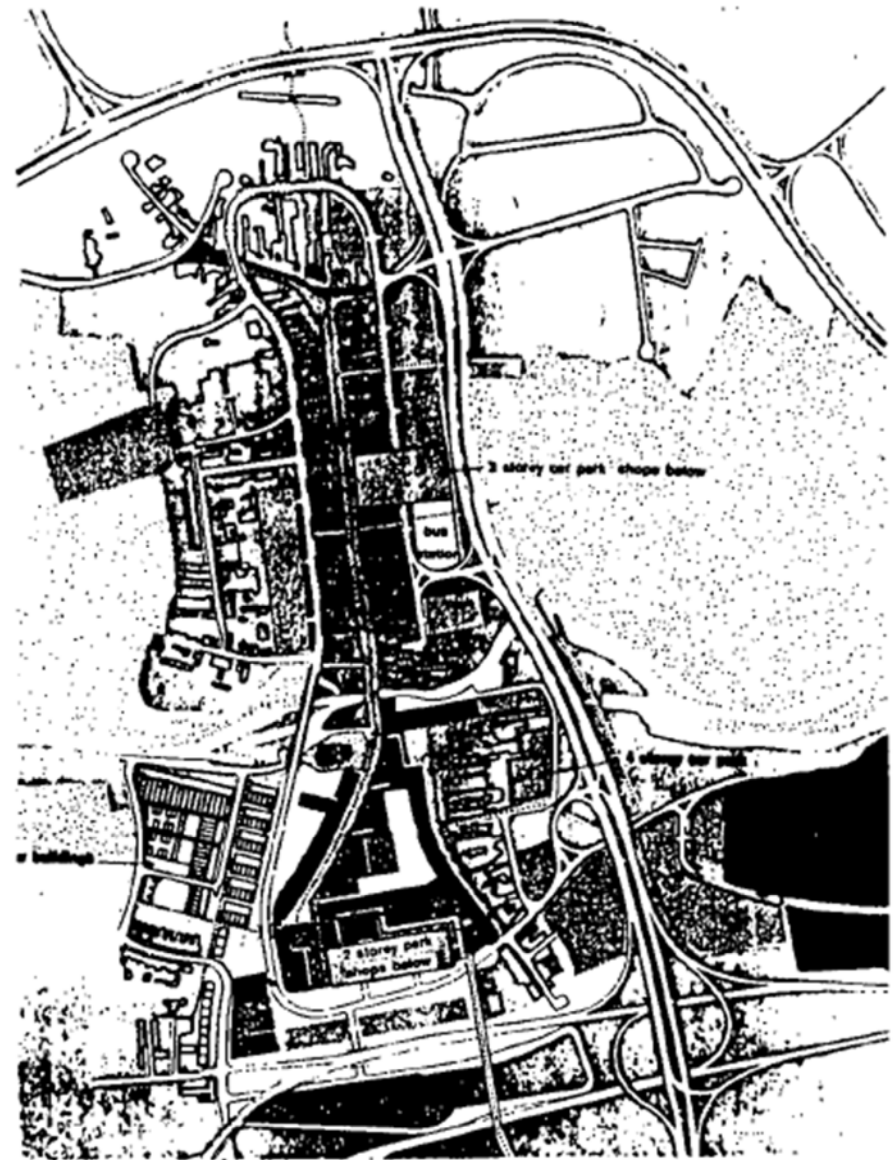
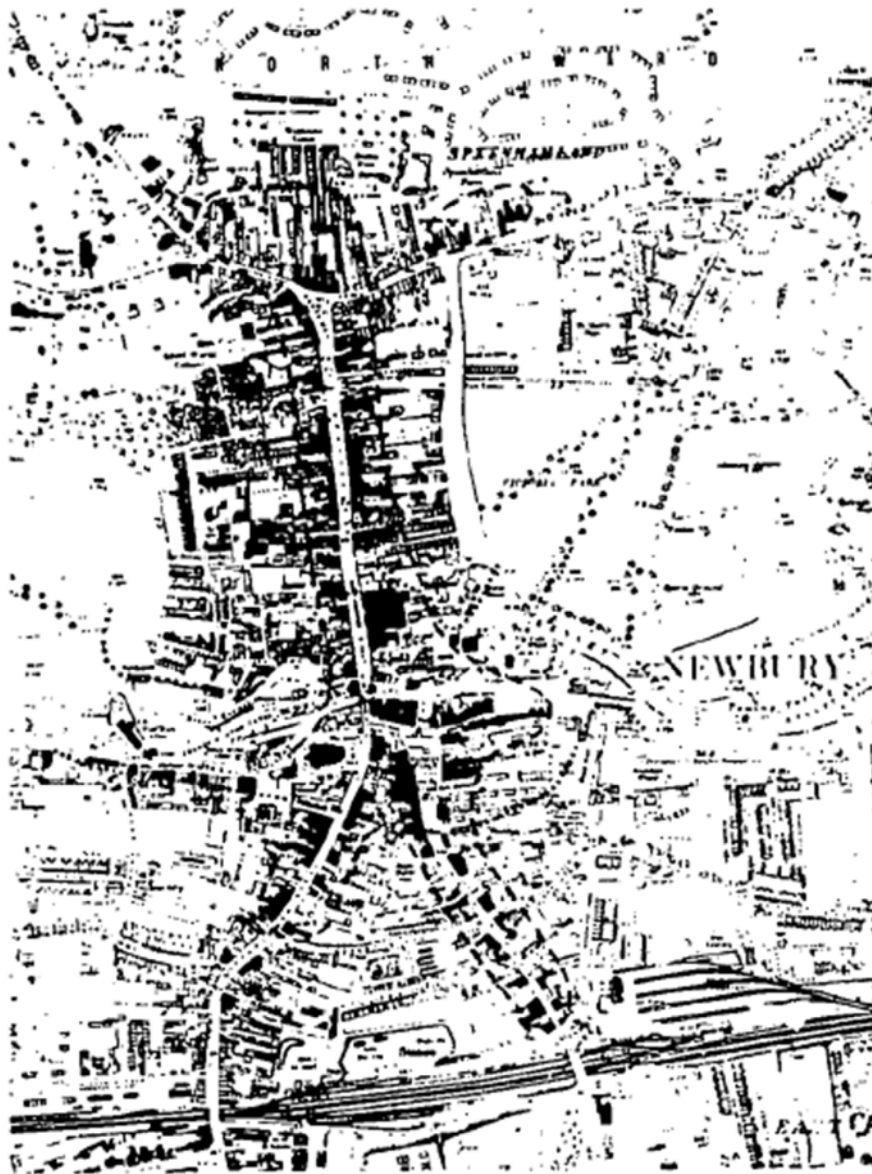


Fig. 25. — An existing town layout. This is the centre of a county town where the shopping and amusement centres, as so often happens, arc upon the main traffic routes (AB and CD), and a serious casualty record is in consequence incurred. A town plan which permits of such cause and effect is a bad town plan. Replanning is called for, alike from the point of view of safety, convenience and amenity.

Fig. 26. — A sound new plan for the town layout shown in Fig. 25. By adaptation of existing roads, the through-traffic is drawn away from the shopping and amusement centre, thus allowing people to shop in safety. On account of the restricted widths of the roads into which the through-traffic is diverted, resort is had to a one-way circular working ; and, for protection of pedestrians, a system of traffic signals, linked on the flexible progressive system, should be incorporated in the plan. Two additional one-way roads, E and F, arc provided to that there may be access to the centre without undue detours.

Figure 5.2 – Before and after plan for Newbury from “Traffic in towns” (1963)



b

This view (contained in a conclusion to suggestions for a small town) is somewhat different to the popular image of the report's conclusion. A choice is put very strongly and a warning that the middle course between the two should be avoided. (In reality, it appears that this middle course is precisely the one which has been adopted.)

But the two alternatives offered are not presented as a choice between, as it were, two legitimate strategies.

“We conclude that the motor vehicle ... is a beneficial invention with an assured future...”

“The usage of vehicles in towns could be curtailed deliberately in order to avoid these (congestion and social) problems, but the only justification for doing so would be the sheer difficulty of designing the necessary alterations to towns and the expense of carrying them out.”

“The broad message of our report is that there are absolute limits to the amount of traffic that can be accepted in towns, depending upon their size and density, but up to these limits, provided a civilised environment is to be retained or created, the level of vehicular accessibility a town can have depends on its readiness to accept and pay for the physical changes required. The choice is society's.”

The conclusions go on to show the mismatch between private investment in vehicles and public investment in roads and infrastructure, showing a widening gap. It is argued that it should be possible to increase the amount of public expenditure to ease transport problems.

It is clear that the report emphasises the visual and social environment. In many cases the human disadvantages of catering for the car far outweighed the benefits to motorists. Yet the overall impression gained from reading the report is that the authors were in favour of vastly increased investment in road building and other measures to cater for the car. Certainly that was the way it was interpreted in many towns and cities. Many cities have attempted schemes of inner city ring roads and fast radial roads, which are roughly along the lines of those shown in the maps depicted in *Traffic in Towns*.

Newbury, for instance, chosen as a case study, has evolved very differently from the suggested plans. Two elements have been built, a dual carriageway north south road to the east of the town centre and single carriageway east west road to the north. But Buchanan saw his roads being built in conjunction with the M4 (now completed) and a north south bypass to carry the A34 (which was still not under construction by 1991). In the meantime the population of Newbury has grown from 30,000 to about 45,000 and the amount of motor traffic has increased by about three times.

The results can be illustrated by comparing photographs in the original report with the situation now. Most features shown in the photographs still exist. The proportion of heavy

goods vehicles in Northbrook Street (the main shopping street) has fallen, but the road is still busy. Loading and unloading for shops still takes place in the main street, with only a few shops using facilities behind the shops. The narrow bridge has a one-way traffic light system. The Market Place is still used as a car park. One of the major changes, which would not show in the photographs, is the building of the A34 dual carriageway, which is generally subject to as much congestion as was pictured in the main street before.

Other, mainly larger cities have gone much further in their attempts to build their way out of congestion. Birmingham is probably the clearest example, with a nearly complete set of three ring roads and a motorway system running through the conurbation. Other cities such as Glasgow and Liverpool demolished large sections of their inner cities to provide fast roads.

Even so, the argument in the Report that there was no half way house was ignored. No towns have altered to the extent that would have fully implemented the 'provide for the car' alternative, except maybe for some of the new towns which have been largely built since the publication of the report. Bracknell (a town of about 80,000 inhabitants) has such a system and large traffic jams, while Milton Keynes has adopted a town plan based around the car.

One feature of 'Traffic in Towns' which remains inexplicable to those outside the discussions on drafting is why the lengthy introduction from the Steering Group seems less overwhelmed by the attraction of constructing new roads, than the Report itself.

The Steering Group point out that:

"If a large proportion of the working population of a typical American city can drive to work it is partly because many of the work places have been evacuated to the periphery. The difficulty of preserving any green countryside between our towns is already so great that there is very little scope for a similar scope in Britain."

"Secondly, the American policy of providing motorways for commuters can succeed, even in American conditions, only if there is a disregard for all considerations other than the free flow of traffic which seems sometimes to be almost ruthless."

And, of great interest given the rapid congestion of the M25 and the suggestion that planners had got their trip generation forecasts wrong, they say of United States experience:

"Each new motorway, built to cope with existing traffic, seems to call into existence new traffic sufficient to create new congestion."

The general conclusion was that they believed that there was a need for a planned road building policy, but that it would not solve the problem.

They go on to discuss the comfort and convenience aspects of the car over public transport. But they do not dismiss public transport by any means:

“To prevent the steady rise of car-commuting, it would be necessary to provide a great many more bus and tube routes, running at very frequent intervals, at reasonable fares and with enough vehicles to guarantee a seat to every passenger. This could hardly be done on a paying basis; it is very questionable whether it could be done at all. But this is not to say that the expansion of public transport cannot make a large contribution. Regarded not as a solution in its own right, but as one arm of a co-ordinated policy, we think the case for expanded public transport in cities is proved.

In any given city there are a calculable number of bodies to be moved between home and work and back again every day. The number that can possibly be carried in private cars, even after an extensive programme of road building, is also calculable and limited. The remainder will necessarily have to use public transport and the means of providing it is one of the essential elements of the sort of co-ordinated and comprehensive planning that is clearly needed.”

In the report these restrictions were not regarded as a solution in their own right, as one arm. They conclude that:

“Distasteful though we find the whole idea, we think that some deliberate limitation of the volume of motor traffic in our cities is quite unavoidable.”

Thus there was a tradition of seeking to moderate car use, but it was predicated on the assumption that continued growth in the centrality of the car was inevitable and at least in part, desirable: it never sought to produce a manifesto against the car. Such a basis was entirely reasonable, but it had three disadvantages. First, the alternative policies that might actually be capable of moderating car use successfully were never more than sketched. Secondly, there was no convincing intellectual alternative to the much more elaborate procedures by which the other stream prepared its plans to provide capacity for increased traffic. Thirdly, it consistently underestimated the extent to which the pressures of traffic growth would overwhelm both protected precincts and expanded arterial roads.

Providing for the car

The idealistic language of planners such as Howard, may be compared with that of Frank Lloyd Wright (1963):

“What nobler agent has culture or civilisation than the great open road made beautiful and safe for continually flowing traffic, a harmonious part of a great whole life? Along these grand roads as through human veins and arteries throngs city life, always building, building, planning, working.”

The idea of traffic growth and the desire to accommodate it was recognised as early as 1913 when Sidney and Beatrice Webb wrote:

“We cannot doubt that - whatever precautions may be imposed for the protection of foot passengers and whatever constitutional and financial readjustments may be necessary as between tramways, omnibuses and the public revenues - the roads have once more got to be made to accommodate the traffic, not the traffic constrained to suit the roads.”

Following the mass production of cars after the Ford Model T in the United States of America in 1908 (the impact was delayed until after the First World War in Britain) the car stopped being a plaything of the rich and became the means of travel for a large section of society.

As motoring became more common in the 1920s and the 1930s a school of thought developed which saw the benefits of car travel and also, could see that demand for private cars and travel would increase. As an example of this view Sommerfield (1938) saw how the problem of congestion arose and recognised that there were two approaches, but could only countenance solutions based only on road building:

“The kernel of the problem is the private car, which we may describe as a new luxury that adds immeasurably more to traffic congestion than it serves to fulfil any real useful purpose in transport and has mainly been responsible for the hundreds of millions of pounds spent on highways during the past twenty years. Those facts are consistently shirked; the blame is laid everywhere save where it belongs. Either the bus is made the villain of the piece - blandly disregarding the congestion and the death roll on trunk highways on which bus services are either few or non-existent - or the horse drawn vehicle is cited as the weakest link in the chain.”

But alongside this recognition the implied policy options are somewhat limited:

“If traffic were to increase ten-fold on a double track line of railway, additional tracks would be laid down and new junctions and signalling improvements would speed up movement. Admittedly, road widening is not so easy of attainment. Apart from the question of cost, it involves in urban areas and not there alone, demolition of property on an immense and entirely prohibitive scale. But those difficulties cannot indefinitely be allowed to serve as an excuse for an almost entire absence of planning and for tackling the job in a piecemeal fashion.”

“We have the alternative of making the roads fit for the traffic, or adopting the retrograde policy of cramping the traffic to fit the roads. If we adopt the former expedient, we must consider the building of an entirely new network of main highways ... It is time that the 18th Century mind should retire from the regulation and planning of 20th Century transport.”

By the end of the Second World War road design was becoming more of a science and the Government publication 'Design and layout of roads in urban areas' (Ministry of War Transport, 1946) laid out standards for road design including traffic engineering considerations applied specifically to the car. In this guide the idea of catering for increased traffic growth was taken for granted.

“... we recommend that provision should be made for a volume of traffic double that which obtained prior to the war. ... We suggest, however, that where there is a foreseeable possibility of the need for further widening in the distant future which may be precluded by the erection of important buildings having a long life, it will be prudent to design the road to carry traffic greater than double the pre-war volume.”

In the late 1950s there emerged a synthesis of various theories concerning traffic, which treated traffic within the realms of physics. An example of this treatment is the 'gravity model' which deals with the amount of traffic flow between two places. This stems from an observation by Reilly (1931) who noted that people tended to travel further to a large shopping centre and formed his law of retail gravitation which likened use of centres to the attraction of masses in free space (as in Newtonian physics). His 'law' stated that:

“Two cities attract retail trade ... from an intermediate city or town ... approximately in direct proportion to the population of the two cities and in inverse proportion to the square of the distances from these two cities to the intermediate town.”

Such explanation, when refined by the use of observed parameters, managed to explain much of the observed movement between towns. The synthesis of such theories led to the development of what became known as the 'Four stage transportation model' a computer technique for predicting the amount of traffic throughout an urban area so that roads could be planned and built in advance to cater for that traffic demand. The technique gained support during the 1960s and many transportation studies were carried out using them. An early example was a study in London (Freeman Fox, 1966). In summary this said:

- Population, employment and incomes in London would rise.
- As a result, car ownership would almost double in twenty years.
- The total number of trips would increase by nearly 50%; the share of car would increase from a third to over half; the share of bus decrease from a third to a sixth; and the share of rail decrease from a sixth to a tenth.
- A 'high class' road network can be provided of sufficient capacity to serve such demands.
- Public transport must be provided for the people unable to use cars, although they are relatively few in number.

The detailed policies developed in London, other cities and the country as a whole, were constructed around two key assumptions, each led by demand trends. Private car use would increase, therefore it was necessary to increase road capacity and public transport use would decline, therefore it would be logical to reduce service levels.

Both of these actually happened. Thus from 1964 to 1974 passenger miles by bus decreased by 16% and passenger miles by private transport increased by 64%. (The main fall in rail travel had already happened, 18% from 1950 to 1964). Bus services were cut by 16% in the decade and the seating capacity of British Rail rolling stock was halved.

With transport models being widely used there emerged a technical and engineering consensus that the growth in motorised travel was inevitable and indeed in a sense the subject did not need discussing. The job of the technicians and engineers was to provide the capacity for that growth.

But at the same time others were looking at the subject from a different perspective and there was a new interest in alternative approaches. The decline in public transport as a result of the growth in car ownership and the social problems outlined in Chapter 4 were becoming apparent. Arguments were being put forward about the social inequities of car ownership and the likely consequences of continued growth in traffic. Examples of such arguments can be found in Hillman, Henderson and Whalley (1973), Illich (1974) and Plowden (1972) and there were many more. The basic arguments were based around social inequalities between car users and non-car users, the waste of energy in transport and the disruption caused by building roads in urban areas.

Such arguments were developed and brought to a wider audience in reports such as 'Changing Directions' (Independent Commission on Transport, 1974), Bendixson (1974) and the Council for the Protection of Rural England (1973) and in responses to the Government's 1976 Green Paper on Transport Policy, for instance Hamer (1976).

These reports had two themes which ran through each to a greater or lesser strength. The first was that of accessibility as the key to transport policy - not mobility. The second was the idea of integrated or balanced transport policies; for instance, the Council for the Protection of Rural England (1973) report, for instance said "*Today Britain has a road policy. It has no transport policy*"

The Government White Paper (Department of Transport, 1977), was clearly influenced by such arguments and included policies of continuing support for public transport, keeping fares low and mentioned the idea of integrated policies, though at the same time in 'Cars for Cities' (Ministry of Transport, 1967) there is a recognition of the problems, but a sense that car growth is inevitable and we have to try and cater for it.

"It often appears that the improvements in the capacity of a road system are very quickly matched by such an increase in traffic that much of the potential benefit from

the increased capacity seems lost. It might be argued that this will invariably apply to any attempts to increase accessibility by car. But it seems to us that this ignores two factors. First, even if increased capacity is largely taken up by increased traffic, it still allows a greater number of people the benefit of the use of personal transport. Second, there seems to be an increasing recognition that some means must be found to ensure that traffic congestion itself does not indefinitely continue to be the main factor limiting the growth of traffic.”

The Public Transport Dimension

During the 1970s and 1980s much of the attention on urban transport policy, especially for larger cities, was focused on the possibility that public transport improvements could act as an alternative to new road construction.

One important experience was that of South Yorkshire County Council in the period 1975 to 1985. In 1975-6 the Council decided to try and break the ‘vicious circle’ of public transport cuts, increased fares and loss of custom, by maintaining the service level and the money level of fares. By 1981 there was a 54% reduction in the real level of fares and an increase of 7% in passengers carried.

An important result observed was that increases in bus use since 1972 were systematically related to age, with high increases for the young, small increases for the middle aged and small decreases for the elderly. One explanation suggested was that the young were responding rapidly to cheap public transport, but older people were still responding to the worsening public transport in a previous period. It was also noted that second-car ownership appeared to have increased less than might be expected and there were suggestions from qualitative social research that public transport policy had contributed to this.

In other Metropolitan areas, a range of different policies to support public transport were implemented, including fares subsidies in London and Liverpool and a new Metro in Newcastle. The policies were costly and the subsidy levels involved gave rise to a political and professional argument about value for money of bus subsidy. The supporters of subsidies mainly cited the wider social and transport benefits of public transport and this was supported by work carried out on subsidies benefits in the Metropolitan areas by the Department of Transport (1982a). However, opponents argued that the subsidy had ‘leaked’ into efficiency and higher wages rather than into better services and looked to deregulation of bus services to bring benefits at the same time as reducing public expenditure.

The policy transition to deregulation for public transport began with the 1980 Transport Act which deregulated long distance coaches and allowed for the setting up of trial areas for local bus deregulation. The 1983 Transport Act brought in the possibility of tendering for local authority services - an option which was little used by local authorities.

The Government began to prepare for the deregulation and privatisation of the whole bus industry with the preparation of the White Paper ‘Buses’ (Department of Transport, 1984a) and the subsequent legislation was embodied in the 1985 Transport Act. We have reported on the results elsewhere (see Stokes et al 1990b, Pickup et al 1991). In summary: vehicle mileage (counting both commercial and subsidised services) increased. While some of the increase has been in creating new routes most has been in competition along major routes, leading to little extra network coverage. Services on some of the less well used routes have been reduced. Much of the increase has been in minibuses (not always implying a corresponding increase in capacity). But rapid change to the services available and the corresponding problems of a lack of information have been a major subject of public dissatisfaction. Also, fares rose very rapidly in 1986 in many areas as a result of the ending of low fares policies, caused by a combination of the abolition of the metropolitan counties, rate capping and deregulation. Since deregulation, fares have risen faster than inflation.

By the end of the 1980s it was clear that bus patronage, which had been increasing, was now falling again *outside London*. Table 5.1 shows this.

Table 5.1 Local (stage) bus services: English Metropolitan areas

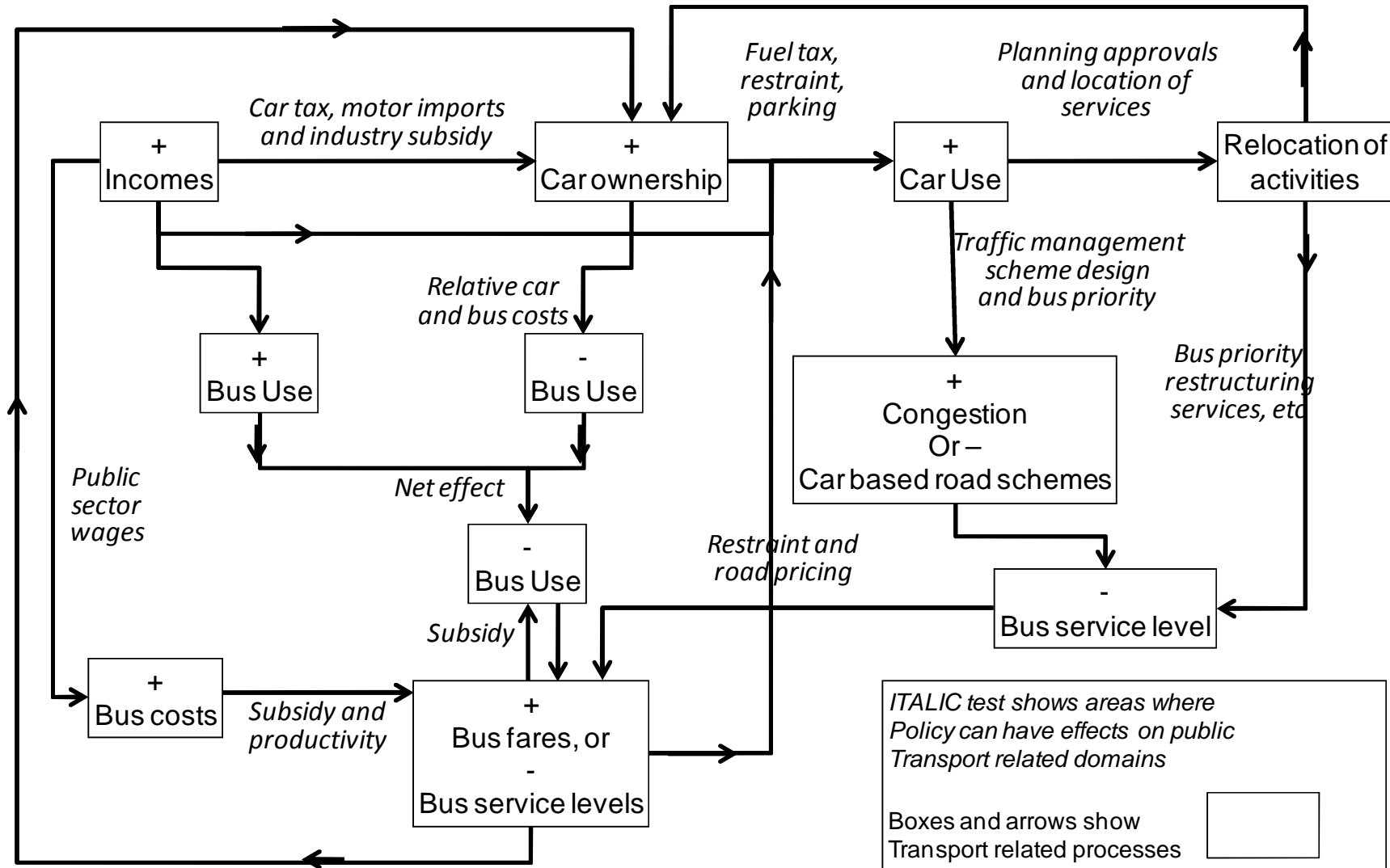
	English Met Areas Journeys 1989/90 figures	London Journeys 1989/90 figures
1982	1981	1041
1983	2011	1087
1984	2047	1162
1985/6	2069	1152
1986/7	1811	1164
1987/8	1733	1240
1988/9	1695	1240
1989/90	1642	1211

Source Department of Transport (1990b), (Corrected from 1989 figures)

Thus although for over a decade public transport was at the centre of local and national Government attention, by the end of the 1980s there was in effect a reduction in the role given to buses in longer term plans for transport, congestion and wider problems. Local Authorities and PTEs are inhibited from initiating large scale bus service improvements because of laws governing competition between commercial and tendered services and discouraged from doing so because of tight controls on spending.

So 1989, like many others, was a year marked by increased car ownership and use and declining public transport patronage. But the implications of these trends were about to be confronted.

Figure 5.1 – The effects of policies on the ‘vicious circle’



From Goodwin (1990)

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CHAPTER 6

THE WATERSHED: 1989 AND AFTER

The watershed was the production in April 1989 of the Department of Transport's 'National Road Traffic Forecasts (Great Britain) 1989b,' a technical document which, like its predecessors in 1984 (National Road Traffic Forecasts Great Britain 1984) and earlier, was primarily designed for use in appraising trunk road improvements:

“Traffic forecasts are important in assessing whether the benefits from a road improvement, over its lifetime, justify the initial cost and in determining the standard of provision. They enabled balance to be struck between providing capacity before it is needed and the cost of adding to capacity at a later stage. Traffic forecasts also play a part in predicting the environmental impacts of traffic such as noise and air pollution.”

Although the main use of the forecasts has been in relation to specific schemes for specific sections of trunk road, the traffic levels in the report are national totals including all classes of road. The forecasts are presented as a range which in the Department of Transport calculations derives almost entirely from the levels of income that would be associated with different assumptions about future economic growth (not from other uncertainties about the future, such as transport policy or road capacity).

The main forecasts are summarised in Table 6.1.

Table 6.1 Traffic Growth Forecasts According to the 1989 National Road Traffic Forecasts
2025 compared with 1988

	'low GDP growth'	high GDP growth'
Gross Domestic Product	+101%	+215%
Car ownership	+60%	+84%
Miles per car	+8%	+22%
Total car traffic	+82%	+134%
Heavy lorry traffic	+67%	+141%
Light goods traffic	+101%	+215%
Bus traffic	no change	no change
Total traffic	+83%	+142%

Source: Department of Transport (1989b)

In the base year 1988, cars accounted for 82% of total traffic, light goods vehicles 9%, heavy goods vehicles 7% and buses 1%. The growth rates imply that cars and vans would be an even greater proportion of total traffic than they are today. Overall, we can think of the forecasts as suggesting that there would be broadly twice as much traffic on the roads as in 1988 and three times as much as in 1976.

In percentage terms, these growth rates are well within those observed to occur in the previous three decades, as outlined in Chapter 3. In absolute terms, the extra traffic is very much greater than had ever previously been accommodated. Between 80% and 90% of the additional traffic would be cars.

It is useful first briefly to unravel these totals, to see what is implied by the various component parts.

Car traffic

The forecasts assume that car ownership will increase from 331 cars per thousand population to between 529 and 608 by 2025. With an assumed population of 58.3m, this implies car numbers of between 30.8m and 35.4m - practically double the number in the UK now. About 46% of the population of the driving age group 17-74 have a car and by the year 2025 this is forecast to increase to between 73% and 84%.

The forecast increase in the number of cars would occur through a combination of some households obtaining their first car and some adding to their stock of cars. In the year 2025, with falling household sizes there are forecast to be 24.0m households. If we assume that

only 90% of households have a car (accounting for those too old to drive, those with disabilities, and those who do not want a car, then households with a car will have between 1.4 and 1.6 cars. Again assuming that 90% of households have cars in 2025, 21.6m cars would be accounted for in first cars. This would leave between 9.2m and 13.8m cars to be distributed amongst households as second or third cars. Of the 24.0m households forecast to exist in 2025 current forecasts to 2001 projected would imply about 7m single person households in 2025 (calculation from data in Social Trends, 1989). Assuming one car per single person household, between 55% and 82% of other households would have second cars and these constitute most of the growth.

In 1988, the average annual distance travelled per car was 14,600km. If car usage is assumed to increase by 8% (the lower mileage forecast), this will make average annual mileage equal to 15,800km; if it increases by 22% (the upper forecast), it will rise to 17,900km.

As an example, take a family with two adults who today are still likely to have only one car. By 2025, they are likely to have two. Although they will no longer have to share a car to do all the tasks that currently need to be done in a car, the mileage of each their cars individually is assumed to be greater than that of their one car now. So where will the increase come from? Do they go on leisure trips to the same places as they always did together, at the same time as each other, but in separate cars? Do they go more than double the distance they used to, for the same purpose? It might be expected that the mileage of the second car in a household would be less than that of the first car, but this is not necessarily the case. The Department of Transport in the National Road Traffic Forecasts (Department of Transport, 1989b) state that:

“Certainly there is no indication in the historical data of average annual use of a car falling as the ownership rate increases: second and third cars in high income households are used more than single cars in lower income households.”

On the other hand Goodwin and Mogridge (1982) concluded that for *private* cars, second car ownership was, as expected, associated with a reduction of the distance travelled per car. But this does not apply to those two-car households where there is a company car.

Company cars tend to do higher mileage than privately owned ones, due to various factors - the work travel requirements, the advantage of subsidised motoring, and the income and lifestyle of those who are offered company cars. Approximately 20% of the total current car stock consists of company financed cars and if the proportion continued to increase to 2025, it is not at all inconceivable that the proportion of company cars in the total car stock could reach 30%. With average mileage of private and company cars remaining as today an increase of the company share to 30% would lead to an overall 8% increase in total mileage (Hallett, 1990b).

Other factors consistent with an increase in the distance travelled per car are the growth in non-work travel (both short distance personal business trips and the longer leisure journeys),

further relocation of retail and other services at out of town locations, increases in journeys to escort children for reasons of security and reduced alternatives, and decentralisation of houses and workplaces.

There are also important underlying social trends that could reinforce the growth. Hill et al (1990) point out that the population is slowly growing, but within that there are substantial structural changes. The numbers in the 15-19 age group will decline significantly and also the numbers of 'young pensioners' i.e. under 75 and residents of densely populated areas. Expanding groups are the middle aged, the very old and residents of suburban and rural areas. The contracting groups are those who are at present the greatest users of public transport, especially buses. The expanding groups are those who at present use public transport least.

Over the past twenty years, an increasing proportion of women have entered the job market in both full-time and part-time capacities. The proportion is expected to increase still further in the next twenty years as women recognise their potential within the workforce. This will be aided by employers, who, facing a labour shortage due to the change in the age structure of the population, will have to provide improved working arrangements for women who previously have not entered the employment market because of family commitments.

In 1986, a full-time working woman travelled 42 miles per week to and from work and a woman in part-time work travelled 16 miles (Department of Transport 1988a). In 1986, 59% of journeys to and from work by women in full-time employment and 62% of journeys by women in part-time employment, were done by car. In addition, as a higher proportion of women become actively employed, thereby increasing the number of two earner families, there is likely to be a wealth effect which in itself may encourage the purchase and usage of a second car. As we have seen above, one of the main sources of growth in car ownership is households acquiring second and third cars. An increasing number of working mothers may give further impetus to this effect. Jansson (1989) has shown that in Sweden, whilst car diffusion is slowing down amongst the male population, implying a near saturation point in growth of car ownership, amongst women diffusion has really only just begun. The conclusion reached by Jansson is that 'female car ownership appeared as the strategic factor for the future development of motorisation'. The rate of increase in the proportion of women obtaining driving licences in the UK over the past twenty years is further evidence of the increased interest shown by women in becoming independent drivers.

Freight Transport

Heavy goods vehicle (HGV) traffic in total is assumed to increase by between 66% and 141% by 2025. This comprises an increase in OGV1 traffic of between 35% and 73% and an increase in OGV2 traffic of between 123% and 265%. There is no forecast of the numbers of vehicles but one can therefore expect a shift from the use of more smaller vehicles to fewer heavier vehicles.

Table 6.2 - Present and Forecast Values of Heavy Goods Vehicle Traffic.

	billion vehicle km		
	OGV1 (2 or 3 axles)	OGV2 (4 or more axles)	All HGVs
1988	16.07	8.85	24.92
Forecast to 2025			
low	21.69	19.73	41.42
high	27.80	32.30	60.10

Source - Department of Transport (1989b)

Between 1977 and 1987, OGV2 traffic has increased by 100%. From this, it would seem that a further increase of between 123% and 265% is not at all inconceivable. Between 1983 (the year when the 38 tonne lorry was introduced) and 1988, the number of 32 to 38 tonners increased by 20% whilst the number of 7.5 to 16 tonners decreased by 33%. Furthermore, OGV1 traffic fell from 12.8 billion km in 1977 to 10.6 billion km in 1986 – a fall of 17%. Combining OGV1 and OGV2 traffic shows that HGV traffic in total, only increased by 9.2% over the decade. This makes the freight forecasts look much more doubtful, particularly the forecast increase in the OGV1 traffic.

Although the forecasts of HGV traffic are in terms of vehicle km, HGV activity is usually represented in terms of tonne-miles rather than vehicle-miles as this gives some indication of the weight of goods that they are carrying. The NRTF gives no explicit forecasts for tonne mileage but it does say that the percentage growth is the same as that of GDP. Applying this to tonne-mileage, where the base is 124.8 billion tonne km in 1988, we find that by 2025, tonne-mileage is forecast to be between 250.8 billion and 393.1 bn. Thus, tonne mileage is assumed to double or even treble by the year 2025.

Over the last decade approximately 60% of the increase in tonne km was accounted for by an increase in tonnes lifted and approximately 40% was accounted for by the increase in the average length of haul, from 68 km to 75.5 km.

Assuming that these proportions hold in the future, we can calculate what the forecasts mean for both tonnage lifted and average length of haul. Thus, assuming that 60% of the forecast increase in tonne mileage is due to more goods being transported, total tonnage lifted would increase by between 60.6% and 129%, i.e. from 1653 m tonnes per annum to between 2653.7 and 3785m tonnes. The average length of haul would increase by between 40% and 86%, i.e. from 75.5km to between 105.7 km and 140.4 km.

The population in 1988 was 56.9 million. This is forecast to increase to 58.26 million in 2025. Relating tonnage lifted to the population, we find that in 1988, for every person in the UK, 29.1 tonnes of goods was lifted. Assuming that tonnage increases by 60% of the growth in tonne-mileage, by 2025 tonnage lifted per person rises to between 46 and 65.

Thus we are talking about an increase of between 59% and 100% in tonnes lifted per person. The implications of this for consumption levels, durability of consumer goods, manufacturing and retailing remain as yet unexplored, but are clearly profound.

Another possible way of understanding the increase in tonne mileage is by assuming that the same weight of goods will travel further. Because length of haul would increase faster than goods lifted, the production or the distribution process will have to change too. Either specialisation increases so that each final product has inputs from many more different locations or each tonne of produce is taken longer distances in the course of its final distribution. The latter effect could occur if goods were taken to several warehouses in different parts of the country before final delivery.

Constraints on Demand Increases

Road Capacity

The discussion above identifies a number of existing social processes that could indeed produce demands for movement on a scale predicted by NRTF. But at some point in time historical experience must stop being a useful guide to the future and we start by asking some very simple questions and offering some simple and approximate answers.

Question 1: Is there physical room on the roads for all this traffic?

If the traffic were to spread itself evenly in space and time, it would fit without difficulty. There are currently 354,000 kms of road in Great Britain; the 'high' forecasts for 2025 (142% increase) give 880 billion vehicle kilometres per year, which is 285 vehicle kilometres per kilometre of road per hour (assuming no further road construction), or five vehicles per minute, a comfortable 12 second headway. This is, however, the most unrealistic extreme position. It is not behaviourally credible that such a geographical and temporal spreading could occur.

Question 2: Is there physical room on the roads for such overall growth, assuming a continuation of the present differential patterns of traffic by road type, location and time of day?

Many motorways and main roads within built-up areas already operate at near capacity at peak periods. Without major redistributions of the times at which journeys are made, they are unlikely to be able to handle more than a very small proportion of the projected growth.

Many unclassified roads would also be swamped, with severe junction capacity problems soon arising and a serious deterioration in local safety and environmental conditions. It is not technically possible for the growth to be imposed on the current pattern of traffic.

Question 3: Is there a realistic way of accommodating the growth?

A compromise between the behaviourally impossible and technically impossible would be that traffic growth unable to occur in one area or time 'spilled over' into another area or time period. There is evidence of this happening already, with the spreading of the peak in large urban areas and the displacement of some shopping and leisure activities to out-of-town sites.

Table 6.3 is a 'guesstimate' of the way in which traffic is currently distributed over time and different classes of road.

Table 6.3 - National distribution of traffic (% of total)

	Motorways	Built-up Areas	Non-built-up Areas	Total
Broad peak (7-10 & 4-6)	4	15	14	33
Day (10-4)	6	18	18	42
Evening (6-11)	3	7	7	17
Night (11-7)	2	3	2	9
Total	15	43	41	100

Source: Department of Transport (1990a)

Judgements of what are realistic estimates of the network's ability to absorb traffic growth are clearly difficult, depending on technical and behavioural parameters neither of which are known within this framework. But the following tentative suggestions about constraints seem reasonable.

- a) A twenty per cent increase in peak period traffic in built-up areas and a 30% growth on the enhanced motorway network could be accommodated by technical improvements in utilisation of capacity without intolerably low speeds or implausible behaviour.
- b) During the day, it is plausible to think of over a 100% increase in activities generating travel, but in motorways and built-up areas speeds would then be unacceptably low. Fifty per cent seems reasonable.
- c) In the night, there is little technical constraint, but it is not plausible to imagine a huge growth in personal travel, or in commercial vehicle movements in towns. One hundred per cent increase overall does however seem possible.

These propositions, applied to Table 6.3, would then require traffic to increase by three times its current level in the ‘unconstrained’ categories, i.e. non built-up areas throughout the day and built-up areas in the evening. The capacity might be adequate, but it is not at all clear what sort of shifts in desired activity patterns would be likely to bring about such growth. The speeds obtained would be reduced by 20% to 40%. Travel during the peak and most of the day – involving greater numbers of people than at present – would therefore also involve each of them in considerably greater allocation of time to travel than at present. Travel time budgets are not completely stable but they have rarely been seen to average more than about an hour per person for all travel by all modes for the whole population. The amounts of travel above and their effects on speeds would imply an average of between one and two hours a day spent just on car travel.

In summary, it does seem as though it would be technically possible to accommodate the predicted total growth in traffic, but only if there were a shift to ‘unpopular’ times and areas of an unprecedented scale. Even then, an excessive amount of time would be spent travelling.

Parking Capacity

In the past, problems of parking capacity have mainly been perceived as confined to central areas. The car ownership forecasts would make it certain that such problems would become very severe in many residential areas, especially where terraced housing prevails and where parking is on-street. In these locations, particularly in southern England, parking appears to have reached its capacity already. Residential parking permits are often a feature of these areas in towns and cities and some authorities are now limiting the number of permits. In places without resident-only parking, people are being forced to find parking facilities further and further from their residences.

Another type of housing where parking is often difficult is high rise blocks. These are frequently council estates which were built at a time when it was not considered that the residents would have a large number of cars. It is often in these blocks that households in the lower income groups live. It can be argued that it is precisely in these areas that the largest growth in car ownership could occur.

In private residential estates, most houses have garages and/or driveways to park their cars. However, even in these areas, parking may be difficult if car ownership increases substantially. Many cars are already parked on the streets as people use their garages for other purposes, or because the second or third family car cannot be parked in the drive as it blocks the exit of the first car.

This phenomenon has big implications for the housing market. If people desire garages with their homes, there will be a shift in demand away from houses without garages to those with. This will increase the price of those with garages and, because these will be in excess

demand, there will be pressure for the building of new estates with garages. This then gives further impetus to the type of urban sprawl which has already occurred in many towns and cities. The speed of change of the housing stock is typically very much slower than the envisaged increase in the parking requirements. Underground car parks are a possibility and already exist in many cities in the UK and abroad. There is virtually no limit to the amount of space available underground for car parks. The problem is their cost, and their perceived security. If, however, the cost of building the underground car parks can be recovered through charges and security guards can be employed, then they may be built. At present, people are still accustomed to parking either free (particularly at their homes) or for a minimal charge. This would have to change in the future if all the additional cars materialise.

Parking will become an increasingly important policy area. It has been suggested that this will be the first major constraint on car use rather than the capacity for vehicles attempting to move.

The NRTF Caveat

The NRTF Report says, in a cryptically brief but vitally important sentence:

“All forecasts assume that on a national average basis, traffic levels will not be constrained by changes in road service quality. The forecasts do not imply that road space will always be provided to accommodate them.”

The immediate question that this caveat raises is, what is the consequence for the forecasts if that space is not provided. No further attention is given to it in this Report. It became the central theme in the following discussion.

CHAPTER 7

THE EFFECT ON TRANSPORT THINKING

In this Chapter we look in turn at the response of institutions, professionals, pressure groups, public opinion and Government to the new perspectives on traffic growth.

The Response of the Institutions

Professional Institutions

The Institution of Civil Engineers set the tone, in “Congestion” (1989):

“Infrastructure provision has not matched this [traffic] growth. ... In effect, congestion is now itself acting as a regulator of traffic.”

“In view of the lengthy period of time involved in the planning and construction of a new transport infrastructure there is no possibility of solving congestion.”

The main requirement for transport policy is put as:

“... the need to co-ordinate transport provision so that maximum use is made of the comparative advantages of the different transportation modes. The motorcar will continue to be the dominant form of personal transport, but the need for coordination recognizes that in urban areas it is essential to co-ordinate provision with other modes of transport. The absence of this leads to the introduction of unregulated and costly measures which can be self defeating.”

The report sees a role for new roads, but stresses the importance of other measures to take strain off the road system. Measures include: the use of traffic management techniques, stricter parking controls, traffic calming measures, pedestrianisation, the encouragement of a bus based public transport system and improvements to rail. The report also raised the question of road pricing:

“In support of road pricing there are four fundamental points.

- I. Very high traffic growth is a reflection of increasing social and economic activity and as such is an indicator of a thriving nation. This had led to severe congestion on all forms of transport.
- II. Mitigation of congestion will require substantial additional physical facilities to be constructed if activities are to continue to thrive.
- III. Physical facilities alone will be insufficient, ineffective and/or uneconomic in mitigating congestion. The time taken for construction will mean that significant relief even where available by that method will, except in very limited instances, be many years in becoming effective.
- IV. Additional measures are therefore required to produce timely relief to congestion. The Institution believes it is now necessary to include road pricing as part of a plan to deal with London and other areas of widespread congestion.”

At the Chartered Institute of Transport Conference in May 1989, a working party was set up to look at the possible role of road pricing: Their report ‘Paying For Progress’ (1990) stated:

“Road pricing should not be considered in isolation but as a key element in a package of transport management measures including park and ride, bus priorities and further pedestrianisation. Of particular importance should be priorities for buses to capitalise on the freer traffic conditions in order to create the extra capacity and better service.... the proceeds should be ploughed back into improving roads, transport and related environmental matters....”

It argued:

‘The main advantages of road pricing will be to give better speeds to essential traffic and to generate sufficient income to pay for road, public transport and environmental improvements.’ It was recommended that a scheme for London should cover the whole area up to and including the M25 and was expected to pay for itself within months.

In a press interview the new president of the Institution of Highways and Transportation, Michael Callery reinforced the idea of a ‘coordinated response’ (Local Transport Today, 1989):

“We must look at limited road building, traffic and highway management measures and public transport options as part of a co-ordinated response to congestion problems.”

The Royal Institute of Chartered Surveyors commissioned a report for its Conference in October, 1989. Its author Bendixson (1990) argued:

‘As businesses become increasingly aware of the rising cost of congestion, opposition to using price to regulate roads is diminishing. Road users pay heavily to make use of the highways, but... they pay at the wrong place, at the wrong time and in the wrong way.’

The Royal Institute of British Architects in “Breaking the Transport Deadlock” (1991) takes a general view and sees the general level of investment (in terms of both money and will) as the basic problem. They call for more investment in all modes and see balance as important:

“... there are no circumstances in which a single policy initiative can solve an existing traffic problem. Above all, it is in urban areas ... that a balance of policy is required, taking account not only of the needs of the motorist, but of a significant proportion of the population who will never drive.”

For towns they say:

“The Institute believes that road building is not in itself a solution to the urban transport problem. It can aggravate rather than ease congestion unless it is linked to stringent measures to prevent the generation of additional traffic.”

They do however, see a role for road building between cities, but argue that a balanced policy would reduce the need for extra road capacity:

“The Institute accepts the need for additional investment in motorways and trunk roads. It does not regard a stalemate or ‘equilibrium’ of traffic congestion as acceptable, although in the long run the application of all the measures proposed in this policy statement should enable major new road building to come to an end.”

“The Institute believes that, in the long term, land use planning is the major means of reducing the need for transport. Where the development of existing towns and cities and the creation of new urban areas places greater distances between home and work or home and shopping, schools, leisure facilities and hospitals, heavier demands are made on the transport system ... Planning authorities should give far more attention to the transport consequences of development decisions, particularly decisions on the location of out of town shopping centres, schools and hospitals; and developers should be expected to pay for the infrastructure and ‘shadow’ cost of development.”

The Institute for Public Policy Research (sometimes described as a ‘left-wing think tank’) issued its first Green paper on A Cleaner, Faster London: Road Pricing, Transport Policy and the Environment by Patricia Hewitt. This gave an extensive discussion on road pricing emphasizing especially:

“It is the absence of road pricing, not its introduction, which is unfair....car drivers on congested roads are imposing costs on other people for which they are not charged themselves. In other words, the drivers are being subsidized... The subsidy is going to the better-off members of the community... Because road pricing removes this unfair subsidy to car drivers, it would in fact be fairer than the present situation.” (Hewitt 1989)

This argument was thought to be influential in persuading the Labour Party to say cautiously that they would look at ‘the feasibility (in some circumstances) of road pricing and using the money raised to fund improvements in public transport’, in its new transport policy statement ‘Moving Britain into the 1990s’ issued after its Annual Conference in October.

Local Government Associations

The London Planning Advisory Committee (a post-GLC co-ordinating body of London Boroughs), commissioned a study from consultants MVA (1988); this found that road pricing in Central London was not only beneficial in its own right, but would increase the benefits from a wide range of other policies. (The same consultants later advised close monitoring of potential application in Birmingham also.)

The Association of London Authorities, comprising mainly Labour boroughs, issued its transport strategy, ‘Keeping London Moving’(1989) stating:

“There is now wide support for restraint based on electronic road pricing, with the revenue being used to improve public transport and the road space freed reallocated to improving pedestrian and cycle facilities, the environment and catering for essential traffic. This would be efficient, flexible and fair. Because most poorer people, especially women, cannot afford a car and rely on buses, which a road pricing system would really help, it would not have the inequitable effects that many people fear.” (Association of London Authorities 1989)

Subsequently the London Boroughs Association (mainly Conservative Boroughs) also indicated support, in their report “Road pricing for London: An LBA Policy Report” (Hurdle, 1990).

The two associations made a rare consensus statement concerning road pricing at a conference on 27th November 1989 (The Joint ALA and LBA Convention on Transport in London). In this statement they both called for improved public transport for buses, tube and train and a recognition that “in the longer term, road pricing may be the most effective means

of traffic restraint". Also promoted were traffic calming, promotion of walking and cycling and accessible transport for the elderly, women and those with disabilities.

In conclusion they stated:

"This statement seeks to take forward the consensus that is being built amongst all members of the community in London, whether the boroughs, community and residents groups, the business community, or the professions. Whilst everyone accepts that transport is a political issue, it should not be a political football kicked backwards and forwards between two extremes. ... A package of closer integration between transport and land use planning, better public transport, a greater regard for the environment and a reduction in the amount of unessential traffic is the right way forward if London is both to have the transport system it needs for the 1990's."

The Association of Metropolitan Authorities published a new policy document in 1990 (Association of Metropolitan Authorities, 1990) in which their general support for public transport was continued, but with added emphasis to a package of policies designed to overcome the problems of congestion and the environment. The policy contains a strong call for integrated policies.

In a similar vein the Association of District Councils and the Association of County Councils have produced policy documents which indicate support for public transport and less emphasis on road building. In October 1990 the Association of County Councils commissioned a start to be made on developing a new balanced transport policy to put to the Government. The Association of District Councils published their policy document (Association of District Councils, 1990) emphasising the importance of environmental considerations in transport policy, calling for a 'lateral approach' involving improved public transport, park and ride, light rapid transit, traffic calming, reducing heavy traffic flows and the possibility of a 'carbon tax' to reduce pollutant emissions.

In general the reactions of the political associations has been one of heading towards consensus rather than the trend of polarisation of policies witnessed during most of the 1980s.

The Motoring Organisations

The Automobile Association and the Royal Automobile Club surprised those who had thought them to be purely concerned with the self interest of the motorist - to drive where and when they choose and to cater for everyone to use a car in such a way.

The overall tone of their responses is best summed up, not from the organisations themselves, but from an editorial in a special supplement to Car Magazine on the future of the car, in July 1990, (Green, 1990).

"We must be tempted to forego our cars when they are at their least efficient and least appealing (such as in day-to-day commuting, long distance business trips and inner

city motoring), so as to ensure their survival for the occasions when private transport is essential and pleasurable.”

“But (public transport) has to be better integrated; it has to be cleaner; it has to be more attractive; services have to be more frequent. It also has to be government funded, and cheaper, for public transport should be a state service, not a government money spinner. The changes needed to revolutionise public transport in Britain are at least as far reaching as those needed to revolutionise the car and its usage.”

The Automobile Association’s response to environmental concerns is voiced in a public policy document (Automobile Association, 1990). The problem facing transport policy is clearly recognised:

“Consequently, traffic congestion is increasing. This is bad economics. It also presents increasing risks to safety and amenity as traffic diverts on to unsuitable roads. At the same time traffic congestion increases atmospheric pollution and this contributes to the decline of the natural environment. Add to this public concern that atmospheric pollution is threatening the future well-being of the planet and it is easy to understand why there are growing demands for action to deal with what is seen as being a critical problem affecting not only this generation but future generations.”

As solutions to these problems the building of roads is still seen as one of the major tools. They see an efficient national road system as vital for the economy and make a distinction between long distance and local traffic especially in relation to the use of the motorway system. They would restrict access to motorways by local traffic but would demand the building of new roads to facilitate local traffic. They also support the continuation of the by-pass programme. However, in the same section in the paper they also write:

“Modal transfer to rail of longer distance goods and passenger traffic should be achieved by investment in the rail network.”

“Choice in mode of travel should be available together with incentives to use public transport. The emphasis should be to encourage the use of cheap, efficient and comfortable public transport - not punitive charging for car use. Capital financing for all forms of urban public transport should be substantially provided by central government.”

Other ways of shifting traffic from the roads are also encouraged. Light rapid transit should be encouraged with capital grants. Park and ride should be provided in urban areas.

“Cycling and walking are the most environmentally friendly mode of travel in urban areas. However, planning has often ignored and neglected these modes.”

In addition they argue for tests on vehicle emissions, changes in driver behaviour to reduce pollution, taxation benefits for cars with catalytic convertors and a long term consideration of road pricing and petrol taxation, but no immediate changes.

Worskett (1990) in a conference paper, indicates a similar shift of emphasis within the Royal Automobile Club (RAC). He sees the attachment to the car as being very strong.

“Let us not forget that for the vast majority of ordinary people in the developed world, the love affair continues. That is political and human reality which we all ignore at our peril.”

“The personal and social benefits of personal mobility have been talked about much less in recent years.... Unless we recognise and take seriously this aspect, we fail to treat huge numbers of ordinary people with the respect and care they deserve and we stand no chance at all ... of convincing the public that any particular package of transport policy measures for the next century deserves popular support.”

But the problems are also recognised:

“There are clearly environmental costs at the local level, and almost beyond doubt, environmental costs at the global level. There are social costs, whether in the form of community severance, or changed lifestyles in the street or local community. There are health and accident costs.”

In terms of policies for the future, public transport is stressed:

“Making it easy and attractive for drivers to use public transport for radial journeys in the conurbations is clearly essential. ... our own detailed survey work at the RAC shows that there is huge public support for the development of proper park and ride schemes. To be successful, however, this requires that good quality parking should be available at bus, tube and railway stations on the periphery.

“It also requires the right level of investment in public transport - and that is why the RAC so strongly supports public transport investment in urban areas.”

They make a clear distinction between journeys for which the car has positive benefits and those for which it has become the only real means of travel. The concept of accessibility is seen as central to transport planning:

“There are ... a wide variety of trips and journey purposes which are made immeasurably easier and more enjoyable, indeed can become events of enjoyment in themselves, if performed by the car. However, there are also a large number of trips by car which take place primarily because the function of access - to a business location, or a shopping complex, or leisure facilities, cannot at present be performed at a level of reliability, comfort or practicality which people find acceptable.”

“I would like to see ‘access planning’ adopted widely, both as a concept and as a criterion for looking at all transportation and planning developments and policy decisions. Physical accessibility, public transport investment, scope for changing hours of opening or hours of work, scope for working from home, need to be looked at together, not piecemeal.”

Industrial Organisations

The Confederation of British Industry's main concern is that freight transport should be efficient, as well as work travel. The main tenor of their report "Trade Routes for the Future" (Confederation of British Industry, 1989) is "to enable British Industry to compete..."

A long list of new roads and road improvements are suggested, including new routes along the south and east coasts, a new outer orbital motorway for London and the south east, a duplicate M6 motorway and better links between Scotland and England. They also argue for investment in a high speed rail link to the Channel Tunnel.

Besides infrastructure building, other measures are proposed including traffic management measures to increase traffic flow. They also suggest investment in light rail, park and ride schemes and public transport improvements. They say;

"Car use is preferred by many because of the absence of reliable, fairly priced and efficient transport services in many areas. Dramatic improvements in public transport, which do not necessarily need to be publicly owned, would be required if road pricing was to be introduced. Such a development might even remove the need to consider road pricing... Public transport facilities should be greatly improved to help overcome existing congestion and prepare the way for introducing road pricing."

The Freight Transport Association had in November 1988 stated (in the context of possible pan-European vehicle taxation after 1992): 'In principle the concept that lorries should pay their way is one which FTA members go along with.' But this was confined to road wear considerations, not congestion costs. Because the majority of freight operators would not have the operational flexibility to avoid the times and areas of highest charging, "road pricing for them would just increase costs and would be a retrograde step".

But there was a possible shift of emphasis by May 1989, when FTA Director General, Garry Turvey, pointed out that many private motorists' journeys were unnecessary and interfered with the major productivity gains achieved by lorries. So, 'one day they (private motorists) might be able to match the productivity and efficiency gains of road freight, but until then any thought of restraint through road pricing or any similar arrangement most surely fall exclusively upon the non-essential journey'. The idea of road pricing as a tool to benefit high productivity vehicles (lorries) or high efficiency vehicles (buses) is emerging as an important theme.

Rees Jeffreys Discussion Papers

As part of our project, we commissioned a series of reports from leading experts, mostly academics and consultants, specialising in transport. The authors were chosen for their range of expertise across a broad range of transport research and to give a mix of ‘left’ and ‘right’, ‘technical’ and ‘ecological’. While topic titles were suggested (and sometimes followed) there was no editorial intervention in the text and all the authors were encouraged to use the reports as a platform for their personal judgements, to the extent that they wished to do so.

Comprehensive Approaches

Holman, Fergusson and Mitchell (1991) put the proposition of a new approach to transport planning quite plainly:

“If the environmental challenges of the twenty-first century are to be adequately met by the transport sector, it seems essential that a more balanced and integrated policy should be adopted: one which encourages technical innovation; which discourages the most damaging practices; which enhances the role of public transport; and finally which sets some bounds on the rate of increase in travel demand.”

Jones (1990b) looked at the overall problems and pointed to the likely solutions for the future:

“Major cities throughout the world are experiencing a similar range of traffic related problems as a result of continual increases in traffic flows, brought about by growth in economic activity and rises in household car ownership rates.”

“In devising an overall transport policy for an urban area, there are three main means by which the level and patterns of demand for travel can be influenced:

- a) By using a combination of the traffic restraint measures on vehicle movement or access ... , together with parking controls.
- b) By providing a high quality public transport system, to provide an attractive alternative to travel by car to the city centre: some cities use this as their main weapon against the car.
- c) By encouraging dispersion of activity, both in space (eg decentralisation of wholesale markets) and in time (eg introduction of staggered or flexible working hours).”

The paper by May (1990) dealt specifically with integrated and balanced policies:

“...the need to find solutions which perform well against a range of assumptions and which are consistent with a range of policy and financial contexts, rather than necessarily choosing the strategy which performs best against the most nicely future.”

“It is clear from their approach that the current series of Integrated Transport Studies (London, Birmingham, Leeds, Bristol, Edinburgh) differ markedly from the 1960s land-use transport studies. This new approach should enable transport strategies to be developed rapidly, not just for the conurbations which are already active, but for larger and smaller freestanding towns, and for the more rural areas which are coming under increasing pressure. It will be important for the Department of Transport at least to recognise and preferably to encourage this process.”

And M. Buchanan (1990):

“Three broad types of policy will be available to handle the problems of transport in towns in the next century; policies of capital investment, control and pricing.... The problems which the transport policies will need to address in the next century therefore seem likely to include the increasing demand for travel caused by rising incomes and car ownership, continuing traffic congestion, the need to expand the road and public transport infrastructure as towns develop, concerns about those left stranded without cars in a society which has come to depend so much upon them and the environmental problems identified 25 years ago in *Traffic in Towns*, but now overshadowed by new concerns about the effects on the global environment.”

Alternatives to Traffic Growth

Plowden (1990):

“The guiding principle of a rational transport policy should be to provide good access to other people and facilities while minimising the need to travel and, in particular, the need to use a car...”

“Within transport itself, the most important requirement is the reform of the rules for using the roads to take proper account of the external costs of using motor vehicles.”

An attempt to look at the scale of future problems of public transport was by Hill and Rickard (1990), writing about demographic trends:

“The analysis of travel behaviour and future trends in travel market segments suggest strongly that the public transport industry is facing a major change in its market over the next twenty years. It is not sufficient to assume that demand can be predicted by applying standard elasticities and trends to an existing market segment. The effects in coming changes in population characteristics are both substantial and very complex.”

“Demographic change over the time horizon of most transport projects, is sufficiently important that it needs to be taken into account at all stages of the planning process.”

Mogridge (1989) argues for improved public transport.

“Buchanan (1963) was exactly right when he said twenty five years ago that the ‘public’s understanding of the position’ was crucial ... The public must be convinced that it is in the interests of all, that dedicated road space be made available for public transport in the centre of the city where necessary and as an additional benefit to the emergency services.”

“The particular way in which public transport should be improved is a design problem particular to each city and its existing mix of road and rail services. It will probably include a shift of current road space from the car to the bus or the tram, so that they can in effect, run on segregated track. Such segregated track on roads could easily be made available for the emergency services. Fire, police and ambulance services would thus be guaranteed a fast route avoiding traffic congestion and jams.”

Nash (1990), discussing rail:

“We take it as given that there is increasing road congestion and increasing concern about local and global environmental effects of road transport, as well as concern to maintain a reasonable alternative for those without a car available. The question is what part rail transport can play in solving these problems in a cost effective manner.”

“Rail services have a great potential to contribute to the solution of congestion and environmental problems. If we want to maintain the existing city structure in the face of growing car ownership and without major urban road building, then a package of measures is necessary. These will include restraining the use of cars and the provision of an attractive alternative so that trips are not simply switched to out of town developments. Some might argue however, that a major decentralisation of facilities permitting widespread use of cars is exactly what is required.”

Hillman (1990) writing about walking and cycling stresses the contribution that they can make.

“This [global warming and carbon dioxide emissions reduction] is very likely to be a key policy agenda item for the 1990s. One of the most obvious ways of achieving this will be by promoting walking and cycling and at the same time reducing dependence on cars and lorries. Indeed, any attempts to formulate a coherent transport policy for the future which does not incorporate walking or cycling as key modes of transport, let alone placing these modes at the centre of that policy rather than at its periphery, is doomed to failure.”

White and Doganis (1990) writing about long distance travel looked at the scope of shifting the balance away from road and towards rail:

“Considerable scope for modal transfer to rail can be identified. Given the growing congestion on some road links, long-distance car journeys for which the ultimate destination is in a city centre or other area with good public transport access, users can be encouraged to use park and ride terminals, located near their origin.”

Traffic calming was the central concern of two papers, and each relate their discussion of recent trends and future directions in these terms. Hass-Klau (1990a) shows the centrality of the ideas behind traffic calming to future policy directions:

“The German planners, but also increasingly the population at large, are starting to understand that German cities can not be built for motor traffic without losing their character and their identity. Maybe one could argue that not very much has been achieved, but 15 years of rethinking are not long for a mode which has been worshipped for more than 60 years.”

“There is no doubt that the growing connection with Europe will help implement traffic calming on a larger scale in Britain despite its more conservative tradition in changing rules and regulations. The pressure for change will simply be too strong and the time to solve transport problems with large road building programmes is surely over, even in Britain.”

On the other hand Roberts (1990) describes an ‘ultimate irony’ in a transport ministry supporting traffic calming.

“The fact that parking spaces often increased after such a measure suggests chicanery: the deft touches of green disguise the accommodation of additional cars...All palliatives are just that; when they are introduced they attract attention at a level quite beyond their real importance...”

(It might be commented that this argument, proved to be somewhat controversial with other authors).

Wright and Huddart (1990) are concerned with congestion:

“A central issue in transport planning is the need to deal with the growing traffic congestion problem and its consequences. If the present growth in car ownership and use continues, traffic jams are likely to increase in frequency and extent, particularly within the central areas of major cities. It has been hypothesised that unless something is done, ‘superjams’ will effectively paralyse city centres for long periods of the day.”

“In view of the potential seriousness of the problem, it is surprising how little effort is being devoted to finding solutions. More research to determine the best way of using traffic engineering techniques to protect against catastrophic congestion and to assist in the recovery from a catastrophic traffic jam once it has occurred, will clearly be beneficial.”

Young, Polak and Axhausen (1990), dealing with parking policy:

“... this discussion of urban objectives indicates that parking policy and the major urban issues should be considered together. Parking policy can assist in obtaining equilibrium between the provision of transport and the allocation of land uses. However, the complexity and dynamic character of an urban area ensures that the interaction between parking policy and urban goals is likely to result in some conflict. Resolution of this conflict requires sensitive and informed decision making.”

Road Building

Hills (1990) also comments on the possibilities for road building solving congestion problems in cities:

“In the U.K. the ‘standstill’ position would require the equivalent of 150 miles of 6 lane dual carriageway to be completed every year....The main worry about this program designed to ‘build our way out of congestion problems is that it applies only to trunk roads and motorways. As, overwhelmingly, journeys start and finish on local roads in towns and cities, urban traffic congestion will (if anything) be made worse, not better by this expenditure.”

Crow and Younes (1990) in a study of the effect of constructing the Rochester Way Relief Road in 1988, conclude that:

“The road is operating well and its planned expectations have been realised In every respect....the new road has relieved most other roads in the vicinity....brought environmental improvements for a very large number of people....and there can be no doubt at all that its construction has been entirely worthwhile.”

Their conclusion proved to be controversial. However, the authors themselves did make an important caveat.

“The forces suppressing the growth in radial movements, such as inner London congestion and parking controls, have remained unchanged and unaffected by the new road. Its principle effect therefore has been to divert traffic from other routes and to redistribute the pattern of journeys...a deliberate decision was to limit the size of the new road....because of the limited capacity of adjacent routes.”

Cooper (1990), writing about freight saw problems wider than simply road building:

“As road building slowed in the 1980s, congestion has increased; the new construction plans announced by the Government in 1989 will not provide substantial increases in road capacity for some time yet. At the same time there are concerns voiced over the cumulative effects of road building, principally that road building does much to generate new traffic and does not simply solve existing congestion problems.”

“The question is whether government should use policy instruments to influence the locational decisions of companies, with the aim of reducing their demand for freight transport.”

“Freight transport faces major new challenges in respect of environmental protection and the scale of this prospect is one that operators and users of freight transport services are only just beginning to appreciate.”

Road Pricing

Road pricing attracted considerable support, but from different perspectives. Hills (1990) puts the case for road pricing:

“With the highest possible investment in new roads and the lowest likely assumptions for future growth, traffic congestion is almost bound to get worse before it gets better, in the absence of any overall pricing restraint.”

“Even if a political consensus existed in favour of a massive and sustained road-building programme, investing in new highways merely to ‘keep ahead’ of traffic growth would not be an economically sound strategy without a proper pricing system being applied to the extra traffic.”

“Certainly, it is hard to conceive of a pricing system which is less equitable than the one we have now.”

But he points out the assumed concerns of the public:

“Public opinion [to road-use pricing] is clearly influenced by how seriously congestion is viewed. Unless the public perceive the current level of congestion as an endemic problem not soluble by other means, then they are likely to object to user charges as ‘yet another tax on motoring’.”

Starkie (1990) takes a more classical economic approach:

“The pricing system for the use of roads is grossly inefficient and this leads to the basing of investment decisions on a confusing cocktail of ‘standards’ and cost benefit analysis.”

Hibbs (1990) sees the problem from a more market-oriented perspective. He supports road pricing, but not in the way envisaged by many of the authors. His idea is that paying the marginal social cost of car travel would allow each mode to compete successfully on the open market.

“For as Hayek reminds us, the administrative solution leads inevitably to coercion; the market leads to freedom of choice. Partial, perhaps, but let us not permit the best to be the enemy of the good.”

“Given that the market solution is to be preferred, then the underlying problem of an imperfect market in urban land must be tackled. The ownership of the transport infrastructure requires radical change, so as to enable a market for its use to emerge. Road use pricing, and a rational funding policy for land for rail transport, must go hand in hand; as they do, the effectiveness of the market as a means of allocating resources to private and public transport will be rapidly improved. And the consequences of this for the sustainability of a market for public transport will be substantial.”

“Indeed, it is not unreasonable to conclude that the only satisfactory solution that will provide both efficient and effective public transport, without coercing the individual, is one in which the public transport industry becomes market oriented and committed to customer satisfaction.”

Huddart, however, in a separate note, simply described road pricing as an idea whose ‘time would never come: support is strong, but not unanimous’.

Safety

Mackay (1990) and Silverleaf and Turgel (1990), writing about safety issues commented about the role of safety in overall transport policy. Silverleaf and Turgel:

“Neither total safety or total security is possible. However considerable efforts are made to reduce the risk of accidents and of attacks on travellers and freight)^ and to minimise the effects of those which do occur. High levels of safety or security require a comprehensive approach. This has three complementary aspects - high quality equipment; the education and training of all groups of transport users in safe behaviour; and the firm enforcement of mandatory regulations and other rules.”

“Because of the varied character of road traffic and the scale and diversity of road traffic accidents, any simple, overall approach to road safety is inadequate. The practical approach has to be a wide range of complementary preventative and protective measures, each designed to counter the specific factors which contribute to groups or types of accidents.”

And Mackay:

“When approaching a congested intersection, drivers, pedestrians and cyclists subtly co-ordinate their activities in a way difficult for an observer to discern. Thus an informed and responding public is a crucial factor. However, there is a school of thought which maintains that government and corporations have an equal or greater responsibility for the safe working of the road transport system.”

Consensus

Not all authors see a consensus of opinion. Tyson (1991) sees a partial consensus:

“Although the policy choices appear extreme and there may be little consensus on which option to adopt, there are important elements of consensus emerging in the transport policy debate. These are the arguments that:

- Something is wrong in the transport sector.
- Transport problems are serious and likely to get worse.
- There is no ‘do nothing’ solution.

There may also be agreement that the two extremes of a totally free market and total central control are unlikely to produce solutions.”

Some remain pessimistic about prospects for the future. For instance, Headicar (1990):

“The transport Rubicon still to be crossed is the political resistance to any explicit control of private car use. The Government’s pronouncement that ‘difficult choices will have to be made in the long run’ means in effect that they are never likely to be made. In the long run the process of motorisation will be complete and the pattern of activity and development will have to be altered so that no basis of transportation other than the private car will be practicable. In the long run there will be no choices left to be decided on.”

Banister (1989) points out that while the consensus may produce policies which will work for cities, the situation in the outer suburban and rural areas may have to be different.

“Ideally, car owners should be persuaded to leave their cars at home and use public transport, but this hope is unrealistic as car owners will continue to use their cars wherever possible, even when they accept that the location they are visiting would be even more attractive if there were no cars there - this is the conflict between self interest and a broader social interest.”

Hallett (1990a), discussing the results of a public opinion survey points to public views on the new approach to planning:

“Most people recognised that there were many problems associated with traffic. Eighty-five per cent of respondents, for instance, agreed that existing roads would not be able to cope with the increase in traffic forecast to occur by the year 2000. Seventy-nine per cent also agreed that traffic fumes were a major contribution to environmental problems. Thus there appears to be a recognition of the problems caused ...”

“... the impression gained from the results of this survey is that congestion and other traffic related problems are set to increase and that there will be some voluntary

reduction in traffic as the problems intensify. However, the level of attachment of most people to their cars is such that it will take some positive action from outside to force any real reduction in traffic and that this positive action will have most impact if it hits people's purses directly."

The Public Response to the Changing Situation

Public opinion, or the perception of it, is of great importance in transport policy. One of the strongest arguments against measures to restrict car use is that 'people would not accept it'. However, there has recently been evidence that many no longer see the car in the same light as they might have done twenty years ago. It should be pointed out that the events that have changed public opinion may not be those that have changed professional and institutional opinion. It is more likely to be the individual experience of difficulty in using a car.

The last two years have seen a large number of public attitude surveys in the U.K. dealing with traffic problems and counter measures, which generally give a consistent picture. Table 7.1 shows the proportion of people in agreement with various statements about traffic, congestion and the environment. Eighty-five per cent thought that existing roads would not be able to cope by the year 2000. An indication of the changing situation with regard to the environment is that in 1989 a Department of the Environment survey reported that 73% were "worried" or "very worried" about traffic exhaust fumes compared with 60% in 1986 (CSO 1990b).

Table 7.1 - Opinions on transport issues, 1989

	% agreeing or strongly agreeing
Growth in traffic is a sign of a healthy economy and should be encouraged	23
Traffic is increasing so fast that existing roads will not be able to cope by the year 2000	85
Traffic fumes are a major contributor to acid rain and other environmental problems	79
It's not the drivers fault that roads get congested	48
People without cars suffer because modern life is geared towards those with cars	58

Source - Hallett (1990a)

Attitudes to measures to combat transport problems

Our survey asked people whether or not they agreed with various measures which would help deal with congestion. The answers are summarised in Table 7.2. The only measure which had more disagreeing than agreeing was that of charging motorists to enter busy areas. The two measures which had the strongest agreement and very little opposition were ‘encouraging walking and cycling’ and ‘improving bus and rail’. Interestingly ‘building more roads’ was less popular than ‘banning cars from central areas’, ‘enforcing parking controls’ and the improvements to public transport, walking and cycling.

Table 7.2 – Agreement with measures to deal with congestion

	Agree or strongly agree	Disagree or strongly disagree
Encouraging walking and cycling	77	10
Banning cars from central areas	69	18
Improving bus and rail	84	6
Charging drivers to enter busy city areas	38	45
Building new roads	64	19
Enforcing parking controls	66	14

Source Hallett (1990a)

Table 7.3 compares support for nine different policies across eight other surveys collated by Jones (1991). This table needs to be interpreted with extreme caution, since the precise options presented varied from survey to survey as did the context (eg in some cases the question spelt out the advantages and disadvantages of a policy). Nevertheless, there is a striking degree of agreement between the different surveys.

Table 7.3 - Support For Different Policies to Reduce Traffic Congestion

Percentage of sample, or ranking in list

	A	B	C	D	E	F	G	H
A. Provision of park and ride services		91		59				
B. Improving/subsidising bus and rail schemes	86	88	63	48	1st	1st	86	65
C. Encourage car sharing/pooling		81		37				
D. Encouraging walking and cycling	77		73	33				
E. Banning/restricting cars in central areas	69	71	70	26		2nd	67	39
F. Enforcing parking controls	66		74			3rd		
G. Building new roads/motorways/car parks	64	49	47	23	2nd	4th		47
H. Charging drivers to enter busy city centres	38	29	27	14			32	30-55
I. Taxing petrol more		21		4	3rd		4	

Key to surveys

A TSU Survey 1989

B Royal Automobile Club, Autumn 1990

C Consumer's Association, May 1990

D Lex Report on Motoring 1990

E Daily Telegraph Survey, June/ July 1989

F Civic Trust: UK Audit of the Environment 1990

G Association of London Authorities, March 1990

H Metropolitan Transport Research Unit, August to October 1989

Taking Tables 7.2 and 7.3 as a whole, we find that there is strongest support for policies that provide alternatives or supplements to car use: park and ride schemes, public transport improvements, encouraging walking and cycling. Next come traffic regulations: better parking enforcement and new restrictions on cars entering central areas, which generally have majority support. Support for more road building is expressed by about half the population, but also has a sizeable proportion against, as well as for.

The introduction of some form of road pricing in inner/central city areas is generally supported by only a minority (typically a quarter to a third); and a general increase in petrol tax is regarded with least enthusiasm. An exception to this national picture can be found in London, where a detailed survey into traffic restraint in central London found more support for road pricing.

There appears to be a great deal of public concern about the problems brought about by the increase in road traffic and a good measure of agreement on what people feel should be done about it. There is strong support for policies that increase travel choice: park and ride, car sharing, improved public transport services and better facilities for walking and cycling. Road building is not considered as important a method of solving the problems as the above mentioned policies.

The Impact of Environmental Concerns

Many of the policy discussions described earlier were conducted essentially in terms of the traditional objectives of transport policy - congestion, movement, efficiency etc. In the late 1980s, however, the nature of the argument was radically transformed by concern about environmental questions of a much broader significance than transport, i.e. the effects of human activity on global warming, acid rain, entire ecological systems, threats to individual health and life and possibly to the survival of human societies.

Perhaps the most important Government initiative was the Department of the Environment's publication of the Pearce Report on Sustainable Development. This spells out the 'polluter pays' principle applied to the services provided by natural environments. "*Environmental goods and services are not bought and sold in the market place. Thus if we leave the allocation of resources to the unfettered market, it will tend to over-use the services*" The Report advocated a comprehensive system of actual or notional prices to be applied to the environmental costs of pollution, use of finite resources, loss of amenity, disappearance of species. Among the emerging evidence concerning transport and environmental concern were the consequence of technical solutions to solve the environmental problems related to vehicles.

Solutions were studied in relation to technical improvements to vehicles, alternative fuels and switches to public transport.

Table 7.4 - Possible energy savings from technical improvements to vehicles

Making engines more efficient to reduce fuel consumption	Ongoing research. Estimates of possible improvements of about 15%
Reducing fuel consumption by means such as speed reduction	Speed limit fall to 80kph would produce saving of about 6%
Converting the emissions from engines into less damaging by-products	Catalytic convertors will reduce most but produce others and keep CO ₂ levels high. Only work when engine is at full temperature.
Developing and using fuels which produce less dangerous by products	Petrol is a relatively clean fuel. Methanol is probably cleaner. Non-polluting electricity production is a long term possibility.
Reducing the amount of motorised travel by encouraging switching of modes	Buses are about half as polluting as cars per distance, but only some journeys could be made by public transport. Walking and cycling instead of car driving could reduce the number or short car journeys.
Reducing the amount of motorised travel by land use measures	Facilities could be located closer together. People would have to be encouraged to use local facilities

Source - Holman, Fergusson and Mitchell (1991)

Motor manufacturers have been improving vehicle efficiency for several years, with new small cars providing over forty miles per gallon of fuel. Scope for improvement involves using 'lean burn' engines, direct injection of fuel, electronic engine management, vehicle weight reductions, and several others. Figures of up to one hundred miles per gallon for petrol engines are not unreasonable, *given several years development*, with an implied saving of 60% on carbon dioxide production by transport.

There are several alternatives to using petrol as a fuel for transport. Holman, Fergusson and Mitchell (1991) analyse the pros and cons of each viable source in turn, and the main limiting advantages and disadvantages are summarised in Table 7.5.

Table 7.5 - Summary of aspects of alternative fuels

Fuel	Advantages	Disadvantages
Methanol	Powerful yet emit less CO ₂ than petrol and petrol vehicles can be converted	Engine has to be waterproof. Problems in cold weather. Increases in Nitrogen Oxide and Formaldehyde emissions
Ethanol	Less Carbon Monoxide	In UK problems of land for production of sufficient quantities. Increase in Carbon Dioxide and other pollutants
Electricity	Much development already. Large reduction in local pollution. Fuel efficient in stop-start traffic conditions	Battery technology needs developing. Current electricity production produces pollutants.
Hydrogen	Fuel efficiency	Production, storage and safety problems.
Natural Gas	Better safety and air pollution	Heavy and bulky tanks in cars
Liquid Petroleum Gas	Lower levels of pollution	Safety considerations
Fuel Cells	In theory, offer greater energy density than batteries	No practical fuel cells available

Source - Holman, Fergusson and Mitchel (1991)

Of all the carbon based fuels petrol is one of the cleaner fuels. While some others produce less carbon dioxide, most produce other chemicals which are known to be, or are likely to be harmful. Holman et al conclude that electricity offers the greatest scope for a low polluting motorised vehicle, but point out that current electricity production methods are as least as polluting as petrol engines. Electric vehicles also use no fuel when stationary, which makes them more economic in congested traffic situations.

Many argue that nuclear power can provide non polluting electricity, arguing that it is historically safer than coal mining and other energy production methods. Opponents argue that its safety is not proved and that the problems of waste disposal and radiation leaks are likely to grow in the future. The current economics of production make it very expensive. It is argued that it has developed mainly because of its interest to scientists and its relationship to the defence industry.

Other renewable forms of electricity production (solar, river based hydro electric, tidal, wave and wind power) have been developed to differing extents. There have been arguments over the economic viability of these, as well as over nuclear power. A change in the economics of fossil fuel production could alter the debate.

Measures to reduce the pollution output of currently used engines involve the use of fuels with specific pollutants removed (e.g. unleaded petrol) and devices such as catalytic converters which contain metals which act as a catalyst to start chemical reactions to convert gases. Platinum and palladium convert unburned hydrocarbons and carbon monoxide into carbon dioxide and rhodium converts oxides of nitrogen and hydrocarbons into nitrogen and water.

Unleaded petrol has already greatly reduced the amount of lead in the air and near roads. However other elements are used instead (such as potassium) which are thought to be dangerous to health in different ways.

Catalytic converters can make a substantial contribution to reductions in toxic chemicals, but they slightly increase the output of carbon dioxide and only work fully when engines are fully warm (after about five miles of travel). As about 50% of all car journeys are less than five miles, a substantial proportion of car travel will be done when the converter is not working properly.

The effect of switching to public transport

Various authors have made calculations of the likely savings in energy use that could be achieved by a switch from private to public transport and are reported by Howard (Transnet, 1990) and are summarised in Table 7.6.

Table 6.6 Energy and CO₂ savings from intermodal shifts (Passenger Transport)

Author(s)	Assumptions	Energy or CO ₂ saving
Maltby et al	Transfer of 50% of urban work trips by private vehicles to bus services	8-12% energy saving
ETSU	10% transfer from car to public transport	5% energy saving
Earth Resources Research/ World Wildlife Fund	Number of passengers on buses and trains double	15% CO ₂ saving
Hughes and Potter	Car use reduced by 5-10%	5-6% (short term) 12% (long term) CO ₂ saving

Source Howard, 1990

Government Thinking

One of the key turning points in bringing these global questions effectively into transport discussions was a Conference of the Ministers of Transport of nineteen European countries in November 1989. The conference was chaired, as it happened, by Britain, in the person of the then-Minister Michael Portillo and received a series of expert reports on the extent to which transport was an important contributor to environmental pollution.

These papers described the transport sector as one of the major polluters and also as one of the most rapidly growing sources of these pollutants, mainly (though not exclusively) due to increases in private car ownership and use. In other words, the same social developments which were most closely bound up with the problem of congestion, were now perceived also to be a major cause of environmental impacts.

It is not surprising therefore that policy remedies that had already emerged in the discussions about congestion should re-emerge as priorities in discussions about pollution. The European Conference of Ministers of Transport adopted (unanimously) a resolution which went considerably further than any previous multi-national statement of its form and which indicated a number of emphases that had not previously been very apparent in British Government thinking, including:

“..Governments should review the use of taxes and/or regulations for motor vehicles to ensure their consistency with the goal of reducing fuel consumption and emissions....”

“..a full range of possible measures that can be taken to reduce transport’s contribution to the “greenhouse effect” be set out together with the costs and practical problems of implementing them..”

“...that traffic management be used to further environmental objectives in transport policy, both in relation to demand management and in relation to changing modal split”

“..it is necessary, in accordance with the ‘polluter pays’ principle, to introduce systems of supplementary charging for environmental damage caused..”

“...that effective and acceptable means of reducing the use of the private car in urban areas need to be applied..”

“..that assessments of infrastructure investment proposals should include traffic and environmental evaluations of the alternatives, including .. extending railway or other public transport infrastructure and that of not building the infrastructure.”

Of course, it is often easier to achieve unanimity in a conference resolution than to apply it in reality and a number of difficulties and differences arose. Some of these became apparent at another conference, organised in London in May 1990 by the World Wide Fund for Nature (WWF), a body whose main concerns had been symbolised by the panda with which it is identified. The conference was on vehicle emissions and the greenhouse effect, and Cecil Parkinson, Secretary of State for Transport at the time, gave the opening address. In his statement four points in particular are worth noting in addition to the important point that the speech itself, and its tone, were certainly treating this question as a serious one:

“First, a strong emphasis that the UK alone and the transport sector alone, could not solve the problem.

Second, a recognition that measures that can be taken to clean up vehicle emissions (e.g. catalytic converters) often do so at the expense of increased fuel consumption - and that makes carbon dioxide emissions, which cannot be ‘cleaned’, worse.

Third, a tone of enormous caution in relation to anything which would generate the political hostility expected from car restraint, or the economic inefficiency expected from public transport subsidies.

Fourth, a suggestion that in some circumstances new roads can reduce pollution because freely flowing traffic uses fuel more efficiently than in the stop-start conditions of heavy congestion.

Each of these points commands considerable respect, though some other participants in the conference - and indeed, in the debate generally - felt that their combined effect might inhibit rather than assist in new initiatives. In particular, another line of argument put forward by Fergusson among others, was that the expected growth in traffic would overwhelm any advantages to be gained from improved technology, so that the ‘Technical Fix’ solutions at best gave a modest breathing space until about 2000 or 2005?”

This Common Inheritance (The Environment White Paper 1990)

The next major landmark was the White Paper ‘This Common Inheritance’, published in September 1990 by eleven Government departments, including Transport and led by the Department of the Environment (1990). At the early stages of preparation of this White Paper there had been some media attention to comments by the Secretary of State for the Environment, Chris Patten, about the Department of Transport’s traffic forecasts, leading to an expectation that the Department of the Environment might distance itself in some way from an ‘unacceptable’ future of massive increases in car ownership and road provision. In the event, Parkinson had already made it clear that ‘the forecasts are not a target it is not the Government’s aim to cater for all forecast demand in all circumstances there will be cases, for example in city centres, where on economic or environmental grounds- or indeed both - it is neither practical nor desirable to meet the demand by building new roads,’ and the anticipated battle did not occur.

But the White Paper did, nevertheless, give clear indications of a further shift in Government thinking. The document, it should be said, is nearly three hundred pages long and naturally shows signs of the different emphases in the different departments of state who had a hand in its drafting. But the sections on transport, especially those in Chapter 8 on ‘Towns and Cities’ show that Government statements are not so far away from the sort of consensus observed to be developing last year at a local level, as some commentators had assumed.

A ‘Balanced Policy’

Possibly the most important aspects were those which derived from a further clarification of the idea of a ‘balanced transport policy’. In its origin, the idea of ‘balance’ had recently been used by Government spokesmen as a convenient way of differentiating Conservative from Labour approaches, Labour having used the word ‘integrated’. But both words have a similar property of emphasising the interactions of different elements of transport policies which might otherwise be pulling in different directions. Thus the White Paper made an elementary (but vitally important and often ignored) connection:

“Providing parking for more cars than the roads can cater for contributes to congestion.” (8.13)

and stated:

“It is simply not possible to cater for unrestricted growth of traffic in our city centres, nor would it be right to accept a situation in which traffic congestion found its own level, with inefficient use of road space and increased fuel consumption.” (8.20).

The approach advocated was:

“..taking pressure off unsuitable routes and allowing environmental improvements, together with improvements to traffic flow on the strategic road network and improved public transport with greater priority for buses....in most cases it does not make economic or environmental sense to increase capacity on roads leading into already congested areas simply to facilitate additional car commuting.” (8.11)

Concerning road pricing, there was no great enthusiasm, but also a clearly deliberate refusal to give firm rejection:

“Eventually it may be necessary to consider rationing use of road space by road pricing, but this approach is largely untried and there would be difficulties in ensuring an enforceable and fair system.” (8.20)

A month later, in October, the Departments of the Environment and Transport announced a joint research project to investigate ways of using development and other policy levers to reduce the amount of travel, especially by environmentally damaging methods of transport, in order to reduce carbon dioxide emissions, Chris Patten said:

“We need to guide new development to locations which reduce the need for car journeys and the distances driven, or which allow people to choose more energy-efficient transport - public transport, bicycles or walking - as an alternative to the car.”

Principles of the New Consensus

Since the publication of the revised road traffic forecasts, there developed a radically new situation. The new feature was that, for the first time, there grew a universal recognition that there is no possibility of increasing road supply at a level which approaches the forecast increases in traffic.

That is of central importance, because it logically follows that:

- a) Whatever road construction policy is followed, the amount of traffic per unit of road will increase, not reduce; i.e. all available road construction policies only differ in the speed at which congestion gets worse, be it in intensity or in spread.
- b) Therefore demand management will force itself to centre stage as the essential feature of future transport strategy, independently of ideology or political stance.

Putting together the changes reported in this Chapter, it is possible to identify five areas of principle on which new policy directions can be built.

First, there is now a recognition of the need to look at the problem as a whole, not in its separate component parts. This would proceed from the highest level of national economics policy and include longer term land use planning trends as an essential background to transport decisions. The *idea* of a unified approach which recognises such interactions is now less controversial than it has ever been and more widely recognised, being called variously ‘integration’, ‘balance’, ‘cohesion’, or a ‘packaged’ approach.

Secondly, it follows that consistency of treatment between modes (a ‘level playing field’) is especially important. Each mode, each sector, each geographical area should be considered in relation to its effects on other modes, other sectors and other areas, by a common set of objectives, ground rules and financial regimes.

The third element of the emerging consensus is acceptance of the impossibility of catering for all the potential desires of traffic movement. Where increases are provided for, they should fit in to an overall strategy in which reductions in specific traffic levels are also involved and where a safety margin is deliberately maintained between maximum capacity and the amount of traffic.

The fourth principle of the new consensus is a professional recognition that human factors and an understanding of travellers' motivations, are key elements of a successful transport policy. It is no longer possible simply to devise technical solutions and impose them by force of logic or political power on a resentful, but acquiescing population. Such policies will not work.

The fifth principle emerges as a softer response from those who are uncomfortable about 'going all the way' with the implications of road pricing. With complete reliance on a market approach, one simply lets the market decide which journeys are still made and which are deterred. But cutting across this, wherever planning tools are used, are distinctions between more and less favoured classes of traffic, often described as the difference between 'essential' and 'non-essential' traffic. This is difficult and inevitably somewhat arbitrary, but in practice at the moment there appears to be a surprisingly broad measure of agreement that some ways should be found to give priority to emergency services, freight deliveries, high capacity transport systems (buses, light rail etc.) in congested conditions and a limited number of needy groups, e.g. disabled travellers.

CHAPTER 8

COMPONENTS OF THE NEW REALISM

Given the problems posed by the inability of the supply of roads to meet the predicted demand for road space and the problems faced on environmental grounds, we can now ask what can reasonably be achieved in transport policy. Two main objectives may be defined:

- To match demand to supply, given the infeasibility of comprehensively matching supply to demand.
- To encourage the use of environmentally beneficial and economically efficient methods of achieving personal access and freight distribution.

To these objectives we add a constraint: it will only be possible to achieve such objectives if the policies offered are capable of making life better, not worse. Otherwise, there is little chance of political support.

This Chapter looks at various elements of policy that have been suggested to solve transport problems. Firstly we look at policies which deal with the demand for travel and the style in which it is carried out; land use policies, traffic calming, road pricing and traffic management. Secondly we look at changes required to individual modes including improvements to public transport, walking, cycling, private cars, lorries and other road users. Finally, we look at the building of new roads.

Land Use Planning

In Chapters 3 and 4 we discussed ways in which the location and size of facilities has altered over the years and how most of these changes have led to longer distances being travelled.

Economies of scale often favour larger facilities and if transport is no problem users often prefer the wider range of services and cheaper prices in larger shops, schools, hospitals and leisure facilities.

But these patterns of development do not lend themselves easily to travel other than by private car. One of the most important changes therefore has to be concerned with making cities pleasant places to be. It is the desire of people to live outside cities that has caused the spreading of transport problems. Transport has not been the key reason for this desire, but if cities can become pleasant, safe places, people might not wish to put themselves in situations where they need to travel so much. Traffic calming and related design tools could improve this situation, but only in conjunction with other urban policies.

The use of land use planning will be vital if the problems of congestion and energy use are to be solved. The actual direction we need to go in is fairly clear. Journeys need to be shorter and there needs to be less reliance on polluting and congesting modes of travel. To do this in a relatively painless way requires that facilities are sited closer to people. Post Offices have been sited regularly over urban areas to allow for easy accessibility in the past and there may be scope for increasing the number of activities which can be carried out at the local level.

Land use and transport planning have usually been linked in institutional terms (in the joint Department of Environment and Transport in the 1970s and in most county level local government organisations). The separation of these aspects in recent years may be seen as one of the reasons for the accelerating perception of a need to link the two, although the global environmental problems of the last few years has widened the concern.

Traffic Calming

The term traffic calming is Hass-Klau's suggested translation of the German 'Verkehrsberuhigung'; we follow her analysis of its development here.

Traffic calming is derived from four roots:

- In Britain, the concept of 'environmental traffic management' discussed by Colin Buchanan in 'Traffic in Towns' (Ministry of Transport, 1963) and which in turn built on the work of Tripp and others.

- In the Netherlands, the application of ‘Woonerven¹’ in an attempt to restrict maximum motor vehicle speed to walking pace and improve the living quality of a neighbourhood¹.
- In Germany, the application of pedestrianisation schemes which initially imposed access restrictions for service vehicles, cyclists and even public transport other than light rail.
- A growing awareness by residents and inhabitants of the negative effects of road building, on the environment, the destruction of valuable buildings and the destruction of neighbourhood communities.

Traffic calming is seen as an attempt to mix different transport modes, creating a ‘peaceful coexistence’ between them, the extent of which will vary according to the character of the built-up area and road.

However, there is no accepted definition of traffic calming throughout Europe, Most Central European experts use the term, but their interpretations are both vague and varied.

In the narrow sense, the traffic calming concept has three main objectives:

- To reduce the severity and number of accidents in built-up areas by reducing the speed of motor traffic to 20 mph. This is normally achieved by changing the physical layout of the road. For example, chicanes, woonerven, road humps parking at right angles, speed tables, road narrowing, extra bends etc.
- To reduce air and noise pollution. This can be achieved for example by forcing drivers to drive more calmly using physical measures as above. Research has shown that the higher the proportion of acceleration, slowing down and braking, the greater the amount of air pollution is produced.
- To improve the urban street environment for non-motor users and to reduce the car’s dominance according to the street type. Examples include well designed bicycle paths, adequate and uncracked pavements, trees, flower beds, benches or playground facilities.

¹Woonerven, or ‘residential yards’, were the beginning of a new type of street design which permitted the coexistence between children playing and car use in urban streets. Dutch engineers, planners and designers showed that with specific design measures such as speed humps and trees at the side of the pavements, the speed of vehicle traffic could be reduced. The idea was to avoid typical street separation between the pavement and the carriageway. Instead it was to be integrated into one shared surface.

But more generally, the aim is to create a society in which motor vehicles lose their dominance in those situations where they have become a nuisance and a danger. This implies the use of many traffic restraint measures like road pricing and the control of parking facilities for particular types of user.

Hass-Klau (1990a) adopts the following general definition, viewing traffic calming as the key to a whole new approach in transport planning and policy:

“Traffic calming is the combination of transport policies intended to alleviate the adverse environmental, safety and severance effects motor vehicles continue to impose on both the individual and society at large.”

In contrast the Department of Transport has interpreted traffic calming as an element in any transport policy and not as the overall transport policy itself. Thus traffic calming measures are described in terms of techniques and measures:

“Traffic calming is an expression used to describe techniques and schemes completed in the last few years on the continent of Europe and West Germany. It is applied to combinations of measures which are designed to reduce the speed and intrusion of vehicles particularly in residential areas, to create an environment in which pedestrians and cyclists feel safer.”

Until now, the main opposition to traffic calming has been from shopkeepers afraid that trade will drop (though in the event the opposite often occurs), sometimes from residents where loss of parking space results and from bus operators when badly designed schemes cause operating difficulties. A bigger argument may be on the horizon - the linking of much more extensive traffic calming schemes with the provision of new by-passes. It will be necessary to be sensitive to historical ‘passions’ and perhaps also necessary to develop a ‘British School’ of traffic calming that learns from, but is not completely dominated by, continental experience.

Here we seem to be at the beginning of an unexpectedly profound and important process. From a traffic engineering point of view, the objectives of traffic calming are fairly straightforward - a reduction in vehicle speed and a shift in the ‘balance of power’ from vehicles to pedestrians in terms of allocation and control of space. The techniques for doing so are well established. Small scale schemes affecting one or two streets at a time are in progress in very many places, with the majority being liked and continued. However, in the course of a general improvement in the attractiveness of streets which this can produce, there is emerging a rediscovery of the importance of urban space, excellence in design standards and a new sense of pleasure in the town itself. It is perhaps not a coincidence that the boundaries of the traffic calmed areas in some German city centres correspond with the whole of the original medieval town. It is also noticeable that the clutter and paraphernalia of street furniture necessary to control the use of cars is itself visually intrusive. Some signs of a second phase of traffic calming are appearing in Europe, in which street space, having been narrowed, starts to be opened out again. Traffic calming is therefore in part connected to a

movement in architecture which sees streets as places, rather than as routes, emphasising the importance of urban space and reclaiming the city as a place to enjoy. Ask an adult to draw a map of their home area and it will almost certainly be a road map. Ask a child and it may start with their house and the houses of neighbours and friends.

Road Pricing

The basic principle of road pricing is that users should pay the costs they impose on others. It is easy to demonstrate that this increases total economic efficiency, since only that traffic will arise whose benefits are greater than its costs. However, there are then two groups of losers - those who are paying more money, only partly offset by extra speed, and those who are now not enjoying a previously uncharged activity. The benefit arises from the revenue which is collected and from other specific groups, e.g. those with a higher value of time saving, or greater efficiency in their use of road space.

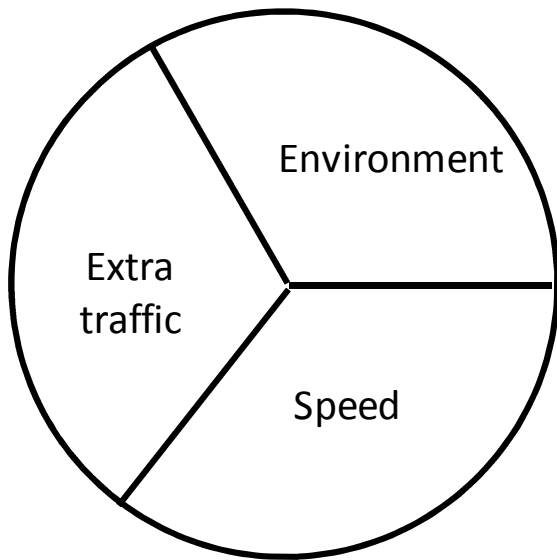
Realising the benefits will necessarily involve some degree of discrimination, either concerning the beneficiaries of expenditure or the direct effects on different classes of traffic. Until the question of discrimination is faced the benefits remain potential, not automatic.

As a result road pricing should not be seen as a completely new policy; it is a focus for strategic transport policy arguments related to those that have become familiar over the last twenty years. It is a very efficient focus because the undefined space in the argument can be filled with many different policies. Road pricing therefore can appear temporarily popular, because several different lobbies can support it, but they are each supporting something different.

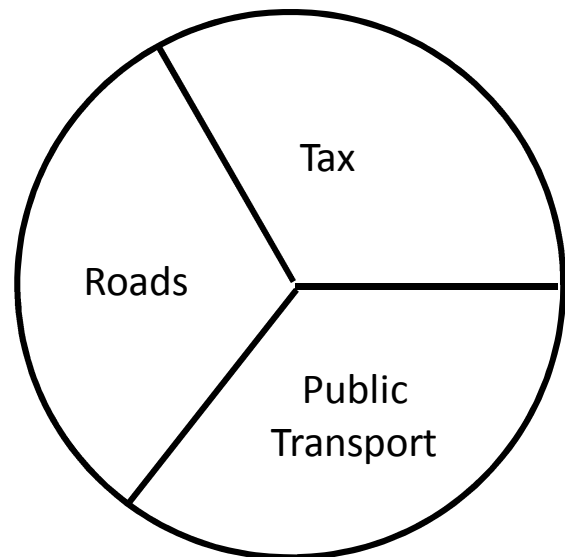
This can create the appearance of a potentially popular policy, in the middle stages of a political process. Early distrust turns to support as each interest group comes to realise the enormous advantages which would accrue when the potential economic benefits are applied to its favoured strategy. (Ideologically this is reinforced by the ease with which the road pricing can be implemented in accordance with market or social principles). But the closer a scheme comes to actual implementation, the more necessary it is to define the details - and then one or more of its supporters turns into a bitter opponent. The more they have been allowed to assume a particular mode of implementation, the more disappointed and antagonistic they will feel.

We have proposed that the benefits of road pricing can be obtained by recognising the legitimacy of the competing arguments and building them into scheme design from the beginning. We call this the 'Rule of Three' as shown in the Figure 8.1

Figure 8.1 – The “Rule of Three”
Allocation of the benefits of road pricing



Released road space



Net revenue

This argument proposes that the road-space which is initially released by road pricing could be used as follows:

- One-third reclaimed for environmental improvement, including pedestrian areas and non-transport uses.
- One-third used for extra traffic, attracted by the speed and not deterred by the cost. It would be appropriate to make arrangements for this to favour high-efficiency and high-occupancy vehicles.
- The remaining one-third for increased speed, especially at congested times, e.g. peak-period speeds to increase by 3-8 km/h. This will require the combination of pricing with other measures to reduce the tendency for traffic growth to offset any achieved speed increase.

The revenue could be partitioned in a similar way:

- One-third considered as general tax revenue, either to reduce existing taxes or to increase social spending in accordance with local or national priorities.
- One-third used for maintenance and possibly new road infrastructure, in locations again chosen in accordance with the varying national or local priorities. (The specific roads required will be modified by the existence of road pricing itself, and the effects of other policies).
- One-third used to improve the effectiveness of public transport, by a suitable combination of fare and service-level improvements.

This is an approach in which the freight, public transport, motor and road industries and the environmental, motorist, commuter, pedestrian and public transport lobbies all have something to gain. It should be made clear that in the period after the implementation of road pricing it is not realistic to assume that arguments about transport strategy cease. There will still be pressure to move the balance in favour of one group or another and shifts due to developing understanding of the relative importance of social economic and environmental objectives. The 'Rule of Three' is not at all a guaranteed long-term alternative to grappling with difficult questions of transport strategy, nor should it be. It is a procedure designed to be approximately fair, sensible and able to use the potential advantages of road pricing to produce a consensus which can allow it to be implemented. Without it, the future of road pricing could be a continual series of last-minute withdrawals.

It follows from this argument that the method of implementation has to be rooted very firmly in a local assessment of policy priorities. For this reason, it may be that the main initiative for schemes should come from local government, with the role of national government essentially being that of setting standards and establishing requirements, including a clear statement of the relationship between the local scheme and other local policies, and the proposed use of the revenues, and evidence of public consultation and support.

A Balanced Transport Policy with Road Pricing

If road pricing is implemented it reinforces the other elements of policy in the following ways:

i) Release of Road Space

- a) Overall traffic demand falls to an economic level reducing the pressure for new infrastructure.
- b) General traffic speeds increase giving some automatic benefits to remaining vehicles including deliveries, buses and emergency services.
- c) Reduced traffic levels give 'elbow room' to facilitate taking some road space away from traffic and using it for environmental improvements, pedestrian precincts and traffic calming and also to allow priority schemes for specific categories of vehicle where this is still necessary.

ii) Generation of Revenue

- a) Provision of adequate funds which can be allocated to public transport infrastructure improvements (e.g. LRT schemes or better interchange facilities) and reducing charges. (NB - road pricing is a user charge, not hypothecated tax revenue).
- b) Adequate funds for improved traffic management systems, enforcement resources, better maintenance and road surface quality, etc.
- c) If desired, a taxation element in the price can be used to reduce other taxation, either generally or specific taxes such as vehicle licence.

Therefore if there is a suitable road pricing system, it produces both the funds and the traffic levels which make it easier to implement the other parts of the package.

A Balanced Transport Policy in the Absence of Road Pricing

The 'with' road pricing case indicates the two main problems that would arise 'without', namely pressure on road space and availability of funds. If they are addressed, it is still possible to secure many of the benefits.

i) Pressure on Road Space

Free marginal use of road space tends to increase traffic levels up to the point where falling speeds are the binding constraint. In the absence of a price lever, this problem has to be handled by engineering, design and other restraint methods:

- a) Much more extensive use of priority measures (bus lanes, possibly lorry lanes, etc.) to protect the more efficient categories of road user.
- b) Integrated systems to discourage car use at both ends of the journey – e.g. control of the number of car parking spaces, more extensive traffic calming and pedestrianisation schemes.
- c) Proportionally greater improvements in public transport services and attractiveness.

ii) Sources of Revenue

In general, the problem is that there is a greater need for funds, but less access to them. This might be solved by:

- a) Greater public expenditure, at national or local level.
- b) Use of untapped special taxes, e.g. payroll levy on employers as in Paris.
- c) Use of other prices, e.g. revenue from car parking, or enforcement penalties, to cross-subsidise other schemes.

Note that the other major potential source of funds, increased charges to public transport users, would in the absence of road pricing be a movement away from the sort of balanced transport policy discussed earlier, not a contribution to it.

Traffic Control

Traffic Management

Traffic management procedures are essentially concerned with making the best use of existing infrastructure, traditionally by manipulating the way in which space is shared and increasingly by manipulating the use of time and space jointly. The procedures were traditionally seen as the antithesis of traffic calming, put forward as a set of traffic engineering techniques to *increase* the flow of traffic along roads. But the same techniques can be used for new purposes.

Key developments include:

- **Stronger Enforcement.** Surveys indicate wide public support for stricter enforcement of existing restrictions, especially where doing so will increase road safety or reduce congestion.
- **Priority.** It is perhaps the simplest aspects of traffic management which can contribute most to a unified strategy, especially techniques to give priority to specific classes of traffic by focusing benefits on the most efficient types of vehicle (often buses), or the most productive (some classes of goods vehicles), or the most urgent (emergency services), or the most needy (vehicles of disabled people) according to local priorities. There is considerable scope for 'time-sensitive' priority measures, for example giving priority access to city centres for buses at peak periods, deliveries at other times and allowing cars in the evenings.
- **'Safety Margins'**. As advanced traffic engineering techniques make use of available space and time, a new problem emerges, analogous to that when all bottlenecks are removed in a road network. If a whole transport system is operating continually at maximum efficiency it is extremely vulnerable to any random day-to-day fluctuations, or accidents. Advanced thinking in traffic management will have to aim not for maximum flows, but allow for a safety margin between flow and capacity, to ensure against catastrophic breakdown. In effect, one is trading off reliability against quantity.
- **Balanced Parking Provision.** These are situations in which parking availability is becoming a more important constraint than capacity for moving vehicles (town centres; residential areas where the housing stock is terraced, flats, multiple occupancy or tenements). A related question is the extent to which parking costs will tend to reflect opportunity costs of alternative uses of the space and its effects on behaviour. In either case, the provision of parking space has a very strong influence on the traffic levels on the road network and the two policies have to be considered jointly.

The Potential for Road Transport Informatics

With the growth of information technology there are many avenues down which research and development are evolving. What we need to do is to consider the logical consequences of the constrained imbalance between traffic growth and capacity and consider what are the implications for advanced electronic systems of traffic management, such as are being developed in the European research programme called DRIVE.

It is likely that transport systems will be working at or near capacity for substantial periods of time. An information system seeking to assist a network operating near capacity has quite different problems to deal with than where there is plenty of 'elbow room'. This is especially relevant when the most advanced methods are being applied to achieve the maximum possible use of capacity, with the minimum bottlenecks. In such circumstances, where a whole system is working uniformly close to its capacity, small fluctuations can cause

disproportionate effects. This is not only a technical problem, but a social one, since institutional responses can themselves be important. Therefore RTI systems need to be designed with reference to:

- i. The system behaviour of the system when near to capacity; instability; reversibility and hysteresis; conditions under which gridlock occurs on roads and breakdown of scheduling systems on rail and air.
- ii. Market responses in the competitive transport sectors (freight, buses) and also in business (employers, services).
- iii. Extent and causes of period-to-period variation, e.g. how the system reacts to instabilities in practice; outside effects such as special events, seasonality and weather; and random or 'noise' effects.
- iv. Effects on 'just-in-time' systems of business management, which depend on reasonably reliable performance of a transport network.

It is clear that information technology is not going to be the only tool needed to accomplish the objectives. The argument here is that:

- Information technology will only be as effective as the general policy context in which it is applied;
- General transport policy is currently in a state of flux throughout Europe, as a new appreciation of the relationship between traffic growth and alternative policies develops;
- As a result, the DRIVE research and development programme can be seen as having to choose between two main applications of its technologies. One choice essentially seeks to increase the effective capacity of the road network, by providing acceptable standards of movement for larger numbers of vehicles than can at present be catered for; a sort of surrogate for new road construction. The other choice would see the technical advances applied to the problems of reducing the amount of traffic to environmentally or economically acceptable levels and to improvements in the efficiency of more intensive users of the network (e.g. public transport).

It would not make sense to make this choice on the basis of the inherent properties of the information systems themselves; they are just tools to be applied to the desired ends. The wider effects have to be borne in mind.

Public Transport

Public transport systems have unchallenged advantages in providing movement for large numbers of people with less use of scarce resources, including land-take, fuel and environmental costs. It is now a matter of virtually complete agreement that major improvements in public transport services are necessary in major cities. In a recent report (Stokes et al, 1991) entitled 'Buses in Towns' we and our collaborators Environment and Transport Planning and Peter Bradburn spell out in more detail the improvements that can be made in public transport, especially bus services. The following sections summarise the main points.

Information

Information provision is an essential element of any public transport service. General information on bus services is necessary to increase the public's awareness of the opportunities provided by buses. The public's perception of how easy it is to travel across town by bus, affects their decisions whether or not to use buses for all or a proportion of their journeys. By targeting information at the occasional bus passenger or at non-users, the potential exists to increase the number of journeys they make using buses in towns and, in turn, to reduce the total number of journeys they make in their cars.

Information can be provided in the home in the form of timetables, service maps showing the routes taken by the bus network within a city or town and/or a service information telephone line. Free newspapers can sometimes be useful for information spreading. Bus operators can ensure that information on bus services, including service numbers, routes and times, are visible and easily decipherable for the bus users at bus stops.

Once inside the bus, some passengers need reassurance as to which stop to alight. This can be provided either visually using a printed route map (similar to the route maps on the London Underground system) or a digital 'stop' indicator showing the next stop along the route, or via an audible message from the bus driver.

In the town centre accessible and reliable information is essential since passengers require reassurance on their return journeys and interchanges as much as they do for outward journeys.

New technology can provide new ways of improving information for bus passengers.

These include:

- 'Prestel' type systems which can relay up-to-date information including maps, timetables, interchange information and fares, direct to people's homes.

- Roadside information which can guide car drivers to park and ride, with information on congestion in city centres.
- Bus stop displays which can give expected times of approaching buses. Such displays can also give information on where to alight for much visited locations.
- Screens in buses which display the name of the next stop, or the progress of a bus relative to the network.

Light rail

Light rail has the potential to improve greatly, public transport in cities. The capacity on a link can be high and the speed can be faster than buses. The image that light rail gives to the public can be much better than for buses. Most of the success stories of increased public transport patronage in Switzerland and Germany in recent years have involved the use of light rail.

In 1990 there were about fifty schemes under consideration in the United Kingdom ranging from the Manchester Light Rail system which was under construction, to schemes put forward in towns with populations of under 100,000. Much of the pressure for these proposals has been seen as a reaction to the 1985 Transport Act which deregulated bus operations and took aspects of public transport control away from local authorities. Light rail schemes are a way of regaining some of that control, even if over a small part of the total public transport network. Not all of these schemes are likely to be successful and many suggest that most effort should be put into improving buses.

It is a question of scale. Large cities can have large demands for public transport flows and light rail will have enormous benefits. It is in these large urban areas that the heavier rail schemes with greater investment are planned. In general, the smaller the city, the smaller the demand for flows and the smaller the scheme required. In many cases it is likely that strong bus priorities, combined with new types of buses could have the same effect, at a lower cost, than light rail.

New bus designs

Many new technologies for buses have been developed, which aim to avoid the disadvantages of conventional buses while retaining their advantages. This is done by introducing some of the advantages of rail. These include guided buses, buses running on two different fuels, trolley buses and buses with very low floor levels.

Guided buses can use ordinary streets in suburbs or in the city centre, but can also use their own track, where they will be unmolested by traffic. A town's bus fleet will not have to be renewed, when a guided bus system is introduced. Stretches of separate track may be built

whenever and wherever needed. As the buses can change from the ordinary road on to the guiding track at a maximum speed of 40 km/h (25 mph) these changes cause no delays at all.

The Duo-Bus is fitted with two engines - an ordinary diesel engine and an electric engine, the power for the latter one being supplied via overhead live wires and power collectors fitted to the roof of the bus (similar to the trolley buses). The idea is for overhead live wires to be fitted in the city centre and inner city areas. In Essen (Germany) a combined guided/duo bus system has been in operation since 1983.

The most obvious advantages of trolley buses over diesel buses are that they cause less noise and no direct air pollution. Their acceleration is better and they use energy more economically, but they do have problems concerned with the need to remain in contact with their power supply.

In Berkeley, California, a hybrid of the trolley bus and duo bus is being developed which takes power from high voltage cables laid under the road surface. The cables under the road act as one half of a transformer to provide power for the motor and charge up a battery so the bus can run on electricity for sections which do not have the underground cables. While the investment would be similar to that needed for trolley bus systems this would be more adaptable, since the lines would not be so intrusive and buses could overtake, solving some of the congestion problems experienced on dense trolley bus junctions.

Floor level buses (allowing entry and exit without steps) make the use of public transport easier for disabled people and especially for those in wheelchairs. Such buses are also more comfortable for everyone, especially parents with prams and the elderly. This allows for faster boarding and alighting, making the bus journey quicker and journey times more reliable.

Ticketing methods

Speed of ticket purchase or validation is a primary factor in bus speeds and bus delays. Average loading times increased dramatically with the introduction of one-person operation. There are several solutions which allow for quicker boarding.

In some city centres bus companies employ ticket sellers to sell tickets to people waiting in queues. Ticket machines at bus stops can also serve the same purpose. Pre-purchased tickets save much time. These can vary from weekly or monthly travelcards, pre-paid 'strips' of maybe ten tickets of set fares, passes valid for particular journeys or zones. The combinations are large.

Ticket validation can take time. In many European cities a 'puncher' is used which passengers use to date stamp their ticket to make it valid. This allows for a much greater range of pre-paid ticketing such as the Strippenkaart (used in the Netherlands and a few

British towns, Eastbourne for example) where people date stamp a number of sections of a pre-paid ticket depending on how far they are travelling. The Dutch system is also nationally based and valid for all buses and light rail so that residents in one city have little trouble using buses and trams in any other place.

Smart Cards are being introduced in Milton Keynes and other cities which enable much more rapid payment. These can either link to credit card systems, or be used in a way which is similar to 'phone cards', so operating like an electronic form of the Dutch system. The system can also be used to deal with concessionary fares.

All of these suggestions can help speed up the flow of buses and can be used to make travelling easier for passengers. However, complex ticketing systems can also make it more difficult for passengers, maybe to the extent of putting them off using buses.

Ticketing is the interface between the passenger and their view of the 'economics' of using buses. It is also one of the main interfaces between the bus company and the passenger.

Bus priorities

Bus priorities enable buses to pass traffic queues and deliver/ pick up their customers from places in towns and cities which can be denied to the private car and indicate to motorists how society values the bus traveller. Individual methods of giving buses priority by means of with and contra-flow bus lanes, banned turned exemptions, bus gates, bus priority streets, etc, are well tried and documented and are effective given the appropriate enforcement. Selective vehicle detection (SVD) at traffic signals can be very efficient in maintaining bus schedules and thus reliability. It is important that buses have speedy access to the junctions which use SVD and this is best done with the use of bus lanes which allow fast access up to the traffic lights.

The reserved busway is a step beyond the bus lane. Bus stopping places would be formalised with pedestrian access across other traffic lanes under signal control. Distinctive colouring of the busway carriageway would be particularly useful at junctions where motorists would be required to give way. These cannot be used everywhere, given existing street widths and patterns, but combined with sections of segregated busway there may be more potential. In theory there is little to choose between LRT systems and busways in capacity terms and busways should be less costly to construct and more flexible where mixed street running is involved. Buses can then fan out to serve residential areas and parts of the town where LRT systems cannot.

Park and Ride

To be successful it is important that Park and Ride is seen as being cheaper, more convenient and faster than the alternative. Few people will opt for Park and Ride if it is more convenient

to drive. Collaboration between Local Authorities and Bus Companies is essential for a scheme to be successful, but other forms of collaboration are also useful. In York for instance, a company building a new superstore provided a car park for Park and Ride on its site, with obvious benefits to both the City and the retailer. Examples of measures to make Park and Ride attractive include the following:

- Bus priority schemes and bus lanes to ensure that journey times are quicker than those by car and are seen to be so. The service frequency must be high.
- Control of city centre parking can ensure that motorists find it more convenient to use Park and Ride.
- Control over prices of parking and Park and Ride fares to make this service cheaper.
- Ensuring that bus services run for more than the 'working day'.
- The car parks must be secure.
- Good information, so people know where they can get to, when and how to get back.

The car is the dominant mode of transport in areas outside towns and cities. The bus is never likely to provide a level of accessibility which approaches that of the car in rural areas. Park and Ride, however, provides the most likely way of reducing the congestion that is caused by people from outside the city without excluding them from the benefits of the city.

Personal security

Solutions to problems of danger and violence will take a long time and are not necessarily mainly concerned with transport policy. But transport is a part of the problem. Using a car for all journeys is an understandable personal response, but it is not open to everybody and it can make the social problem worse.

Safe transport schemes have been set up in several cities to provide door-to-door, or town centre to door services for women in the evenings. These are undoubtedly of great use for women who feel threatened. However, as a long term solution they may only add to the problem, since this will reduce the ratio of women to men using other forms of public transport and circulating in the streets, perhaps making attacks on both women (not using safe transport schemes) and men more commonplace. Conductors on buses make people feel safer. Closed circuit television, radio contact and speedy help from police could lessen the likelihood of violence on the buses. Bus companies could reduce the walking and waiting risk element of travel by:

- Use of a 'safe area' in town centres for evening and night bus routes. The area could have police presence, good lighting, an open environment, perhaps with shops, with all bus routes using the area ensuring a reasonable number of people at any time.

- Taking people closer to their homes on return journeys from town centres.
- Taxis can be used by bus operators along routes with low bus frequencies during evening hours. These are used in mainland Europe and act as a substitute for buses and as a way of improving security. There are many successful examples on the continent.

Non-urban areas

We have discussed solutions to improve public transport which are mainly concerned with towns and cities where there is the greatest scope for a switch to buses or light rail. In non-built up areas the problems are greater; cars have a much more obvious advantage and much of the recent development outside cities has been based around provision for the car. However, bus routes do not have to stop at the edges of cities. There are improvements that can increase buses' viability.

- There are links in the non-urban network which have loadings whereby good quality public transport could be viable. Between small towns and large villages and towns there is often enough demand for viable services, but they generally have to be fast and because frequencies will be lower they have to be reliable, so passengers can be sure the bus will arrive and on time.
- Linked to this, there are ways of increasing public transport viability by looking at improving access at both ends of a journey. Park and Ride is currently operated from peripheral locations to city centres. It could be extended to having car parks further outside to increase the public transport leg of the journey for those living further out. The Park and Ride route would become more like a rail route with stops at large car parks every two or three miles. Peripheral facility development could only be allowed at locations where high speed Park and Ride buses pass.

Financing of Public Transport

Following deregulation and the conversion of many public sector bus operations into commercial companies, there has been an increasing emphasis on one source of finance for bus operations - the customer. Only a small proportion of bus finance comes from public subsidies, usually in the form of special payments for old age pensioners, or support for the minority of tendered 'social' bus services.

This has some undesirable effects. Comparing journey costs, bus journeys tend to be more expensive than car journeys than they really ought to be, considering their advantages in efficient use of road space and pollution. The right balance of car and bus use would require buses to be cheaper, or cars more expensive, or both.

The economic and social advantages of buses merit the use of a wide range of other sources of finance besides fares. These include:

- national subsidy in recognition of their contribution to reducing global pollution
- local subsidy in recognition of their contribution to reducing congestion and road expenditure
- employers' contribution (e.g. payroll tax) in support of their role in delivering people to work.

Also, fares revenue can be indirectly enhanced by local authority traffic management policies, giving extensive priority to buses thereby increasing their speed and attractiveness.

The policy that would have the biggest positive effect on bus financing would be road pricing. If all road vehicles were charged for their use of the road (in proportion to the congestion, pollution and road wear they cause) and the revenue were then returned by improving the various methods of transport (in proportion to their respective economic efficiency), virtually all financial problems of the bus industry would be solved. Buses would be cheap, fast and well-funded.

It is difficult to persuade people to do what they do not see as in their best interests. The key has to be to provide incentives to car users to switch to bus and deterrents to bus users from switching to car, so that the individual interest corresponds with the social interest. This is not just a question of marketing or advertising; it has to be done by shifting the real balance of advantage between car use and bus use.

This can be achieved by changing the balance of road space allocated to buses and cars (priorities, bus lanes, parking, etc). If the allocation of road space reflected the relative efficiency, buses would have a speed advantage over cars. The other way is to change the balance of costs paid by users (subsidies, road pricing, parking etc). If the cost of travel reflected the costs imposed on other users, buses would have a price advantage over cars.

By making improvements in the relative attractiveness of buses compared with cars, one is laying the basis for a well-founded, self-interested shift from car use to bus use which benefits the individual and everybody else as well. Individual choices help to reduce congestion, not to cause it.

Walking

Walking is an almost universal mode of transport. All except those who are physically incapable of walking use this as the main method for some journeys, and to and from vehicles and within buildings. Walking, by some measures, is one of the most important modes of transport, even in a car dominated society.

Transport policy should have measures which would improve the conditions of walking at this core. These include:

- Ensuring activities can be carried out locally. Policies require the maintenance of existing facilities such as local shops, post offices, schools. The tools to ensure these policies are outside the specific realm of current transport policy.
- Giving back priority to pedestrians over vehicles. Policies here are closely related to pedestrian areas and other traffic calming measures which give pedestrians a sense of priority. This could be combined with a legal priority for pedestrians in many areas and the use of engineering techniques such as raised pedestrian crossings. Other measures include the siting of and the timing of pedestrian phases of crossings to benefit pedestrians.
- Maintenance of pavements and ensuring that building work does not disrupt pavements and walkways.
- Protection from the weather in certain situations. These would include covered parts of busy areas to reduce the amount of walking that has to be done in bad weather. Also important is the design of walkways relative to wind funnelling caused by buildings.
- The widening of pavements in busy areas.
- Increasing security for pedestrians in towns and cities after dark. Many people are afraid to walk in their neighbourhood after dark, living in a state similar to a permanent curfew. Few of the solutions to this problem lie in the direct realm of transport policy, but the implications on transport (and especially car use), are nevertheless important.

Cycling

Walking and cycling are often grouped together in surveys and discussion of transport issues, but they are very different. Both are unmotorised and are used predominantly for short distances; both have histories of having been largely ignored by transport planners and while a minority cycle, walking is done by nearly everybody. Their respective roles in the way they can be used as tools of transport policy is very varied.

In Britain, it is mainly younger people who cycle. It is also much more popular in areas which are flat and in smaller towns and cities where distances travelled are likely to be shorter and road layouts less threatening for cyclists. In some such towns up to 20% of work journeys were by bicycle in 1981. Cycling is traditionally more common by students and hence is more important in towns such as Oxford, Cambridge and York.

In recent years several local authorities have encouraged cycling as a way of reducing travel by car. Measures have included the introduction of cycle lanes, cycle priorities and allowing

cycles to use bus lanes. In Oxford, cycle use doubled in the central area between the mid 1970s and the mid 1980s (Jones, 1989). In 1981 cycling accounted for 22% of journeys to work in the city and in 1987 22% of shopping trips in the centre were made by bicycle (Environmental and Transport Planning, 1990).

In general the improvements have been from a low base level and the proportion of cyclists is still small in most towns.

In a recent study by Environmental and Transport Planning (1991), comparison is made of provisions for cycling in Britain and Germany. In Britain, there are some 13 million bicycles compared with 18 million cars, but the usage in general is very low, at around 3% of all journeys. By contrast, in Germany there are 48 million bicycles, compared with 30 million cars and they are used for about 10% of all journeys and up to a third in some towns. Yet in Britain there are also a few towns in which cycles are used extensively, in some cases for up to 25% of work journeys.

The study compared six approximately paired towns in the range 90,000 to 250,000 population; these were Oxford and Heidelberg; Peterborough and Ingolstadt; York and Munster. Perhaps the most interesting contrast is that 'support for cycling' in the English towns was still essentially marginal, with the expenditure of perhaps tens of thousands of pounds on welcome, but small-scale, cycling facilities. The German towns saw cycling as a central part of their transport planning, with expenditure on schemes costing hundreds of thousands of pounds and strong promotion based on arguments of environment, congestion and health.

This difference is reflected in the scale, rather than range of facilities available. British provision tends to be on a smaller scale, but of a wider variety than in Germany, mainly consisting of cycle routes and usually allowing cyclists to use bus lanes. Overall, Germany has over three times the level of cycle use as Britain. It also has a similarly high number of fatal accidents to cyclists (though proportionally rather less slight accidents). The accident rate per cycle-kilometre therefore is rather similar in the two countries - probably within the range of measurement errors, though there are several indications in each country that accidents do not increase quite as fast as the amount of cycling.

But they do increase. The risk of having an accident is around three to five accidents per million cycling-kilometres for cyclists and less than one per million vehicle kilometres for car users and this has led some British transport planners to be rather resistant to the inclusion of 'promotion of cycling' in transport policy.

Here we should consider the nature of the accidents. The largest proportion of them are between cyclists and cars and especially in certain categories: at roundabouts; at junctions where the cyclist is going straight ahead and the car is turning; and situations where the cyclist has made some manoeuvre and the car has not accommodated for it. Cyclists often complain that drivers do not recognise their existence and drivers that cyclists are invisible.

Both are reflections of a problem of perception that affects the driver, but damages the cyclist. (There are also of course other accidents, e.g. between cyclists, or cyclists and pedestrians, but these are smaller in number).

It seems that cycle tracks are not always associated with lower accident rates partly because of their poor design. The one very clearly defined situation where a substantial increase in cycling is associated with a reduction of accidents is that of the large scale traffic calming schemes - though even here there can be increased danger on the perimeters, especially in the case where there is a fast ring road around the traffic calmed area.

In British conditions it does not seem to follow that 'walking and cycling' should automatically be combined together as the favoured methods of transport, especially at a time when many people who have no adult experience of cycling might feel threatened by too heavy-handed official exhortations to 'get on your bike'. But those with experience of cycling even in a British town where cycling is widespread (such as Oxford) can testify to its remarkable efficiency as a fast, convenient and easy method of transport for a significant proportion of the trips that even rather lazy and unfit people want to make. The key seems to be to provide the maximum possibilities for people to cycle if they want - traffic calmed areas, cycling lanes and routes (with good lighting and smooth surfaces), well marked priority systems and secure parking spaces and combine these with education to motorists designed to increase their awareness of the presence of bicycles (and education of cyclists that their moral superiority does not necessarily make them invulnerable). These provisions will naturally lead to an increase in cycling by choice.

Private Cars

The current problems of congestion have been seen to be largely caused by private car use. Private cars form the bulk of road movement and all feasible solutions involve some degree of restriction or pressure on car use. This aim, when stated on its own understandably causes antagonism with car drivers; car drivers depend on their cars and have got used to them - any reduction in their use as an end in itself will not be welcomed.

Most of the policies and measures described have been aimed at reducing car use, but in ways whose benefits are intended to be considerably greater than the disadvantages. Another point of importance is that there is a recognition that car travel will still be demanded. The aim of the policies is to ensure that:

- Cars can still be used easily where they provide access or convenience that is superior to that which any other mode could provide and where their use does not impose unmitigated external damage or costs on other travellers or the environment.
- Where car use is to be inhibited this must be done in a way that provides the maximum compensating benefits in terms of alternative modes and improved quality of life.

The problem of congestion has been its self-regulating nature. Improvements to the road network have soon been counteracted by increased traffic filling the space. Similarly, if improvements to public transport have initially reduced congestion, then other motorists may adapt their journeys to fill that space. Improving supply without moderating demand may be self-defeating. One of the main arguments against using pricing to do this has been that it will have little effect on those who can pay for it, but a great effect, especially on those with special needs, but little money. But to discourage those who have less need for car travel, while allowing access for those who have greater need would imply a degree of confidence and agreement in defining 'need' which is not really apparent.

Ideally, other modes would be made so attractive that no one would be forced to use their cars - the roads would be free of a significant proportion of traffic. In practice, a balance must be sought by the combined effect of:

- Increased public transport capacity and relative advantage over car use;
- The use of traffic management techniques and parking controls;
- The use of public education and information systems to convey to people how to use their cars more responsibly and which journeys could be more easily made by other means.

Cars and safety

Measures can be taken to reduce the effect of the vehicle, road and human factors in accidents. These include:

- Vehicle design and construction with emphasis on tyres, brakes, steering and lights.
- Road design and layout including non-skid surfaces, crash barriers and markings to improve driver visibility.
- Traffic management and control with the aim of minimising conflict risks by separating and segregating different types and streams of users and of traffic.
- Road user behaviour with emphasis on the education of all groups of road user.

Historically, driver education and public information campaigns have been favoured by Government. However, when subjected to scientific evaluation they have generally failed to show any detectable benefit in reducing the number of accidents. What the research does show is that to be effective, the behaviour to be influenced, the target audience and the specific message, need to be clearly defined and focused. Mackay (1990) suggests that traffic safety education must be based on the reality that everyone learns about traffic from experience and consequently, behavioural patterns are set in light of those experiences. A study by Marsh and Collett (1984) investigated the perception of risk and road dangers of drivers who voluntarily wore seat belts and those who did not, (the research being conducted

before the compulsory wearing of seat belts legislation). One of the most surprising findings was that those drivers who always wore their belts had a lower perception of risk and dangers on the road than those who never wore belts. Hence, these drivers were more likely to drive recklessly believing themselves to be safe. They had expected non-wearers to be more of the opinion that driving was safe and therefore seat belts were unnecessary, when in fact the opposite was found to be the case. The implications of this for driver education campaigns were massive and their warning seems to have been well-founded. Although the number of drivers killed in crashes fell, so proving the protective value of seat belts, the accident rate went up by more than would have been predicted on the basis of the pre-legislation figures.

Constraints, an alternative way of modifying driver behaviour, are a matter of law and law enforcement. Traffic laws aim to control behaviour and to punish activities which are perceived as either antisocial or likely to lead to accidents. The use of the law in this way however, is controversial. Mackay (1990) perceives the law as a reflection of a community's values,

“...the application of legal sanctions can work only if there is a tacit acceptance of the law by the majority of people and an infrastructure available which will allow enforcement of such laws on the minority who do not conform.”

Given this, traffic law as a mechanism for behavioural modification is mainly relevant to behaviour which can be shown to be related to a high risk of crash involvement and injury. As an example, in Scandinavia, public acknowledgement of the risks associated with drinking and driving have led to a high public acceptance of severe penalties for this offence and highly visible breath testing procedures. In Britain the combination of public information campaigns and strict law enforcement - particularly throughout the festive season - have resulted in behaviour modification with respect to drink-driving habits.

Research at the Institute of Transport Economics in Norway has focused on the effects of speed-limit enforcement on individual road user behaviour and on accidents. The results have lead researchers to conclude that there is virtually no effect if enforcement on a given road is stepped up by less than three times the previous level. If it is increased by three to five times, the number of accidents may be reduced by about 10% to 20%. Really intensive enforcement with an increase of over five times may reduce accidents by up to 20% to 30%.

Well defined behaviour modification programmes can be effective if they are realistic and are aimed at identifiable problems and targeted at populations that lend themselves to educational intervention. Such programmes should be carefully evaluated and monitored and resources spent only on those which are likely to be effective. When subjected to scientific evaluation, many driver education and public information efforts fail to show any detectable benefit in reducing crashes. To be effective, educational efforts to modify road user behaviour must be set in the context of an individual's background and culture. Thus, behaviour modification is a very important traffic safety strategy, but successful Implementation requires a disciplined and scientific approach to the selection of the appropriate type of modification programme.

The link with traffic calming, speed limits and safety

The Institution of Highways and Transportation are advocating the application of various traffic calming techniques on British roads, in particular, for urban residential roads. As part of the traffic calming technique the urban safety guidelines suggest a maximum speed of 20mph for these categories of road. This is in line with present Government thinking for speed limits in residential areas. Local councils are currently being encouraged to adopt this policy.

In another Government review under way, measures are being considered to increase the maximum motorway speed limit. This change has been a contentious issue for some time now and two schools of thought have emerged from the debate. Both schools argue their viewpoint in terms of safety and accident risk. On the one hand there has been the argument that speed kills; the faster a vehicle is moving the more likely the driver is to lose control of the vehicle and giving people the opportunity to drive faster will encourage more drivers to do so. Hence safety levels are reduced. On the other hand those in favour of increasing the speed limit believe that the increasing lack of adherence to the current limit (due in part to the greater number of powerful cars with improved braking systems on the roads) is creating a dangerous motorway system with unpredictable vehicle speeds. The police admit that they are finding it increasingly difficult to enforce the current speed limit. The latest figures show that 63% of cars on motorways now drive faster than 70 mph and 27% are exceeding 80mph, Some police forces suggest an increase in the speed limit to 80 mph arguing that this could be more rigorously enforced, so acting as a greater deterrent for those drivers who persist in driving at unsafe speeds.

Lorries, deliveries and freight

Freight transport is a vital element of transport, but it is commonly perceived to be the biggest nuisance. One of the Greater London Council's last acts was to introduce night time lorry bans on major roads through London, combined with a system of permits for use during the day. Meanwhile, maximum tonnage levels are being increased, in order to allow competition in international markets.

There is now a widespread recognition that rail could never again become the primary mode for freight transport - the geography of manufacture and markets combined with the less dense rail network operating near capacity would make such a policy unworkable. Even with policies of maintaining rail and water freight capability, the roads will still carry the bulk of freight mileage.

While recognising that some goods movement seems to be as inherently trivial as some passenger movement, there is nevertheless a move towards considering freight transport as 'more important' to the economy than private car travel and that measurable congestion costs apply more to freight than to most other forms of travel. Thus there are arguments for

ensuring that freight has some form of priority on inter-urban roads; but this has to be combined with measures to ensure that this does not transfer freight unnecessarily from the other more environmentally acceptable freight modes.

In urban situations (or the distribution end of the freight cycle) there are calls for more environmentally friendly vehicles and ways of making deliveries. Suggestions have been made for another level of distribution whereby heavy vehicles transport freight to out of town distribution depots, from where smaller vehicles make fewer deliveries to single outlets such as shops in city areas. Thus, instead of a shop receiving small deliveries from ten large lorries in one day, one lorry would make one large delivery per day. The argument is that freight companies would save on congestion costs and the amount of freight traffic in cities would be reduced. Clearly there is a long way to go before such schemes could be easily workable with problems of speed of deliveries and organisation of the system to be overcome. But schemes of this nature have been used in Paris and in the Netherlands.

There is also scope for much logistical research on the linkages between freight transport and personal travel, as shown in the rough calculation of personal travel generated by seven articulated lorries in Chapter 2. With hypermarkets and other-large retail outlets the need for freight traffic is reduced - a few lorries from regional distribution depots make all the deliveries needed. The final distribution to customers is done by people in their cars. But the congestion implications of stores of different sizes at different locations needs to be weighed up, both in logistical terms and also in terms of the likely effects and behaviour of those who do not have access to a car.

Despite its importance, the solutions for freight transport have not been as well thought out in recent debate, as has personal transport. But there is increasing realisation of the gross imbalance in costs and benefits: a 10% cut in car traffic would produce a substantial benefit for lorries, but a 10% cut in lorries would not have detectable or lasting benefit for cars. Road pricing systems, traffic calming schemes, public transport priority and pedestrianisation can all be done in a way which eases, or makes more difficult the distribution of goods. On balance, lorries have more to gain than to lose from these policies, properly carried out.

Emergency services and other priority users

Emergency services are generally agreed to deserve priority use of road space. For other reasons, buses, sometimes taxis and delivery vehicles are also seen as having greater priority, as are people with disabilities. Needs of these users varies:

- Police, fire and hospital services require speedy access to all areas.
- Fire services generally have fixed routes from fire stations to all other parts of a city.

- Emergency ambulance services may use set routes, but also need to gain fast access from hospitals where they have left patients, or from somewhere on return routes to base.
- Police services need fast access from anywhere to anywhere else.
- People with disabilities need access to all areas, but speed is not so important.
- Thus the prime requirements are that all areas in a city must be reachable by emergency services and there must be the ability to gain access at speed. Many of the measures outlined above have implications here:
- Traffic calming measures can be harmful if designed badly. Emergency services have claimed that measures such as road humps could cause deaths by slowing travel speeds, or the movements caused could be dangerous.

But other measures can help emergency services:

- Bus lanes and reserved bus ways can be used by emergency services. The knowledge that they are used by emergency services can help control illegal parking.
- Gates for use by buses to preclude cars can also be used by emergency services and the knowledge of their regular use by buses would help them to know that they are always in working order.

New Roads

There is a need for a roads policy, since the majority of movement is and will continue to be, by road, but it has to be a roads policy which is realistic and deals with achievable and acceptable goals.

There is a definite movement away from very large scale schemes whose main rationale is the provision of extra capacity to 'meet demand'. Different people have found different reasons to justify that movement; pragmatic, economic, environmental, engineering. But the different routes converge on the same conclusion, namely that the provision of road space has to be logically linked to realistic and acceptable amounts of traffic and therefore must be completely consistent with all other aspects of transport policy.

This is welcome, because it changes the focus of the argument away from 'roads' or 'no roads' and frees the mind to consider the specific circumstances where road construction genuinely might be helpful. It remains abundantly clear that there is not yet consensus on what specific roads programme follows from the new understanding, though the extremes are closer together.

One line of argument says that if congestion is going to get worse whatever roads are built, then why bother to build any at all? For urban areas, by abandoning large scale schemes, all

the bitterness of campaigns and enquiries can be avoided and attention diverted to more productive uses. It should be said that this view, once confined to a small minority, now commands significant professional support, being underpinned by theories about the amount of traffic generated by roads. The rejection by Cecil Parkinson of many of the road schemes envisaged in the London Assessment Studies was felt by some London planners to be consistent with this view, as applied to the inner areas of major cities.

At the other extreme, the view remains that even if road construction cannot solve congestion, it makes a necessary contribution to doing so and things would be even worse without substantial new infrastructure than with it, so one should build as many roads as finance and political constraints allow - especially in situations where public transport is least able to provide a feasible alternative.

Of course, both descriptions are simplified cartoons of what people are actually saying; there is complete agreement that new capacity is required for new industrial and residential developments, and nearly complete agreement that provision of substantial new road capacity for car access to city centres is not justified. Cutting across this, there is wide professional support for a substantial increase in work on surface quality, potholes, maintenance and associated facilities including lighting and some indications that this is often considered by the public as more important than the provision of new roads.

Overall, our approach is to start with a conception of the sort of town that people want to live in and consider the amount of traffic that can be sustained successfully by the best possible combination of environmental and public transport improvements. In general, this will fall far short of the total potential demand for movement by private car, at least under current attitudes and projections. The provision of new road space will not meet this potential, though it might give cause to increased expectations for doing so. Therefore 'meeting the demand' is an inappropriate justification for new road construction. In these circumstances, it is sensible to consider the need for new road construction last instead of first.

Institutional and Financial Implications

Thinking about appropriate institutional arrangements is lagging behind thinking on policy itself, still being scarred by arguments about the abolition of the metropolitan counties and the GLC and the battles between local and national Government about financial powers. The basic principle will be the need to find institutional arrangements that allow coordination of the different elements of a strategy and consistent treatment of different modes. This will have to involve a recognition that a coordinated policy requires either regulation or financial levers, or both. It may be possible to define two or more quite different structures (e.g. corresponding with planning or market-based ideologies) which would be capable of delivering the goods.

There is a large (but not unanimous) measure of agreement for policies which make very limited reliance on new road construction, but substantial improvements in public transport services, both rail and bus, together with consistent policies on traffic management, traffic calming, parking and pricing. This requires coordination as a means to an end. Some institutional arrangement has to be found to do that.

At present the main source of expenditure for roads is taxation and the main source of funds for public transport is the users. One option is to make users the main source of all transport expenditures, by implementation of some form of road pricing.

The point has been made that road pricing only makes sense as part of a 'total transport package' in which pricing produces the elbow room on the road network which makes possible the other improvements (bus lanes, improved speed, space for essential passenger and freight transport, traffic calming and environmental improvements). Those in turn are necessary in order to make road pricing politically acceptable. However, that argument applies equally to any other efficient means of traffic reduction, by physical restrictions, rationing, permits or exhortation. Road pricing is different from all those because it is not just a price, it is a revenue.

That means that 'coordination including road pricing' involves entirely different institutional arrangements and financial possibilities than 'coordination excluding road pricing'.

Two (politically unrealistic) benchmarks may be defined on how this could be organised and financed. There could be a combined public planning and operations agency, or a privately owned transport company, both with monopoly control over charging and providing capacity for all modes. Either could easily be completely self-financing provided that internal cross-subsidy was allowed and mode-based profit centres strongly discouraged. In either case, taxation-based public expenditure would reduce or even disappear.

A smaller public agency with a comprehensive brief might achieve these objectives while implementation and operations still remained in the hands of a mixture of public and private sectors, using some commercial and some non-commercial approaches and without taking away their vested interests and powers. We would suggest five strict conditions for this to be successful. These conditions are about using levers instead of instructions.

- First, its brief must cover all modes of transport and it must deal with both infrastructure and operations.
- Secondly, it must have certain sorts of financial power. Especially, it must allocate public expenditure on transport including construction, maintenance, operating subsidies, enforcement and management and be able to balance these against each other.

- Thirdly, since it will not directly fix prices, it must have taxation influence giving it adequate leverage to ensure that the relative market costs of fuel, road use, parking and public transport journeys are all consistent with their long term direct and indirect costs to the economy. This would also include some tendering functions and ability to compensate or tax employers and travellers whose costs or benefits were distorted and to achieve politically specified objectives, e.g. for disabled travellers or other special groups. In other words, financial and market levers would be used to achieve what bureaucratic procedures cannot. If the costs are right, then we can rely on the market to do most of the rest, in its own interests. That way, internal management and efficiency of public transport operators or British Rail or freight companies is enhanced, not reduced.
- Fourthly, it must have administrative powers enabling it to carry out some residual functions that cannot be left to the market even if costs are right, for example coordinating the provision of reserved space for emergency or other priority vehicles, dealing with temporary crises and initiating experimental improvements.
- Fifthly, its internal structure, accounting conventions, legal brief, staff training and technical data base, must be based throughout in considering each mode, each area and each problem, in relation to its effects on the rest of the system.

The effect of this sort of arrangement would probably be as follows:

- a stable total volume of public expenditure on resources, but with a significant shift between heads (e.g. roads, public transport, parking, management, etc);
- an increase in the turnover of funds passing through public agencies in the process of transfer or allocation between sectors;
- a reduction in private expenditures and time-based costs (e.g. congestion delays), partly offset by an increase in money based costs (tolls, charges, etc), which are then ploughed back into further improvement;
- a reduction in total (public plus private) resources spent on transport.

CHAPTER 9

CONCLUDING REMARKS

The change which would make the most rapid and most sensible contribution would be a reduction in the total amount of car use, of which an appreciable proportion would be transferred to other modes. Of as great importance in the long term is the altering of land use patterns and ensuring that goods distribution is managed in a sensible manner.

Are such objectives realistic? There is a varying amount of experience of the effects, in practice, of the policies discussed in Chapter 8. But it is genuinely difficult to give a completely reliable judgement on the overall impact of such policies. This is for several reasons:

- First, at present, only some are being tried; for example in Britain improvements to public transport have been intermittent and complex – a general long term decline in service network densities and frequencies, offset by some substantial improvements in particular areas such as rail electrification and a long term increase in the real level of fares with generally rather short lived fares reductions in a few large cities.
- Secondly, there is very limited experience on one important element of policy, namely road-pricing.
- Thirdly, it is unfortunately rare that the different transport and planning policies in an area have all been pulling in the same direction. Frequently, for example, a local authority may have been encouraging additional parking facilities for offices or shops, at the same time as attempting to reduce central area traffic levels; new road or commercial developments have been implemented without consideration of their impacts on traffic in neighbouring areas.

Earlier in the text we referred to the love affair with the car. However, when we examine this love affair it is apparent that the relationship is under strain. At the very least some marriage guidance and new types of awareness and behaviour are necessary and some people are even beginning to speculate about trial separation or divorce.

This disenchantment has tended to be coupled with a feeling of necessity for a car amongst many people and has not been associated with many people giving up their cars. The infrastructure of Britain has become 'car friendly' and 'public transport unfriendly'. In many cases, however, people who do not especially want to run a car continue to use them, either because they feel that other forms, of transport do not cater for their needs, or because the need to drive is stronger than the desire to not pollute.

There are many who are sceptical of the idea that car use can be reduced. Their arguments tend to stress one basic point. People like cars and they like to use them. To put controls or penalties on the use of cars is regarded as an invitation to lose votes and no sensible political party would contemplate doing so.

Yet car use has been subject to a wide range of social controls since the earliest days. Some of these controls are so deeply entrenched that we can hardly envisage life without them - that traffic going in the same direction uses the same side of the street, for example. Others are accepted in principle, though with less overwhelming support in practice - speed restrictions, or parking controls, requirements to maintain vehicles to prescribed standards of mechanical performance (lights, brakes, etc). In addition, motoring like any other widespread human activity, develops its own unwritten codes of social behaviour, sometimes, but not always, endorsed in official advice such as the Highway Code. These norms, however, can vary in different areas, so that one can see rather different conventions on, for example, weaving movements at roundabouts, or letting someone out of a side street, in London compared with some rural areas. Other conventions, even apparently well established ones, change from time to time. Thus it was not so long ago that the offer of 'one for the road' was a symbol of hospitality and goodwill to one's guests. We cannot unfortunately say that the problem of drunken driving has been solved, but the phrase has now virtually disappeared: it is simply not an acceptable thing to say.

A similar change in attitudes has been observed about the acceptability of the control of parking, whether by the application of charges in a continually expanding area where parking was formerly free, or by increasingly stringent regulation by clamps or red routes.

In a way, all such controls are infringements on rights, privileges or freedoms of the individual. As such, they are rarely welcomed initially, but become implemented due to the overwhelming pressures of safety, efficiency or the protection of other people's rights. And typically, where they are well-judged, the advantages become manifest to greater proportions of the population. Eventually the controversy dies down and they become permanent features of our lives.

In a special supplement to 'Car' magazine in June 1990 called 'The car in the future What you'll be driving in the next century', the bulk of articles dealt with ways of helping the car to survive in the future. In an editorial to introduce the supplement Gavin Green writes:

“Future cars must use energy more sparingly, both in the rate that they use fuel and in the manner in which they are made. Equally, the car's role in society must change. Cars should be used less. This may not be bad news for the motorist...”

In other countries we already see profound changes in the perception of alternative forms of transport, walking, cycling and public transport. With the popularity of fitness (itself partly the result of a positive USA Government campaign aimed to ensure US youth would be fit enough to be drafted into the army if necessary), walking, running and cycling have become more fashionable. 'Mountain Bikes' are advertised in the same manner as cars, featuring speed, power, sex and freedom. In Zurich, which is currently much celebrated for its increasing use of public transport since expanding the city's tram network, much positive public transport advertising has been used. This promotion concentrates on the positive social, environmental and economic gains of using public transport rather than private cars.

It is now established that trends in many Central European cities are going in the opposite direction to those in Britain.

Would people change their behaviour?

In our opinion survey we asked about the effects on car use of various changes that might occur in the future. The greatest reported impact was from an increase in petrol prices to £4 per gallon - only a third said they would be unaffected; a doubling of parking charges would affect about half that number of people. A doubling of journey times by car, or public acceptance that car fumes seriously damage the environment, resulted in about the same proportion saying they would reduce car use if a very good public transport service provided.

In order to increase public transport use, better service quality appears to have more effect than cheaper fares, whereas the converse does not appear to be true; a doubling of journey times by car has less impact on reducing car use than higher petrol prices. It is the most committed car users - those who regard a car as essential, or drive every day - who were least likely to report a drop in car use in response to the changes listed. Thus the population seems to divide into heavily committed and more marginal car users.

Table 9.1 - Impacts of other changes on car use among those who drive at least once per week

Change in Use of Car, subject to the following conditions:	Use car less, or give it up	Make no change
“If you found that your friends or neighbours were using their cars less, to help the environment”	27%	67%
“If parking charges doubled”	29%	70%
“If traffic congestion increased substantially, doubling your journey time”	40%	57%
“If it was proved that car fumes seriously damaged the environment”	42%	58%
“If the cost of fuel increased to £4 per gallon”	63%	37%
“If public transport fares were reduced substantially”	31%	68%
“If public transport services became frequent and reliable”	41%	58%

Source - Hallett (1990a)

In an RAC Survey (RAC, 1990), 57% of drivers agreed that “many of the short journeys I currently make by car I could just as well walk”; overall, about 10% of car journeys were rated ‘not at all important’ and 70% ‘important’ or ‘essential’. Between one third and a half of drivers claim that certain trips could be diverted to public transport, depending on how ‘ideal’ the service was - but around half could not envisage making any use at all of the best service they could conceive of.

Remembering that such stated intentions are always to be judged with caution, improvements in service quality seemed more likely to induce a switch of mode than reductions in fare levels, reflecting the fact that many drivers feel that their present service levels do not make public transport a feasible alternative to the car.

The most recent survey in this stream of work is one produced in January 1991 by Lex Service PLC, providing an opportunity to check the patterns described above.

There are some encouraging signs that motorists are by no means concerned only with their own short-term interests, but can see wider social issues. In particular there are six important themes in the results which can help the development of realistic policies.

- First, it is clear that large numbers of motorists continue to enjoy using their cars. The report describes the predominance of the traditional car owning class male, middle-class, moderately wealthy. But they are increasingly being joined by women and the less well-off, who perhaps have a more pragmatic view of the advantages of cars. And in any case, the sheer weight of numbers is reducing both the efficiency and enjoyability of car use. Hence it is other drivers, more than anything else, which causes annoyance or anxiety - they are seen as inconsiderate, noisy, or incompetent. Together with other worries, about getting lost, or parking, or breaking down, the overall picture is that for a considerable number of people the glamour has gone out of the whole thing.
- Secondly, there is widespread support for policies which are aimed at reducing speed, especially in residential areas (significantly, in response to the question worded “in the town where you live”) but also, though not so strongly, on motorways. This is important, because the objective of reducing travel times has been so central to transport policy for so long, the assumption has been that in general speed reductions have to be imposed on a resisting population of motorists, for the interests of others. Now it seems that an appreciable proportion of motorists themselves are expressing support for quite widespread speed reductions. A word of caution is necessary here; speed is known to be one of the areas where people’s declared opinions do not always correspond with their behaviour. Nevertheless, there are reasons to suspect that we are about to enter a period where the reduction in high speeds may be as central to policy as the increase in very low speeds. It is not clear how that would balance out, but at the least it would mean that measures of changes in overall average speeds would then be a misleading guide to success or failure.
- Thirdly, there remains support for “better” roads, (it is not clear whether people interpreted this to mean roads of a higher quality, or more roads) and to a much smaller extent wider motorways and main trunk roads, but among motorists - as among transport professionals - these are no longer seen as the cornerstone of a solution. The R.A.C. survey reported that “two out of three drivers believe that building more roads will never solve the problem of congestion.” (R.A.C. Motoring Services, September 1990).
- Fourthly, there is greater support for improved public transport alternatives. Here a caveat is also very necessary. It would be quite unrealistic to expect support in a survey for better public transport to be easily converted into motorists switching from one to the other. But all changes occur at the margin. The really interesting result is the growth in declared acceptability of public transport as an influence on personal car use - from 23% in 1988, 32% in 1989 and 38% in 1990 (up to 48% among London motorists). This indicates that the automatic preference for car use is giving way to a more reasoned consideration; if so, then policies that would have been very difficult to implement successfully only a few years ago, may now be more popular.

- Fifthly, the Lex survey, as others, indicates the unpopularity among motorists of increased charges as a tool to reduce traffic levels. This is a well-founded and logical response and has to be believed by those supporters of road pricing who will be disappointed by it. This strengthens the argument made above that if pricing is to be one of the tools used (because of its advantages in economic efficiency or in raising the money to pay for other improvements) it will have to be seen as part of a package to be acceptable.
- Finally, there is an intriguing contrast between what people believe should happen and what they believe will happen. In particular, nearly half believed that motoring costs would be increased and less than one in five expected public transport to be much better. This might be interpreted as indicating some sort of cynicism about the ability or goodwill of governments to deliver improvements, or a form of self-deprecation towards the end of a long interview in which they had been encouraged to express personal views on a wide range of difficult issues which have, so far, defeated solution. It is clear that there is wider public support than ever before for measures that will improve the attractiveness of other modes, relative to the car. But it is also clear that few people will, of their own accord, decide that in the wider interests of society they will change their behaviour to improve the environment and reduce congestion. It is also clear that any changes which are seen to have a damaging effect 'on the pocket' will be resisted.

Transport in Society

In every documented human society travel and transport in one form or another appears to have played an important role in sustaining life and enhancing the development of the society. Evidence of long distance trade is found in archaeological investigations of ancient societies. Personal movement for fundamental economic motives is part of agrarian, hunting and industrial societies - although in some cases largely limited to certain social groups.

In historic times, there are disconcerting similarities between congestion problems recorded in ancient Rome, in medieval times and in Victorian London. There are also some widespread similarities in the amount of time that societies find themselves able to allow for travel - typically, about an hour a day on average, for widely different sorts of society both now and in the past.

Although the hour a day average spent on travel seems to be fairly stable, in different countries and among various social groups, the amount of movement that it 'buys' has increased enormously, primarily under the influence of increases in speed through technical change and the widespread diffusion of that technology. The invention of the wheel, horse drawn vehicles, wind and steam power, the internal combustion engine and jet power - in conjunction with the appropriate infrastructures - have extended the range of reachable destinations and the catchment area of settlements.

The influence of advancing technology in increasing the size of the area in which effective communication takes place, has been a very long term trend with only few and short lived interruptions or reversals. It should be said that this has often had damaging effects on the existing societies and major long term effects on the shape and growth of settlements. But overall it seems as though the technical improvements in transport have been quickly adopted - despite local opposition - and have tended to increase economic efficiency and to improve the quality of life in many ways.

The most significant development in land-based transport in the second half of the twentieth century has been the rise in importance of the car, to one of dominance in most economically advanced societies. This increasing influence and reliance on the car has often been looked at in the same way as transport developments in previous periods, i.e. simply as the diffusion of a 'technically superior' method of travel, offering higher speeds and greater convenience.

However, the scale, diffusion and specific characteristics of the car are simply not the same as transport developments in any previous period. The car is more ubiquitous in its ownership and far reaching in its impacts. In addition, there are a number of self perpetuating mechanisms triggered by the growth in mobility leading to congestion and overcrowding. This shows itself in many ways, including increasing delays and fuel consumption in traffic jams; longer waiting and boarding times for buses and trains; unreliability, tail-backs, bunching, stacking in the air, queues on the ground, over full stations, interchanges, airports and seaports and on occasion lock-ups of the whole system. So interconnected is our transport system that delays in one place can affect other places many miles away or even in different countries.

We are in the middle of a process which is based strongly on entirely legitimate human aspirations, built from individual decisions each of which, on its own, makes perfect sense. But the overall effect is uncontrolled and self-defeating. Our argument is that it is now necessary and possible to choose a different path: necessary for environmental and economic advantage; and possible because of the unprecedented breadth of understanding that it is not possible to provide for unlimited car use.

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EXECUTIVE SUMMARY

In 1988 the Rees Jeffreys Road Fund initiated a research programme on the characteristics of traffic growth and the policy solutions that might be available. The project was coordinated by the Transport Studies Unit, University of Oxford, and included seminars, discussion papers written by thirty-four of the leading specialists in the field and inputs from institutions representing industry, different sectors of transport, consumers, motorists and other travellers and professionals in engineering, planning and operations. The work contributed to, and benefited from, an unprecedented period of discussion and reappraisal among those working on transport.

The Report, presented for discussion at a Conference in London on March 21st 1991, (and, as always, solely the responsibility of the authors) argues that there was a watershed in transport thinking following the publication of revised traffic forecasts by the Government in 1989 and that - possibly for the first time - there are signs of a new consensus emerging; a 'New Realism' in which many traditional assumptions about transport policy are being rewritten. The primary focus is transport in and around towns and cities.

There are six main steps in the argument.

1 Current Patterns of Movement

It is clear that transport is an essential part of the economy, both because of its size {around 16% of total expenditure and taking on average an hour a day of everybody's free time) and because it is pivotal to production and social life. But in general it is only a means to an end and 'mobility' is less important than good standards of access for both passengers and freight. It is not always realised how much of all transport is short-distance. A third of all personal trips are on foot. Even for car journeys, 57% are less than five miles and the average is eight miles. Similarly for freight traffic, 73% of all goods lifted in the UK are set down within the same region and the average length of haul is less than fifty miles.

If we look at the make-up of traffic as a whole, 45% is in built-up areas and 14% on motorways. For all classes of road, cars are by far the most numerous vehicles and for the country as a whole over 80% of the vehicle-miles are by cars, with 16% by vans and lorries and only 1% by bus and coach (which do, however, provide for nearly 20% of the passenger journeys by vehicles on the road).

Thus private cars form the bulk of traffic. Within this, a third of car journeys are for work purposes (including education) and two-thirds for a wide range of other reasons shopping, personal business, social, recreational and pleasure trips. Car ownership is widespread - two-thirds of households have one or more cars - but the usage is not evenly spread over the population. In particular, car ownership is very strongly related to income; over 60% of men have access to a car as the main driver, but less than 30% of women; and car use is on a very much lower level among the elderly. .

2 Traffic Growth

Consideration of the features of traffic growth in the post-war period reinforces some but not all of these conclusions. It is true that the largest part of traffic growth has been due to cars not lorries. Indeed, car traffic, already the largest base, has also been growing twice as fast as goods vehicle traffic over the last decade. For freight, there has been an increase in the tonnage of goods moved, broadly taken up by the use of larger vehicles; most of the extra freight traffic on the roads is due to an increase (around 1% a year) in the average length of haul, as origins and destinations get more spread out. By contrast, growth in car use has been associated with a decrease in the average occupancy of cars, as well as an increase in the average journey length and in the total number of trips. There has been an increase in the proportion of journeys less than five miles, and in the proportion of non-work journeys. Short distance car journeys for non-work purposes are not only larger in number, but are also growing very fast.

On the other hand, the social characteristics of traffic growth are showing new features. The 'new elderly', brought up with cars, will tend to keep them when they retire and car use

among women is increasing very rapidly, partly for reasons of security. Children are being driven to school, rather than walking. As a result, there has been a decline in the traditional base of the bus market. Since the legislative changes in 1985, which were accompanied by an increase in bus miles, but also higher fare levels, there has, as yet, been no evidence of new markets developing.

The increase in traffic levels has taken place in a context of increasing pressures for development of rural and suburban areas and changes in retailing and service provision, all of which tend to encourage widely spread origins and destinations for which car use is increasingly necessary. Rising incomes enable the whole process to continue. Overall, the 'love affair with the car' has developed into a sort of dependence, in which psychological factors, influenced by education and advertising, play an important role. But the key driving force is seen to be the great convenience offered by personal transport in giving a control over time and space which has never previously been possible.

3 Problems of Traffic Growth

But the advantages are bought at a price and that price has been increasing to a level which is becoming unsupportable. /

First, the economic costs of congestion are considerable. These arise because of a technical law of traffic engineering that, when the traffic level approaches the capacity of the system, each extra vehicle adds greater and greater delays to everybody else on the network. The costs of these delays to other travellers are not taken into account in deciding whether, when and where to travel - each traveller is understandably concerned primarily with his own advantage. Compared with free flow conditions (though that is not an achievable objective) the resources wasted in traffic delays have been estimated at £15 billion per year.

Secondly, the cost in terms of human life and injury from traffic accidents is substantial. Over three million people have been hurt in road traffic accidents in the last ten years, including 55,000 killed. The number of fatal accidents has been declining, but still exceeds 5000 per year.

Thirdly, road traffic is a significant cause of local and global environmental problems. Locally, traffic noise, visual intrusion both of vehicles and all the associated street paraphernalia, fumes and the feeling of being overwhelmed by the presence of moving and parked vehicles, all detract from the pleasantness of urban areas and take away some of the attractions of wanting to travel to them. Globally, road traffic is one of several important sources of the pollutants that cause acid rain, ozone depletion and global warming. Concerning carbon dioxide, produced on every journey by the burning of any fossil fuel, road traffic is one of the few sources that is both substantial (about a fifth of total emissions) and increasing.

Fourthly, closer examination suggests that the change in mobility given by car use has not all been in a favourable direction. Social problems have arisen; those without access to a car suffer from the declining standards or increasing costs of public transport systems deprived of a wealthy base market. New patterns of living and working, in part encouraged by car availability, in turn generate more traffic which reduces the efficiency and attractiveness of the car use itself.

4 Two Streams of Thought

Although the scale of current transport problems is new, their existence is not new at all, and nor is their recognition. For many years there have been two co-existing streams of thought among policy makers and advisors on how to cope with the car and the problems it causes. One view has been to control car use in order to keep it within bounds defined by broader social objectives - both Tripp, in the 1930s, and Buchanan in the 1960s argued that residential and other areas should be kept insulated from excessive car use. But there was always an ambiguity in the argument, with some aspects of the other view; that the growth in cars was inevitable and it was necessary to provide sufficient road infrastructure to accommodate them. It was this view that provided the dominant orthodoxy for transport planning in the 1960s and 1970s. Planners and local authorities who took a different approach - looking to public transport as a substitute for road construction, for example - were generally seen as going against the trend. Their initiatives tended to be partial and short-lived.

But the initiatives designed to provide enough capacity to keep pace with increasing car use never actually provided enough road space to do so, let alone to provide enough additional capacity for other road users, including freight, which many thought should have an economic priority. As a result, traffic continually expanded much faster than the capacity of the network, 'spilling over' into previously less congested places and times of day. This gave an extra boost to the fear - continually asserted over several decades and as often denied - that extra roads themselves induced the extra traffic to fill them up.

During this period there were bitter battles between 'pro-roads' and 'anti-roads' campaigners, each with supporters drawn from political parties and interest groups.

5 The Watershed: National Road Traffic Forecasts in 1989 and their Effect on Thinking

In April 1989 the Department of Transport issued revised traffic forecasts (the earlier forecasts having underestimated traffic growth). These suggested that economic growth and existing trends would result in traffic levels by the year 2025 that would be between 83% and 142% higher than in 1988 - ie broadly double the current levels. Although there has been a technical argument about whether these predictions are plausible or not (for example, in

relation to the excessive amount of time that might be spent in travel, or the freight growth rates) they do seem to correspond with historically observed trends.

The forecasts were made at about the same time that global environmental questions were becoming a matter of great concern, including at Governmental and international level, and also at the same time as a manifest dissatisfaction among the population as a whole about the standards of public transport services, road congestion and the quality of urban living generally. The combined effects had a traumatic effect on the thinking of people involved in the planning and provision of transport services - it seemed neither possible to fit such traffic increases into any realistic road network, whether improved or not, nor a very good idea to try to do so even if it were possible.

The single most important conclusion of the resulting discussion was the proposition that there is no possibility of increasing road supply at a level which matches the growth rates in demand. It follows logically that (a) whatever road construction policy is followed, the amount of traffic per unit of road will increase, not reduce, ie congestion will get more severe or more widespread, and (b) demand management would therefore become the centre of transport policy; if supply cannot be matched to demand, demand has to be matched to supply.

This was the first step which allowed the possibility of a new consensus to be developed. That process is still continuing, and it is an important feature that the traditional alignment (roads lobby versus public transport lobby) has given way to a new and more fluid search for common interests, for example between bus and lorry operators, or between environmental and industrial interests, even between economists, planners and engineers. In many towns and cities there are also signs of cross-party agreement on transport policy,

6 Elements of the New Realism

A key feature of the new approach is the understanding that all the different parts of transport policy have to be in harmony with each other - it is no use planning the amount of road space, and public transport capacity, the parking provision and the patterns of land-use with different and conflicting objectives. It is also realised that to achieve this will require a wide range of different levers, prices, markets, laws, enforcement resources and institutions both from the public and private sectors.

The specific mix of these will vary from place to place, but there are certain common themes. These are:

- A very substantial improvement in the quality and scale of public transport provision, in some cases by new light rail or other high capacity reserved track systems and in most by extensive bus priority measures. This is almost completely agreed in principle, though there is not yet agreement on how to achieve it.

- Traffic calming, both as a set of detailed engineering techniques to reduce traffic speed in residential and central areas (by speed humps, chicanes, restricted road width, etc) and also as a general strategy to tilt the balance of advantage in favour of pedestrians and sometimes cyclists. These measures, together with pedestrianisation of a scale until now more familiar in European than British cities, are designed to improve the quality of life rather than mobility as such and are a necessary component in compensating for the loss of some expectations of car access,
- Advanced traffic management systems, including automatic driver guidance and integrated signal control, to get the most efficient use out of the existing network- no longer defined as the maximum throughput of vehicles, but allowing for a deliberate safety margin between traffic levels and capacity and also making provision for priority for the most efficient classes of vehicle or other local priorities (often mentioned are buses, delivery lorries, emergency services and disabled travellers).
- There is an increasing interest in the contribution that road pricing could play in knitting together the other policies (eg by providing some margin of unused road space with which to deliver the environmental improvements and public transport priorities) and, unlike all physical methods of restraining car use, producing a large revenue which could be used to fund the other improvements. Road pricing is politically controversial and is likely only to be acceptable if it is carried out as part of a total programme of improvements, with safeguards to ensure that the revenue is used for this programme and that groups who lose out are more than compensated with other benefits. It has another advantage; by ensuring that the prices that are charged for transport services are approximately in line with their costs, the market can work more efficiently as between the different methods of transport and the resulting traffic levels will be those that are economically merited.
- In this logic, assessment of the need for new road construction is seen to follow from a consideration of how much traffic it is desirable to provide for, which will be influenced by the combined effects of the policies described. There will still be occasions when new road construction is clearly justified - for example, in connecting a new industrial or residential development to the network - but construction 'to meet demand' is no longer the core of a transport strategy.

One of the great difficulties that has been experienced in the past in experimenting with one or other component of this list of policies, has been the political resistance from individuals or interest groups who feel their freedom to pursue their private and company interests is under threat from policies which deliver more sticks than carrots and do not fit together onto a logical whole. Perhaps there has been an element of truth in this, on occasion. But now the situation is different; it is traffic growth, and inappropriate responses to it, which constitute the threat to economic efficiency and a decent quality of living.- The 'New Realism' has the potential to deliver tangible improvements in the standards of living, working and moving, both for industry and individuals. Recognition that it is not possible to provide for unlimited car use is the key which has unlocked the possibility of other and more realistic directions.

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