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Edited by

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CRC Press
Boca Raton Boston New York Washington, DC

WOODHEAD PUBLISHING LIMITED
Cambridge England

Published by Woodhead Publishing Limited, Abington Hall, Abington
Cambridge CB1 6AH, England
www.woodhead-publishing.com

Published in North America by CRC Press LLC, 2000 Corporate Blvd, NW
Boca Raton FL 33431, USA

First published 2003, Woodhead Publishing Ltd and CRC Press LLC

British Library Cataloguing in Publication Data
A catalogue record for this book is available from the British Library.

Library of Congress Cataloging in Publication Data
A catalog record for this book is available from the Library of Congress.

Woodhead Publishing ISBN 1 85573 614 4
CRC Press ISBN 0-8493-1783-5
CRC Press order number: WP1783

Typeset and printed by Replika Press Pvt Ltd, India

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Preface

Through 15 years of association with the Velo-city cycling conferences, together with central involvement in the recent growth of the world walking conferences known as Walk21 I have been extremely fortunate to listen to and learn from inspirational researchers, professionals, speakers and practitioners in the world of non-motorised transport. Many of them are represented in these pages, and I have to say that I am immensely proud to have had the opportunity to work with them and to be their editor. All are esteemed colleagues and I am lucky to count many as friends. In particular I wish to acknowledge the debt I owe to three special people – Les Lumsdon of Manchester Metropolitan University, Ian Napier of IN Partnership Consulting in Sydney, and Jim Walker of the London Walking Partnership. Quite apart from the depth of knowledge and understanding that I have gained from them, all three have taught me the value of not just talking, but of walking and talking.

As well as the contributors, there are others that I would like to thank for encouragement and support in promoting walking and cycling through the years. They include John Adams, Ben Plowden, John Whitelegg and the late John Roberts in the UK; and from Australasia, Sue Dunn from Adelaide; Helen Abrahams, Robyn Davies, Michael Roth and Bronwen Thornton from Brisbane; Nigel Flannigan, John Grant and Ian Kett from Melbourne; and Donna Goodwin and Steve Scrivenor from New Zealand. It is important too to recognise that without provocation and encouragement from Iain Stevenson and guidance from Francis Dodds of Woodhead Publishing the project would never have tottered its first step let alone completed the circuit.

In all of this pleasure brought by scholarship and collaboration, there is one desperately sad note. This book has 54 chapters: it should have had 55. On 21 March 2002 one of the contributors was struck down and killed by a vehicle while crossing the street in St Louis, Missouri, in the USA. Susie Stephens was a founder and former director of the Thunderhead Alliance, a national coalition of bicycle advocacy organisations, which she had grown from a small band of determined advocates into a national force. Poignantly,

she was in St Louis doing work for the National Center for Bicycling and Walking. She was 36. On the Thunderhead Alliance website, a former colleague reflects that 'her memory will always inspire us to set the highest goals'. Her loss is graphic testimony to the timeliness and relevance of the ideas championed in this book.

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Introduction: talking the talk but not walking the walk

Rodney Tolley, CAST (The Centre for Alternative and Sustainable Transport), UK

If sustainable transport is defined as 'transport that meets the needs of the present without compromising the ability of future generations to meet their own needs', it is evident on many criteria that our current car-based travel patterns are unsustainable in terms of present and future generations. The premise of this book is thus that there is a short and long term imperative not only for us to switch to more sustainable forms of transport (which include public transport) but for large proportions of our travel to be moved to the *most* sustainable forms, walking and cycling.

Though it is true that in the last decade the merits of walking and cycling have been better recognised, promoting them still often takes place in a vacuum, without any serious consideration given to the necessary trade-off between trips by different modes. Given that the number of trips per person is stable at about three per day, it follows that an increase in the number of trips by one mode must be at the expense of another. Therefore the sustainability goal should not be, for example, 'to increase walking', as this might be at the expense of cycling, yielding no sustainability gain. It is, instead, to increase walking and cycling and simultaneously reduce car use. It is here that the real battle is to be fought.

Without any doubt, in many countries green mode promotion at the local level is important and there are countless successful projects with non-motorised components such as travel plans, safe routes to school, walking buses, car free days, walk to work days and much more. However, the background is of rapidly rising motorisation of society and spaces. There are green gains, but they are set in a sea of red losses. The same governments that are espousing the new green transport agenda are simultaneously accepting and anticipating rising volumes of motorised traffic – and this failure to grasp the nettle of traffic reduction sits extremely uneasily with goals of increasing trips by

bicycle and, to a lesser degree, on foot. For once a popular aphorism can be taken literally: we talk the talk but we don't walk the walk.

However, we must not disparage 'talking the talk', as it is a necessary pre-condition to knowledge and understanding, and indeed to raising awareness of these issues amongst those who do not even conceptualise walking and cycling as forms of transport at all. The opportunities to exchange information and best practice on walking and cycling have grown rapidly in recent years. Cycling has long had major conference series, led by the biennial Velo-city in Europe and Pro-Bike (now Pro-Walk Pro-Bike) in the USA. These streams converge from time to time in the VeloMondial (world) conferences. However, walking, disadvantaged by its very ubiquity, has remained an unexplored byway of research until relatively recently. It was not until 1997 that the UK held its first National Walking Conference and this has since become an annual event, hosted by CAST. Global gatherings have followed, the first being Walk21, held in London in February 2000. Since then successive conferences have been held in Perth, Australia (2001), Donostia-San Sebastian, Spain (2002) and Portland, USA (2003) with future Walk21s in advanced stages of planning for Europe and Australasia.

Underpinning and paralleling this burgeoning information exchange is rapid growth in practical interventions and in research. However, an extensive research agenda remains, dealing with such issues as:

- improving understanding of the cultural dynamics and motivations that affect people's willingness to walk or cycle;
- identifying what elements of the urban environment encourage or discourage walking and cycling;
- discovering how to evolve leisure walkers and cyclists into everyday, utilitarian walkers and cyclists;
- determining how walking and cycling may be better integrated with public transport;
- quantifying the health benefits of walking and cycling as modes of transport;
- developing indicators of urban quality and economic vitality based on walking and cycling;
- agreeing on how best walking and cycling may be promoted and marketed;
- ensuring that walking and cycling address the social exclusion agenda;
- determining how walking champions and professionals should be identified, encouraged and trained and their needs supported within decision-making structures;
- encouraging a paradigm shift in the way that policy-makers think about walking and cycling.

This list is not exhaustive, but it is indicative. These are the questions that need to be asked, to address the central cultural, economic, social and ultimately political significance of the pedestrian and cyclist in the sustainable cities we must hope and work for in our future. In this, we as a community of researchers,

activists, policy-makers – and, dare I say it, pedestrians and cyclists – need to find the opportunity of sharing our experiences and expertise. This book is part of that process and in a way can be seen as the third in a series that began with the publication of the first edition of *The greening of urban transport: planning for walking and cycling in western cities* in 1990. Of its 20 chapters, 12 were updated for the second edition, published by Wiley and Sons in 1997, but 29 were newly written. Of the chapters in this present book, ten are by authors represented in edition two, but this time only three of these are updated chapters and the rest are new. An opportunity has been taken to broaden the geographical coverage of the text in order to put walking and cycling into a wider, global context.

Rees (Chapter 1) begins by examining the concept of ecological footprints, carrying capacity, the consequent need for zero growth and the importance of walking and cycling to this goal. Hillman's concern (Chapter 2) is the overarching issue of global climate change and the centrality of walking and cycling to reversing existing unsustainable trajectories. Geurs and van Wee (Chapter 3) identify what an environmentally sustainable transport system looks like and what policy instruments would be needed to achieve it, in particular, tradable CO_2 emission permits. Newman (Chapter 4) discusses the rediscovery of the importance of walking to a city's economy and community, as, across the world, the rich knowledge-based developments are taking place in the walking transit areas of cities in preference to the car-orientated districts.

After these introductory contributions, there is no attempt to arrange the chapters in any detailed logical sequence, as it is expected that readers will 'dip into' the book rather than attempt to read it sequentially. Thus, Brög and Erl (Chapter 5) critique the underestimation of walking in traditional data gathering and model building, followed by Goodman and Tolley (Chapter 6) arguing that unless socio-cultural influences are incorporated into current policy, aims of increasing walking are unlikely to be achieved. Monheim (Chapter 7) then contends that a turnaround from existing myths of full motorisation will not come from technical concepts but from social forces, which will convince people that sustainable transport will produce cities worth living in. Gehl and Gemzøe (Chapter 8) account for the loss of balance between the meeting, trading and movement functions of public space, leading to invaded and abandoned cities. However, many cities around the world are now being re-conquered by new urban visions, based on walking. Porta (Chapter 9) examines how the whole problem of street life and urban form can be made a component of the urban sustainability question and describes experiments with formal indicators of measurement.

The argument that sustainable development cannot be achieved without gender justice and gender equality is developed by Lehner-Lierz (Chapter 10), who demonstrates that it is the bicycle rather than the car that is the vehicle of liberation for women. Cavill (Chapter 11) shows how physical inactivity has become a serious public health problem and emphasises the

enormous contribution that routine, everyday walking and cycling can make to improving public health, while Napier (Chapter 12) attempts to reveal the broad value of the walking economy in fields of personal and community health, retailing and tourism. He contrasts this with the lack of powerful economic interests to improve conditions for walkers and cyclists and identifies new personal transport devices as potential partners and catalysts for change. Wittink (Chapter 13) then lays to rest the myth that more cycling will lead to more traffic deaths and shows that, in contrast, road safety will increase as a result of more bicycle planning. High levels of cycling and safety for all road users go hand in hand – and this is a clear and powerful message. Next, Hass-Klau (Chapter 14) examines the complex relationships between public transport and walking, as far as is possible given the paucity and poor quality of data on linked trips, whilst Sauter (Chapter 15) examines how for a century the perception of walking has been shaped by the motor car and the driver's perspective. He looks at these perceptions in historical, sociological and philosophical contexts and speculates on how these distortions can be overcome in the future.

In the next contribution (Chapter 16), an attempt is made by Forward to explore the nature of attitudes and how they relate to behaviour. She analyses the key stages in attitude change and recognises the importance of a sound theoretical basis to interventions, together with an understanding of target groups' needs and motivations. McClintock (Chapter 17) continues the theme, not only by identifying individuals' perceptions of barriers to cycling, but also by extending the analysis to official attitudes to encouraging cycling. The key here is not to have a negative pre-occupation with traffic danger, but to stress the positive advantages in terms of health, the environment and the economy. Following this, Tolley, Bickerstaff and Lumsdon (Chapter 18) report that a survey of European walking experts presents a negative picture of the future of walking in Europe, which does not fit with goals of sustainability. At the same time an unparalleled advance in policy and strategy is forecast to appear in the next decade – and the challenge will be to translate this into practice to reverse existing trends. Finally, Diekstra and Kroon (Chapter 19) provide a psychological analysis of car addiction in an attempt to explain why politicians pay lip service to measures to protect road safety and the environment, whilst doing everything possible not to impede growing car use.

Opening the Strategies section, several chapters focus on infrastructure and design. Ploeger (Chapter 20) describes the design strategy that should underpin the provision of bicycle network infrastructure and Roberts-James (Chapter 21) then provides the comparable perspective in regard to walking. McMillen (Chapter 22) outlines some of the factors that drive the process of improving pedestrian access for people with disabilities and provides a checklist of recommendations. Jones (Chapter 23) also focuses on design, but at the level of the neighbourhood, comparing conventional suburban development patterns with 'new urbanist' designs which produce walkable, mixed use

neighbourhoods. Monheim (Chapter 24) then emphasises the importance of pedestrian precincts in adapting city centres to new lifestyles, not as a technical measure, but as a way of emphasising the identity and uniqueness of the city centre as a focus for leisure, tourism and culture.

Tira and Spence (Chapters 25 and 26, respectively) turn our attention to the safety of walking and cycling. Tira shows that it is best achieved in the context of urban safety management, whereby 'black-spot treatment' is replaced by area-wide approaches, delivered by a coalition of committed parties in a 'sharing interests' strategy. Spence critiques traditional road safety strategies, which have led to many walkers and cyclists withdrawing from conflict situations by reducing trips. New 'road danger reduction' approaches, which control dangers at their source, have now forced themselves into the mainstream of road safety practice.

Next, Pharoah (Chapter 27) argues that walking and cycling are very different modes which require separate treatment by planners. Lumping them together does them both a disservice, he contends: the strength of each mode needs to be recognised in an integrated approach that sees them planned together with motorised modes. Subsequently, Vanderslice (Chapter 28) describes how the US, perhaps because it has arguably the worst conditions for pedestrians of any country, has seen the most impressive growth of advocacy groups, which attempt to win improved facilities and to change behaviour. James and Brög (Chapter 29) look at a different way of changing behaviour through the pioneering TravelSmart/Individualised Marketing technique that is now spreading to cities across the world and promising to win more walking by modal switching from cars.

The next two chapters both examine the intersections between health and transport. Wright (Chapter 30) examines ways of creating supportive environments for physical activity through a variety of Australian interventions, whilst Davis (Chapter 31) examines the need for collaboration between the health and transport sectors, using a case study of a WHO project in three European countries. Two successive chapters then deal with the US. Clarke (Chapter 32) reports on the US' widely-commended changed policy environment for walking and cycling. However, he observes that they have hit an 'asphalt ceiling', and have made as much progress as they can without upsetting the established order. Clarke suggests that new alliances with health may allow such upsets to be achieved. Komanoff and Pucher (Chapter 33) follow by identifying the major barriers that make up that ceiling and discussing ways of overcoming them if the political obstacles to a changed philosophy could be circumvented.

Lumsdon (Chapter 34) provides our only chapter on recreational cycling through an examination of 'near to home' cycling on Britain's National Cycle Network. This is providing benefits in terms of sustainable tourism development and is now seen to be supporting rural economies. Finally in this section, Sloman (Chapter 35) charts the fluctuating fortunes of the green modes in recent political history in the UK and concludes that there are

grounds for optimism. She sees the need now to push for 'quick wins' rather than flagship projects. However, echoing other calls in these pages, she emphasises the need to put traffic reduction at the core of sustainability policy.

Leading off the Practice chapters, Godefrooij (Chapter 36) debates the merits of integrating cycling into the road system and Kitahara (Chapter 37) focuses on the importance of community development efforts in conserving walkable environments in Japan. Next, a technique being used in The Netherlands to identify best practice locally is described by Borgman (Chapter 38) and then Gaffron (Chapter 39) draws lessons from a study of the implementation of local walking and cycling policies in Britain. Turning our attention to Australia, Burke (Chapter 40) questions whether gated communities have any place in a sustainable future in view of their demonstrated barrier effect to movement on foot. In the US context, Fenton (Chapter 41) argues that promoting walking must involve a coalition of health, transport, environment, safety and liveable community advocates if it is to combat, *inter alia*, the obesity epidemic now being exported by the US to the rest of the world. Continuing the interest in promotion, Walker (Chapter 42) extols the virtues of marketing walking via a people-centred process which integrates targeted messages with physical improvements, and then Litman (Chapter 43) examines how non-motorised transport can be better incorporated in new travel demand management strategies. The classic work on safe routes to school in Denmark is then updated by Underlien Jensen (Chapter 44), identifying not only existing interventions to improve facilities and extend traffic calming, but also the need to influence attitudes. Finally, Elster (Chapter 45) concludes that local cycle projects which contribute to social inclusion goals offer an important way of engaging a wider audience with cycling.

In the short Case studies section, chapters deal with US best practice in pedestrian facility design (Anders and Seiderman, Chapter 46) and with UK best practice in designing streets for people (Sellers, Chapter 47), whilst Mercat and Héran (Chapter 48) deal with the universal problem of bicycle theft. Successive chapters then deal with software and hardware interventions – software in the case of using cycling courses as a way of integrating immigrants into a host culture (van der Kloof, Chapter 49) and hardware in the contributions of Ashton-Graham (Chapter 50) and Mamoli (Chapter 51), who deal with cycle facility provision in the very contrasting environments of Western Australia and Italy. Two other chapters examine campaigns to promote walking, one in a city with a strong sustainable transport agenda (Carter and Johnson, Chapter 52) and the other in a voluntary, community-focused health-targeted initiative (Ashcroft, Chapter 53). Spence concludes the volume (Chapter 54) by describing best practice in cycle training, arguing that this produces a win–win scenario of safer cyclists cycling more.

What of the future? An optimistic perspective on the present and future of walking and cycling would recognise that in the last decade there has been a clear shift towards a more holistic view of their place in the modal balance.

Whereas for years the problem has been dealt with as a set of safety and infrastructural issues – thereby missing the wider political and institutional barriers that need to be overcome in order to create walkable and cycle-friendly communities – the developing urban renaissance agenda may place these modes more centrally in future sustainable transport policy.

The primary aim of such a renaissance is to create people-friendly urban areas by enhancing their quality and environment and, in turn, to improve their amenity, viability and vitality. The creation of safe and attractive pedestrian and cycling environments in towns and cities is a necessary condition for success and is central to improving them for shoppers, visitors, workers and residents alike. In other words, quite apart from pro-walking and cycling arguments based on sustainability, the environment or social inclusion, there is a strong business case for improving conditions for the green modes. For walking in particular this changed perspective may allow it to escape from its local authority 'safety ghetto' and become connected to issues of town centre management, or urban regeneration, whilst at a national level powerful alliances can be made with strategies on social inclusion and crime reduction, for example. Indeed in the future, it may be that the way to promote walking will be to stop talking about walking; that is, rather than promote walking as transport to get somewhere, it may be more effective to promote the things you can do when out walking – window-shopping, strolling, people watching, playing and so on. The focus would effectively shift from the activity of walking to the creation of high quality environments in which walking becomes a natural and pleasurable activity.

There are, however, alternative views of the future. A pessimistic perspective would stress existing forecasts of more cars; more car use; more crashes; less everyday walking and cycling; more sedentary lifestyle-related deaths; more depletion of, and international conflict over, energy reserves; more emissions; more global warming; more climate change; and more induced poverty, dislocation and conflict. None of these indicators currently has a trajectory even remotely consistent with a sustainable future. Because appropriate transport choices are the sine qua non of the achievement of sustainability, the use of our feet – on the ground or on pedals – must be at the heart of future transport systems, living arrangements and use of public space. That will be a challenging goal for us and our children, but one that we have no choice but to achieve.

Part I

Principles

1

Ecological footprints and urban transportation

William Rees, University of British Columbia, Canada

1.1 Introduction: The new global context for local planning

The world in 2003 is not the same world humans inhabited 50 years previously. Environmental problems are no longer simply local effects of local activities. An unprecedented era of human-induced global ecological change has arrived (Daly, 1991; Goodland, 1991; Rees, 1995a, 2000; Vitousek, 1994). The reason is simple. By sheer growth in scale – four to fivefold since the Second World War – the global economy has, in effect, begun to merge with the ecosphere and human activities are radically reshaping the global landscape. Indeed, half of the world's landmass has already been transformed for human purposes and half of the planet's accessible fresh water is being used by people. Given the steady erosion of 'natural' habitats, it should be no surprise that the rate of biodiversity loss is now estimated to be 1000 times the 'background' rate.

The effect on material processes is equally disturbing. With the growth of production and consumption some material economic processes now rival natural flows and their impacts are global in scope. More atmospheric nitrogen is fixed and injected into terrestrial ecosystems by humans than by all natural terrestrial processes combined (Vitousek, 1994); stratospheric ozone depletion now affects both the Southern and Northern Hemispheres; atmospheric carbon dioxide has increased by 30 % since the Industrial Revolution and is now higher than at any time in at least the past 160 000 years. Partially as a result of this increase, mean global temperature is also at a record high and the world is threatened by increasingly variable climate and more frequent and violent weather events (Lubchenco, 1998; Tuxill, 1998; Vitousek *et al*., 1997; WRI/UNDP, 2000; WWF, 2000).

Concomitant with these structural changes, humankind has become the

functionally dominant species in all the world's major ecosystems. By the end of the twentieth century, human beings, one species among millions, were already appropriating directly and indirectly up to half of net terrestrial primary productivity and 30 % of net estuarine and continental shelf production (the source of 96 % of the global fisheries catch) for their own use (Vitousek *et al.*, 1986; Pauly and Christensen, 1995). The inevitable result is the human displacement of other species from their niches and the accelerating extinction rate noted above (Rees, 2000). In short, with the continuing increase in human populations and *per capita* consumption, critical biophysical systems are stressed beyond capacity and many local and global waste sinks have been filled to overflowing. For the first time in their two million year history, humans are capable of altering the geological and biological evolution of the entire planet.

Paradoxically, the globalisation of ecological change has been accompanied by the localisation of human populations and settlements. Up to 80 % of the citizens of many so-called industrialised countries now live in cities and half the world's population of about 6 billion will be urbanised by 2010.

Cities are, of course, centres of intense economic activity. This means that many of the forces driving global change originate in cities. As much as 75 % of final consumption and pollution generation already takes place in urban areas although they occupy only about two per cent of the world's landmass. The construction, operation and maintenance of buildings alone account for 40 % of the materials used by the world economy and for about 33 % of energy consumption (Worldwatch Institute, 1995). On the positive side, 'the sheer concentration of population and consumption gives cities enormous leverage (e.g., economies of scale, agglomeration economies) in the quest for global sustainability' (Rees and Wackernagel, 1996).

This chapter shows why we urgently need to plan for more sustainable transportation, particularly transit, bicycles and walking, in our cities. Its major premise is that the onset of global change requires (among other things) a radical rethinking of the policy framework for local governance and development. To develop this point, the chapter first emphasises the nature of cities as ecological entities. Remarkably, this is unfamiliar territory for most citizens and politicians. However, with the urbanisation of the human population, urban ecology may well become a major preoccupation of sustainable development planning in coming decades. It then shows the potential contribution of cities to sustainability through improved transportation planning. This demands a much expanded role for self-propelled transportation – bicycling and walking.

1.2 The human 'ecological footprint'

It is one of the great ironies of our human-induced ecological crisis that people do not even think of themselves as ecological beings, as part of the

natural world. Indeed, the industrial era has been characterised by a perceptual 'Cartesian dualism' that has been remarkably successful in maintaining the psychological separation of humankind from the rest of nature. One consequence is that we tend to think of pollution or the collapse of ecosystems as *environmental* problems rather than as problems of *human economic dysfunction*. Even economics, the study of how society can most efficiently exploit the natural world, has historically considered most forms of ecosystem destruction to be mere 'negative externalities' and therefore somehow outside the (market) system of concern.

In an effort to overcome this perceptual bias, the author has pioneered with his students a more holistic approach to global ecological change called 'ecological footprint analysis' (Rees and Wackernagel, 1994; Rees 1996; Wackernagel and Rees, 1996). This model recognises that, far from being separate from nature, human beings are integral components of the ecosystems that support them.

Ecological footprint analysis is related to traditional trophic ecology. The analysis begins by quantifying the material and energy flows required to support any defined human population and identifying the corresponding sources and sinks. In effect, it describes the material dimensions of the human ecological niche, including the population's extended food-web. Of course, the human food-web differs significantly from those of other species. In addition to food energy, the human food-web must also account for the material and energy flows necessary to maintain industrial metabolism. In short, the human food-web incorporates the material demands of the entire economic process supporting the study population.

Ecological footprinting gets its name from the fact that many forms of material and energy flow (resource consumption and waste production) can be converted into land- and water-area equivalents. Thus:

> The ecological footprint of a specified population is the total area of land/water required, on a continuous basis, to produce the resources that the population consumes and to assimilate the wastes that the population produces wherever on earth the relevant land and water is located. (Rees, 2001a)

In other words, ecological footprinting estimates the area of productive ecosystems scattered all over the planet whose biophysical output is effectively appropriated by the study population for its *exclusive* use – land used to produce soybeans for the Japanese cannot simultaneously be used to produce bok choi for the Taiwanese. When data are available, population eco-footprint estimates are trade-corrected (consumption = production + imports – exports). Indeed they include both the area appropriated through commodity trade and the area required to produce the referent population's share of the free land- and water-based services of nature (e.g., the carbon sink function).

1.3 The eco-footprints of cities

> Great cities are planned and grow without any regard for the fact that they are parasites on the countryside which must somehow supply food, water, air, and degrade huge quantities of wastes. (Odum, 1971)

Even early published estimates showed that the ecological footprints of average residents of high-income countries, accounting for just average food, fibre and fossil energy consumption, ranged as high as five to seven hectares per capita (Rees, 1992; Rees and Wackernagel, 1996; Wackernagel and Rees, 1996). The food eco-footprint includes both a terrestrial component (crop and grazing land) and a marine component, the latter based on seafood consumption. The fossil energy component estimates the area of average dedicated carbon sink forest that would be required to assimilate average carbon dioxide emissions. (This probably produces a conservative estimate. Alternative ways of estimating the energy component often produce larger eco-footprints.) More comprehensive or recent analyses push the higher average eco-footprint estimates to 12 hectares per capita (Folke *et al.*, 1997; Wackernagel *et al.*, 1999; WWF, 2000).

By simple multiplication, the ecological footprints of high-income cities are typically two to three orders of magnitude larger than the geographic area they physically occupy. Eco-footprint analysis thus dramatically underscores Odum's (1971) characterisation of cities as ecological parasites. For example (revised from Rees, 2001b):

- British researchers estimated London's ecological footprint for food, forest products and carbon assimilation to be 120 times larger than the city's geographic area (IIED, 1995), or about nine-tenths the area of the entire country. In the absence of trade and natural material cycles, and assuming the inter-convertibility of farm and forest land, the entire ecologically productive land base of Britain would be required to sustain the population of London alone.
- In 1996, the author's home city of Vancouver, Canada had a political–geographical area of 11 400 hectares and about 472 000 residents. Using the then Canadian average ecological footprint for food, fibre and carbon sinks of approximately 7.7 hectares per capita (Wackernagel *et al*., 1999) it is estimated that the aggregate eco-footprint of Vancouver city is 3 634 400 hectares, or 318 times its nominal area.
- Using data from the Toronto, Canada region, Onisto *et al*. (1998) estimate a per capita ecological footprint of 7.6 hectares. The 2 385 000 residents of the city of Toronto proper therefore have an aggregate eco-footprint of 18 126 000 hectares, an area 288 times larger than the city's political area (63 000 hectares).
- In a more comprehensive study using region-specific data, Folke *et al*. (1997) estimate that the 29 largest cities of Baltic Europe combined appropriate, for their resource consumption and waste assimilation, an

area of forest, agricultural, marine and wetland ecosystems 565–1130 times larger than the combined area of the cities themselves.

These data emphasise that no city as presently defined can be sustainable on its own. In ecological terms, cities and urbanised regions are intensive nodes of consumption sustained almost entirely by biophysical production and other processes occurring outside their political and geographic boundaries. As noted in the introduction, this means that cities (and the inhabitants of cities) are both the drivers of global ecological change and an essential key to sustainability (Rees and Wackernagel, 1996).

1.4 Global overshoot

Ecological footprinting suggests that consumption by the present global economy (i.e. the human population) already exceeds the long-term productivity of the ecosphere. For example, Folke *et al.* (1997) show that the carbon dioxide emissions of just 1.1 billion people (19 % of humanity), living in 744 large cities, exceed the entire sink capacity of the world's forests by 10 %. Wackernagel and Rees (1996) estimate that with prevailing technologies and average consumption levels, the present world population exceeds global carrying capacity by 10 % to 30 %. More recently, data in Wackernagel *et al.* (1999) suggest that humans may have overshot long-term global carrying capacity by as much as 40 %.

These studies show that the wealthy fifth of the world's population that consume nearly 80 % of global economic output have unwittingly claimed the entire sustainable biophysical output of the ecosphere for themselves. Put another way, despite grotesque material inequity between the rich and poor, there is not enough 'natural capital' (natural resources and biophysical processes) left on the planet to provide the continuous 'natural income' (life-support goods and services) necessary to support even the present human population sustainably, at present average consumption levels, using prevailing technology.

1.5 'Factor-10' reductions

In response to this new reality, various studies suggest that for sustainability in a growing world, even present emissions of carbon dioxide must be reduced by a minimum of 60 % and those of many other pollutants by between 50 and 90 % (RMNO, 1994a; IUCN/UNEP/WWF, 1991; MOHPPE, 1988). More generally, assuming a near doubling of the 1990 population figures and a quadrupling of world output over the subsequent 50 years (3 % growth per year), sustainability demands that the resource/environmental impact *per unit consumption* be reduced by up to 90 %, at least in rich countries.

For example, Carley and Spapens (1999) argue on ethical grounds that reductions in energy and material use of 80–90 % in wealthy countries are necessary to create the ecological space needed for necessary growth in the developing world. Other studies reach similar conclusions (Ekins, 1993; RMNO, 1994b; Schmidt-Bleek, 1993a, b). Even the Business Council for Sustainable Development (BCSD) seems to have accepted that 'Industrialised world reductions in material throughput, energy use, and environmental degradation of over 90 % will be required by 2040 to meet the needs of a growing world population fairly within the planet's ecological means' (BCSD, 1993). Note that such scenarios generally assume continued gross domestic product (GDP) growth in both the North and South, 'which remains the principal, practically unchallenged global aspiration' (Ekins and Jacobs, 1994).

Clearly, if the material dimension of welfare is to be maintained in the face of such massive cut-backs, substantial gains will have to be made in energy and material productivity (technological efficiency) in coming decades. In other words, improved resource productivity can help the rich to shrink their eco-footprints, thus creating room for the poor to expand theirs. Growing support in principle for reductions in the First World's energy and material use to one-tenth of present levels through alternative technologies and increased resource productivity is sometimes called the 'Factor-10' movement.

1.6 Eco-fiscal reform

Discussion in mainstream policy circles of how to achieve such demanding objectives has so far been confined almost exclusively to enhanced technological and economic efficiency. However, even this limited 'tech-fix' approach presents major difficulties. The last 25 years have been spent convincing ourselves – and the rest of the world – of the incompetence of governments and of the efficiency of untrammelled markets as a cure-all for whatever ails us. Nevertheless, many analysts agree that markets alone will not achieve the desired efficiency gains. To begin with, a major effect of spontaneous efficiency gains may well be to *increase* energy and material consumption. Efficiency-induced cost savings result in higher wages and lower prices, so consumers have more disposable income to use in their pursuit of cheaper goods and services. Consumption rises. It is therefore almost certain that governments will have to implement internationally co-ordinated programmes of ecological fiscal reform. Among other things, this implies accelerating taxes on the energy and material inputs to manufacturing, accompanied by progressive reductions in payroll and income taxes. The higher resource costs are required both to stimulate the needed efficiency gains in the first place (manufacturers will compete to maintain reasonable consumer prices) and to prevent the price/income 'rebound effect' (higher costs control wages and higher consumer prices prevent additional spending). Meanwhile, payroll and income tax relief is required both for social equity (i.e., to protect the relatively poor against

rising prices for goods and services) and to maintain some semblance of revenue neutrality (von Weizsäcker, 1994; Rees, 1995b, c).

While making some gains in Germany, Denmark and other European countries (particularly Scandinavia) eco-fiscal reform remains a hard sell in the anti-interventionist political climate that now prevails (particularly in North America). This is regrettable. Fiscal reform for sustainability must be broadly endorsed and implemented across the international community, to stimulate general progress toward energy/material conservation and to maintain the 'level playing field' for fair trade in an increasingly global marketplace.

1.7 The values-and-lifestyle option

Whatever fiscal stimuli are eventually put in place, ten or even fivefold efficiencies will not be easy to achieve in many key economic sectors in the time available. It is difficult to conceive of a high-rise office tower or even a family house with ten per cent of the mass and embodied energy of equivalent structures in 2003. More basically, can active humans survive on 10 % of 2500 calories per day? Obviously not (though shifting from meat to vegetable and fruit calories would significantly decrease one's eco-footprint). The point is, efficiency has its limits. As one of the author's students put it, a decent cup of coffee requires a certain minimum number of beans! This suggests that, even if the necessary monetary reforms are adopted, it would be foolish to put all our sustainability eggs in the efficiency basket.

Indeed, there may be much to gain by addressing more fundamental issues. For example, how do we change the culturally-induced values, beliefs and behaviours that underlie the consumer society and drive otherwise sensible people to define themselves largely in terms of income and the accumulation of material goods? Given the momentum of the industrial growth economy, shifting basic values and behaviour would seem a daunting task. However, it may become easier as society slowly comes to recognise that the growth agenda is not actually working. Many people intuitively feel what the scientific data are starting to show, that beyond a certain income level there is little indication of improvement in either objective or subjective assessments of human well-being.

For example, between 1957 and 1993, US real per capita income more than doubled to $16 000. In 1993, compared to 1957, 'Americans [had] twice as many cars per person – plus microwave ovens, colour televisions, air conditioners, answering machines and $12 billion worth of new brand-name athletic shoes a year' (Myers and Diener, 1995: 13). However, doubled affluence made them no happier. In 1957, 35 % of respondents told the National Opinion Research Center that they were 'very happy' compared to just 32 % in 1993. Given 'soaring rates of depression, a quintupled rate of reported violent crime since 1960, a doubled divorce rate, a slight decline in marital happiness among the marital survivors, and a tripled teen suicide rate,

Americans [had become] richer, [but] no happier' (Myers and Diener, 1995: 14). Other studies in the US and elsewhere report similar results (Lane, 2000).

In this light, the most important sustainability-related question may be: How can society evolve so that people have adequate physical security but achieve a sense of self-worth and acquire social status from non-material forms of personal achievement? In other words, how can we begin the shift to a cultural paradigm that supports people to substitute rejuvenated personal and social capital (non-material forms of self-fulfilment and social relationships) for their present compulsion to acquire and consume ever more physical capital (manufactured 'stuff')?

To many readers, the degree of technical and social engineering implied here will seem abhorrent. Certainly it would appear to be politically and socially impractical. However, it is nothing new – we have already been engineered. The 'consumer society' is itself a social construct, the socially-engineered creation of post Second World War private enterprise achieved through the help of mass media and the advertising industry. In any case, the urgency of global ecological change clearly requires a redefinition of political practicality.

To clarify, eco-footprint analysis and the various other studies cited above all either implicitly or explicitly recognise that the present human economy has already overshot global carrying capacity. Present overshoot means that for sustainability, future development must be less-than-zero-impact development. Even if we achieve the desired efficiency gains, long-term ecological sustainability requires that we repair the damage already done to the ecosphere. Many of the Earth's renewable and replenishable natural capital stocks will have to be rebuilt to increase the Earth's capacity to accommodate the demands of the additional billions of people to come. In this light, if society is serious about sustainable development, no policy stone – technological or social – should be left unturned.

1.8 Cities, transportation and urban form

Most energy and material use occurs in cities and much of this is attributable to transportation. Petroleum powers most of the world's 625 million vehicles – indeed, 30–50 % of the world's oil is consumed in all forms of transportation and this proportion may rise to as much as 60 % by 2010. Transportation is therefore a major source of greenhouse gases, climate forcing and pollution generally. Brower and Leon (1999) found that, overall, household use of transportation, from recreational boating to airline travel, is responsible for 28–51 % of greenhouse gases and air pollution, and 23 % of toxic water pollution. Private vehicles are the major culprits. The average new car in the US emits two tonnes of carbon – 7.3 tonnes of CO_2 – per year. To put all this in context, if 40 % of the carbon dioxide emissions attributable to the

population of a typical high-income city were generated by transportation, the carbon sink for this sector alone would occupy about 20 % of that city's ecological footprint.

In North America, the combination of private cars and light trucks, and ready availability of inexpensive fossil fuel, has given shape to congested, sprawling, inefficient cities that are profligate in their waste of both land and material resources. The 'auto-transformation' of North America occurred subtly over a long period of time. Transportation was once seen mainly as a means to an end, as a facilitator of economic and social life. It served the community. However, with the rise of the automobile culture, the perceived right to unlimited personal mobility gradually, subtly, almost unconsciously, became an end in itself. Consequently, we have reached the point where the community now serves the demands of the automobile. Urban health, safety on the streets, neighbourhood design, environmental quality and city form have all given way in the service of the private car. And regrettably, the blight of congestion and sprawl now also increasingly plagues many European and Asian cities.

On the brighter side, the crisis in urban transportation provides a major opportunity to enhance urban sustainability. Humanity currently exists in a dysfunctional relationship with the natural world and auto-bound cities are both a symptom and a cause of this dysfunction. Sustainability requires that transportation in cities be returned to serving wider social and economic needs. In future, urban design and urban transportation must focus on achieving more with less, on reducing land, energy and material use while increasing the liveability of cities for people.

The potential is considerable. Walker and Rees (1997) show that the per capita ecological footprint associated with housing type (density) and associated transportation requirements is reduced by 40 % with the shift from single family to multi-unit urban residences. Such data open the door to a greater emphasis on planning for transit, bicycling and walking in cities. Private automobiles are the least energy-efficient and most ecologically damaging means of moving people within cities; bicycles and walking are the most energy-efficient, environmentally sound and healthy forms of urban transportation; transit is in between. Clearly there is much to be gained from a switch to ecologically saner forms of urban transportation, particularly facilities for pedestrians and cyclists.

1.9 Good planning needs both carrots and sticks

With proper planning the drive for more sustainable cities should be perceived as good news by city dwellers. After all, it implies progressive improvement in the quality of urban life. At the same time, because it also implies the need to change well-worn habits, many people see sustainable development in negative terms, as potential personal sacrifice. For example, urbanites perceive

that they may have to limit the use of their cars but it is unclear to them what they gain in return.

This dilemma shows that scientists, urban planners and politicians have failed both to convey a sense of urgency about the problem and to create a compelling vision of the sustainable city. Decision-makers will not be able to sell 'sustainability' to ordinary citizens until the latter can seize on it for personal gain. People will come to own sustainability only if they are convinced it is in their personal and collective interests.

There are two immediate ways of bringing this about. First, people need to be assured that what they now perceive as personal sacrifices are, in fact, part of a positive trade-off. Yes, their behaviour and expectations may have to change, but as a result, they will actually be better off than before. Why would anyone want to forgo use of the family car in the city unless he/she were assured that a viable alternative mode of transportation was available and that other values of urban life would also be enhanced to compensate for any residual inconvenience?

Municipal governments and planning agencies should implement strongly active, long-term public information programmes to raise issues of sustainability to public consciousness and to encourage in-depth public debate on options and opportunities. It should not be too difficult to convince the majority of electors that a clean, healthy, safe city, with several transportation modes providing access to increasing numbers of urban amenities (because of higher densities and the resultant economies of scale) is preferable to a polluted, unhealthy, dangerously congested, auto-dominated city with fewer viable public amenities. The fact that the healthier, more humane, city would also have a significantly smaller ecological footprint is a bonus that would not even have to be advertised.

These amenity carrots would seem all the more attractive if authorities showed greater signs of willingness to brandish the economic stick. Contrary to popular belief, the private car is the most heavily subsidised form of urban transportation. Direct and indirect subsidies have been variously estimated at several hundred to three thousand dollars per vehicle per year, at least in North America. Moving towards full social cost accounting for the automobile, through higher registration fees, fuel taxes, road pricing, bridge tolls, etc. (eco-fiscal reform), would be both economically efficient and ecologically sound.

Strong economic incentives are also effective in changing consumers' behaviour and ultimately their values. Full cost accounting might well persuade many previous proponents of the car to begin exploring the alternatives. They would soon be pleading instead for improved public transit, better pedestrian access, and more facilities for bicycles in our cities. In short, well-informed citizens who are also strongly motivated to change might gladly abandon their cars in town in favour of more efficient and less costly alternatives for many kinds of trips. They would soon come to enjoy enhanced urban living as part of the bargain.

1.10 Cities, cycling and sense

As noted, walking and bicycling are the most energy efficient, healthy and generally sustainable modes of urban transportation. It simply makes good sense to walk or use a bicycle for short trips in the city. However, people do not always act in what seems to be the most technically rational manner. The speed, comfort and convenience of cars makes them formidable competitors with alternative modes particularly when perceived costs are low.

To make matters worse, cars have become the most potent symbol of the consumer society. Many people's egos ride with them in their cars as the latter have come to advertise their owners' personalities, wealth and social status. For all these reasons, urban development experts sometimes comment that rising urban incomes inevitably lead to increased auto ownership and use, accompanied by a decline in the viability of other urban transportation modes.

Certainly this is a real danger in much of the world as incomes increase. There is no question that car ownership is strongly correlated with income and in many countries the number of cars is growing faster than the human population. However, Kenworthy *et al.* (1995) have shown that rising wealth is not necessarily associated with uncontrollable increases in automobile dependence. The catch is that, to avoid automobile dependence, municipal governments must implement '. . . strong physical planning policies that favor non-auto modes' (Kenworthy and Laube, 1997).

As suggested above, positive policies towards mass transit, pedestrians and cycling work best in combination with economic constraints on the car. The objective is to provide viable alternatives to the car while ensuring that the cost of driving accurately reflects its true impact. General planning considerations that can help move us in the right direction include:

- land-use zoning to encourage mixed land-uses at higher densities, particularly in strategic nodes (e.g., urban village centres) around transit stations;
- placing priority in transportation spending on infrastructure for preferred modes – transit, cycling, walking – and increasing the costs associated with auto use (e.g., higher road and parking fees);
- emphasis on the provision of fast, comfortable, convenient public transit (e.g., light rail) for longer trips within the built-up area;
- explicit policies to integrate transit service with new infrastructure for pedestrian and bicycle traffic;
- various policies leading to the eventual conversion of the city centre to pedestrian and bicycle use only;
- engagement of concerned citizens' organisations on both sides of the issue in a systematic programme of information exchange and dialogue on urban sustainability, the 'Factor-10' imperative, and the benefits of non-auto transportation modes, particularly walking and cycling.

It might help if, parallel to the above, non-government organisations (NGOs)

Table 1.1 Sustainable urban transportation: shifting to bicycles and walking

Objectives for bicycle and pedestrian planning
1 Increase the proportion of public roads subject to traffic calming to increase safety for pedestrians and cyclists and to reduce motorised traffic
2 Increase the total length of dedicated (separated) cycleways by planned target amounts each year
3 Increase the total length of pedestrian-friendly streets by targeted amounts each year
4 Create tax incentives (associated with building permits, business licences, property taxes, etc.) to increase the proportion of businesses and dwellings with facilities for bicycles (e.g., daytime storage) and cyclists (e.g., accessible showers)
5 Increase on a priority-route basis the proportion of public transit vehicles capable of carrying bicycles
6 Develop an active campaign to publicise the personal, community and ecosystems health benefits of cycling and walking
7 Create and publicise targets to increase the annual share of work and shopping trips taken by bicycle or by walking

Source: liberally extended from Kenworthy and Laube (1997).

with an interest in urban sustainability were to mount concerted campaigns in major centres focusing on the anti-social aspects of auto use in urban areas. This effort might be compared to the vigorous (and successful) anti-smoking campaigns of the 1980s, and the current fight against 'second-hand smoke' being waged by NGOs to good effect in North America.

Within this overall framework, Table 1.1 summarises some of the specific objectives that might be used to guide the rebirth of walking/cycling cities in the modern world.

1.11 Does it work? The case of Freiburg, Germany

The city of Freiburg in southern Germany was successful in stopping the growth in auto use even as car ownership increased. According to Pucher and Clorer (1992, in Kenworthy and Laube, 1997), Freiburg's car ownership increased from 113 per 1000 people in 1960 to 422 per 1000 in 1990. However, despite this growth in vehicle availability, car use was virtually constant between 1976 and 1990. It rose only 1.3 % while total trips increased by 30 %. Most significantly, transit ridership increased by 53 % and bicycle trips by an astonishing 96 % during this same period. Consequently, the share of trips by car fell from 60 % to just 47 % and growth in car ownership has slowed.

Pucher and Clorer (1992) credit Freiburg's success at reducing auto dependence to simple but determined planning initiatives aimed at enhancing alternative urban transportation modes. These include pedestrianisation of the city centre, city-wide traffic calming (e.g., 30 km/hr speed limit in residential

zones), and more difficult, expensive parking, combined with upgrading of the city's light rail system. What is the overall effect of these measures?

> First, [they have] sharply restricted auto use in the city. Second, [they have] provided affordable, convenient, and safe alternatives to auto use. Finally, [they have] strictly regulated development to ensure a compact land use pattern that is conducive to public transport, bicycling, and walking. (Pucher and Clorer, 1992: 386)

Compare the Freiburg story with the situation in the auto-dominated US where policies generally favour increasing road capacity. The residents of sprawling low density American cities are already by far the biggest car users in the world at over 11 000 km per person per year. This is 2.5 times the European average and 7.5 times the average for the residents of even wealthy Asian cities. Nevertheless, 'Los Angeles, which is reasonably typical of other US cities. . . has been doubling its *increase* in car use per person every decade between 1960 and 1990' (Kenworthy and Laube, 1997). Planning for bicycles is particularly difficult in the North American context (see Box 1.1). Regrettably, the US model with its addiction to the car seems to be gathering strength in many parts of the developing world.

Box 1.1 The case of Austin, Texas

Modern North American cities have generally been unfriendly to bicyclists. This is only beginning to change as cities as diverse as Vancouver and New York implement bicycle master plans. Sometimes this involves a significant commitment of resources to dedicated paved paths and roadways for bicycles – even wintry Calgary has a few of these – but more often the commitment of resources is minimal. Typically, the city will identify on-road signed bicycle routes, only sometimes providing a dedicated bicycle lane or shared-use path of some sort (e.g., a bus/bicycle lane). However, it is often legal for cars to park in so-called bicycle lanes rendering them useless for cyclists.

The city of Austin, Texas is probably fairly typical. In 1999 *Bicycling Magazine* declared Austin to be among the top ten US bicycling cities and in 2001 and 2002 it was ranked number two among cities of 500 000 to one million people. However, according to bicycleaustin.com, if this ranking is valid, 'then what [it] really shows is how lousy the rest of the continent is for cycling, and not how great Austin is.' Legal car parking in bicycle lanes is only one of the barriers facing Austin cyclists.

The overriding problem is that Austin has put very few resources into earning its reputation. Austin City Council created a Bicycle Program Co-ordinator position in 1994 but allocated no funds to fill it. The Department of Public Works found the money to carry the post, but no

Box 1.1 (continued)

budget for the Co-ordinator to fulfil his responsibilities. He nonetheless carried on, borrowing from other departments and using debt-bond funding until stretched to the limit. This situation continued through the 1998 budget which again committed zero dollars to the needs of cyclists and pedestrians and added to the reasons for the Bicycle Co-ordinator to resign. In a subsequent letter to the Council, former Bicycle Program Co-ordinator Rick Waring observed 'Austin has a long history of lip service without real commitment to bicyclists and pedestrians'. This statement would resonate with bicycle planners and cyclists in many cities across the Continent.

Source: http://bicycleaustin.com/top10.html

1.12 Conclusion

We are in global ecological crisis. The human ecological footprint more than spans the planet. While the general problem is widely acknowledged by scientists and many of the world's governments and international agencies, we denizens of the industrial growth economy continue to act out a business-as-usual scenario despite the evidence that this agenda is actually reducing our personal and social well-being.

The problem is as acute in urban development as in any other domain of modern life. What we need are cities that are more compact, more efficient in the use of existing infrastructure, safer, healthier, and richer in urban amenities; all of which can be facilitated by expanded investment in public and non-motorised transportation. What we are getting in many parts of the world are cities that are increasingly congested, inefficient in the use of energy and material, more dangerous, unhealthy, less capable of maintaining existing amenities, spatially dominated by infrastructure for private automobiles, and poorly served by public transportation.

This situation can be reversed – a well-informed public will support measures for sustainability that are seen, on balance, to provide net private and public benefits. Moreover, evidence exists in the form of broad international comparisons and detailed case studies to show that forceful concerted action can improve urban land-use efficiency, reduce auto dependence, and greatly increase transit use, walking and cycling in cities. All this generally tends to improve the quality of urban life while reducing the urban ecological footprint. What seems to be lacking is public understanding of both the urban sustainability problem and the potential solutions. Without a broad base of popular support for strong policy measures, the political will to act crumbles in the face of vested interests and the comfort of status quo.

Of course, we cannot say with certainty that more energy and materially efficient cities would catalyse a general move toward sustainability. What is certain, however, is that continuing our addiction to the automobile will draw us ever further away from the needed 'zero-impact' approach to future development. By contrast, greater use of transit, bicycles and walking can bring us closer to that goal. As wheeled mechanical transportation, bicycles are ecologically superior to automobiles in that they:

- require fewer resources for their manufacture and operation and are less polluting;
- are more sparing and equitable in their use of urban space, freeing up land for housing, parks and other amenity uses;
- are healthier in use for both their riders and the public at large (less air pollution);
- are more economic to manufacture, purchase, use and service – even parking for bicycles requires fewer resources and space.

In short, given increasing human populations, deteriorating global environmental quality and the need to reduce resource throughput, bicycles seem to be a morally, ecologically and economically superior transportation choice for those who can use them compared to private automobiles for many trips in the city.

While considerably slower, walking trumps even bicycling in terms of material use and demands for space and economy, and has similar health benefits. Even the speed disadvantage of walking is greatly diminished in the compact mixed-use urban spaces and places that evolved naturally in historic walking cities or that are possible in car-free zones of modern cities designed to reflect the capabilities of normal human bodies.

As a final point, an increasing number of people would benefit from getting back in touch with their bodies. This does not refer to the general health benefits to normal people who enjoy self-propelled transportation. Obesity is now a major lifestyle-related public health problem. There are an estimated one billion significantly overweight people on Earth living mostly in the auto-dominated high-income cities of the developed countries. Cycling and walking may well be the least expensive prescription available for what is turning out to be an extremely expensive modern urban pathology.

1.13 Acknowledgement

This chapter is revised and updated from a presentation to: *Velo-City '97* (10th International Bicycle Planning Conference), Barcelona 15–19 September, 1997.

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2

The relevance of climate change to future policy on walking and cycling

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2.1 Introduction

We are at a defining moment in history. We have to come to terms with newly acquired and unpalatable evidence that points to the need for urgent and, it would seem, unwelcome changes in our lifestyles and activities. Since records began, nearly all the hottest years on Earth have occurred since the mid-1980s. Glaciers are receding and sea levels rising, and the frequency of freak storms and flooding is growing apace. Already the character of the Gulf Stream has altered to an extent that, in the opinion of the Government's former chief scientist, is 'awesome'. The tundra in north Canada, Alaska and Siberia is slowly melting, releasing methane which is a significant greenhouse gas contributing to the process of climate change.

Theists could interpret these signals as a manifestation of a divine warning of the need to limit abuse of the planet we have been bequeathed. Atheists could argue that they reflect an evolutionary development in which the planet is simply responding in a variety of reflexive manifestations to destabilising pressures on its ecological equilibrium. Either way, against the background of our collective responsibilities, inaction or turning a blind eye to the near-incontrovertible corroboration of a highly disturbing process is clearly unacceptable.

A primary cause of the changes appears to be the quantities of fossil fuels that are being used to provide for our energy-dependent activities. Climate scientists have established that the levels of gaseous by-products are well in excess of the planet's capacity to absorb them. The consequences for Earth's natural greenhouse characteristics that have so far enabled it to support life appear dire. Given the current link between the growth of the economy, not

least in the transport sector, and fossil fuel use, the possibilities of avoiding irreversible damage are rapidly diminishing because the scope for de-coupling that link is falling so far below what is now needed.

2.2 The implications of climate change

Recognition of the incompatibility of continuing growth and adequate protection of the global environment is made more obvious by considering the built-in momentum associated with the wider adoption of energy-intensive lifestyles. Indeed, given that greenhouse gases remain in the atmosphere for up to 100 years, those resulting from the use of fossil fuels during the *last* 100 years have to be factored into calculations of ecological outcomes. From this perspective, the otherwise attractive adjective 'sustainable' loses its meaning in any debate on public policies aimed at accommodating further growth. If we are to act as 'stewards' of the planet for present and future generations, the ecological imperative of protecting it must represent an essential background against which decisions are made. This requires extreme thriftiness in our consumption of finite resources (Hillman, 2000).

In the year 2000, a report of the Royal Commission on Environmental Pollution (RCEP, 2000) quoted the Intergovernmental Panel on Climate Change (IPCC) calculation of the need for a minimum global reduction of carbon dioxide emissions of 70 %. The IPCC has consistently stated that, if that highly challenging target is not met, the disturbing consequences of climate change that we are already witnessing are likely to intensify, and the costs of coping with them are bound to rise sharply (Houghton *et al*., 2001). In light of this warning, the RCEP recommended the reduction be met by 2050 (RCEP, 2000), and the UK Government accepted the target in its *Energy Review* in 2002 (Cabinet Office, 2002).

2.3 Sharing responsibility

In political terms, the way forward has to be through the medium of international negotiations such as the ones which have been the focus of conferences on climate change over the last ten years, including those in Rio de Janeiro, Kyoto, Berlin and, most recently, the 'Rio + 10' conference in Johannesburg. These negotiations can be seen to be stages in the challenging process of achieving consensus on the subject.

For many years, the Global Commons Institute (GCI) has argued for the adoption of an internationally acceptable framework or formula. The one it has advocated is called *Contraction and Convergence* (Meyer, 2000). The extent of the overall contraction and the date by which it needs to be achieved would be determined by and, if necessary, revised, in light of the most

up-to-date scientific evidence on the subject. The requirement that the process incorporate convergence towards equal per capita carbon emissions to complement and run in parallel with the process of contraction is clearly essential. There can be neither moral grounds for anticipating, nor political prospect of obtaining, the agreement of all countries on delivering the target without applying this principle of equity to take account of their current contributions to the problem. The populations of the Third World cannot be expected to make the same contribution to the globally-necessary reduction as populations of the developed world.

In relatively affluent countries such as the UK, this means that average per capita emissions must be cut from their present level of nearly 9.5 tonnes by over 90% to just 1 tonne. On an evenly-stepped programme that entails reducing them by 5 % each year up to 2050. Recent advances in scientists' understanding of the ecological processes involved in climate change suggest that the target must be reached much sooner than 2050. As an indication of the significance of this, it can be simply calculated that affluent countries such as the UK would need to achieve a reduction of 10 % each year if the target had to be met in 25 rather than 50 years.

2.4 The role of transport

To understand the relationship of these figures to current lifestyles in the UK, it is important to appreciate the role of each component of energy-dependent activities. At present, overall average annual household emissions are over 25 tonnes. This is comprised of roughly 11 tonnes for each household's share of the operation of power stations and refineries; 5.5 tonnes for industry; 3.5 tonnes for domestic use, mainly heating; and 4.5 tonnes for transport – excluding air travel (Hillman, 1998a). The required reduction is so substantial that no sector of the economy can expect to be excused from contributing. All fossil fuel-dependent activities have to come under scrutiny. It must also be recognised that there are limits on the contribution that technology can make in the form of efficiency gains, and on the substitution of fuels with lower emissions of greenhouse gases per unit of energy.

What are the implications for policy? The case for transport being obliged to deliver an above-average contribution can be made here. Demand for energy-intensive patterns of travel is more amenable to moderating influences. Decisions on where to live and work are typically made many times during an adult lifetime. These obviously then determine the distances that have to be covered, for instance for commuting or for leisure, and whether journeys are of such a length or complexity that they cannot be realistically made on a regular basis without having to travel by car or train.

Clearly, the scale of change in patterns of travel and transport is so considerable that it will necessitate much less choice and a substantial re-ordering of priorities, unless of course there was to be some phenomenal

technological breakthrough to eliminate the causes of climate change originating from human activities. But there is little encouraging evidence to suggest this within the time-scale available to offset serious social, economic and environmental damage.

Cars are an obvious target as, within the transport sector, they are by far the most significant source of emissions. An average current use of over 9500 miles per car per year (Department of the Environment, Transport and the Regions, 2001) results in about 3.3 tonnes of carbon dioxide (Consumers' Association, 2002). That is well over three times the quantity which would be available (under reducing methods) as an equitable annual ration for each person for *all* their fossil fuel consuming purposes. A lot of personal travel, such as holiday breaks to distant destinations, and much freight mileage, such as conveying from abroad consumer durables also manufactured in the UK, and out-of-season fruit and vegetables, are relatively inessential, but performed frequently. Against the background of the need to prioritise which component of the energy-dependent sector is the more appropriate to deliver the required reduction in emissions, these current and growing practices can certainly be seen as far less essential than supplying heat in the winter.

Of course, many of these transport movements are made by air. There are strong grounds for seeking to ensure that these make an especially large contribution to the reduction as the release into the upper atmosphere of emissions from aircraft is particularly damaging. It is also all the more important to be concerned on this score as air travel is the fossil fuel-using sector that is demonstrating by far the greatest current rate of growth. The fact that there is no prospect of renewable energy sources being available for aircraft propulsion within the foreseeable future is not a justifiable reason for excusing it from playing a major role in this regard. This is particularly so when the current scale of air travel, and even more so its predicted expansion, is taken into account.

Nor could it be considered acceptable to excuse the air travel industry's involvement in negotiations on how the target of reduction is to be met owing to the complexity of apportioning to particular countries the greenhouse gas emissions from national airlines catering for international travel. Again, to put the relevant calculations into context, carbon emissions on one person's round trip by air from London to Florida, based on the aviation fuel used and typical aircraft seat occupancy on such flights, add up to 1.8 tonnes. That is nearly double the annual personal ration of emissions from all activities referred to earlier.

2.5 A conflict of objectives: growth or sustainability

It is very apparent that the per capita 'ration' of 1 tonne or the household 'ration' of 2.5 tonnes, close to one-tenth of average current levels, will only cover the most essential of energy-intensive activities. One obvious route to

enabling people to live 'within their means' lies in promoting the adoption of local patterns of travel, namely ones that can be predominantly met on foot, bicycle or bus rather than those over long distances entailing dependence on car or rail use. However, a brief examination of previous policies and practices that have influenced current patterns, and which at present look likely to be continued with only minor modifications, suggests an unwitting discrimination against such a strategy. They give a strong impression that politicians have been loath to implement measures that run counter to what they perceive to be what people want. That is so even where this preference can be seen to be largely or totally inspired by the public's limited appreciation of a policy's longer-term consequences, and, in particular, its ecological impact.

An allied and complementary inspiration for politicians aiming to achieve as much growth as possible in the transport sector without taking adequate account of its implications, and for them not prioritising policy in favour of non-motorised transport, can be noted. A future of 'universal car ownership' has been anticipated. Against this theoretical background, the geographical limitations of walking are removed through the medium of technological advances enabling travel without effort over longer and longer distances and at ever-higher speeds. For those unable to benefit from the availability of a car, or whose choice of car use has to be limited on grounds of an insufficiency of road space or parking space, an enhanced public transport system is volunteered. What is generally overlooked is that its qualities can only rarely match door-to-door car travel.

The outcome of the wider availability of cars can be easily identified in the rising use of motorways. It has been assumed that their provision would extend access to a vastly increased catchment of opportunities leading to enrichment of the quality of life of those able to travel on them. Eventually, it was thought, nearly everyone would enjoy the benefits. However, whilst in the short-term this network of high speed roads has enabled people and freight to be moved around in less time than before, in the longer-term its success has carried the seeds of its own destruction.

Owing to the impossibility of meeting the growth in demand for the movement of vehicles that the network has generated, congestion and delay, especially in and near the urban areas served, have become all too common features of the reality of daily travel. Understandably, in the absence of limits on road use – other than the costs of fuel and the lack of pressure exerted to encourage decisions being reached from a wider perspective than self-interest – drivers have simply attempted to maximise the advantage they judge that they can derive from using them. All too often, they have then locked themselves into a travel pattern from which they are unable to extricate themselves as congestion has followed in the wake of too many other drivers following the same 'logic' and a public transport alternative is an unavailable or unrealistic option.

Nevertheless, a main policy objective has been to enable people and goods to travel further and faster by road, rail and air. The fact that pursuit of this

objective for all modes runs counter to promoting sustainable patterns of activity in that it entails higher fuel consumption is wantonly ignored. At the same time, it has appeared reasonable to plan so that all journeys can be increasingly made with more comfort, security and convenience. Moreover, as if financial support comes from someone else's pocket, there has been a strong preference for the cost of travel being partly offset by public subsidy. Widespread support for this approach is reflected in the decisions of successive governments, with one revealing a bias towards the provision of public transport as a public service, followed by one persuaded that it is more cost-effective to invest in building more roads. The fact that a much lower share of scarce public funds would be required to achieve a truly sustainable transport policy focused on walking, cycling and bus use does not appear to have been considered, let alone appreciated.

Demonstrations in the UK in 2000 about the price of petrol, and the Government's conciliatory response to protestors at the time, can be cited as evidence of the incentives and pressures brought to bear on governments to continue with policies that promote more extensive patterns of transport and travel. The Government's proposed spending of £180 billion on transport between 2000 and 2010, as set out in its 10 year plan, has commanded widespread public, political and media support (Department for Transport, 2000). The growing demand for personal travel by car and freight movement by lorry has been the background against which, with all-party support, a substantial and continuing road building programme has been maintained. The purpose of the programme has been to increase both the vehicle capacity of the road network and the amount of by-pass construction intended to relieve communities of the environmental damage and danger arising from traffic in small towns and villages.

Similarly, the perceived need for substantial investment in the rail network and its services to cope with the rising demand for longer distance patterns of travel is reflected in the fact that one-third of the sum proposed in the Government's ten year plan was earmarked for it. That represents a considerable subsidy to users, particularly if it is calculated in relation to the number of beneficiaries rather than to the population as a whole – rail only accounts for one per cent of all journeys. Moreover, the plan gave no indication of what proportion of the costs of providing the services are to be, or even should be, recovered from fares.

The apparent absence of public concern about the escalating costs of upgrading the West Coast rail line in Britain from the originally quoted price of £2 billion to the current estimate exceeding £12 billion could also be alluded to in this context. Mention too could be made of the Mayor of London's promotion of additions to the capital's underground system, such as the proposed new *Crossrail* route from Paddington to Liverpool Street, in spite of the lamentable experience of the very high and hugely escalating costs of the Jubilee Line Extension.

The fact that air travel incurs no cost to cover its environmental externalities

could be interpreted as an indirect and substantial subsidy to both those who fly and those who benefit from goods that are transported by air. Government approval in 2001 of the British Airport Authority's proposal to build Terminal 5 at Heathrow airport (Byers, 2001) was clearly informed by a key argument that the inspector for the inquiry deployed in recommending approval for its construction. He argued that there was no government policy on containing growth in air travel (Vandermeer, 2001) and therefore, by implication, every attempt should be made to meet the predicted demand for it. Again, this suggests that governments have failed to appreciate the immensity of the ecological problems coming in the wake of this blind spot in their thinking (Hillman, 1998b).

The extent to which policy and practice are biased in favour of longer motorised journeys at the expense of journeys made at the local level can be seen where there is an obvious conflict of objectives in decision-making, that is where main roads pass through traditional urban high streets. Typically, pavements are narrowed, front gardens requisitioned to allow for road widening, especially close to junctions, and railings erected to prevent pedestrians crossing on foot where they find it most convenient. At a limited number of designated locations, traffic lights with a short pedestrian phase are provided, together with a 'placebo' button to encourage people who wish to cross the main road to think that they are setting the phase in their favour.

The railings can be seen to encourage higher speeds on the roads in question, as drivers have to pay less attention to pedestrians. The railings also heavily discourage the local population from using shops and facilities on both sides of the road. Furthermore, they lead to an increase in the road's traffic-carrying capacity thereby lowering its amenity from the perspective of pedestrians and cyclists. This harms further the health of people working, living or simply walking along it owing to the consequent higher levels of pollution, noise and danger.

The outcome of this approach in the transport domain – reflecting the failure of governments to take decisions that have the prospect of delivering sustainable outcomes – can be seen in the changes in personal travel in recent decades. National Travel Surveys covering the population of Great Britain show that, over the last 25 years, average annual mileage travelled has risen by 44 %, and the length of journeys by more than one-third, with the increases occurring for *all* main journey purposes. Mileage by car and rail has risen by 67 % and 31 % respectively (Department for Transport, 2002). The number of visits by air by UK residents to overseas destinations has increased more than fourfold (Department of the Environment, Transport and the Regions, 1997). As if this is compatible with its professed sustainability goals, the UK Government forecasts a further 40 % increase in road traffic over an equivalent 25 year period ahead. Rail travel is planned to grow by 40 % between 2000 and 2010 and air travel by 5 % each year.

2.6 Unwelcome obstacles and fallacious assumptions

A review of current transport policy points to four major factors standing in the way of delivering a transport strategy of an ever-improving and expanding infrastructure and services to enable people to travel further and faster. First, there is the insufficiency of public money from the Treasury to do as much as is thought desirable. This represents a perpetual limitation in the absence of any end-state being identified, particularly in terms of easy accessibility to a predetermined set of destinations and of an acceptable speed with which these should be able to be reached. Second, there are electoral considerations reflecting public concerns on environmental issues, notably those regarding noise and air pollution, and local opposition to new developments motivated by understandable objections based on self-interest. Third, there is the continuing problem associated with the insufficiency of road space in urban areas, and the problems entailed in acquiring land and property to provide for new transport infrastructure. Finally, planning delay, which is an inevitable consequence of the democratic process of widespread public consultation and comprehensive inquiries, has added significantly both to the cost and time of delivery of any development. Nevertheless, as has been seen, unsustainable growth continues.

How this has come about, given the growing understanding among relevant professions – though not in the population at large – of the issue of climate change, and its implications for future transport policy needing to be heavily orientated towards encouraging non-motorised travel, is not understood. Some of the explanation can be seen to lie in the way that the public and politicians alike have subscribed to a number of fallacious assumptions.

The first assumption has been to base policy on the judgement that the most effective way of minimising energy-wasteful travel is by bringing about a significant transfer of journeys currently made by car to public transport. However, in the UK, at current occupancy levels, fuel use per passenger kilometre by public transport is only about 20 % lower than it is by car. And even this relatively small percentage is reducing as technology, spurred on by market forces following recent legislation on differential taxation according to carbon emissions, is applied to getting more car kilometres out of a litre of fuel (Hillman, 1996). Moreover, the word ‘transfer’ implies that journeys now made by car can be returned to bus or rail. But transport statistics since the 1980s show that for every passenger kilometre lost to public transport, the number of passenger kilometres travelled by car has increased 20-fold (Department of the Environment, Transport and the Regions, 2001).

This damning statistic undermines the frequently cited argument that if only the quality of public transport services can be improved, people can be persuaded to return to it from the car. Very few of the journeys now made by car were previously made by public transport. Moreover, in the same way that the provision of motorways generated far more traffic mileage than it relieved from the existing road network, so too in the main does improved

public transport provision generate more traffic mileage rather than bringing about the wished-for transfer from the car. In respect of a policy on reducing fossil fuel use, it is therefore to some degree counter-productive.

The second assumption, allied to the first, is the belief that a major contribution to lowering emissions can be made by making more efficient use of fuel in motor vehicles. However, by lowering the unit cost, this all too often leads to the generation of more energy demand. At the same time, it also encourages the public to buy vehicles with more engine capacity and higher performance levels without incurring additional running costs.

Third, and again linked to the view that greater efficiency is the key to delivering the necessary reduction, is an oversight in the equation of the role of distance travelled. It is thought that because, per passenger kilometre, travel by train results in lower emissions than travel by air, journeys made by rail are an effective way of limiting emissions. From the perspective of meeting national or international targets on this, however, mileage as well as mode needs to be taken into account. For instance, it is less damaging for a short holiday break to fly from London to Paris than to take the train to Nice. And it is even less damaging to go by car to Brighton, and not at all damaging to go on a cycling tour of the Cotswolds!

Fourth, it is thought that speed is an unimportant factor in the pursuit of policies on reducing fuel use and carbon emissions, whereas in fact it represents a significant element. Higher speeds by any transport method require not only more intensive use of fuel but also promote geographical dispersion of activities. Given the objective of seeking to minimise fuel use, this latter outcome has even more undesirable effects than the former as it tends to be associated with regular, frequent and longer trip patterns.

2.7 Discussion

Until fairly recently, successive governments had seen no need to question the implications of attempting to cater to the public's addiction to an apparently insatiable appetite for travelling further, faster, in ever greater comfort and at ever lower cost. They have continued to rely on the illusory belief that this component of our lives requires no limits imposed on it and that, where any problems are identified, they can be unquestionably resolved without interfering with personal choice. No significant policy initiatives have been contemplated for doing so. The continuing availability of resources – materials, land, and private and public finance – combined with technological advances and human ingenuity, have allowed the demand to go on rising to an extent somewhat lower than proponents of the free market would have wished, but nevertheless far exceeding past expectations.

However, there is now considerable evidence demonstrating the unsustainability of this process, not least in light of reports of the Intergovernmental Panel on Climate Change, the Royal Commission on

Environment and Pollution, and reluctant recognition of it as can be seen in government responses to these reports. This chapter has shown that in affluent countries, carbon emissions must be reduced to a considerable extent, far exceeding what can be achieved through measures of applying greater efficiency in the use of energy. When this is linked to the fact that these countries' populations' 'rations' must also be equitable and preventative of serious damage to the planet's eco-system, it is clear that a dramatic U-turn in transport policy needs to be made as a matter of urgency. This requires a reversal of the policies that governments have pursued in the past and, disturbingly, largely continue to pursue.

Two interacting problems stand in the way of taking sufficiently effective action. The Government has to accept that the decisions it has been taking have been seriously misguided. From the perspective of electoral considerations, this difficulty is so challenging that it is commonplace to claim it to be politically unfeasible. Support for this view is reinforced by considering the implications of repudiating long-held positions. It can be painfully deranging, the more so with procrastination. It is maintained, therefore, that it would be unrealistic to expect any government to make such a profound admission of past errors of judgement. However, in this instance, that argument must be dismissed as totally unacceptable when set against the damage from continuing with present policies.

The strategy necessary to address adequately the problem of climate change requires the adoption of targets over a predetermined number of years aimed at substantially reducing both the distance and speed of travel by road, rail and air. If these targets are not met, the disturbing consequences of climate change which we are already witnessing are likely to intensify, and the costs of coping with them are also likely to rise exponentially. The targets must be set to deliver what must be the key objective of transport policy, that of preventing serious damage to the planet.

At present, there appears to be little prospect of success as the public look to government to take the necessarily demanding decisions. But these decisions are all too heavily influenced by electoral rather than broader public interest objectives reflecting our widespread wish to 'have our cake and eat it'. It is clear, however, that the way forward in responding to the exigencies of climate change cannot continue to find expression in 'buck-passing' responsibility between public and government on such a crucial issue.

If the delivery of sustainable patterns of activity is to be more than an expression of intent, there must be far more personal and political commitment. The necessary targets for reducing greenhouse gas emissions will only be met if there is due recognition of their link with an individual's lifestyle and working practices. The essential dramatic change will only be brought about when there is a wide consensus based on an informed appreciation of the fact that fossil fuel-using activities are having deleterious effects on the health of the planet and, in all likelihood for this reason, on the quality of life of its future populations.

Every sector of our fossil fuel-dependent economy must come under scrutiny. In the transport sector, there has been a crucial failure in policy to recognise that the most effective way of minimising energy-wasteful patterns of activity, especially those related to conserving finite fossil fuels, is not by achieving a transfer from the car to public transport. Nor is it by aiming for more efficient use of fuel in motor vehicles (which all too often leads to the generation of more energy demand by lowering its unit cost). It is obvious that the way ahead lies in promoting modes of transport that do not use petrol at all – walking and cycling. Such a policy initiative would also further many other social, health and local environmental objectives, the advantages of which most people recognise.

Many corrective changes in approaches to policy and practice are needed to promote walking and cycling. The first and most obvious needs to be focused on reducing the volume and speed of traffic. The second lies in the realm of land-use planning. A presumption should exist against large-scale facilities when more numerous, albeit smaller, ones serving smaller populations are a realistic alternative. Decisions should be made with an awareness of their implications for the convenience and safety of pedestrians and cyclists and the amenity of their environment. The third is to encourage local authorities to broaden the aspects they take into account in their appraisal process for determining the most cost-effective strategies to adopt on transport investment. The process should ensure that all the public benefits are incorporated. Encouraging walking and cycling promotes health, and reducing air pollution and greenhouse gas emissions improves the local and global environment.

The fourth approach for justifiably favouring the non-motorised modes, and walking in particular, is concerned with the reallocation of road space. Pedestrians, especially children and the elderly, are increasingly exposed to danger, and their journeys are often lengthened to make it easier to cross roads in safety. For this reason, perhaps the measure with the greatest scope for promoting walking is the concept of the uninterrupted pedestrian network, consisting of pavement-level linkages across most roads. Its construction would be staged over, for example, a ten year period, starting outside schools, park entrances, quieter shopping areas, bus stops on less strategic routes and road intersections in residential areas.

2.8 Conclusions

Climate change and urgent action on its implications, not least in the sphere of transport, must be placed at the top of the political agenda. The incompatibility of policies catering for growth rather than decline in road, rail and air transport and those intended to deliver a sufficiently adequate response to the prospect of climate change from excessive use of fossil fuels is obvious.

The harsh reality that must be faced is that if individual lifestyles result in

the production of more than their fair share of greenhouse gas emissions, then there are only two possible outcomes. Either others will have to be denied their fair share or, more likely, the planet's climate will be seriously destabilised, with all the awesome consequences that are already beginning to be witnessed. This predicament is the consequence of a previous failure to act collectively on our responsibilities – directly as individuals, and indirectly as electors who, in a democratic society, can influence political decision-making. In all conscience, we cannot continue to bury our heads in the sand on this issue.

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3

The role of non-motorised modes in an environmentally sustainable transport system

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3.1 Introduction

What is the role of non-motorised modes in an environmentally sustainable transport system? This is one of the issues addressed in the 'environmentally sustainable transport' (EST) project of the Organisation for Economic Co-operation and Development (OECD). The main objectives of the project were:

- to establish a definition of and criteria for a sustainable transport system;
- to decide what a sustainable transport system looks like and how it might be reached, i.e., which instruments governments could deploy;
- to examine the economic and social implications of such a transport system;
- to develop guidelines that governments in OECD countries and others could use for moving their transport systems forward.

Teams from nine countries undertook six case studies. The countries involved were Germany, Sweden and The Netherlands, as well as the Quebec–Windsor corridor in Canada, the Oslo region in Norway, and the Alpine region comprising parts of Switzerland, Austria, France and Italy. Related studies have been undertaken jointly by the United Nations Environment Programme (UNEP), the OECD and Austria for 14 Central and Eastern European countries, under the Central European Initiative (CEI). Japan and Italy have also carried out similar studies (see OECD, 2001a, b) (Fig. 3.1).

This chapter summarises the results of the EST study for The Netherlands, conducted by the Dutch National Institute for Public Health and the Environment (RIVM), by order of the Dutch Ministry of Housing, Spatial Planning and the Environment (see Geurs and Van Wee, 2000). It focuses on

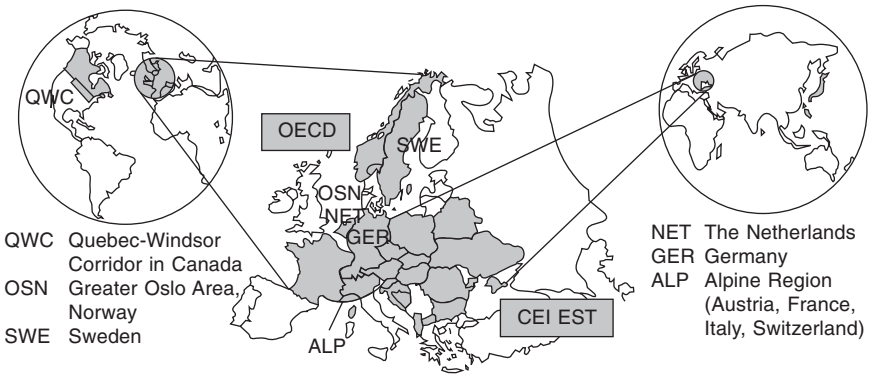

Fig. 3.1 EST pilot studies. Source: OECD (2001a).

the role of cycling in an environmentally sustainable transport system, and the function of the different types of policy instruments in the attainment of EST.

In the OECD project very sharp emission reductions were thought to be necessary for the realisation of EST. The OECD (1996) defined a sustainable transport system as one that throughout its full life cycle operation:

- allows generally accepted objectives for health and environmental quality (e.g., such as those from the World Health Organisation concerning air pollution and noise) to be met;
- is consistent with ecosystem integrity (e.g., critical loads and levels for acidification);
- does not result in worsening potentially adverse global phenomena such as climate change and stratospheric ozone depletion.

Furthermore, six criteria were identified as being the minimum number required to address the wide range of health and environmental impacts from transport. The criteria were selected so that local, regional and global concerns would be addressed, specifically noise, air quality, acidification and eutrophication, ground-level ozone, climate change and land-use. The following criteria for EST were derived for the year 2030:

- A stabilisation of atmospheric concentrations of CO_2 emissions at or below their 1990 levels to prevent climate changes. Accordingly, total world-wide CO_2 emissions are to be reduced by between 50 % and 80 % for OECD countries. Total CO_2 emissions from the transport sector should not exceed 20 % of 1990 levels.
- To prevent human health damage from ambient NO_2 and ozone levels and nitrogen deposition, total nitrogen oxide (NO_x) from transport emissions should not exceed ten per cent of such emissions in 1990.
- To prevent damage from cariogenic volatile organic compounds (VOCs) and ozone, total emissions of transport-related VOCs should not exceed ten per cent of such emissions in 1990.

- To avoid harmful ambient air levels, fine particulate (PM_{10}) emissions from transport are to be reduced by between 55 % and 99 % of their 1990 levels, depending on local and regional conditions. For The Netherlands case study a 90 % reduction target was assumed.
- To prevent health concern or serious noise pollution, noise from transport should be reduced to a maximum of 55 dB(A) during the day and 45 dB(A) at night.
- Land-use, and in particular infrastructure, for the movement, maintenance and storage of transport vehicles is developed in such a way that local and regional objectives for air, water and ecosystem protection are met.

Policy analysis and development can be conducted in the light of present circumstances or future goals (Fig. 3.2). In the former case, forecasts based on current social and economic trends provide the basis for determining what may be required to accommodate or mitigate those trends (forecasting). In the latter case, future goals are set and worked backwards from to determine what must be done to reach them (backcasting). In other words, the former kind of policy development results in doing what is possible to avoid an unwanted future, the latter in doing what is necessary to achieve a wanted future. Within the OECD EST project both approaches are taken. A business-as-usual scenario (forecasting) and an environmentally sustainable transport (EST) scenario (backcasting) have been developed for the period up to 2030. The EST scenario will, by definition, meet the EST criteria (see above) by 2030.

The remainder of this chapter is structured as follows. Section 3.2 describes the business-as-usual trends for the Dutch transport system up to 2030. Section 3.3 describes the EST scenario, descriptions of which are focused on passenger transport, and, specifically, non-motorised modes. Section 3.4 describes an instrument package and a possible instrument–implementation time path for the EST scenario, while Section 3.5 outlines the social and

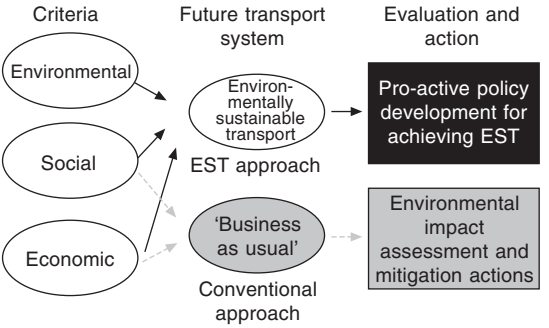

Fig. 3.2 The EST approach and the conventional approach to transport policy-making. Source: OECD (2001a, b).

economic impact assessment. Section 3.6 presents the conclusions of The Netherlands' pilot study.

3.2 Business-as-usual transport trends in The Netherlands

As in other Western European countries, the car is the dominant transport mode in The Netherlands in terms of passenger kilometres driven (Fig. 3.3): currently almost 80 % of passenger kilometres are made by car. However, in contrast to other countries, the bicycle is also an important transport mode. That is, bicycle ownership is amongst the highest in the world (the number of bicycles owned roughly equals the number of inhabitants), and cycling currently accounts for about 25 % of all trips and 7 % of all passenger kilometres (CBS, 2002). The number of bicycle kilometres almost equals the number of rail passenger kilometres. In Dutch cities, the number of bicycle trips may account for up to 40 % of all journeys (Fig. 3.4). Figures 3.3 and 3.4 illustrate the significant role of the bicycle in the Dutch transport system. This role has been relatively constant in the last few decades as have the number of kilometres travelled per person (approximately 3 kilometres per person per day between 1985 and 1998). However, if one looks at the total number of kilometres travelled, the role of the bicycle is decreasing (Fig. 3.5): car travel, is growing much faster, in terms of both number of trips and distance travelled.

For the period up to 2030, walking and cycling will be at similar levels to those of 1990, thus maintaining their current position in the transport system. However, road-based motorised traffic will strengthen its position: car use is expected to grow by 75 % in the period 1990–2030, and lorry use by 175 %

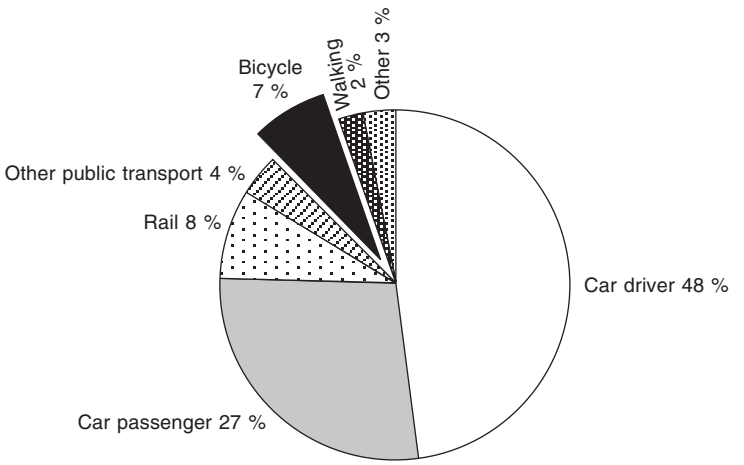

Fig. 3.3 Share of transport modes in number of passenger kilometres driven in The Netherlands, 2000. Source: CBS (2002).

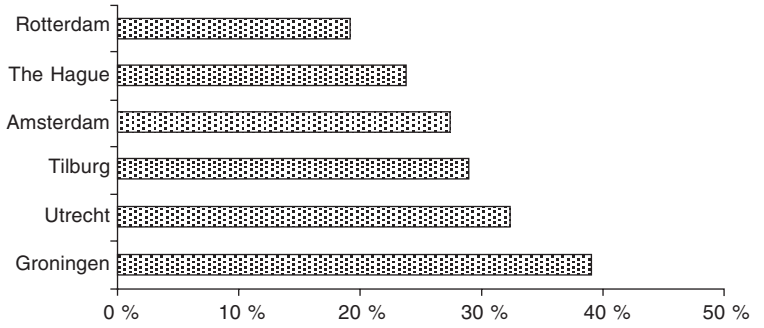

Fig. 3.4 Bicycle trips in selected cities in The Netherlands, as % of total journeys, 1995. Source: AVV (1997).

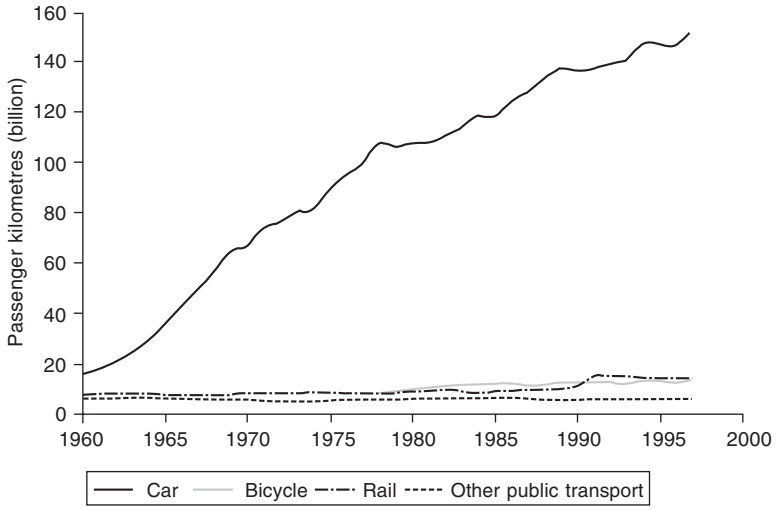

Fig. 3.5 Passenger mobility in The Netherlands, 1960–98. Source: CBS (2002).

(see Fig. 3.6). This growth can be derived from the business-as-usual scenario (BAU) developed for the OECD project. The BAU scenario illustrates the development of the transport system assuming a continuation of present trends, moderated by likely changes in legislation and technology. This scenario does not necessarily conform to current governmental policies in The Netherlands. In general, the BAU scenario for the period up to 2015 is based on the transport forecasts carried out for National Environmental Outlook 3 using Dutch national transport models (see Van Wee *et al.*, 1996). For the period 2015–30, trend extrapolations and corrections have been made on the basis of assumptions and general expectations.

As a result, the business-as-usual emission forecasts show a far from sustainable transport system (see Table 3.1). Total CO_2 emissions from the

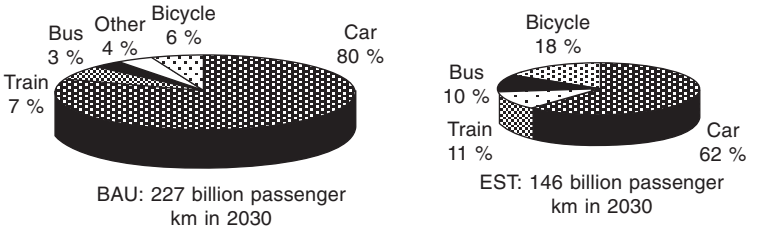

Fig. 3.6 Passenger transport volumes and mode choice in the business-as-usual (BAU) and environmentally sustainable transport (EST) scenarios in 2030.

Table 3.1 Vehicle use and emissions in 2030 – BAU scenario (index 1990 = 100)

	Vehicle use	Emissions (Index)				
	Unit	Index	CO_2	NO_x	VOC	PM_{10}
Car	veh. km	175	131	25	30	23
Rail-passenger	pass. km	140	127	302	95	266
Bicycle/walking	pass. km	100	0	0	0	0
Lorry	veh. km	275	230	84	44	85
Inland shipping	tonne km	175	137	140	137	140
Rail-freight	tonne km	200	105	157	135	234
Total transport emissions			159	67	46	78
EST criteria			20	10	10	10

transport sector are expected to increase by about 60 %, whereas NO_x, VOC and PM_{10} emissions are insufficiently reduced. If the OECD criteria for an environmentally sustainable transport system are to be met, CO_2 and PM_{10} emissions will have to be reduced by 87 % of the BAU scenario emissions in 2030; NO_x emissions by 85 % and VOC emissions, 78 %. Furthermore (although not shown on the table), noise emission and land-use levels for transport are also much greater than EST targets.

3.3 A vision of an environmentally sustainable transport system

Clearly, business-as-usual trends are far from environmentally sustainable. This section addresses the question of what an environmentally sustainable transport (EST) system might look like. An EST system has to satisfy two main criteria. Overall motorised mobility has to be reduced significantly and the remaining demand for mobility has to be met with vehicle categories with the lowest unit impacts. The EST scenario shows a trend breach in both technological development and behaviour. In the EST scenario, about 60 % of the reduction of CO_2 emissions in passenger transport is the result of

changes in technology, and 40 % the result of reduced mobility levels, mode shifts and more efficient vehicle use (higher occupancies).

Mobility patterns have to change significantly. People will have to work in or closer to the locations/regions where they live and increasingly commute by slower modes. Average trip distances will be shortened and origin–destination patterns will change, thus reducing total passenger mobility by 35 %. The role of non-motorised modes must increase significantly compared to business-as-usual, not primarily to reduce car use but to improve accessibility to social and economic opportunities. The spatial infrastructural constellation must promote and facilitate short-distance trips, walking and cycling. People must be able to access many opportunities (such as schools, shops, offices, friends and family) comfortably, without using the car. This means that locations for work, recreation and shopping must be in the proximity of residential areas. Land must be used more efficiently (e.g., building in high densities, mixed land-use). New urban areas must be built so as to realise 'compact cities', i.e., new housing and working locations that are – as much as possible – realised within or connected with existing urban areas. However, not all of the entire demand for housing (more than 1.5 million houses between 1995 and 2030) can be realised within existing urban areas. A small number of new urban towns will have to be developed close to existing metropolitan areas, along public transport infrastructure between existing towns. These new towns, comprised of approximately 25 000–50 000 inhabitants each, will be fairly self-supporting; a large share of activities is employed within these towns. Working and living will be closely related to each other, the structure of services of high quality and the living climate good. The new towns will be linked with existing towns by high-quality public transport, and within the new towns non-motorised transport will be given a higher priority than car traffic. Overall, the role of motorised transport must change radically: car use is reduced by 50 % compared to the BAU level in 2030 due to shorter distances per trip, high vehicle occupancies and a shift to rail, i.e., about the same number of car passenger kilometres in 1970 can be sustained in 2030 according to this scenario. The role of cycling will increase substantially, i.e., the number of passenger kilometres will double, and its share in total passenger transport will triple.

The role of public transport (in terms of passenger kilometres) in EST is assumed to be the same as in the business-as-usual scenario: a decreased number of passenger kilometres due to shorter trip distances is assumed to compensate for the shift from car use to rail (see Fig. 3.6). To achieve heavy emission reductions, vehicle technology will have to be substantially improved. In EST all cars are assumed to be hybrid, with very fuel-efficient engines (running on liquefied petroleum gas (lpg) or another kind of gas) and end-of-pipe technology to reduce NO_x and VOC emissions, i.e., de-NO_x catalysts and vaporisation control measures. Rail transport emissions will be reduced due to technical improvements is trains (regenerating braking energy, light materials, less rolling resistance, improved aerodynamics) and the use of sustainably produced electricity (100 % electrical traction).

Table 3.2 Vehicle use and emissions for the EST scenario in 2030 (index BAU 2030 = 100)

	Vehicle use	Emissions (Index)				
	Unit	Index	CO_2	NO_x	VOC	PM_{10}
Car	pass. km	50	10	6	6	9
Rail-passenger	pass. km	100	10	18	0	0
Bicycle/walking	pass. km	200	0	0	0	0
Lorry	tonne km	25	6	4	6	6
Inland shipping	tonne km	755	29	15	29	26
Rail-freight	tonne km	485	77	119	0	0
Total transport emissions			10	8	15	13
EST criteria			13	15	22	13

The changes necessary to attain the EST criteria will also have major impacts on the freight transport industry and other sectors of the economy. The freight transport sector must change radically, i.e., a shift from road transport to rail and inland shipping, a better logistical organisation of all modes, a large reduction in transport distances, and highly improved vehicle technology. Consumers will be able to buy more durable goods, thus reducing the need for transport. Changes in other sectors of the economy are also necessary, especially in the agricultural sector (a move towards more regional production and consumption) and the energy sector (to increase the efficiency of conventional energy production by up to 80 % and the share of renewable energy production by up to 40 %).

The results of the assumed changes are given in Table 3.2, showing total CO_2, NO_x, VOC and PM_{10} emissions to be below the EST criteria in 2030. Furthermore, with a combination of technical measures (e.g., lower speed limits, electric vehicles in urban areas) and reductions in motorised transport (mainly during the night), the noise and land-use criteria can also be met.

3.4 An implementation pathway for environmentally sustainable transport

3.4.1 Policy instruments for the attainment of EST

Clearly, current Dutch transport policies are not sufficient for attaining an environmentally sustainable transport system. In The Netherlands' EST project, a combination of regulatory and pricing instruments is considered the most plausible way to realise the envisioned changes in mobility patterns, complemented with land-use and infrastructural policies to support and facilitate EST and to increase the (social) feasibility of EST. The instrument package for passenger transport is described below.

A system of tradable CO_2 emission permits is considered the most important in the attainment of EST. People receive a CO_2 budget (of 160 kg CO_2 per inhabitant older than 12 years in 2030) and are free to buy or sell permits at market price. If a person wants to spend his or her entire CO_2 budget on car use –and does not buy extra permits – the number of car passenger kilometres is limited to about 8000 (passenger) kilometres using a fuel-efficient hybrid car. As a result, people will try to optimise their travel patterns within their budget. Possible effects are:

- a reduction in the number of passenger kilometres, depending on the total CO_2 budget for passenger transport and the price of buying extra CO_2 permits;
- less energy use per vehicle kilometre, e.g., the higher the energy efficiency of the car and the better the driving behaviour, the more vehicle kilometres can be driven with the same CO_2 permit;
- modal split changes, e.g., bicycling and walking will increase.

The system will be gradually implemented so that the CO_2 budget per inhabitant can be gradually reduced to the desirable CO_2 emission level for 2030. The time path will be announced in advance to promote anticipative behaviour.

The role of *land-use policies* in an environmentally sustainable transport system differs from the current one in transport policy (i.e., to reduce motorised mobility and related emissions). In an EST system, land-use policies are aimed at increasing accessibility to social and economic opportunities for cycling, walking and public transport to facilitate the required changes in mobility patterns (shorter average travel distances and less motorised travel). Improved accessibility is the result of the combination of both improving bicycle infrastructure and land-use policies, such as building in high densities and mixed land-use. Furthermore, locations of activities (e.g., work, recreation and shopping) must be close to residential areas. The demand for new housing and working locations will primarily be met within existing urban areas. New urban areas will be built so as to realise ‘compact cities’. Furthermore, the Dutch employment location policy for new employment locations for ‘the right business in the right place’ (e.g., new offices built near railway stations), combined with pricing measures, will be expanded to include relocation of existing companies/businesses.

The role of *infrastructure policies* also differs from the current one in transport policy to improve bicycle infrastructure in EST. In current policy, encouraging bicycle use is very often seen as a way to reduce car use. However, because the impact of (only) improving bicycle infrastructure on car use is very small, the bicycle receives poor attention in current Dutch policy. To illustrate, only six per cent of government expenditure on road infrastructure is related to bicycle facilities (Habitat, 2000). Government expenditure per passenger kilometre on public transport is about 100 times higher than on bicycle facilities. In EST, improving bicycle facilities is not

primarily seen as an instrument to reduce car use but to improve accessibility to social and economic opportunities. Infrastructural policies comprise the following. Motor vehicle infrastructure in cities and towns with 40 000 to 100 000 inhabitants will be largely converted to a non-motorised infrastructure. Not only will bicycle lanes be built on the roads but also high-quality parking facilities at many places will be realised. The number of barriers (mainly roads) to be crossed will be reduced to make cycling more comfortable and safer, mainly by prioritisation at traffic junctions (the bicyclist has priority and not the motorised vehicles) and also by building multi-level crossings (leaving cyclists and pedestrians at ground level and motorised traffic below the surface).

Several *regulations* will need to be introduced to promote good health and 'quality of life'. Transport in urban areas will have to be almost completely electrical or non-motorised. Vehicles with a conventional combustion engine will not be allowed in centres of cities with more than 40 000 inhabitants; however, access for electric or hybrid vehicles operating in the 'electric mode' in these areas will be allowed. *Pricing policy* instruments like increasing fuel taxes and road pricing will be necessary for the short- and medium-term instruments. These pricing instruments will eventually be replaced by the system of tradeable CO_2 emission permits after 2015.

To increase traffic safety for cyclists and pedestrians (and also to reduce the attractiveness of car use and to promote shorter distances) *speed control measures* will be introduced and speed limits lowered on all road types. Vehicles will be equipped with on-board speed adaptation systems for systematic maintenance of lower speeds. Local or regional multi-company buildings with *telecommunication* facilities – to the main offices – will be located at town peripheries. Furthermore, telecommunication will be used to replace long distance passenger travel. *Education and information* will be very important instruments for achieving public acceptance of the necessary changes towards EST, especially the system of tradeable CO_2 permits. Finally, *policy changes outside the transport sector* are needed. Several instruments will be necessary to reduce emissions in other sectors of the economy to a (more) sustainable level. Flexible housing and employment markets are a necessity for shorter trips between home and work. Fiscal instruments stimulate moving closer to one's working location. Furthermore, several instruments will probably be necessary to achieve a 40 % sustainable energy share of energy production and a highly efficient level of conventional energy production.

3.4.2 Timing of implementation of instruments

When do the instruments have to be implemented if an EST system is to be achieved by 2030? This section briefly describes the methodology and results of the implementation time-path (see Geurs and Van Wee, 2000) for a detailed description). In this study, an implementation time path for the

instruments is constructed by using the backcasting method, i.e., if we assume the instrument to have its full effect by 2030, the start of the policy implementation phase can be calculated backwards. Furthermore, the concept of the 'policy life cycle' is used, consisting of three phases:

1. recognition (or acceptance);
2. policy adjustment;
3. policy implementation.

Analysis of policy life cycles of technical emission reductions in The Netherlands in the past, mainly outside the transport sector, showed that the average acceptance and adjustment phase took about 6 years, and the average implementation phase about 18 years (Van de Peppel *et al.*, 1997). Here, it is assumed that the pre-implementation phase will take about five years; for relatively 'easy' instruments (e.g., information instruments) this period will be shorter and for 'difficult' instruments (e.g., tradeable CO_2 permits) it will be longer. The implementation phase of mobility measures depends heavily on the instrument type. Regulations and information instruments may have a relatively short implementation period, of, for example, one to five years, whereas land-use and infrastructural measures require a long implementation and adaptation period. The full effect of these measures is long-term, taking place in approximately 15–20 years. The implementation phase of technical measures, assumed to consist of full replacement of road vehicles, will take (at least) 15 years. A timely implementation of the instruments, necessary to achieve the changes in mobility patterns envisioned by EST, will only occur if:

- the current policy life cycle radically changes, i.e., the pre-implementation period must be shortened;
- in the short term a start is made with the implementation of the land-use and infrastructural instruments (e.g., a shift from a motorised to a non-motorised infrastructure), given the long implementation and adaptation period of these instruments.

3.5 Economic and social impact of sustainable transport

The OECD EST project focused on how to move transport systems that are *environmentally* sustainable. However, an environmentally sustainable transport system is likely to have considerable social and economic impacts. Within the OECD project a preliminary assessment of the economic and social impacts was undertaken. There are no generally accepted methods available to quantify the economic and social impacts of long-term transport scenarios, especially scenarios where structural economic and societal changes are likely to occur. Indeed, there is some reluctance among economists and social scientists to engage in this kind of work because of the methodological

perils. Therefore, results presented here can only be preliminary and must be treated with caution.

3.5.1 Economic impact

Within the OECD project several preliminary assessment methods were used (OECD, 2001a,c). The University of Karlsruhe (Rothengatter, 1998) developed two assessment methods:

1. a sophisticated system dynamics model allowing for feedback loops between the transport system, economic and demographic developments and spatial patterns;
2. a simplified assessment method called 'Impact Path Analysis'.

Both methods were used for the German case study (with consistent results) and the latter approach was also conducted for The Netherlands. Both the Austrian and Norwegian case studies used a general equilibrium model.

The assessment method used for The Netherlands' case study allows assessment of the order of magnitude of macro-economic changes based on data provided by 'input–output' tables of national accounts. It is important to note that the assessment is restricted to transport-related sectors of the economy (i.e., road-vehicle manufacturers, secondary car business and transport services, railways, airlines, the tourist industry and retail business), but includes multiplier effects to incorporate forward and backward linkages to other sectors of the economy. From the economic impact analysis it can be concluded that:

- The macro-economic impacts of the changes of the shift from motorised transport to non-motorised passenger travel (in terms of gross domestic product (GDP) and employment losses) are probably relatively small. It can be expected that Dutch society will function reasonably well with fewer private cars. The largest economic losses (reductions in value added and employment) are found in road freight, aviation and marine transport, i.e., long-distance freight transport will decrease substantially because of the changes in origin–destination patterns and production and consumption. The losses in these sectors cannot be fully compensated for by value-added and employment gains in other sectors (the railways and local business).
- The changes in all transport-related sectors will result in a loss of material welfare for the entire economy, i.e., GDP in EST is about four to eight per cent lower than in BAU in 2030, the total loss of employment is about one to three per cent. This means that the average yearly GDP *growth* in the EST scenario will be a few tenths of percentage points lower than the business-as-usual scenario, and the total Dutch employment level will be a few percentage points lower in 2030. However, the assessment method deployed does not incorporate structural economic changes and dynamic developments, which will mitigate economic impacts.

Moreover, in the long-term, environmental policies will result in productivity gains which may more than offset the initial reduction of demand due to higher prices and restrictions on motorised transport (OECD, 2001c).

- The total loss of material welfare (GDP) for the year 2030 can be largely – but probably not fully – compensated for by gains in non-material welfare (expressed in reductions in external costs). The non-material value of the combination scenario is calculated by estimating the external cost savings for air pollution, noise, traffic accidents and congestion in monetary terms. Total monetary external cost savings for the combination scenario compared to the BAU scenario are about one to four per cent of the Dutch GDP in 2030. These figures probably underestimate the total non-material value because the external costs of direct and indirect land-use, loss of landscape, ecological disturbance and waste are not incorporated.

The economic impact analysis did not include a micro-economic evaluation using welfare economics. However, it can be expected that on a micro-economic level the current (and BAU) difference in consumers' surplus for a car trip and a similar non-motorised trip will be reduced. In other words, in BAU a car trip will still be highly valued by individuals because of instrumental characteristics (e.g., flexibility, less travel time to destinations) and affective characteristics (status, etc.), whereas the costs of the trip are modest. In EST, the consumer surplus of a car trip will be much lower because the car trip will be valued lower (e.g., the car will have a lower accessibility level to opportunities in urban areas compared to alternative non-motorised modes), as the car-trip costs are much higher (CO_2 permits will have to be bought if current mobility patterns are to be maintained). Thus, on a micro-economic level (individual) losses of EST for passenger transport – compared to BAU – will probably be relatively low.

The results of The Netherlands' case study are consistent with the preliminary results from the other case studies and assessment methods (see OECD, 2001c). Overall economic repercussions on countries' economies as a result of proceeding towards EST rather than BAU would be relatively small; average GDP would slightly change (although with some variability between countries), and employment rates may either increase or decrease depending on the country's situation and policies. Furthermore, negative economic impacts can be mitigated over time as market forces are positively stimulated by environmental policies, which may lead to increases in productivity. However, the transition to an EST system will require significant structural adjustments.

3.5.2 Social impact

In the OECD project, a number of social factors were identified which were thought important and sensitive to changes in mobility, i.e., material wealth, land-use, accessibility of opportunities, community relationships, crime, safety,

health, and democracy (Adams, 1999; OECD, 2001a). These factors were used as a framework to describe qualitatively the expected social differences between the BAU and the EST scenarios for The Netherlands for 2030. The relationship with mobility in the past for each social factor is described on the basis of data for The Netherlands, where available. This is projected up to 2030 for both the BAU and EST scenarios using existing scenario studies. The most important social impacts (related to material wealth, accessibility and land-use safety and health) resulting from a shift from motorised travel to non-motorised travel are described below.

Material wealth
Mobility is related to wealth. Higher income groups have a higher level of car ownership, travel farther, use their cars more often and as a result have a higher level of access to economic opportunities. In the EST scenario, motorised transport is substantially reduced and non-motorised transport strongly increases (mainly due to a system of tradeable CO_2 permits). As a result, differences in travel behaviour between income groups will be smaller, i.e., higher income groups pay a relatively higher price for maintaining their travel behaviour than lower income groups.

Accessibility and land-use
The spatial-infrastructural constellation of an environmentally sustainable transport system promotes and facilitates non-motorised transport. An important benefit is that accessibility differences between the car on the one hand and bicycling, walking and public transport on the other will be much lower. More opportunities will be readily accessible by walking and cycling, thus increasing people's choice of mode options, and improving access to social and economic opportunities for those without cars. In the business-as-usual scenario land-use trends (a further national deconcentration and regional suburbanisation of activities) negatively influence the accessibility level of opportunities for those without a car, and less opportunities are readily accessible by non-motorised modes and public transport.

Safety and independence
As traffic increases, traffic danger increases, especially for cyclists and pedestrians. As a result, fewer people attempt to cross the road, fewer cyclists venture forth upon the road and fewer children are permitted to travel independently. As a result, children are denied the experience of mixing interdependently with their peers and learning to cope without adult supervision (Adams, 1999). In EST, due to lower urban traffic levels and better bicycle infrastructure, bicycling (and walking) is much safer. As a result, EST will permit greater independence for children.

Health
Significant health benefits can be expected from the attainment of an

environmentally sustainable transport system. Firstly, more bicycling and walking involves more exercise. The guidelines from the World Health Organisation (WHO) for healthy living ('30 minutes of moderate exercise, such as brisk walking, every day') will be met by more people, which may have several health benefits. The risk of coronary heart disease, diabetes, high blood pressure, and obesity may be reduced, and symptoms of depression and anxiety may be relieved. Secondly, health problems related to local air pollution and noise nuisance (from road traffic and aviation) will decrease, as the total volume of urban road traffic and aircraft movements will be significantly reduced. See WHO (2000) for an overview of the wide range of transport related health effects.

3.6 Conclusions

This chapter has summarised the results of a pilot study on environmentally sustainable transport (EST) for The Netherlands for 2030, focusing on the role of the bicycle in the transport system. In conclusion, EST can only be realised if mobility patterns radically change and future technological development is much greater than in the past. The role of the bicycle in the transport system will greatly increase; its share in total passenger transport kilometres will triple. In order to achieve a significant reduction in motorised transport and a shift to non-motorised transport, a system of tradeable CO_2 emission permits is considered to be the most important instrument.

Land-use and infrastructural policies are important to increase accessibility to social and economic opportunities through cycling, walking and public transport. The role of land-use policies and infrastructural policies to improve bicycle infrastructure in EST differs from the current one in transport policy. In current policy, land-use policies and encouraging bicycle use are seen as instruments to reduce car use and related emissions. In EST, however, land-use policies and improving bicycle facilities are seen primarily as instruments to improve accessibility. Due to changes in land-use (e.g. building in high densities, mixed land-use) and improved bicycle infrastructure, people can access many opportunities (such as schools, shops, offices, friends and family) comfortably, without using the car.

If the shift towards non-motorised transport is to be realised, measures will have to be taken and instruments implemented in the short-term, mainly because of the long pre-implementation and implementation period of land-use and infrastructure policies. An environmentally sustainable transport system for both passenger and freight transport will probably have significant economic impact (e.g., GDP growth will be lower). However, the macro- and micro-economic impacts of the shift from motorised passenger travel to non-motorised travel are probably small: Dutch society will function reasonably well with less motorised transport. Mobility patterns envisioned by EST will have significant social benefits. Differences in travel behaviour

and thus access to social and economic opportunities between income groups will be smaller; people's mode-choice options will increase; traffic safety for children and the elderly will improve, thus increasing their travel independence; and public health will improve.

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4

Walking in a historical, international and contemporary context

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4.1 Introduction

Humans walk. This basic biological fact is neglected at our peril. With all our technology and urban artefacts if we do not build walking into our daily lives and our cities' infrastructure, then we will create stunted, unhealthy lives and bad cities. This chapter will try to give an overview of walking and cities based on this fundamental assumption. It will try to do this from a historical perspective and then from recent trends to speculate on how walking is once again emerging as a vital part of city planning.

4.2 History of walking in cities

In the several million years of human history, walking was fundamental to survival. In hunter–gatherer communities if you could not walk you did not survive. However, with cities emerging 6–8000 years ago, settlements were created where the biological imperative to walk for food and water and ceremony became less obvious. Nevertheless our basic biology of skeletal and muscular shape, metabolism and psychology remain fundamentally dependent on walking (Leakey and Lewin, 1977). Perhaps this provides the basic reason why we have now built this need to walk into the structure of our settlements.

4.3 Walking cities

The first cities can all be seen as 'Walking Cities', i.e., they could be walked across from one side to the other in one hour, or, an average journey (home to work, home to city centre) would take half an hour (Fig. 4.1). This journey time appears to be built into human psychology/biology and urban economy as a fundamental organising force (Manning, 1978; Zahavi and Ryan, 1980).

All the ancient cities grew to be 'one-hour wide' (Marchetti, 1994). This one-hour wide city has been found to be constant in UK cities for 600 years (SACTRA, 1994). Walking cities thus grew out no more than 5–8 km in diameter and from there they would grow upwards. This can still be seen in cities that have not become part of mechanised transport. These 'cities' are often in the Third World or are villages on Italian mountain tops. Shibam in Yemen retains its original walking form from the third century AD with narrow streets and mudbrick buildings eight to ten storeys high (Fig. 4.2).

Most historical walking cities have densities of over 100 people per hectare (ha) but rarely more than 200 per ha. When squatter villages are thrown together they are about this density as they have little space between dense clusters of buildings. Virtually all cities, apart from brand new ones such as Canberra, Brasilia and UK New Towns, have a walking city centre.

In the past 20 years there has been a strong planning movement to ensure all walking cities are able to reassert their walking character. This has occurred for many reasons but now can be seen as essential for economic, environmental and social purposes. Many have been restored as walking environments because of the heritage issues which are not only about buildings but also the 'life

Fig. 4.1 The traditional walking city (high density, mixed use, organic). The lighter areas show open spaces.

Fig. 4.2 Shibam in Yemen, a typical walking city. Source: Dr Jacques P. Feiner.

between buildings' (Gehl, 1987). The 'car free cities' movement in Europe started in the medieval centres and continues to gather more support through 'car free day' celebrations (Britten, 2000) and now through 'car free housing' (Scheurer, 2000), which is a scheme where whole neighbourhoods are created with medieval walking characteristics. These 'car free housing' developments usually have substantial public spaces in their common land and have car sharing facilities as well as good transit nearby. As will be shown later, these car free areas are proving to be important to the new economy and their reinvention affirms their historic role as expressions of the human ability to walk. Indeed, we often say these places are very 'human' and mean that they are 'walkable'.

4.4 Transit cities

The Industrial Revolution destroyed walking cities. It brought smoke and waste as well as work for thousands more people than the traditional city could possibly hold. The density and form of the cities was not suitable anymore and thus a vigorous reassessment occurred in the latter part of the nineteenth century, on how to create a new kind of settlement to accommodate a new economy. With pipes to channel water and wastes, and rails to carry people it became possible to build the city along corridors. The transit city was invented through a combination of the public health movement, the transit movement (trams and trains) and the garden city movement (the father of town planning) (Fig. 4.3).

The new transit city could now spread 20–30 km along its corridors and still be 'one-hour wide'. But along each of the tram streets and at each new rail station walkable environments could still be created. The walking city was thus spread out along tram lines and was duplicated at each station in the form of a railway suburb or village. This form of city is still very evident in

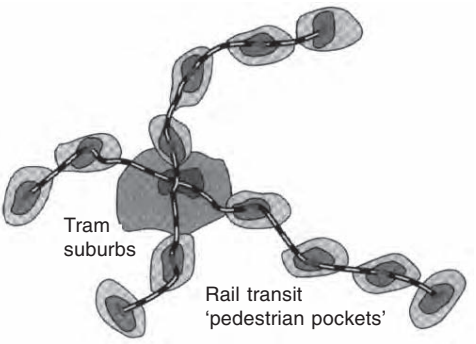

Fig. 4.3 The transit city (mixed density, mixed use, grid based, centralised). The different shades indicate differing degrees of population density (darkest = greatest density).

Europe, it is a major component of cities in the US, Canada, Australia, New Zealand etc. and is the basis of new cities like Singapore, Hong Kong and Tokyo. Walking environments in the transit city are critical to the functioning of the transit system. As Fig. 4.4 shows, the best transit cities also have the highest rates of walking and cycling (data from 44 global cities in Newman and Kenworthy, 1999).

Many Third World cities (like Bangkok, Jakarta and Delhi) have developed with bus-based corridors. They are usually very dense walking environments (often collections of villages) joined together by extremely busy roads. These cities cannot function well as transit-based cities even though they have transit city forms because their transit systems are inadequate. The buses remain as stuck as other forms of transport in traffic and people find walking very unattractive and unsafe. This has been solved partly in a few cities like Curitiba, Brazil, and Kunming, China, by bus-ways and a strong commitment to walkability in their infrastructure. However, the transit problem can only usually be solved by building rapid rail systems or new light rail systems that enable the transit system to move quicker than traffic in each corridor (Newman and Kenworthy, 1999).

Dense corridors without a decent walking infrastructure, are a planning disaster that no one wants to see reoccur, but they are proving very difficult to overcome. Providing the funding for mass transit and walking remains difficult in Third World cities due to World Bank policies that favour freeways and not mass transit systems (Ridley, 1995). Such cities will remain trapped in traffic with appalling walking environments, unless the reality of their transit city forms is recognised. They are not built for cars and thus do not live easily with them in large numbers.

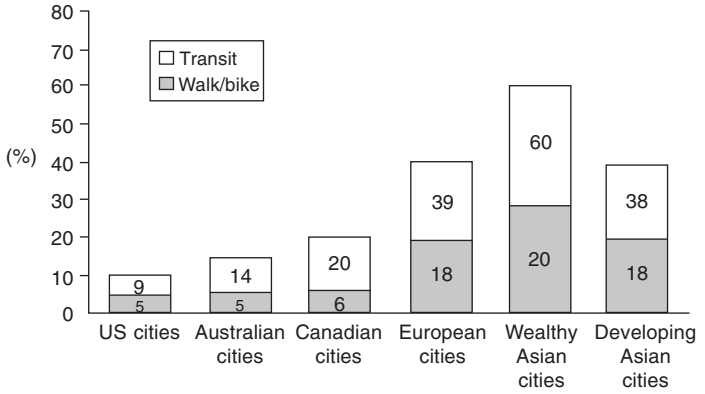

Fig. 4.4 Proportion of workers using public or non-motorised transport (1990).

4.5 Automobile cities

The post-1940s economy in the industrialised world gave rise to the automobile as a mass form of movement. It was not a technology that was necessary to solve a major urban problem (as transit was) but the car's popularity in creating new freedom over space and time became a momentum for urban change. It was associated with other social movements such as post-war housing resettlement, anti-crime/anti-race movements in the US and housing to go with new industrial estates. It was also fed by English sentiments such as the Town and Country Planning Association's motto, 'Nothing gained by overcrowding', which facilitated urban sprawl.

However, although it promised freedom over space and time, the automobile is also constrained by the 'one-hour wide' city though this has meant 40–50 km in every direction, thus filling in all the urban area between the transit corridors (Fig. 4.5). The limits to urban sprawl are now being seen as the automobile city reaches capacity. This is being reflected in the reurbanisation processes outlined below and also movements like the New Urbanism and Smart Growth.

The automobile city is also constrained by the fundamental need to walk and have walkable environments. When cities encourage all movement to be door to door automobile trips then they create environments that no longer express the fundamental human qualities of biological history and urban history. The automobile city has many inherent problems which are summarised in Table 4.1. Underlying all their problems is the lack of walkability. Door to door car trips are convenient but not good for our health, for our families, for

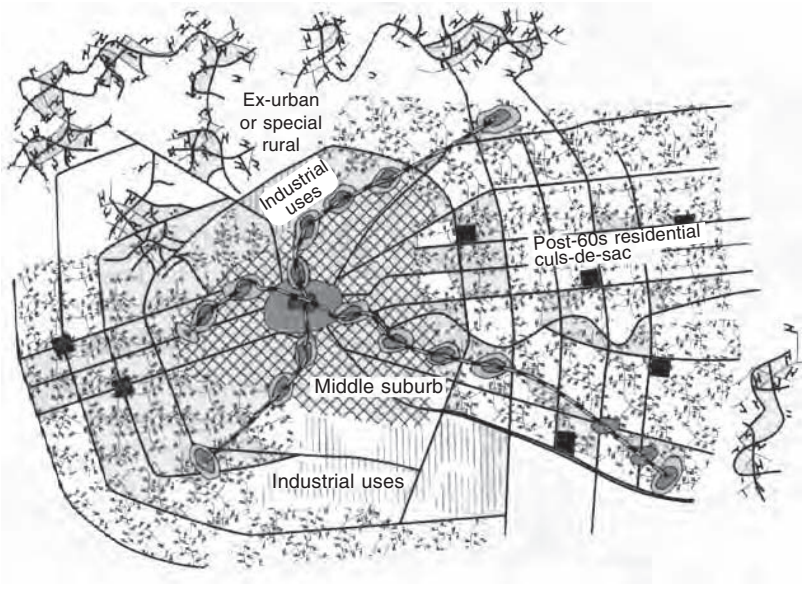

Fig. 4.5 The automobile city.

Table 4.1 Multiple problems of automobile dependent cities

Environmental	Economic	Social
Oil vulnerability Photochemical smog, lead benzene etc. High greenhouse gas contributions Urban sprawl Greater stormwater problems from extra hard surface Traffic problems – noise, severance	External costs from accidents, pollution etc. Congestion costs, despite endless road building High infrastructure costs in new sprawl suburbs Loss of productive rural land Loss of urban land to bitumen	Loss of street life Loss of community Loss of public safety Isolation in remote suburbs Access problems for car-less and those with disabilities

our communities, and for our cities. The reaction to this is being realised and in evidence presented below it is asserted that a new form of city needs to be built out of the existing automobile city, and is indeed already underway.

4.5.1 Evidence for the decline of the automobile city

There is growing evidence that building more car-based infrastructure does not work. The Texas Transportation Institute examined 15 years of US spending on road building and found no evidence of a difference in congestion between those cities which invested heavily in big roads and those which did not (STPP, 2000). Ordinary citizens can generally understand this better than traffic engineers with their models of cost benefit analysis that rely so heavily on time savings. On a city-wide basis time is not saved, it is converted into faster travel that is the basis of further sprawl. The automobile city thus becomes a very expensive way of building a settlement and with an unsolvable traffic problem at its core – unless more emphasis is given to reducing the need to travel by car.

The shift in the US to a more democratic approach to transport funding has led to a rapid increase in funding for new transit systems and for cycling and walking (STPP, 2000). The worst automobile cities like Phoenix, Houston, Denver and Los Angeles are all now building rail systems, increasing traffic calming and building cycle and walk tracks – though they have a long way to go. Perhaps the greatest evidence for the decline of the automobile city is a market-based process that reveals how people are turning away from the automobile-oriented parts of the city and are feeding a reurbanisation boom. In this process the city is becoming more oriented to its historic walking and transit city areas and thus a new less car-dependent urban process is being established. The process is very obvious in Australian cities (and New Zealand cities – see Laird *et al*., 2001) and will be illustrated by some cross-city data.

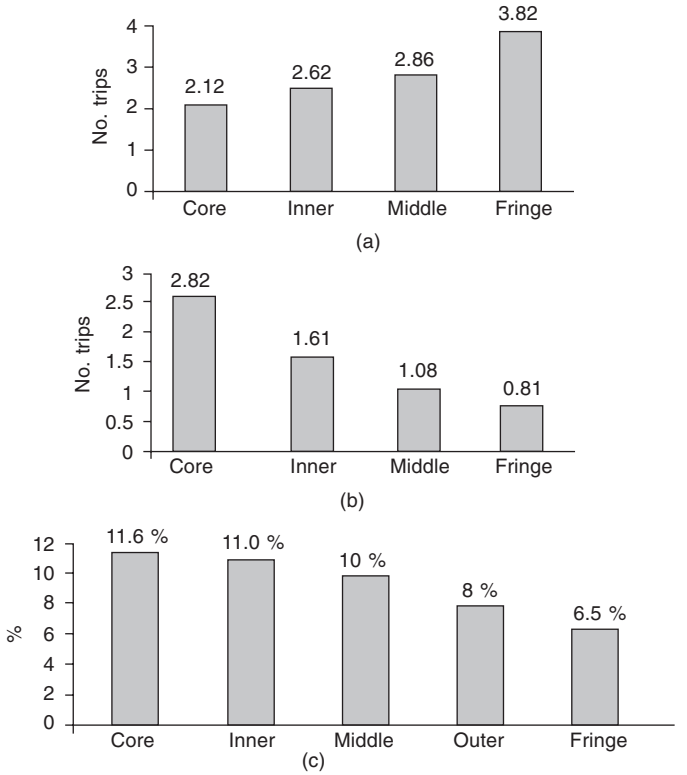

Fig. 4.6 Transport patterns in Melbourne: (a) car trips per person per day by district; (b) walking or cycling trips per person per day by district; (c) proportion of households earning $70 000 or more by district. Source: Department of Infrastructure, Government of Victoria.

Data from Melbourne show the variations in vehicle use, transit and walking per capita in different areas of the city. It is of interest to see how important walking is in each part of the city but it is especially obvious in the walking city and transit city areas of the core and inner suburbs (Fig. 4.6). However, the data also show that areas of highest value (where the most wealthy live) are in walking and transit city areas and growth in real estate values in these places has been quite dramatic in recent times, whilst auto city areas have not been so popular. What is causing this and how does it relate to the transportation patterns that shape cities?

4.6 Re-urbanisation and the 'knowledge-based' city

Across all the cities in our study there is a process of re-urbanisation developing (Newman and Kenworthy, 1999, 2000). Nearly all cities are increasing in density. In US cities this has mostly occurred in outer area 'edge cities'

although most of its cities have strong walking city centres that are the highest valued real estate and which are undergoing significant revitalisation (Gratz, 1989).

The re-urbanisation process is very obvious in Australia where densities have been rising again after a century of decline (Fig. 4.7). This is occurring mostly in the walking and transit city areas hence car use has become less important in more and more people's lives, especially for the new, wealthy members of the walking and transit city areas. Thus a reduction in car use can be expected as is apparent from Fig. 4.8. The catalyst to this process has been the growth in the new 'knowledge economy' or 'services economy'. This global process requires people to interact creatively 'face-to-face' as well as to be able to use electronic communications and process information. The urban design outcome of such 'face-to-face' requirements is the kind of human qualities expressed in the walkable environments of historic cities. The coffee shops and mixed use, dense urban environments of city centres and inner areas where cars are not dominant, is now becoming an essential component of the new global economy city.

However, the processes are not at present favouring the automobile city areas in Australian cities. The outer suburbs are not attracting the new global

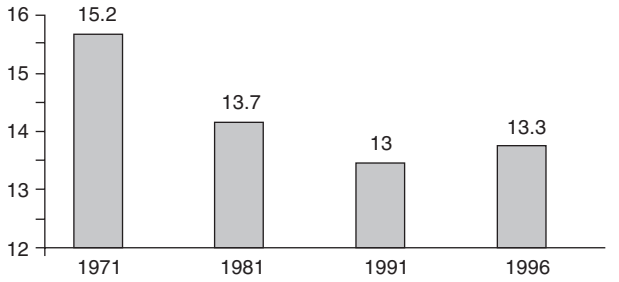

Fig. 4.7 Density trends, 1971–96, in Melbourne, Perth, Brisbane and Sydney (people per hectare).

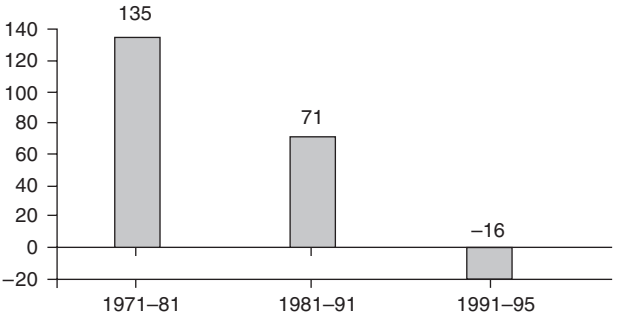

Fig. 4.8 Annual increase in per capita car kms of travel, 1971–95, in Melbourne, Perth, Brisbane and Sydney.

economy jobs or any of the associated denser housing. It is necessary in social justice terms to recognise that the outer suburbs need help in their urban design. If they cannot build sub-centres that are attractive in human terms – i.e., are walkable, with a good transit base – they will continue to decline. With planning assistance it is possible to redevelop viable, walking centres as strategic redevelopment areas in the middle and outer suburbs.

It is possible to imagine a future city where a whole range of new sub-centres are built around good public transport and provide the focus for new development, instead of continued fringe growth through geographically dispersed houses. This is illustrated in Fig. 4.9. There is a further rationale for this kind of city as well as the economic and environmental gains outlined, and this is the social benefit associated with walkable urban centres. There is significant literature on the importance of social capital in the functioning of a city (Putnam, 1993) and this is facilitated through the kinds of 'accidental interaction' that characterise walking city areas. Thus the establishment of walkable centres right across our cities can be justified in social terms and are frequently proposed as part of crime reduction strategies.

Perth's community code for new development has a 'walkable centres' approach as its basis and in Melbourne the Urban Villages Plan from the mid-1990s is the basic strategic approach applied. Many cities are now recognising the importance of this multi-centred city strategy but its relevance in Australia is now very obvious.

Walkable centres must be rebuilt into all parts of the city. This will ensure that we have the option to walk to a good transit system (10–15 minutes in

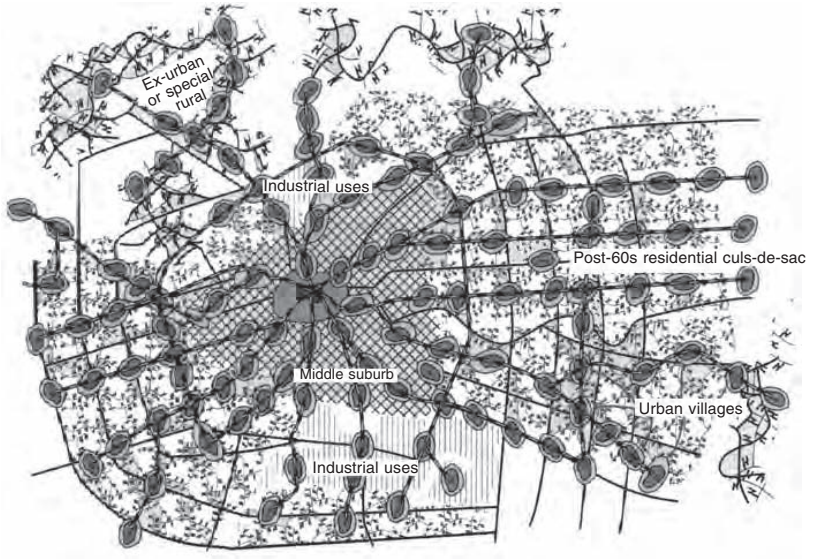

Fig. 4.9 The future information city – urban villages (walking-oriented) linked by quality public transport, throughout the suburbs.

the morning and 10–15 minutes in the evening are seen as the 'incidental exercise' recommended by health authorities) or to local services and jobs. The mental health benefits of walking are now also well-known and indicate that, for children, walking is an essential part of their development and local 'sense of place' (Hillman, 2002). As petrol prices rise and the costs of the automobile city are more recognised the future city model, with its walking character, will be given impetus. However, the main force should be the inherent human need to walk and the fact that we want to be part of walkable environments. This is built into us and we need to build it into our cities.

4.7 Conclusions

The walkable areas of cities are now receiving close attention by urban designers. Their significance is being seen by commercial and community groups as well as planners committed to the common good. These areas are good for our health, good for communities and good for local economies. Partnerships should thus be feasible between private, public and community sectors, but only rarely do they get a chance to be expressed in cities as often the funding of urban infrastructure (especially transport) is not oriented towards walking centres. There is an emerging model in the release of transport funds that requires these local partnerships to be formed before funding can be given. Such a bottom-up approach is enabling more funds to be directed into non-highway purposes. However, around the world such funding will not occur unless more walkable urban centres are envisaged by local citizens. That this is now much more evident perhaps indicates that awareness of the innate human need to walk is increasing.

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5

Does anyone walk anymore?

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5.1 Introduction

Does a mobile person in the twenty-first century travel around without motorisation? It seems that we are all becoming increasingly mobile. The rise in mobility is still linked to social value systems and it seems to be taken for granted that mobility and transport (the distance covered) are used synonymously. In this context transport is hardly considered as a means to an end. However, as soon as transport is seen as a necessity for basic requirements; as an essential means to an end; as a sum of required changes of location; to perform an activity; completely new aspects occur:

- travel can be ascribed to individual needs;
- the distance covered is principally independent from the mode of transport, thus non-motorised transport – walking and cycling – is as important as motorised private transport or public transport;
- the possibilities of mobility are defined by individual, social, local and temporal situations;
- mobility is defined as a change of location, which is called a 'trip'. A trip is embedded within a journey, which starts by leaving the house and ends by returning home.

Certainly this view of transport, as the sum of individual changes of location, makes new demands on the methodology of empirical research. It is not enough to record the individual phenomena, i.e., in traffic counts the study must be based on complete out-of-home activity patterns. To really consider all modes used – especially walking – a closer inspection of trip-legs is necessary (Socialdata, 1993). In 1975, in the Federal Republic of Germany,

mobility was measured for the first time with a travel diary (KONTIV® design: Continuous Survey of Mobility Behaviour, Socialdata, 2002*)*. Against much opposition, this survey recorded all changes of location, including walking and cycling trips. Only then did it become obvious that non-motorised modes played an important role in the modal share (Socialdata, 1986).

5.2 The modal share of walking and cycling

5.2.1 Methodical requirements

To represent the importance of walking trips adequately, a methodology was necessary that could also determine the different legs of a trip. A corresponding survey methodology was developed by Socialdata to apply and finally put into action the 'New KONTIV®-Design'. Within a research project for the German Ministry of Transport, Building and Housing (Socialdata, 1999), corresponding surveys were used as the basis for the source and analysis of characteristics of walking and cycling trips. This research project was based on an analysis of the database 'Germany 95', which comprises data for around 205 000 people and more than 600 000 trips. An update of these results was done in a new research project for the German Ministry of Transport, Building and Housing (Socialdata, 2002).

5.2.2 Mobility

Mobility is defined by a number of core indicators that are normally presented for an average person per day (Table 5.1). The out-of-home activities are events that occur away from the home, and lead to a trip. The sequence of trips from the moment of leaving until returning home is called a journey. The out-of-home share comes to 79 % of the total population of Germany. On an average day an average person undertakes 1.7 activities and therefore covers 3.1 trips. These trips combined consist of 5.7 legs of trips. Therefore an average trip comprises 1.9 legs with different modes. On an average day, a person will leave home 1.4 times.

Table 5.1 Mobility in Germany (2000)

Core indicators, per person per day	
Activities	1.7
Journeys	1.4
Duration (min)	64
Trips	3.1
Legs	5.7
Distance (km)	21

Source: KONTIV®, Socialdata (2000).

5.2.3 The mode of transport

There are different approaches for the presentation of mode use, but they all illustrate the importance of non-motorised mobility in their own way. The most common form of illustrating modal share is to use the main mode of a trip. This has the advantage that there is just one mode per trip. If different modes are used for one trip, one mode has to be defined as the 'main mode'. Criteria for ranking are: Cycling 'beats' walking; motorised private transport 'beats' non-motorised transport; and public transport 'beats' motorised private transport. However, the disadvantage of this approach is obvious: walking, where it is in combination with another mode on a trip, does not rate as important compared to the other modes. Therefore, there is a need for an additional survey step which is able to identify the mode used for all legs of a trip.

On examination of the main mode of transport per trip, the following picture appears. On an average day in the year 2000, an average German citizen covered 22 % of all trips solely by walking and 10 % by cycling. The share of car trips as a driver comprised 42 % and as a passenger 13 % of all trips. One per cent of trips were taken by motorbike whilst the remaining 12 % were trips covered by public transport (Table 5.2). However, in this illustration, only a share of the actual walking trips are represented, just those trips which are covered on foot from the point of departure to the destination.

The importance of walking increases when all modes used on a trip are examined; then, it turns out that 1.5 different modes are used per trip. In 70 % of all trips, walking is a mode used for a leg of a trip. Only when an analysis of trip legs is carried out, does the importance of non-motorised transport become completely obvious. Legs are those stages of trips which occur by changing the mode of transport. A trip, which is covered by walking from the point of departure to the destination, consists of only one (walking)

Table 5.2 Mode choice in Germany (2000)

Mode	Main mode on a trip Total %	All modes used per trip Total %	Mode for legs per trip Total %
Walking	22	70	104
Bicycle	10	10	10
Motorbike	1	1	1
Car as driver	42	42	42
Car as passenger	13	13	13
Public transport	12	14	15
Total	100	150	185

Source: KONTIV®, Socialdata (2002).

leg. In contrast, the use of public transport normally implies at least three legs of a trip: the stage to the bus stop, the ride, and the stage to the destination.

An average trip consists of 1.9 legs of which there is more than one leg of walking. People who use public transport normally walk to and from the stop or station, and people who take a car normally walk to and from the parking site. Therefore, every mobile person walks, so interest in secure, comfortable walking can be assumed of every mobile person.

5.3 Constants and variables

When considering the possibility of modifying daily mobility, it is important to check whether some mobility parameters are more difficult to change than others. The reunification of the two parts of Germany in 1990 provided an exceptional opportunity in this respect, as the changes in East Germany were so decisive and took place so quickly that reliable findings can be obtained from a careful analysis of mobility behaviour on the constants and variables relating to this behaviour, assuming that the corresponding data are available. This is fortunately the case, for one of the few regular, empirical surveys in the former East Germany – managed by TU Dresden – was the SrV-Survey, which, starting in 1972, determined mobility characteristics for a series of towns at five yearly intervals (TU Dresden, 1972).

Since a number of supplementary mobility surveys were conducted in East Germany following reunification, there was a unique opportunity to observe trends in mobility behaviour following marked changes in basic conditions. The findings are even more revealing when compared with similar data for West Germany. For this, Socialdata surveys were used and accordingly grouped. Since slightly varying universes had been chosen in some cases in the many basic surveys, some standardisation was, however, necessary. All characteristics were to be shown for all inhabitants (with no age limits), all journeys, and all days of the week.

The very marked changes in the framework conditions scarcely affected the mobility of the inhabitants in the various towns (see Fig. 5.1). The number of activities outside the home is around 1.7 per person per day, the number of trips required for these activities around 3, and daily travel time is about one hour per inhabitant. Only the distance travelled daily has risen appreciably since 1972: in the new *Länder* by 10 km and in the old *Länder* by 9 km per individual. Accordingly, the mobility gain is still limited to the distance travelled; none of the other indicators show such a mobility gain.

Compared to overall mobility, there were big changes in mode choice (see Fig. 5.2). In the towns of East Germany, more than half of all journeys in 1972 were made (exclusively) on foot, a tenth by bicycle, and almost a quarter on public transport. Motorised private transport accounted for the remaining sixteen per cent, which was broken down in roughly equal shares among motorised two-wheelers (five per cent), car drivers (six per cent), and

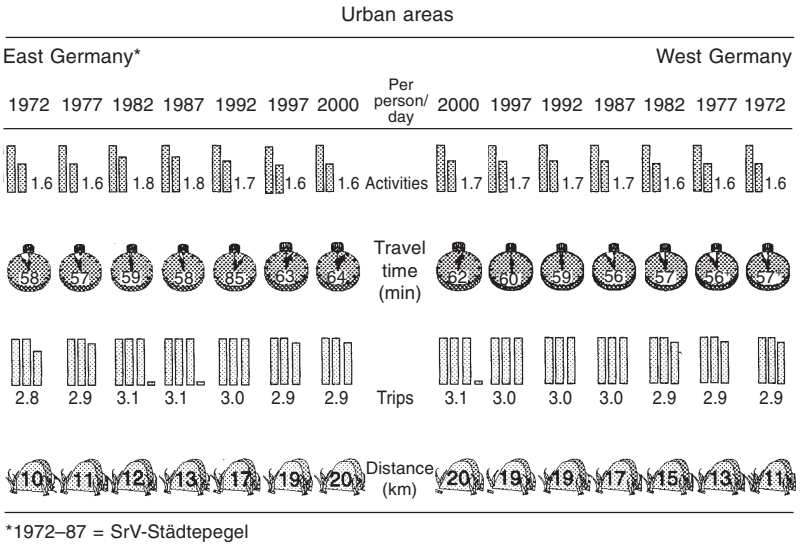

Fig. 5.1 Mobility in urban areas of East and West Germany, 1972–2000. Source: Socialdata (2002).

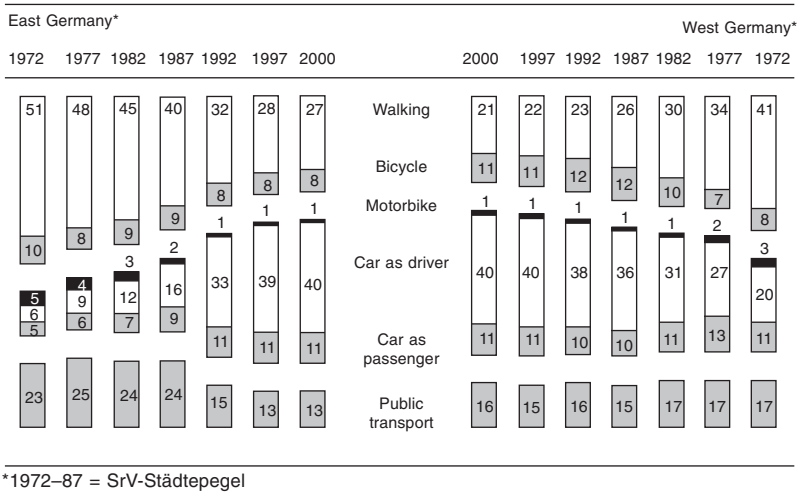

Fig. 5.2 Mode choice in urban areas of East and West Germany, 1972–2000. Source: Socialdata (2002).

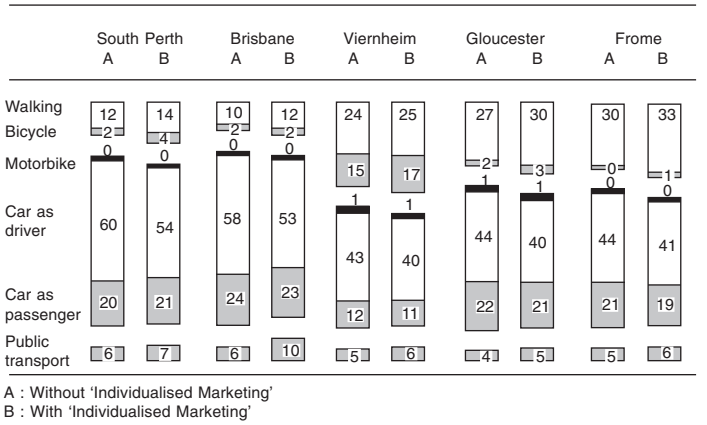

Fig. 5.3 'Individualised Marketing' pilot projects. Source: Socialdata (2002).

car passengers (five per cent). By 1987 the share of car drivers had risen by a factor of almost three (from six to sixteen per cent), and the share of car passengers had almost doubled (from five to nine per cent). These increases were mainly to the detriment of the walking mode (which decreased from 51 to 40 %). The situation in East Germany in 1987 was similar to that of West Germany at the start of the 1970s. The trend in West Germany was marked by a steep decline in the walking mode (from 41 % in 1972 to 21 % in 2000), a sharp increase in cycling (although from a lower initial level), and a twofold increase in car drivers. This development was repeated in East Germany in a shorter span of time (between 1987 and 2000). Accordingly in 1997 the difference in transport shares in both parts of Germany had already narrowed considerably and in 2000 they were nearly identical.

However, there are examples showing that the chain of 'greater distance – higher speed – faster modes' can be reversed. As shown, the mode choice is a parameter which is variable and can be influenced. Voluntary travel behaviour change programmes based on a personalised, customised marketing approach ('Individualised Marketing') have proven to be highly successful in achieving mode shifts from the car to environmentally-friendly modes (see Fig. 5.3). A large-scale application in South Perth with 35 000 people confirmed these results and even proved that walking was the mode with the highest 'substitution-value' for car-use (see Chapter 29).

5.4 Life cycle groups

In order to demonstrate to what extent motives for everyday sequences of life have an effect on mobility behaviour, lifestyle groups from different socio-demographic variables were closely examined using a later evaluation of the data base (1997). A comparison between the mobility characteristics of the

different age and socio-economic groups showed strong variations (Table 5.3). While the characteristics (activities, journeys, trips and legs) of children, students, apprentices, and the employed population are noticeably above the average, they are lower for those undertaking home duties (without children), unemployed active men and elderly people. In groups with higher trip numbers, the number of trip-legs increases as well. This shows that groups with high mobility are dependent on walking as a 'supplementary mode', as both the use of cars and public transport are accompanied by walking to parking places and stations.

A differentiation of the daily trips with the main mode (Table 5.4) as well as with life cycle groups shows differences which are primarily connected with employment, gender and the possession of a driving licence. Thus the share of car trips continuously increases at the expense of non-motorised mode trips from the age of driving licence acquisition (18 years), especially for males. The highest share of car trips and the lowest share of walking trips can be found in the group of working males. Females, in contrast, have a higher share of walking and cycling trips. Those doing home duties mainly concentrate their mode choice on environmentally-friendly modes – walking, cycling and public transport. Unemployed men up to 60 years and younger male pensioners have a relatively small mode share of trips which are solely covered on foot or by bicycle. In contrast, female pensioners in this age group have a stronger tendency to use non-motorised modes.

The importance of walking becomes even more obvious when studying the mode choice of elderly people of 70 and older. The share of car trips as driver of male elderly pensioners decreases to one-third of the daily trips and the share of walking increases considerably. Therefore, walking is the most important means of mobility for this group.

If activities outside the home are examined (Table 5.5), substantial differences depending on the life cycle are obviously to be seen, with a wider spread of activities in the case of children, young people and the economically active compared with housewives (with no children) and retired people. When education/working, occupational activities and child-rearing come to an end, people go out merely for shopping and leisure activities or to make use of services. However, this happens, as shown, at a lower level of mobility.

5.5 Conclusions

The results presented in this chapter are highly relevant for travel behaviour surveys and transport policy making and planning. It has been shown that developed and well optimised empirical methods exist that can survey all forms of mobility including all forms of non-motorised traffic. However, in the practice of transport research and planning, procedures and methods are still found which overestimate the importance of motorised mobility (Brög and Erl, 1993).

Table 5.3 Mobility indicators by life cycle group, Germany (1997)

Per person/day	Average	Under 6 years	In education/training phase				Economically active						Home duties (up to 60, female)		Economically non-active				
							Single		With partner, no children		With partner, + child								
			Up to 18 years, male	Up to 18 years, female	18 years and over, male	18 years and over, female	Male	Female	Male	Female	Male	Female	Child-less	With child	Up to 60, male	60–69, male	60–69, female	70 and over, male	70 and over, female
	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
Out-of-home share (% share)	79	71	85	83	82	81	90	90	85	85	87	86	75	82	72	75	68	62	51
Mobile persons:																			
Activities	2.2	1.8	1.7	1.7	2.4	2.2	2.7	2.5	2.4	2.2	2.5	2.6	2.1	2.6	2.3	2.2	1.9	2.0	1.7
Journeys	1.6	1.5	1.5	1.5	1.6	1.6	1.7	1.6	1.6	1.5	1.8	1.9	1.7	2.0	1.7	1.8	1.5	1.6	1.4
Trips	3.8	3.3	3.2	3.2	4.0	3.8	4.4	4.1	4.0	3.7	4.3	4.5	3.8	4.6	4.0	4.0	3.4	3.6	3.1
Legs	7.1	5.5	4.8	5.1	8.0	7.7	9.0	10.2	8.5	7.3	9.0	8.7	6.5	8.1	7.5	6.9	5.6	6.0	4.9
All persons:																			
Activities	1.7	1.3	1.4	1.4	1.9	1.8	2.4	2.3	2.0	1.8	2.2	2.3	1.6	2.2	1.6	1.7	1.3	1.2	0.9
Journeys	1.3	1.0	1.3	1.3	1.4	1.3	1.5	1.4	1.4	1.4	1.5	1.6	1.2	1.6	1.3	1.3	1.0	1.0	0.7
Trips	3.0	2.3	2.7	2.7	3.3	3.1	3.9	3.7	3.4	3.2	3.7	3.9	2.8	3.8	2.9	3.0	2.3	2.2	1.6
Legs	5.6	3.9	4.1	4.2	6.6	6.2	8.1	9.2	7.2	6.2	7.8	7.5	4.9	6.6	5.4	5.2	3.8	3.7	2.5

Source: Brög, Erl and Glorius (1998).

Table 5.4 Main transport mode choice by life cycle group, Germany (1997)

Mode	Average	Under 6 years	In education/training phase				Economically active						Home duties (up to 60, female)		Economically non-active				
							Single		With partner, no children		With partner + child								
			Up to 18 years, male	Up to 18 years, female	18 years and over, male	18 years and over, female	Male	Female	Male	Female	Male	Female	Child-less	With child	Up to 60, male	60–69, male	60–69, female	70 and over, male	70 and over, female
	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
Walking	24	35	37	37	15	17	19	23	12	19	11	19	31	31	24	31	38	39	50
Bicycle	10	7	21	18	14	14	9	10	6	8	6	9	11	9	9	10	11	9	7
Motorbike	1	–	3	1	4	2	1	–	1	0*	2	0*	0*	0*	1	1	0*	0*	–
Car as driver	41	–	0*	0*	44	34	58	47	70	43	72	51	29	42	53	46	16	35	8
Car as passenger – household car	10	52	18	20	4	5	0*	0*	2	14	2	12	16	12	3	2	18	2	8
Car as passenger – non-household car	3	3	5	5	4	7	3	4	2	3	2	2	3	2	1	1	2	2	4
Public transport	11	3	16	19	15	21	10	16	7	13	5	7	10	4	9	9	15	13	23
Total	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

*Less than 0.5%
Source: Brög, Erl and Glorius (1998).

Table 5.5 Activities by life cycle group, Germany (1997)

Activity	Average	Under 6 years	In education/training phase				Economically active						Home duties (up to 60, female)		Economically non-active				
							Single		With partner, no children		With partner + child								
			Up to 18 years, male	Up to 18 years, female	18 years and over, male	18 years and over, female	Male	Female	Male	Female	Male	Female	Child-less	With child	Up to 60, male	60–69, male	60–69, female	70 and over, male	70 and over, female
	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
Work	19	–	1	1	10	9	31	31	35	35	34	25	4	2	5	2	1	1	0*
Duties/business	7	–	0*	0*	4	3	15	6	17	6	16	4	2	1	5	5	1	3	1
Education/ training	8	23	42	44	24	25	1	1	1	1	1	1	1	2	2	–	–	–	–
Shopping	26	28	11	13	17	20	20	25	17	27	17	25	47	38	35	42	48	45	49
Use of services	6	6	3	3	4	5	4	5	4	5	4	5	10	8	13	13	12	13	15
Accompanying others**	4	8	1	1	2	2	1	3	2	2	6	18	4	22	5	2	2	1	0*
Leisure	30	35	42	38	39	36	28	29	24	24	22	22	32	27	35	36	36	37	35
Total	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

*Less than 0.5%
**Taking/fetching
Source: Brög, Erl and Glorius (1998).

Transport planning frequently uses models. These models should, therefore, also be able to handle walking and cycling. Additionally, it needs to be mentioned that new model generations are able to show the change between different modes, where walking and cycling become alternatives to the use of cars. These models form an important basis for shaping the urban space and transport networks for all means of transport.

The accessibility of urban space for non-motorised transport is also important. Large shares of daily mobility are still taken up by non-motorised travel, e.g., home-based trips for short distances, and also walking linked with the use of the car and public transport. Additional short walking trips are made, for example, whilst shopping in the city or on lunch breaks.

Of special importance are interfaces between simple modes, i.e., parking lots, bicycle parking facilities, bus stops and stations. It was shown that nearly every trip – including car trips – has a walking component. This combination, however, does not receive the same attention from planners as other intermodal means of transport.

Finally, it needs to be stressed that the 'substitutional value' inherent in walking is very high. As shown in the example from South Perth, walking is an important replacement for car trips. In this way, walking creates health benefits and leads to increased physical activity.

5.6 References

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6

The decline of everyday walking in the UK: explanations and policy implications

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6.1 Introduction: the role of walking in transport policy

Since the early 1990s local authorities have been increasingly encouraged by central government to re-orientate their transport plans away from cars and towards sustainable modes. In 1996 a discussion document was released by the Walking Steering Group with the aim of reversing the decline in walking and encouraging it as a serious mode of transport (Department of Transport, 1996). It recognised that to be successful, walking must be considered as part of an overall strategy and not just in isolation. In July 1998, the Government published its Integrated White Paper on transport, setting the framework for transport policy in the UK and providing the context within which the Government's detailed policies were to be taken forward. The basis in the White Paper for encouraging walking was the need to reduce dependency on the car. The 'New Deal' for walking was to make it more attractive, safer and therefore a more viable alternative mode of transport (DETR, 1998a). The primary instruments for this were Local Transport Plans (LTPs), through which the Government expected better provision for walking, with increased levels of funding promised.

Extraordinarily – given its past poor record on encouraging cycling – Britain is now actively taking a lead in developing pro-walking policies and the interest in promoting walking is accelerating quickly. By the year 2002 there had been:

- five national walking conferences (CAST, 2002a);
- three international conferences (www.walk21.com);
- the establishment of a new Local Authorities Walking Group (CAST, 2002b);

- a good practice guide on preparing local walking strategies as part of the Local Transport Planning process (Pedestrians Association, 2000);
- a best practice guide on planning and providing for pedestrians (IHT, 2000);
- a one-stop shop of good practice guidance case studies and references (London Walking Forum, 2000);
- numerous research initiatives, symposia and other publications.

It is not only those concerned with walking as transport who have encouraged people to get out on foot. Increasingly, policies, strategies and advice in the fields of air quality, sustainability, health, the countryside, tourism, social inclusion and town centre management, for example, are incorporating a recognition of the importance of good walking conditions or high levels of pedestrian activity to meet their goals.

Although recent policy statements on walking indicate a new commitment to improving conditions for pedestrians, in reality there has been little strategic dimension. At one stage it seemed likely that walking would have its own Transport White Paper 'daughter' document and a National Walking Strategy was expected. However, sustained and vociferous criticism of the Government's stated view of the importance of walking followed the Secretary of State's ill-judged 250 metre car journey from his hotel to the Labour Party conference venue in 1998. In a climate of palpable fear of 'Ministry of Silly Walks' headlines in pro-motoring tabloid newspapers, the promised strategy document was repeatedly delayed and down-played. By 2000, the advice document *Encouraging walking: advice to local authorities* (DETR, 2000) – quietly published with no launch event or other publicity – was all that remained of the Strategy.

This vacillation on the part of government has caused considerable disillusionment. In the winter of 2000–1 the Environment, Transport and Regional Affairs Committee (ETRA) of the House of Commons carried out an inquiry into the expenditure, administration and policy of government towards walking in towns and cities. The resultant Select Committee Report was uncompromisingly critical of the Government, arguing that the attention, action and priority accorded to walking failed to match its importance and were inadequate to reverse the longstanding trend of decline (ETRA, 2001). Amongst many recommendations is a call for a National Walking Strategy. In its response, the Government has accepted that there must be such a Strategy and that this must be underpinned by changes to personnel training, communication with practitioners and advice to local authorities (DETR, 2001).

Given that serious attempts are now to be made to reverse the decline in walking, it is imperative that there is a clear understanding of what the 'problems' are with walking, and what therefore might be the most appropriate 'remedies'. This chapter attempts to review the knowledge of everyday walking as expressed in the literature of the past 30 years. Such a review will help to evaluate the way in which barriers to walking have been conceptualised and

subsequently incorporated in remedial measures. It will be concluded that there has been an overwhelming concentration on physical definitions of barriers to the detriment of incorporation of socio-cultural barriers, despite plentiful evidence that these are significant obstacles to the increased adoption of walking in everyday life.

6.2 The importance of walking as a mode of transport

Prior to the late 1990s it was very difficult to appreciate fully the significance of walking in Great Britain. This was due to inconsistent measurement, the difficulty in defining walking trips themselves, the lack of importance attributed to short distance journeys by official statistics and the fragmented nature of the available data (Hillman, 1990). The first reasonably comprehensive statistical picture of walking only became available in 1998 in *Walking in Great Britain* (DETR, 1998b), which enabled a snapshot of walking in Great Britain to emerge through an amalgamation of several statistical sources on walking. It demonstrated the importance of walking, yet at the same time highlighted its continuing decline as an everyday mode of transport: since the mid-1980s the proportion of all journeys made on foot in the UK has fallen from 34 % to 27 %.

Despite this decline, walking remains vitally important in contemporary Britain. Although it accounts for only three per cent of the total distance travelled, it is still the dominant mode of transport for short journeys. At least 28 % of all journeys are less than 1 mile and 80 % of these are made on foot. Walking is the most widespread mode of movement in Great Britain, mainly for short journeys up to one mile and second only to the car on journeys between one and two miles. Indeed, walking accounts for three and a half times more journeys than all public transport journeys (Hillman, 1997).

Almost all trips involve a walk at some stage of the journey, even if it is only a very short walk to and from public transport or a car park. In fact, as walking is an integral element of all trips, it can be seen as the ‘glue’ that binds the transport system together, although this might be better conceptualised as ‘oil’ that helps the system to run more smoothly. Moreover, with 35 % of car journeys being less than 2 miles in distance there would appear to be much scope for promoting walking as an alternative to car use for these shorter distances.

The significance of this higher volume of walking would be its benefit to individuals and communities. For individuals, walking is a health-giving activity. The encouragement of physical activity to prevent and cure some of the major causes of disease and ill health within the population has gained a high profile in the health sector. In particular, walking has been described as ‘the nearest activity to perfect exercise’ (Morris and Hardman, 1997). Encouraging people to walk more can produce a significant range of health benefits to the individual, including cardiovascular benefits, weight

management, and a reduced risk of osteoporosis, diabetes, premature death, anxiety, depression and colon cancer (Cavill, 2001).

A further health benefit is that more walking (and thus less car use) is also likely to have significant impacts on environmental pollution. Motorised transport is one of the fastest growing sources of air and noise pollution, and of emissions that are implicated in the enhanced greenhouse effect and acid rain. Although the introduction of cleaner vehicle technology has had an influence in reducing some polluting emissions, this is likely to be off-set by the continued growth in road traffic, and in particular short distance car trips, which are highly polluting and are most likely to have replaced walking trips.

It is also important to recognise the contribution that walking can make to reducing deaths and injuries in road traffic accidents. In a motorised traffic environment, walking is relatively unsafe, although of course the source of danger is the vehicle rather than the pedestrian. In contrast, walking in an environment dominated by walkers is safe for everyone, as this is the most benign mode of transport of all.

There are also health benefits (in a broader sense) to be gained in the wider community from an increase in the number of people walking and a decrease in private motorised transport. Access and equity are two important considerations. Those least well off in society are less likely to have access to cars to reach increasingly distant facilities such as shops and hospitals, and, simultaneously, the loss of local services disadvantages those who are more reliant on walking as their main mode of transport. Moreover, walking does not just entail moving on foot from A to B. It also encompasses strolling, sitting, chatting with neighbours and friends, and the use of the street for other social activities. Increasing levels of motorised traffic have made these activities more difficult, if not impossible. Comparing children in 1971 with children in 1990 demonstrates a marked decline in their independent mobility during this period (Hillman *et al.*, 1990). The growing trend is for adults, fearful of the threat of traffic and strangers to their children, to accompany them to school, often by car, which paradoxically perpetuates the negative conditions from which parents are trying to protect their children.

The reduction in the amount of children walking to school is just one component in the gradual withdrawal of people from public spaces, which reduces the chances of informal supervision so that the street becomes a sterile and more feared place. Jacobs (1961) suggests that the key factor in creating 'liveable cities' is to establish a mixed land-use pattern that decreases distances between facilities. This results in an environment with heavy pedestrian activity, a reduced level of interference from motorised traffic, informal supervision by everyone and a sense of ownership of public space. As Pharoah (1992: 10) comments, 'if a city is to be "liveable", it has to be "walkable"'.

6.3 Factors affecting walking as a mode of transport: a review of the literature

In light of the vital importance of walking to urban life and personal health, one could expect a very large volume of research and publication on this mode. The reality is quite the reverse: walking is very thinly represented in research projects and published outputs are scattered and fragmented across disciplines. However, when this existing literature is assembled and examined for its explanations of why walking is in decline, a number of factors emerge as the most widely studied. These are described below.

6.3.1 Footways

Compared to other pedestrian issues, 'footway conditions' have received a relatively large amount of research attention, with a focus on such issues as:

- cracked or uneven footways;
- litter and/or dog dirt;
- parked vehicles and cyclists on the footways;
- footway repairs;
- narrow or non-existent footways;
- overhanging trees;
- snow or ice;
- high kerbs;
- obstructions such as signposts.

The most comprehensive coverage of footway conditions can be found in the MORI questionnaire surveys conducted in 1987, 1995 and 1997 (National Consumer Council, 1987, 1995; General Consumer Council for Northern Ireland, 1997). Complaints about footway conditions have changed very little over time, with cracked or uneven footways emerging as the most cited barriers. Narrow footways are a particular problem for women, who have difficulty in negotiating confined spaces with pushchairs or young children (DETR, 1998b), and kerbs and steps are specific problems for disabled people (Mitchell and Stokes, 1982; Hitchcock and Mitchell, 1984). It is estimated that nationally there are roughly seven million accidents due to poor footway conditions per year (Morris and Hardman, 1997) and in 1995, 110 people died as a result of falls in the street.

It is clear that improved footway conditions can act as a motivation to increase walking. The EU-funded project WALCYING (walking–cycling) (1998) suggests that the most important infrastructural and political measures likely to encourage a modal shift to walking include more footways, wider pavements with smoother surfaces and the prohibition of cyclists on pavements. Research by Cleary Hughes Associates (1998) into the feasibility of walking the journey to work established that wider, cleaner, continuous and better maintained footways were essential requirements for increasing walking in and around the work site.

6.3.2 Traffic

Much empirical research into walking in the transport field is conducted with the intent of improving the pedestrian environment, particularly in relation to pedestrian conflict with motorised traffic. The economistic incentive is to reduce the private, public and community costs of accidents (TEST, 1976). Accident statistics drive much of the research, therefore, and predominantly structural solutions are suggested to problems generated by increasing levels of traffic. This emphasis on planning, engineering and commercial solutions is a reflection of the need of institutionally powerful interest groups to control the pedestrian environment rather than any desire to explore pedestrian experience *per se* (Hill, 1987). It may not be surprising in pedestrian surveys, therefore, that 'traffic' is often cited as a significant barrier to walking. This may well be due to the reality of rising levels of traffic and consequent unpleasant walking environments, but it may also be a reflection of the research thrust itself.

The finding that traffic *is* a major deterrent to those walking is supported by many surveys. For example, Caunter *et al.* (1997) sought to shed light on why people do or do not walk short journeys. They identify difficult or dangerous crossings (33 %) and traffic speeds (26 %) as major concerns. However, the response to these worries has most often not been to reduce traffic danger at its source by reducing traffic volume and speed, but instead to keep pedestrians away from traffic by restricting their movement (Hill, 1987). Such engineering interventions are frequently based on observed pedestrian behaviour, but this does not take into account any latent demand for journeys and journeys postponed or withheld due to perceived danger (Hine, 1996). As traffic increases, roads are more likely to be avoided and, therefore, pedestrian casualty rates are likely to be lower despite a more dangerous environment (Adams, 1995). Although the number of pedestrians killed in road accidents has fallen over the last 30 years, this decline is a function of the decline in walking; of avoidance strategies adopted by pedestrians; and the withdrawal, by parents, of children from the street.

6.3.3 Weather

Poor weather is often cited as a significant deterrent to walking and a reason for driving (Gunnarsson, 1995; Mackett, 1999). It is difficult to identify ways in which to enhance the experience of pedestrians who view poor weather as a disincentive to walking. A number of authors suggest structural measures, such as design of buildings, sheltering pedestrians from the worst of the weather, and providing changing facilities at work (Ramsey, 1997; WALCYING, 1998).

6.3.4 Distance

Hillman (1990) asserts that one of the primary deterrents to walking is the availability of destinations within reasonable walking distance. He points to

the growing trend towards rationalisation of public and commercial facilities, a lowering of housing densities and a tendency towards peripheral positioning of facilities. The consequences of this are dispersed patterns of activity and lengthening journeys often beyond reasonable walking distance. In contrast, in cities with high urban densities, levels of car ownership are lower and levels of public transport use, cycling and walking much higher (Newman and Kenworthy, 1989; Hillman, 1998).

The distance over which it is considered feasible to walk varies considerably. For example, some research suggests walking is practicable for up to 1.6 km (TEST, 1976; Mitchell and Stokes, 1982), some suggests 2 km (IHT, 2000) and some suggests 2 miles (Department of Transport, 1996; Sissons and Senior, 1998). In contrast, acceptable walking distances in the US research results were as little as approximately 0.4 km (Demetsky and Perfater, 1975). In a study of ten European countries, the average distance thought acceptable for walking was between one and two kilometres (WALCYING, 1998). Acceptable distance varies depending on the physical characteristics of the pedestrian system, for example in terms of design and terrain, pedestrians themselves and the purpose and context of the journey (Fruin, 1987; Goodman, 2001a).

6.3.5 Time

In research on deterrents to walking, distance and time have been inextricably linked through an emphasis on travel-time. Walking is often regarded as taking too much time for it to be considered a relevant alternative to driving (WALCYING, 1998). However, research points to conceptualisations of time other than travel-time, which are of equal or greater concern when considering walking, specifically by those travelling by car. In studies of the potential for modal shift, for example, as well as travel-time as a key deterrent to walking, 'time pressures' and 'time constraints' are mentioned in discussion about travel (Coleman and Curtis, 1997; Sissons and Senior, 1998; Mackett and Ahern, 2000). It is suggested that time pressures 'should not be dismissed simply as an "excuse" as perceived scarcity of time may be a feature of post-modern society, particularly in two-parent dual-employment families' (Sissons and Senior, 1998: 219). The nature of work, gender, the presence of dependent children in the household and other distinct life cycle events are important factors affecting perceptions of time pressures and time constraints (Goodwin, 1995). These factors are found significantly to influence people's perceptions of time and their willingness to consider walking as a mode of transport (Goodman, 2001b). These more socio-cultural understandings of time are vital in broadening our understanding of the reasons for the decline in walking. However, these approaches and any subsequent non-structural recommendations for improving the environment for walkers are still far from mainstream within transport planning and policy.

6.3.6 Personal safety

Personal safety issues may be considered as both a physical or social barrier to walking, though a majority of solutions lie in the realm of modification of the built environment. Fear of crime is known to have significant impacts on feelings of personal safety and consequently, there are implications for the propensity to walk (Crime Concern, 1999; Crime Concern and Social Research Associates, 1999). Dark, urban and isolated locations are key variables in inducing fear of crime, and journeys that have to be made in such circumstances will not encourage people, particularly women, to walk. Thus, the hours that people work, the route they would have to take, and gender are important variables in whether people would consider walking (Goodman, 2001a).

The waiting and walking stages of accessing public transport also cause concern, and the low social status associated with these modes does little to enhance feelings of personal safety. Any weak link in the journey chain can deter and therefore the whole journey from door to door needs to be considered (Crime Concern and Social Research Associates, 1999).

6.3.7 Factors affecting walking as a mode of transport: an overview

The fragmented nature of the research on walking makes it difficult to gain a coherent picture of walking as a mode of transport. While specialised studies of pedestrian behaviour produce vital findings, they tend to be isolated from the socially situated contexts in which decisions about walking are made (Hill, 1987).

The thrust of the evidence cited above is that walking remains important in society but that it is in long-term decline. Explanations imply that this is a function primarily of the problems people experience whilst walking. The research bias reflects the outcome of public opinion surveys, where problems with walking in general have been found to reside primarily in the physical realm – in relation to footway conditions, traffic, weather, distance, time – or in the area of personal safety. It is almost certainly a methodological bias too, as questionnaire-based public opinion surveys are more likely to produce 'thin descriptive' responses couched in terms of daily problems, as opposed to 'thick' description (Geertz, 1993), which has a greater capacity to uncover context, meaning and the subtlety and complexity of everyday life. The use of more in-depth qualitative techniques, which can reveal underlying motives and reasoning, has, until recently, been very scarce in walking research. Although both cultural and physical variables influence behaviour and therefore the use or non-use of streets by pedestrians (Rapoport, 1987), the majority of research has neither investigated barriers at a socio-cultural level, nor acknowledged the possibility of solutions beyond the realm of the physical. The following section addresses these issues.

6.4 Alternative perspectives on the decline of walking

6.4.1 The 'invisibility' of walking

Walking has rarely been treated as a mode of transport in the way of other modes, despite its ubiquitous and important nature (Wigan, 1995). Even though walking accounts for such a large proportion of modal share, particularly for short journeys, it is still often overlooked in policy and in planning. National sources of information about travel are inadequate, as they have not been designed to detect the full range of issues for pedestrians and as information has not been collected at a sufficiently detailed level. For example, journeys of less than one mile were excluded from the main published tables of the National Travel Surveys (NTS) until 1998, leading to an under-representation of the relative importance of walking by a factor of three (Hillman and Whalley, 1979).

Walking is such a normal part of everyday life for the majority of people it is very easy to take it for granted. In addition, because of its 'omnipresent ordinariness', it is difficult to place responsibility for walking within one government department. As the Metropolitan Transport Research Unit (MTRU, 1996: 5) suggests, walking is 'hidden' as it is 'so basic to all basic planning and transport activities, and so undemanding in terms of government finance, that it somehow slips through the net in strategy formulation'.

In addition, pedestrians are thought to have relatively little economic significance as there is a commonly held belief that they contribute less to economic spending than motorists do and therefore there is little economic incentive to plan for walking. Walking is relatively simple and cheap to provide for, so there is not much in terms of technological and engineering challenges to stimulate planners. As walking does not attract big budgets, it does not attract powerful people, and championing pedestrian issues does not normally further careers. Evidence to support this is admittedly anecdotal (Local Authorities Walking Group, 2000); however, it does seem that the relative cheapness of walking and the absence of big budget walking projects repels the 'high-fliers' and relegates walking matters to junior or less important personnel.

This lack of professional focus is compounded by the failure of the public to bring it to the attention of planners and politicians. Walkers are not a special interest group. Everybody walks, and because walking is so ubiquitous, there are no really powerful lobbies or advocacy groups as there are, for example, for motorists and indeed most modes. There is thus great difficulty in getting views of pro-pedestrian people incorporated into the planning process, thereby increasing the problem of the invisibility of walking. It is interesting that the main lobby group for walkers in the UK, the Pedestrians Association, found it advantageous to re-brand itself as 'Living Streets' in 2001, dropping the pejorative 'pedestrian' from its title altogether (Living Streets, 2001).

6.4.2 The social construction of transport

The 'invisibility' of walking has been couched in this chapter mainly in terms of policy, planning and public decision-making. However, it may be that walking is often invisible to individuals too, in the sense that it is not even considered as a transport option in relation to alternatives. It is possible that positive social and individual perceptions of the car and negative perceptions of walking may be as important as any perceived physical barriers to walking. However, as there has been little research into perceptions of walking as a mode of transport, it is only possible to make inferences based on related literature.

Choice of transport mode can be viewed in relation to social norms, which are the generally accepted normal practice for a specified behaviour (Solomon, 1998). For example, when culturally shared perceptions place certain behaviour outside the mainstream of social activity it makes it more difficult for that behaviour to be adopted (Eden, 1993). Research has identified the car as holding substantial cultural capital in attributes such as status, wealth and power, alongside its transport function (see, for example, Chapter 9, and Stokes and Hallett, 1992; Solomon, 1998; Stradling *et al.*, 1999). This cultural capital can often supersede the actual transport function of the car and become the reason for mode choice.

Many authors demonstrate the cultural dominance of car travel in relation to all other modes, from which it can be implied that the social acceptability of walking is marginalised by car travel, which assumes social superiority in aspects such as status, comfort, convenience, safety and privacy (Goodman and Tolley, 1999). Walking, cycling and public transport use for utilitarian purposes are assumed to have a low social status in the UK because they are used predominantly by those on low income, those who cannot afford to own or drive a car, women, children and older people (Finch and Morgan, 1985; Davies *et al.*, 1997; Turner and Pilling, 1998). Understanding travel as a social norm has implications for measures taken and for the type of disciplines needed to find long-term solutions (Solomon, 1998). This is reflected in recent European and UK research into reducing car usage, which suggests the need for education, attitude and behaviour shifts, and marketing and information solutions, as well as more traditional physical elements of transport research (WALCYING, 1998; ADONIS, 1998).

Research carried out by the authors also points to different explanations for the decline in everyday walking. Firstly, these include social, economic, lifestyle and political issues. For example, a range of temporal constraints influencing people's attitudes to walking were identified, revealing a high degree of complexity and inter-relatedness in attitudes to, and decisions about, walking to work (Goodman, 2001a). Secondly, experts forecast that the depressive influence of social, economic, lifestyle and political factors on walking would more than outweigh the effects of the predicted increase in funding, facilities and infrastructure for walking over the next ten years (Tolley *et al.*, 2001). In short, it was felt that despite considerable efforts

being made in the physical and social safety areas, walking would continue to decline. The clear implication is that there are significant deterrents to walking which lie beyond the physical environment.

6.5 Conclusions

The decision of whether or not to walk is affected by broad socio-cultural influences over how transport is socially constructed in peoples' minds, itself influenced by the invisibility of walking in the public and professional domain. These issues may have as much influence as physical deterrents to walking and are inextricably linked to how people perceive the pedestrian environment. However, it is clear that the research to date focuses very strongly on obstacles to walking and on the physical barriers in particular. Much of the research tends to neglect the wider social and transport contexts within which people make their travel decisions. For example, relatively little is known about what motivates people to walk or about how walking fits into current lifestyles and value systems. The conclusion for walking policy-makers and planners must be that encouraging people to walk more may not be as straightforward as making physical alterations to the pedestrian environment.

As far as policy is concerned there is a need for strong leadership from central government if walking levels are to be maintained, despite the operation of adverse trends. A significant change in attitudes and behaviour is needed to shift the balance in favour of walking. The health sector provides an interesting comparison where large-scale public health campaigns have been successful in bringing about desired behavioural changes in, for example, the social acceptability of smoking and drink-driving. The most effective campaigns have been those that combine 'information, education, service developments, legislation, changes to the physical environment and the active engagement of politicians, the media and local community groups in a shared agenda for change' (Hamer, 1998: 10). A similar paradigm shift is needed for altering travel behaviour. What is needed is a balance of approaches that incorporates physical, social and individual change.

Clearly, walking policy must recognise and interlace with other policy frameworks (Lumsdon and Mitchell, 1999). The failure to recognise that walking issues are multidisciplinary and multi-facetted has had major consequences, in that the wide range of factors that influence travel decisions and behaviour have been reduced in policy advice to a simplistic over-reliance on physical solutions to pedestrian problems. To continue to conceptualise walking in isolation of the wider social and transport contexts will lead to a superficial understanding of the complexity of travel behaviour decisions. Reversing the decline in walking is unlikely to be achieved by tactical measures dealing with physical problems, in the absence of a strategic framework. The acknowledgement of the socio-cultural context of walking, and not just its physical barriers, is perhaps the crucial issue for future walking policy.

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7

Visions for city traffic and mobility

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If you want to build a ship don't drum up the men to fetch the wood, allocate the jobs and divide the work, but teach them the yearning for the wide open sea. (Antoine de Saint-Exupéry, reference unknown)

7.1 Introduction

The first oil crisis in 1973 was a shock and provoked some rethinking about reliance on the car. Car-free Sundays (a measure to counteract the crisis) enabled the town and countryside to be experienced in a completely new way and also promoted alternative mobility. In contrast, during the oil crisis of 2000 the car lobby tried to push through their supposed right to cheap fuel for an urban and economic system which, despite all the declarations to the contrary, had become even more car-dependent. The demand of the Austrian President Thomas Klestil 'Don't just say what is popular, but try to popularise what is necessary', is regarded as political suicide by politicians faced with the mobilisation of public anger by populist defenders of the fixation with the car. Those who issue warnings and think beyond the present are a minority voice in politics, business, general society and the media and do not really have enough muscle to prevail. The 'realists' continue to dominate: they want the removal of bottlenecks and optimisation of the current transport system and consider the growth in traffic to be unavoidable. They denounce concepts that question these basic assumptions as ideological or utopian. The underlying 'car pact' causes intractable 'stagnovation' (Canzler and Marz, 1996).

The 'transport turnaround' is not primarily a technical transport problem,

although important individual contributions must come from this sector. Most of all, it will require linkage between the essential elements quoted above: a coalition of social forces must be formed to convince people that sustainable mobility will mean a better quality of life. The initiatives must interlink at all regional levels, from local to EU, and at all institutional levels, from citizens' initiatives to parliaments and governments. Up to now this has been very fragmented (see Monheim, H, 1997a, b; Monheim, R, 1997).

The objective of this chapter is not to systematically summarise and evaluate concepts or to develop a closed vision such as those provided by Adam *et al*., (1999), Monheim, H (1997a), Monheim, R (1977), Topp (2002a), Hall and Pfeiffer (2000), Knoflacher (1993), Monheim and Monheim-Dandorfer (1991), Petersen and Schallaböck (1995), Schallaböck (1999), Vester (1999) and Wolf (1994). Instead, by way of examples, some problems and approaches to solving these problems will be discussed. The starting point is the assessment that prognosticated trends are not inevitable, but rather that alternatives are necessary, feasible and worthwhile. Although the traffic situation in towns and cities will be the main topic of discussion, the problems cover the whole spectrum of transport and must therefore be dealt with comprehensively, and specific regional strategies also need to be developed.

7.2 Motorisation

As the threat to sustainable future urban development caused by traffic is due predominantly to too high a number of cars and their excessive travel distances, and unsuitable drivers' behaviour, this must be the basis of the approach to solving the problem. The operating capacity of the road transport system is continually increased through the removal of bottlenecks, information technology and vehicle optimisation, despite the façade of opposing rhetoric. This intensifies the problems for the urban townscape, as it deepens the dependence on the car and leads to the misallocation of scarce resources.

The reduction in motorisation necessary to produce steadily flowing car traffic may well appear utopian under prevailing political conditions. It is therefore necessary to make people aware of the benefits to quality of life and transport efficiency since ascetic programmes of sacrifice only appeal to minorities. A more intelligent mobility must meet the psychosocial regulatory needs (Klühspies, 1999) of the citizens better than current transport use. In place of the fear of change there must be joy in new experiences. In general, transport and urban planning must disengage itself from technical and economic fixations and become orientated towards individual needs and those of society (City:Mobil, 1999).

Whereas the increase in motorisation and extension of the infrastructure for car traffic is generally regarded as a necessary accompaniment (sometimes also a requirement) of economic growth, countries and cities do exist where prosperity and modernity are accompanied by less motorisation. Conversely,

there are regions with poor infrastructure that have a high level of motorisation. In Denmark and The Netherlands, for example, there are just 332 and 370 cars, respectively, for every 1000 inhabitants. In Italy, by contrast, there are 577. As 'compensation' the Danes travel 958 km and the Dutch 1010 km by bicycle every year. By comparison the Italians cycle just 168 km, and the Spaniards only 24. In Hanover there are 405 and in Freiburg 418 cars per 1000 inhabitants, whereas in the much less attractive cities of Saarbrücken there are 530, in Zweibrücken 546 and in Salzgitter 590. The general assumptions are also contradicted by the fact that in towns such as Freiburg and Kassel motorisation is lower in 2003 than it was at the beginning of the 1990s. This is partly attributable to the intensive deployment of the environmental lobby (Lötscher, Mayer and Monheim (2000a); for development of motorisation according to regional types, see Adam *et al*. (1999)).

The concept of full motorisation, though often asserted, is irrelevant for the central areas of conurbations. On average, 40 % of households in such areas have no car (Berlin: 47 %), and this proportion is even higher in the inner cities. This is not just attributable to people on low incomes and senior citizens, but also to groups with a certain lifestyle who are concentrated here and who are emancipated from the car by virtue of their self-esteem and attitude to mobility. They consider the lack of a car to be not a loss but a gain in terms of independence.

It is one of the great injustices of our urban and transport systems that the residential areas with the lowest levels of motorisation suffer most from the effects of car traffic. Despite this, car-free living is usually dismissed as a utopian niche concept. There is no willingness to acknowledge the benefits of the lifestyle of those many households that already do not own a car. People living in the inner areas also have the added disadvantage that rents are higher, whereas the commuters, in addition to their low rents, also receive state subsidies through mileage allowances, a form of reward for the urban sprawl. A sustainable housing and transport policy would have to correct this underlying situation as a matter of priority. This is not only a bid for social justice. It also makes economic sense as unrestricted use of land will lead in the long-term to considerable costs of maintaining the infrastructure. The German Federal Environmental Agency for one attaches great importance to an urban development that saves land.

7.3 Disengagement of car use from car ownership

Cars are very emotive subjects, both for those who own them and sometimes for those who do not (involuntarily or by intention). An important condition for reducing the problems caused by mass ownership of cars (such as space requirements, consumption of raw materials and the cost burden) would be to disengage car use from car ownership. This would also facilitate a more conscious decision about whether to make a particular journey by

car or some other form of transport. This would require new forms of organisation.

In densely populated areas car sharing is more likely to facilitate an intelligent mobility mix. Within Germany, Hamburg and Berlin were therefore the pioneers. The increase in car sharing was long hindered by the lack of an effective organisation structure; however, since 1998, most initiatives have been co-operating within a Bundesverband CarSharing e.V. (bcs). These car-sharing groups still remain autonomous and follow different philosophies; whilst some act more entrepreneurially, others still consider themselves as purely environmentalists. At the beginning of 2002, the associated clubs had 55 200 members using just 2070 cars in 201 cities. The development of car sharing from an ecoproject to a mobility service is seen as essential for greater penetration of the market (Franke, 2001; Gillwald, 1997; Pesch, 1996; Petersen, 1995). Important impetus is provided by co-operation with public transport operators at local and federal levels (Huwer, 2001; Röhrleef, 2001).

In Switzerland the combination of car sharing and public transport has led to the formation of a national group, 'Mobility', which has 48 200 private members, with 1650 cars located in 930 places throughout Switzerland (primarily in the German-speaking Cantons). One important component of the rapid expansion involved close co-operation with public transport operators at the local and federal levels (cars are available at 250 railway stations). The enterprise is growing rapidly and is making a profit. An increasingly important business sector is 'Business Car Sharing', which enables companies to reduce their mobility costs. Its 800 customers come from all sectors of the economy (including public administration) and different sizes of company. The Government and regional authorities in Switzerland have forcefully promoted integrated and customer-orientated mobility services (Schad *et al.*, 1999, and the literature references quoted therein).

A further step is the cash car: a private vehicle, if not required by its owner, can be offered on the 'transport market' via this car sharing enterprise and the owner receives money. The owner negotiates a full service leasing contract and the monthly leasing rate is reduced by the revenue from the car sharing (Canzler and Franke, 2000; Canzler and Knie, 1999). To test this new type of integrated transport service, a project development company was established in Berlin in 1998 (CHOICE mbH – Company for Highly Organised & Integrated City Traffic Elements). In parallel, promoted by the Federal Ministry of Education and Research (BMBF), a research project was started to evaluate the results. For the field test, 70 leasing contracts were concluded in Berlin by the end of 2000. The results are being analysed by the Scientific Centre in Berlin for Social Research (Wissenschaftszentrum Berlin für Sozialforschung GmbH WZB).

In order to develop further potential for integrating the car into innovative concepts for mobility services, the objective should be collaboration with car manufacturers, car dealers, car hire companies and garages. The concept for an appropriate service platform was tested in 1998 by the Rhein-Westphalia

Institute for Economic Research and the Institute for Car Economics at the Nürtingen Technical University, promoted by the Federal Ministry of Education, Science, Research and Technology. For 'kilometre leasing' there was an estimated market potential of 7.3 million customers and DM 12 billion. Those interested came from all sections of the population. However, the cultural divide between the car business and the car sharing groups was too wide for the project to be realised (Dietz, Knie and Reindl, 2000). That notwithstanding, the objective should still be the establishment of a national mobility service platform. The dilemma between the ecological and economical outcomes of car-sharing is critically dissussed by Wilke (2002).

Frick, Knie and Reindl described the requirements as follows:

> Entry into the mass market of short-term car rental requires a uniform mobility brand, complete regional-wide cover, a possibility of using this service nationwide and more convenience and comfort for the customers. Also required are cheaper rates, a new technology platform based on the most up-to-date traffic control technology (Telematics), the networking of private and public transport operators, approaches to new customer groups through new sales alliances and very intensive marketing initiatives, to make the advantages of networked mobility effective in terms of sales. (2000:20)

Up to now these types of concept have been blocked by interests and ideologies. The environmental lobby must learn to emancipate itself from the 'good person' niche and to emerge as an efficient service provider.

Separation of car use from car ownership and its integration into a functional, optimised, intermodal transport mode of choice offers an important future perspective for densely populated urban areas for several reasons:

- because of the lack of space the actual savings will be particularly evident in the traffic flow (car sharers drive less) and parking requirements;
- as a result of the higher population density and the greater potential of modern and flexible residents, greater density and sophistication in car sharing can be achieved;
- the public and regional transport system will be suitable for a greater number of transport needs, and more destinations will be reached without the car because of a better mix of transport modes;
- expenditure on car transport will be reduced by virtue of the fact that the self-sufficient character of the car will be overcome. At present it is more cost-effective to use a car if travelling many km as a large proportion of expenditure does not depend on total distance; instead of this it must be financially rewarding not to use the car (which, however, is available) (Knie and Petersen, 1999).

7.4 Choice of transport mode

The great and increasing importance of the car is supposedly an unavoidable concomitant of progress. By contrast, empirical analyses confirm considerable scope for manoeuvre. Urban and forward-looking regions in particular are less dependent on the car (see Lötscher, Mayer and Monheim, 2000a, b). Whereas the percentage of the population in the Ruhr area using a car showed a continuous increase from 42 % to 53 % between 1976 and 2000, it decreased in Munich from 44 to 36 %. In Freiburg it rose between 1982 and 1989 from 39 % to 44 % but fell again to 39 % by 1998, during which time public transport use increased from 11 % to 21 % and bicycle use from 15 % to 19 %. In general, car use in old industrialised towns in Germany is particularly high (Witten, 62 %; Solingen, 64 %; Saarlouis and Neunkirchen, 68 %); in similar sized administration and service towns it is often much lower (Münster, 37 %; Mainz and Freiburg, 39 %; Göttingen, Heidelberg and Osnabrück, 41 %; Erlangen and Würzburg, 42 %).

The greatest potential, with comparatively little expenditure, can be mobilised for cycling (for example, many towns in Germany already have good cycling infrastructure: Bremen, 22 %; Giessen, Göttingen and Rosenheim, 24 %; Erlangen, 25 %; Dessau, 27 %; Münster, 32 %; Bocholt, 33 %). These peak values are the result of an intensive promotional policy and the reason that there are not more imitators is mainly political (for future chances of the bicycle, see Topp, 2002b). Since 1976, Munich has increased its bike ratio 2.5-fold (to 15 %). In keeping with the high-tech image of the city, in 2001 the private company 'Call a Bike' showed further potential for intelligent mobility with decentralised, computer-controlled rental bikes. Despite the initiative failing, due to initial economic start-up difficulties, the know-how was adopted by German Rail with the intention of expanding this service all over Germany after having tested it in Munich (for a brief overview of bike sharing, see www.callabike.de and Klaus, 2002).

Regarding future visions, it is more important that research into mobility behaviour related to lifestyle refutes the claim that everyone wants to go back to nature but nobody wants to go on foot. A pilot study for Schwerin and Freiburg showed that 'car fans' used the car for 65 % and 56 % of their journeys, respectively, whereas the 'environmentally friendly' used their cars for only 19 % and 10 % of journeys; public transport, in contrast, was used by 7 % and 5 % of 'car fans' against 21 % and 25 % of the environmentalists. Trips on foot in Schwerin attracted 65 % of those 'mobile and experience-oriented', and 52 % of the 'unobtrusively environmentally aware', and in Freiburg 43 % of those who were 'traditionally nature-orientated'. In Freiburg the bicycle is the most common mode of transport for the 'ecologically resolute' at 31 % (City:Mobil, 1999; Götz, 1999).

These large differences are also due to the fact that these lifestyle groups choose the residential and activity locations that suit them. A comparison of four districts in Cologne showed the highest concentration of 'modern

intellectual' and 'computer fan' lifestyle types together with below average motorisation, and the highest number of public and regional transport season ticket holders for city centre neighbourhoods. They cited accessibility at 52 % and infrastructure at 47 % as the reasons for their choice of where to live. Residents of these districts use the car for only 27 % of journeys to work and 15 % of shopping trips (Wulfhorst *et al*., 2000). Qualitative studies on the Cash Car (see above) confirm the lifestyle-specific high use of 'green modes' for everyday journeys by urban modern groups, but sometimes in association with long-distance leisure and holiday trips (Canzler and Franke, 2000).

Urban transport planning must offer these groups, which are important for the future of the town, a living environment that is worth having. Unfortunately such objectives have hardly been considered anywhere up to now, let alone implemented, as their importance is underestimated in the competition between regions for an innovative workforce. On the other hand, urban and transport planning must put a special emphasis on groups that are subject to problematical mobility conditions. These include single parents, working mothers, children and the elderly. These groups are especially disadvantaged by the depletion and devaluation of local neighbourhoods. The politics of perpetual acceleration, with the goal of making distances less important for the more mobile population groups, further burdens these disadvantaged groups.

Traditional surveys enormously underestimate the proportion of trips for accompanying dependent persons, who lack adequate alternatives. These trips not only create additional traffic but are often burdensome for the accompanying persons as they have to plan their daily routine according to these needs. These service trips and the constraints they bring have hardly been considered up to now in mobility research. Summarising, one can state that is it very important to shift the emphasis of transportation planning from an engineering perspective to strategic mobility management based on the nature of travel decisions (destination, mode of transport) embedded in a social–ecological environment (Beutler and Brackmann, 1999; Wehling, 1998).

7.5 A quantum leap in alternative transportation

Transportation planning has generally been restricted to dealing with the apparently unavoidable growth in car traffic, even if in the interests of 'political correctness' a different impression is sometimes created. To a large extent environmentally compatible transport means have only a secondary function. The basic principles of developing a public and regional transport system that will be sustainable in the future have not been pursued consistently in any German city up to now (except in part in Freiburg). However, by contrast, a good example is Zurich (Aeschbacher, 1996). A referendum prevented the construction of an underground 'metro' as envisaged by planners and politicians.

Instead a highly efficient tram and light rail system was developed. It runs self-confidently under the slogan 'We are the No.1' and 'We keep Zurich on the move' the reality of which is experienced on a daily basis by, for example, priority at traffic lights. Meanwhile Zurich offers an all-round service in conjunction with car sharing for intelligent mobility which for the Swiss means also an efficient service. Zurich is not against the car but only against its inappropriate use to the detriment of its own prosperity. The widespread dissemination of the environmental ticket emanates from the desire to acquire beautiful things by saving on car expenses, yet still to be mobile (Bratzel (1999) analyses the conditions for success of an environmentally-oriented policy comparing Zurich with Amsterdam, Groningen and Freiburg; Zentrum für Interdisziplinäre Technikforschung (1996) analyses the blockades at the local level).

A comparison of the two similar sized cities of Bochum (with underground light rail in the centre) and Zurich demonstrates the consequences of differing political orientation. In Zurich the number of departures from public transport stops per square kilometre of residential area is more than 3.5 times higher and the level of motorisation almost one-quarter lower than in Bochum, despite the higher spending power. The few cars also stay in the garage twice as often. The results show that 45 % of people in Zurich (from the age of 14) make journeys of over 500 m by public transport and 30 % by car, compared with 13 % and 62 % respectively for residents of Bochum. In comparison to Zurich, journeys not made by public transport in Bochum are due to no such suitable transport being available (twice as many cases), a lack of public transport information (three times as many cases) and a lack of willingness to use the public transport system as a result (surveys by Socialdata, UITP, 1998, 1999). There should be no question as to which city represents the future model.

The Austrian Vorarlberg region shows that even in rural areas it is possible for there to be a quantum leap in public and regional transport. This has been achieved by linking together improved service (customer orientation through high stop densities, frequency and quality of service) and professional marketing. In the meantime many medium-sized and small German towns have introduced successful bus systems where public and regional transport was previously given no chance (VDV, 2000). Their marketing is superior to many transport operators in densely populated areas.

The increase in numbers of people using public transport as a consequence of innovative marketing approaches has been demonstrated in many cases. One highly successful method was 'Individualised Marketing' (see Chapter 5). It was developed by Socialdata, a Munich-based research company directed by Werner Brög (2000), and tested in 1996 by experiments in 33 European cities in co-operation with the UITP (International Union of Public Transport) and the local public transport agencies (UITP, 1998, 1999). One example illustrates the high potential for switching to public transport. In 2001, after the extension of a suburban rail line (S-Bahn) from Stuttgart to the adjacent

city of Filderstadt, half of the suburban residents were informed by the traditional means of brochures and mass-media, whereas a consulting firm specialising in customer dialogue (Omniphon) appealed to the other half personally in a 'Dynamic Customer Dialogue'. A neutral evaluation by INFAS (Institut für Angewandte Sozialwissenschaft) demonstrated an increase in public transport ridership of 8 % with the traditional methods, compared with 20 % with the 'Dynamic Customer Dialogue'. Notwithstanding the considerably higher costs of the latter these were paid off after only two months and afterwards resulted in higher revenues. Furthermore, the image of public transport was greatly improved as were the information levels of the population.

7.6 The city of short trips

The most popular vision for sustainable urban transport development is the 'city of short trips': 'compact, mobile, urban' (Apel *et al*., 1995, 1997 and 2000). It would be outside the remit of this chapter to discuss this in more detail. The main task is to integrate transportation and land-use planning in such a way that the former does not follow quasi-autonomous trends but is designed according to the principles of sustainable and liveable urban and regional development (BBR, 1999; Beckmann, 2001; Brunsing and Frehn, 1999; Holz-Rau *et al*., 1999; Ponel, 1999; Reutter and Unger-Azadi, 2000; Würdemann, 1998). When evaluating empirical results with respect to the potential for savings in traffic volumes, one must beware of constructing simple links between land-use structure and behaviour. The approach to lifestyle already discussed highlights the great diversity in behaviour alternatives, and also group-specific concerns, and refutes the common assumption 'but everyone wants . . .' or 'but everyone can . . .'. When 'manifest trends' are quoted continuously 'which cannot be easily controlled' (Hesse, 1999: 324) there is a great danger of losing sight of the fact that individual rational action is influenced by external conditions. These are to a large extent political and are often associated with enormous cost to the community (e.g., implementation and maintenance of infrastructure, subsidies for commuters). The ability to change these conditions is largely dependent on images and visions, for example of the monoculture of owning one's home and car as opposed to a diversity of urban lifestyles. It is a disadvantage that many decision-makers believe in the former and are suspicious of the latter because it appears incalculable. They pit their safe edge-of-town 'mainstream culture' against the challenges of an urban mix. One should be aware of these links when searching for visions for urban transport and mobility.

7.7 A new myth?

The development of cities and transport is not controlled by rational considerations alone but to a large extent by emotionally charged visions, which, because of their promise of progress, could also be termed myths. In the age of industrialisation this was the myth of the railway, glorified in the cathedrals of railway stations. After this, imported from the US, was the myth of the car, promising joy and freedom, glorified in freeways and motorway intersections and reproduced on a daily basis in advertising and the media. Even if political correctness forbids confessing to the image of the car-friendly city, complex interlinked factors mean that it continues to prevail. Good reasons, even absolute necessities, will not be enough to overcome this. Successful individual examples of a new transport culture do, however, confirm the potential. For any reversal to have a widespread impact it is not enough for isolated 'lighthouses' to show the right direction, while development on a broad front continues to proceed to a dead end. In stressing this danger it is not intended to deny the value of an incremental approach, as for instance, the 'Lead-projects Mobility in Conurbations' which started in 1998 under the guidance of the German Federal Ministry of Education and Research (see www.mobiball.de).

Dependence on the car can only be overcome by a social trend rooted in the emotions, by a new myth. This may appear suspect to planners programmed to deal with the facts. But it is true that trends are frequently triggered by mythical impulses (at the same time concealing tangible interests). A current myth is overcoming the Fordistic regulatory system by doing away with spatial commitment and introducing telematic networking everywhere. However, in contrast to the American model of de-urbanisation, there are clear signs of re-urbanisation, be it the change of heart of new elites to consider urban qualities; be it the transformation of inner cities to urban entertainment centres. In global competition, urban traditions are an important locational advantage of Europe, that can only be effective if proximity, density and mix are again valued as a counter to the Internet. This is not a romantic dream but a model for the future, which could develop a great attractiveness and identifying function, in contrast to the explosion in globalisation and pollution by traffic chaos and environmental damage.

The importance of solving traffic problems in order to regain cities that are worth living in is also highlighted in a report written by Hall and Pfeiffer (2000) for the Federal Minister of Transport, Construction and Housing on *Urban Future 21. A Global Agenda for Twenty-First Century Cities*. The authors pin their short- to medium-term hopes on integration of transport and urban land-use planning, promoting public and regional transport and radical charging for private motorised transport, and they demonstrate considerable potential using 'best-practice' examples. In addition they believe that after 2020 'ecocars' will bring about some relief, but overlook the fact that the anti-urban effect of motorisation extends far beyond the environmental

problems. Overall they overestimate the possibilities of implementing their sound arguments in the face of the persistence of forces that have controlled the failed developments thus far – David versus Goliath. A 'catapult' to bring about a transport turnaround does not appear to have been found yet. The myth of the city worth living in could develop the necessary impact, if in the meaning of Saint-Exupéry, desire opens hearts and eyes if there is enough courage (or rage) to hold on to an urban quality of life against the destructive force of ever increasing anomalous traffic. The means and ways necessary to bring about this turnaround are well known and have been successfully tried and tested.

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8

Winning back public space

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8.1 Traditional uses of public space: meeting place, market-place and traffic space

Although the pattern of usage has varied in detail in the course of history, public space has always served as a meeting place, market-place and traffic space. Public spaces such as streets and squares have always been a place for people to meet and greet each other; a place to exchange information about the city and society; a place where important events were staged such as coronations, processions, feasts and festivals, town meetings and public punishments such as executions. They were also a market-place where goods and services were offered and exchanged. Finally, streets and squares provided thoroughfares for the movement of goods and people, providing the essential links to the various parts of the city.

In the past, when most movement was conducted on foot, there was often a good balance between the three uses of civic public space. Pedestrians were able to walk where they needed to go, meeting, trading, talking and taking in the sights all in the same trip through town. The needs for trade, social interaction and communication were fulfilled simultaneously in the same public space. However, in the twentieth century, particularly in the industrialised nations, conditions for the three main uses of public space changed. New patterns of traffic, trade and communication have interrupted centuries of tradition. Electric trams and bicycles, introduced at the end of the nineteenth century, gave people a wider range and allowed the city to expand significantly in area. Once cars were introduced at the beginning of the twentieth century, transportation patterns changed dramatically. After the Second World War in particular, car traffic in the city developed by leaps and bounds and the use

of public space changed accordingly. Heavy car traffic does not coexist peacefully alongside the uses of the city as a meeting place and market-place. Uses that had been in balance for centuries were now in open conflict.

The city as market-place also underwent dramatic changes in the twentieth century. Trade from open stalls was gradually relocated to small shops along streets and squares, then to increasingly larger shops and supermarkets, and finally to giant shopping malls, usually far from the heart of the city. New shopping centres were established within the city, closed in on themselves and no longer part of the public arena. Trading in these centres takes place in indoor enclaves through a labyrinth of private walkways complete with small squares, bubbling fountains, muzak and air conditioning. In the process, the market-place, with its attendant 'public life', has become strictly controlled, with all activities and human interaction regulated by security guards. Quite literally, the market has been taken from the public arena and moved to the private sphere.

The twentieth century also decisively changed conditions for the city's use as a meeting place and information exchange. The rapid and extensive development of print and electronic news media has made it possible to provide people with an endless stream of information about the local community and the wider world. A seemingly endless stream of opportunities for indirect communication from person to person has also emerged: first the telegraph, then the telephone, the cell phone, e-mail and the Internet. Individual mobility provided by cars and other forms of transportation and the development of cheap forms of long-distance travel have also provided new opportunities to communicate. The traditional role of the city as an important meeting place for its citizens has changed completely.

These massive changes in society within only one century make those cities that still provide dynamic public spaces of special interest. The many people on the streets and in the squares in these cities have chosen to be there, to walk and spend time in public spaces. Despite the many changes in patterns of use as a market-place and meeting place, the city continues to offer a significant alternative, a valuable supplement to the multitude of other options.

8.2 Current uses of public space

A look at different cities and cultural patterns in countries, where communications, market-places and transportation have undergone radical changes since the early 1900s, gives a varied picture of the current uses of public space and the conditions for the use of the city as a public arena. Broadly speaking, it is possible to observe and describe four very different types of cities:

- the traditional city – where meeting place, market-place and traffic continue to coexist in balance, more or less;
- the invaded city – where a single use, usually car traffic, has usurped territory at the expense of the other uses of city space;
- the abandoned city – where public space and public life have disappeared;
- the re-conquered city – where strong efforts are being made to find a new, workable balance between the uses of the city as meeting place, market-place and traffic space.

8.3 The traditional city

In the Middle Ages, towns emerged on the premise of pedestrian traffic. Streets were adapted to foot traffic and squares tailored to such uses as markets, town meetings, military parades, religious processions and so on. There are still many cities, particularly in Europe, whose structure was formed during that period. The centres of many European cities still have a medieval character. Isolated examples of intact medieval cities continue to function in traditional ways, with Venice as one of the best-known examples (Fig 8.1). Cities and public space of that period continue to be well suited for all types of pedestrian activities. The size of these cities, the dimensions of the streets, the distribution of uses along streets and squares, and the scale and detail of

Fig. 8.1 Venice, Italy: a traditional city balancing the use of public space as meeting space, market-place and traffic space.

buildings are in harmony with the needs of pedestrians and their movement through the city. In these cities, public spaces continue to serve simultaneously as meeting place, market-place and traffic space. In those cities in which car traffic has not been allowed to take over, we can still see modern versions of the traditional uses of public space.

8.4 The invaded city

In old cities and urban areas where car traffic has gained the upper hand, public space has changed dramatically. Car traffic and parking have gradually usurped space in streets and squares. Not much physical space is left, and when other problems such as safety, noise and pollution are added, it does not take long to impoverish city life. It becomes unpleasant and difficult to get around on foot, and spending time in public spaces is made impossible by lack of room, the need to avoid traffic and a poorer quality environment (Fig. 8.2). The result in city after city is that only the most essential foot traffic battles its way between moving and parked cars, and only a fraction of the other traditional uses of public space become possible.

Numerous studies have shown the obvious correlation between urban quality and public life. Well-designed public spaces inspire a broad spectrum of urban activities. Attractive walking routes and places to stop along the way encourage foot traffic. This pedestrian traffic in turn promotes social and recreational activities, because people walking along become inspired to linger and enjoy the urban scene. In impoverished public spaces, in contrast,

Fig. 8.2 Westport, Ireland: an invaded city where car traffic has substantially reduced public space for meeting and trading.

most social and recreational activities disappear completely, leaving only the remnants of the most necessary pedestrian activities. People walk there because they have to, not because they want to. Indeed, in most of the cities besieged by cars, the quality of public space has become so poor that people avoid the city centre altogether.

8.5 The abandoned city

Where urban tradition is weaker and car culture has had more time to develop without major constraints from urban planning, a new type of city develops. This city has no historical model, because for the first time in history, pedestrian traffic has been made impossible or superfluous, and many of the other activities traditionally tied to foot traffic in public spaces have disappeared completely. Public life in public places is gone. There are many cities of this type, particularly in North America. City centres are a sea of asphalt with parking places marking off the space between buildings (Fig. 8.3). Walking is impossible and would also be impractical. Distances are too great and the places an intrepid pedestrian might encounter on his or her way would be ugly, dirty and possibly dangerous. Such cities are not intended for walking. Pavements have disappeared in the city centres as well as residential areas, and all the uses of the city have gradually been adapted to serve the motorist.

Fig. 8.3 Spokane, USA: an abandoned city where walking has been made difficult or superfluous, and public life in public spaces no longer exists.

Transportation and life itself are totally dependent on the car in a drive-in culture. The heavy dependence on the automobile means that children too young to drive, the elderly too old to drive, and the handicapped physically prevented from driving, are consigned to a life of isolation or being transported everywhere by others. Indeed, it could be said that, for young people, life does not really start until the day they turn 16 and acquire their driving license! People shop from drive-in stores along car-filled streets, by and large requiring the driver to drive and re-park at each destination. The alternative is to shop in large dedicated shopping centres outside the cities. Only in these centres is it still possible to walk easily to and from the car park to the centre and then within the covered centre itself.

As a countermeasure to the out-of-town shopping centre, numerous cities have experimented with new forms of shopping environments adapted to car culture. In some cities shops have been moved indoors into shopping arcades within the city centre itself. The Eaton Centre in Toronto is a notable example. Other cities such as Calgary, Winnipeg, Minneapolis and Atlanta have built skywalks, systems of pedestrian bridges running one or two storeys above street level. Pedestrians are lifted up a storey and can move about indoors from building to building, protected from the weather and free from streets and other public spaces at ground level. A different category of centrally located, private shopping environment is 'the underground city' as the phenomenon is known in Montreal and Toronto in Canada, as well as in cities such as Sapporo, Nagoya and Osaka in Japan. These cities have set up a network of underground shopping centres, often integrated with the city's underground rail system.

Common to all of these types of shopping centre is that they are private and usually closed outside office hours, and that both pedestrian activities and other city activities are subject to heavy restrictions conditional on the commercial character of the centres. Outside the shops themselves there are often few places or opportunities for individuals and groups to meet and interact. A notable resulting public health problem in these cities, where it is virtually impossible to cycle or even walk any distance, is that many citizens are overweight and in poor physical condition. Some of them try to combat the problem by jogging during their lunch break or spending time in fitness centres or working out on some of the many exercise machines designed by the fitness industry to fill this need. For other segments of the population, who have neither the opportunity nor the motivation to engage in fitness activities, the problem literally grows larger and larger. Doing away with public space – and public life to a great extent – thus has many direct and indirect consequences on the quality of life of citizens.

8.6 The re-conquered city

Over the past 30–40 years, interest in public spaces and public life has begun to grow again, often as a direct result of the decline in both areas, and in

many cities efforts are now being made to support pedestrians and the quality of public spaces. Paradoxically, one important source of inspiration came from shopping malls, particularly in the USA. As early as the 1920s, when the first malls were built, it was clear that customers had to be lured out of their cars and into car-free shopping streets in order to concentrate on shopping. Some of the earliest pedestrian areas in Europe such as Lijnbahn, built in war-torn Rotterdam in the 1950s, and the rebuilding of many German cities in the same period, had this same starting point. Many of the other pedestrian areas established in the 1960s and 1970s throughout Europe, including the pedestrian street in mid-Copenhagen from 1962, were also based primarily on this commercial concept (Fig. 8.4). The idea of using public spaces once more as social and recreational, as well as commercial, spaces grew gradually from this foundation and was reinforced during the decades that followed. Jane Jacob's description of the development in American cities in her book *The Death and Life of Great American Cities*, published in 1961, had a major impact. Subsequent American and European research began to highlight the importance of varied forms of public life in the public spaces of the city, and the importance of rejuvenated public spaces in improving the quality of urban living.

Tradition was a further important source of inspiration for European cities in particular. Many cities sought to recapture a long tradition of using public spaces for social and recreational activities. Throughout the 1960s and 1970s, more and more pedestrian streets and squares were established in European cities. Conditions for pedestrians were also gradually improved in the wider network of streets. Pavements, for example, were widened and enhanced with street furniture, flowers and trees. An important turning point in the growing traffic congestion in cities was the oil crisis of 1973. The halt in traffic expansion led to planned efforts to limit the encroachment of cars in the cities as well as other measures to ensure a better balance between motorists and other forms of transport. Interest in bicycling and public transportation grew accordingly.

Although many cities in Germany and Scandinavia pioneered efforts to remove cars from the city centres and create better conditions for pedestrians, it was in Barcelona, starting in about 1980, that a broader concept of public spaces was formulated as part of a co-ordinated public space policy. It was in Barcelona that the concept of 'the re-conquered city' was born. What happened in Barcelona was the starting point for a new, intense period in the last 20 years of the twentieth century, in which increasingly urban spaces were created or renewed as part of a co-ordinated effort to create new kinds of public life. Dutch, German and Scandinavian cities were among the first to experiment with the new types of city space pioneered in Barcelona. More recently, many cities in central and southern Europe have followed suit. Corresponding urban strategies can now also be found in cities in North and South America, Asia and Australia. The examples of Portland, USA, and Curitiba, Brazil, are remarkable, and show that we can no longer refer to public space strategies as being solely a European phenomenon.

Every part of the world has desolate, invaded and abandoned cities, and all over the world there are cities that have fought back by inviting inhabitants to return and use public space. An interesting common trait is that most urban improvements are carried out, or at least initiated, by visionary individuals

(a)

(b)

Fig. 8.4 Copenhagen, Denmark: a re-conquered city. This sequence shows the city's main thoroughfare from 1880 to 2000: (a) 1880 – combining meeting, trading and traffic; (b) 1960 – invaded by traffic with little room for pedestrians to do more than keep moving; (c) 1968 – five years after pedestrianisation, walking and shopping predominate; (d) 2000 – six times more space is now available for pedestrians, with more opportunities to socialise in the numerous outdoor cafés.

or groups. It can be a mayor, a city architect, a city council, a political party or inspirational co-operation between consultants, politicians and grassroots movements, but common to the cities that have recaptured public space are visionary, targeted urban policies. Typically, various themes are combined in these urban visions, such as traffic safety, public health, a reduction in resource consumption, a reduction in noise and pollution, and efforts to strengthen the role of the city as a democratic forum. Where visions and politics coincide to meet these objectives, it is clear that cities actually do become better places in which to live and spend time.

(c)

(d)

Fig. 8.4 (cont'd)

8.7 New public spaces for new public life

At the beginning of the twenty-first century, there are many examples of cities in which urban policy initiatives have improved urban quality. Traffic, noise and pollution have been reduced, foot traffic and bicycle traffic have been reinforced. Public life has blossomed on the streets and squares of the city in a way not seen 20 or 30 years before, certainly not in the form it has today. This public life is not a new version of an older urban tradition, but a truly new phenomenon. In a society in which more of daily life takes place in the private sphere – in homes, at computers, in cars, at individual work stations, or in strictly controlled and privatised shopping centres – there are clear signs that the city and its public spaces have been given a new and influential role. In contrast to the many private spaces in people's lives, the opportunity for them to interact with others in public spaces is becoming extremely attractive. The information society is providing new meaning and significance to the city as a public space.

8.8 Acknowledgement

This text is a revised version of the opening chapter in *New City Spaces* by Jan Gehl and Lars Gemzøe, published by The Danish Architectural Press, Copenhagen, 2001. For further information see www.arkfo.dk.

9

Formal indicators of social urban sustainability

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9.1 Introduction: setting the stage for walking as a social urban activity

> The pedestrian is a social being: he is also a transportation unit, and a marvellous complex and efficient one. (. . .) Formulas based on the pedestrian as a transportation unit are most applicable to transportation situations, such as getting from concourse exit A to gate B. But pedestrians are social beings too. Sometimes they stop and chat with someone, even on the concourse. They cluster in doorways. They pause to look at a shop window. In a word, they self congest. The crowding and the pleasure are inextricably bound up. To put it another way, part of what attracts people to the street is a measure of the congestion the high standards would save them from. (Whyte, 1988: 56–77)

This chapter deals with the pedestrian as a social being, seen from the perspective of an urban designer. Saying that pedestrians are social beings means that they are context-sensible: they are affected by the cultural, economic, social and eventually environmental contexts. This chapter focuses on the environmental context of pedestrians, and more specifically, it analyses the formal components of urban public space that could increase and foster the presence and mutual interaction of pedestrians on the street, in its everyday, ordinary urban life. The hypothesis is that the ever-changing forms of human exchanges within a public space are the genius of the city, the very reasons for which cities are built.

In this context it is also important to investigate the contribution of the form of public spaces to a diverse, dense urban life as a whole. The thesis, in fact, is that to foster human exchanges in a public frame may result in

fostering social cohesion, local identity, mutual aid and natural surveillance, public health, and even local economy. Unfortunately, this is not a widely accepted concept, especially considering the current emphasis on non-material aspects of communication when considering the info-city of the future. The micro sociology of face-to-face interaction in a public frame could probably gain much more consensus if considered under a macro sociological perspective, as in Niklas Luhmann's general theory of Social Systems (Luhmann, 1990).

9.2 The System of Interaction in Niklas Luhmann's general theory of Social Systems

Because we are speaking of direct human exchanges in a built environment, Luhmann would say that we are dealing with *interactions* and that the whole question should be posed within the mutual interdependence of Social Systems and Systems of Interaction. These are two separate systems, both social, mutually dependent, but characterised by one basic difference that defines their boundaries: *communication* (dominated by language) for Social Systems, and *physical co-presence* (dominated by sensorial perceptions) for Systems of Interaction.

The progress of societies through history is, in Luhmann's vision, a movement from simplicity to complexity through the gradual diversification of Social Systems in different sub-systems specialised according to their function. The relationships among the sub-systems and between the Social System as a whole and its environment cannot be considered communication. No proper communication can take place, for instance, between the legal and political sub-systems because of the difference between their respective linguistic codes, which are and must be specialised. Moreover, no proper communication can occur between society and its environment, because in that case both communicating entities would be part of the society. The influence sub-systems can have on each other, and the influence environment can have on the Social System as a whole, is a sort of interference; that is, generating stimuli which will be perceived as noise, or better, in Luhmann's words, 'resonance'. The receiving entities will react according to their own internal conditions and rules, often unforeseeably.

What is relevant in the context of this chapter is the recognition of the positive impact of this type of exchange on the progress of societies. Taking into account the sole exchange between society and its environment, it is the ever changing pressure of the environment on Social Systems which ensures their gradual diversification in more complex, functionally diverse forms. On the other hand, the complexity and diversity of Social Systems is the basis for their potential response to more complex environmental challenges. In evolutionary terms, the good maintenance of the exchange between Social Systems and their environments is nothing less than vital for societies. Now,

according to Luhmann, what manages the environmental noise and capitalises it in favour of the proper social communication, what in short actually goes to this encounter with the environment and listens to its requests on behalf of the Social System, is the System of Interaction.

As mentioned earlier, if Social Systems are characterised by communication, Systems of Interaction are characterised by physical co-presence. If in Social Systems language dominates, in Systems of Interaction sensorial perceptions dominate. Compared with linguistic communication, perception receives information in far less selective, less demanding, more rapid and more simultaneous forms. Human beings see, hear, touch others and the environment. This sensorial activity is, according to Luhmann's general theory of Social Systems, the crucial step in the evolution of societies. Beginning from perceptions and psycho-emotional situations people establish relationships with others and those relationships may initiate the communicative cycles among functional sub-systems and inside the Social System as a whole. For instance, beginning from the perception of an environmental disease, arguments and interventions in the environmental field as well as in urban or transportation planning may emerge. Environment generates resonance in society by human sensorial interaction. It is no surprise that the recent growth in interest among urban sociologists in the question of space does find in human interaction, in face-to-face exchanges and in the proxemic rituals, a privileged ground; that is the interpretation of Bagnasco (1992), who so interprets studies like those of Anthony Giddens (1984) and especially Erving Goffmann (1963, 1967).

Once the stage is set for the specificity of human exchange in condition of co-presence, the different exchange in condition of absence (non-material communication) gains its own specificity. As Bagnasco argues:

> The reciprocity of practices among actors in condition of co-presence is what Giddens terms 'social integration'. The extending of social relationships in space and time poses the question of systemic integration, that means of interconnections among those who are physically absent. That second spatial/temporal condition of interaction, non directly mediated by the sensorial abilities of the body, is based on different processes and social webs. (Bagnasco, 1992: 15)

With reference to Table 9.1, attention should be focused on those contributions of a disciplinary nature (of the discipline of urban design) which deal with Systems of Interaction, and focus on a particular kind of environment: the urban public space. Space is a component of what we call environment, and urban public space is a component of space. Therefore it is crucial, and inherently relevant for urban planners, to understand if, and to what extent, spatial configurations seem to inhibit or to favour processes of perception within the Systems of Interaction. The city of pedestrians is far more than the city where pedestrians can walk. It is the city where human personal exchanges find a favourable environment and diverse, reactive, creative and healthy communities can grow.

Table 9.1 A map of societal forms and their principal characteristics

System	State of the other	Practices of integration	Dominant relationship	Means of relationship
Social Systems	Absence	Systemic integration	Communication	Language
Systems of interaction	Co-presence	Social integration	Perception	Sensorial abilities

9.3 Moving the question of form towards urban sustainability

In previous research (Porta, 1999, 2002) the author found that urban planning and design has not contributed all that much to the study of relationships between spatial configurations and human face-to-face daily interaction. On the other hand, it is possible to identify a number of authors who have dealt with these issues, beginning with the seminal work of Jane Jacobs in the early 1960s, and who actually had to counter a consolidated heritage of disciplinary ideologies, professional habits and organisational forms. Among others, figures like Oscar Newman, Raquel Ramati, Clare Cooper-Marcus, Jan Gehl, Peter Bosselmann and Allan Jacobs could be mentioned. These researchers could be grouped together for their focus on public space and a shared style of research, which may be called 'observation'. One crucial element of that style was the disposition to rely on the ethnographic observation of people in real life rather than building abstract visions of what real life ought to be. This observative approach allowed for the richness and diversity of daily urban life to emerge with all its connections with the configurations of the built environment. In the works of these authors, the theme of Luhmann's Systems of Interaction recurs, and highlights the issue of the relationships between form and social 'wellness' in all its richness. A number of achievements could be identified as the contribution of this line of study in several fields, namely urban design, crime prevention and transportation planning. However, beside their direct findings, those studies leave a threefold treasure for further research: on one side they define something like the 'street life' and acknowledge it as a relevant business for making contemporary cities work; on the other side they build conclusions on what components of the urban form seem to support the richness and diversity of street life; finally, they raise the issue of quantification of those formal components.

Building on these foundations, it seems possible to move one step forward in the direction of making the walking city a more recognisable task for urban planners and decision-makers: *to make the whole problem of street life and urban form a relevant component of the urban sustainability question* (Fig. 9.1). There is a substantial agreement at the international level in articulating the broad concept of sustainability into four sub-areas, concerning environmental, economic, institutional and social issues (Pezzoli, 1996). When

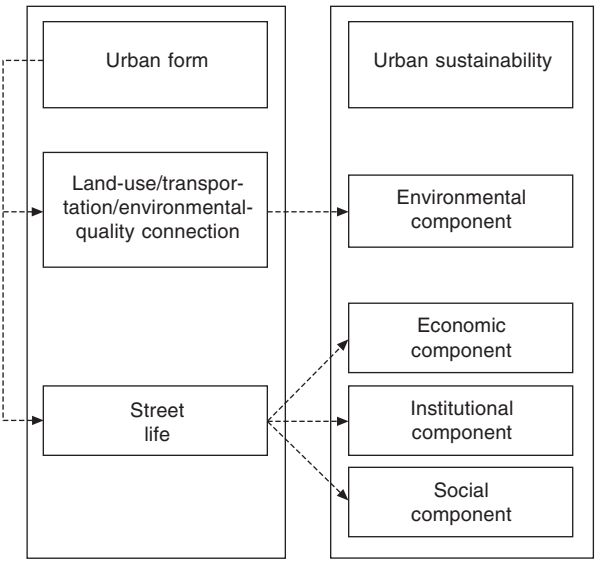

Fig. 9.1 The contribution of urban form to urban sustainability.

applied to the urban environment, the concept of sustainability faces several contradictions, due to the displacement from a natural-orientated to a mainly social-orientated setting. Reflections on how the forms of cities play a role in urban sustainability have mostly dealt with the impacts of city form on natural resource balances and energy efficiency (the environmental component of sustainability), deepening the land-use/transportation/environmental-quality connection. Here, urban form has been reduced mainly to land-uses, focusing on city size, density, or on the relationships between land-uses and transportation systems. Little research, if any, has addressed the impact of city form on social behaviours as part of the urban sustainability question, and by that is meant its impact on economic and institutional issues. The street life concept allows for a better understanding of the links between urban form and the social component of sustainability, and that leads us to reconsider the 'observative' tradition in urban design.

Under this new light, the problem is to identify which components of urban form are likely to foster street life and to understand how to measure them. In more appropriate terms, it means to develop formal indicators (indicators of physical form). As the role of Sustainable Development Indicators (SDIs) is 'to assist decision-makers and policy-makers at all levels . . . to point to trends and relationships in a concise way [and therefore to] help to guide national policies for sustainable development and facilitate national reporting on measures to implement sustainable development' (UN-CSD, 1999) the identification and verification of quantitative indicators of selected components of urban form appear to be the key for an evaluation of form in urban sustainability terms.

9.4 Jane Jacobs' landscape and the observative tradition in urban design

As mentioned earlier, a relevant disciplinary tradition for the identification of formal components as well as their quantification can be found in what may be termed 'observation' in urban design. At the core of this style of works we can find a positive idea of urbanity. It was Jane Jacobs who described this idea in 1961 (Jacobs, 1992), setting up a powerful framework which has been enriched by a number of later studies. The same framework now, far from being significantly outdated, is showing a noticeable power of self regeneration at the core of the present urban sustainability concept (O'Meara, 1999; Newman and Kenworthy, 1999). The compact, diverse, dense city appreciated by Jane Jacobs for its potential of fostering urban communities in social, economic and institutional terms, is the same city which seems to show the best performances in terms of energy efficiency and balanced modal split in transportation. That street life/compact city perspective is common to all the observative authors, therefore embedding the compact city concept of formal quality both in the selection of relevant formal components and in the definition of criteria for their quantitative measurement. Thus, here we find a great attention to things like the 'transparency' of street façades; the number of shop windows and entrances; the need for many medium or small size buildings; the need for a tight relationship between building fronts and streets; the continuity of the transition from the more private to the more public spaces; the need for 'anchor objects'; the need for integration rather than separation of different uses and users within the same urban spaces (also for the integration of cars and pedestrians); the primary importance of places and objects to sit on; and so forth.

Some of the authors mentioned above, namely Allan Jacobs and Peter Bosselmann, consciously tried to develop procedures for the quantification of such formal components of public spaces: that is in particular the focus of some of the best student work on their course IDS 241 at the University of California at Berkeley.

9.5 Formal indicators: two case studies in Western Australia

The formal indicators idea has been well received in Western Australia. The Ministry for Planning – now Ministry for Planning and Infrastructure – has been framing an internationally recognised concept of the 'liveable neighbourhood' and developing a whole family of formal indicators at the scale of the neighbourhood and the district (Jones, 2001; State of Western Australia, 2000). LandCorp – a governmental land and project development agency – is engaged at the front line of getting things done through the hard work of designing real cities (LandCorp, 1994).

LandCorp's most important initiative is the development and design of the new town of Joondalup, which is located in the metropolitan area of Perth. On the other side, a few kilometres south of Perth's central business district, the old Victorian town of Fremantle is regarded as a benchmark for other Australian cities seeking to establish a community based around a walkable central business district; the city inherits from history a very compact, dense, mixed-used, diverse, human-scaled urban core, largely renovated ten years ago following concepts of historical heritage preservation, traffic calming, urban liveability and commercial retail enhancing. 'Freo' is now considered a reference for the tight linkage between a good city form and a flourishing public life.

Having won many planning awards, Joondalup represents a modern attempt to plan a city around some of the same characteristics that are thought to have contributed to Fremantle's success. Place and identity, a balanced modal split, safeness, social cohesion, community-oriented urban design and transit-oriented transportation planning are all emerging key-concepts in the visions developed for Joondalup.

Both the Ministry and LandCorp had good reasons for sustaining a comparative study of Joondalup and Fremantle in order to understand how much the young, brilliant student was progressing towards its master. The study was commissioned to Murdoch University in early 2001 and was directed by the author under the supervision of Peter Newman at the Institute for Sustainability and Technology Policy (Ministry for Planning, 2001).

9.5.1 Two families of formal indicators

The study is based on two different families of formal indicators: urban fabric and street indicators. The former family was drawn by previous studies, the latter represents a new advancement within the same perspective. Developed by the Western Australian Ministry for Planning and Infrastructure, urban fabric indicators measure formal indicators at the scale of the district or the neighbourhood. Underpinning the development of these indicators is the assumption that traditionally designed town centres or suburbs are more sustainable in terms of social equity, economic security and the protection/enhancement of the environment than 'conventionally' designed suburbs. Because this part of the study shows a lower content of innovation it is not amplified in this chapter.

Developed at a theoretical level by the author and tested for the first time in this study, street indicators measure formal indicators at the scale of the street. They are designed to quantify the elements that are visible from the pedestrian perspective and are supposed to add to the social quality of the urban scene. They are the elements that most directly impact on the person as he/she walks down the street and are more likely to foster/inhibit face-to-face contacts.

The following street indicators have been used in this study:

- sky exposure;
- façade continuity;
- softness;
- social width;
- visual complexity;
- number of buildings;
- 'sedibility' (availability of objects to sit on);
- detractors.

9.5.2 Data collection methodology

Working from a central point in each city, a 400 metre radius was drawn to define the study area (50 hectares). That distance is widely recognised to define the pedestrian catchment area for all services of a local kind; it also identifies the 'five minutes walk to the smaller neighbourhood centres' in the recent Ministry for Planning research (Ministry for Planning, 2000). The data in this study were always collected in, and referred to, that basic unit of 50 hectares, both in the urban fabric and the street indicators cases. Two separate studies were then worked out for urban fabric and street indicators.

These latter indicators are aimed at isolating the individual components that as a whole either add to or subtract from street vitality. This dissection will help planners to understand the building blocks of a successful (or unsuccessful) street. Whether the street is planned or built, these indicators can be used to improve the vitality of a street. The study on street indicators measured existing streets in Fremantle and Joondalup. Measurements were taken using photos along the centre of the street, 25 metres apart. A camera was attached to a tripod at eye level to ensure that each photo was capturing the same field of view. Once the photos were developed, each photograph was analysed to gather the measurements for all indicators. Each photo was scanned and a computer program was used to make precise measurements. Although this project used photos from existing streets, measurements could be taken from 'virtual' streets built in a 3D program. This could help planners to correct problems before the project is built.

9.6 Case study results

The formal indicators methodology is fit to provide an effective description of several basic formal characteristics of the streetscape that seem to contribute to social life in cities (Table 9.1). Provided that the old Victorian fabric of Fremantle is to some extent a model for the compact city of the future in Western Australia, evidence is shown that selected indicators do describe effectively such a model in terms of urban design features.

Two kinds of outcomes emerged. On one side, the analysis clearly identified weak and strong factors of the street networks of Fremantle and Joondalup: the local communities may take advantage of this study to launch policies aimed at improving their public spaces. The methodology is fit to drive the attention of the communities to general issues and to an overall discussion of the state of their central business districts, as well as to fine-grained, in-depth assessments of one block or one street, or even single parts of a street (Figs 9.2 and 9.3). On the other side, a number of lessons have been learned in reading the Fremantle 'model' and the Joondalup 'best practice' realisations. Evidence has been raised on the opportunity to follow some very general 'rules of thumb' in designing urban spaces for urban people. Those 'rules' may be summarised in the following ten points:

1. streets should be as narrow as possible;
2. buildings (especially institutional buildings) should not be isolated in lots, but should line the streets;
3. building fronts should be as continuous as possible along the street and not set back;

Fig. 9.2 Photo-by-photo layout: façade continuity in Joondalup.

Fig. 9.3 Photo-by-photo layout: façade continuity in Fremantle.

4. there should be many small buildings instead of few large ones;
5. retail should be at the ground floor wherever possible;
6. parking lots should be avoided: on-street parking is much better; even multistorey parking is better, provided that retail is located at the ground floor facing the street;
7. porticos, arcades, low fencing, stoops, shelters and the like can provide a soft transition from the street to the building, which is crucial;
8. blank walls, large billboards, traffic lights, on-street trash cans and high light poles should be avoided;
9. trees on wide streets are very often the only thing we can do to make existent streets more lively and friendly, but they can make a lot of difference;
10. places for sitting are all-important: provide such arrangements wherever possible.

There is no doubt that a lot of work needs to be done to develop urban design guidelines from the above. However, it must be carried out in touch with local communities. What works for one community may not work for another; there are no set thresholds where anything below is bad and anything above

is good: thresholds – or, much better, formal indicators based on performative guidelines – must be locally defined, or locally rejected.

Notwithstanding the need to link any guideline development to interaction with the local communities, several references to quantitative thresholds stemming from this study were suggested. These suggestions were framed within an overall criticism of the *Joondalup City Centre Development Plan and Manual* (LandCorp, 1994), a major planning tool created by the City of Wanneroo and LandCorp which substantially contributed to the development of the Joondalup urban scene.

The Development Plan and Manual (DPM) is in all respects a very advanced document, a very aware, complete and clear planning tool. It summarises the cutting edge research in sustainable urban design in terms of multi-level planning and design guidelines. It is effectively articulated at two major levels, policies and design guidelines, that are differently worded, the former in a more performative and the latter in a more prescriptive style. The DPM should therefore be regarded as a major achievement in the area of urban design worldwide. From the general visions to policies (Plan) and guidelines (Manual), the document approaches the development of a new regional city consistently, focusing on the need to create more integrated, mixed-used, safe and lively urban spaces. A lot of effort has been spent to define shared visions of what to do to achieve a more dense, rich and diverse urban community along with a more sustainable transportation network and a more economically viable milieu.

Nevertheless, with some exceptions, our study produces evidence that to the extent that Fremantle is a 'model' for Joondalup – or, in other words, provided that Fremantle is a concrete, real-world realisation of the same urban vision adopted for Joondalup – the distance is still great between the model and Joondalup (see Table 9.2).

As for the DPM field of action, two major issues still seem weak:

1. the scale of the city is still too large;
2. regardless of how bad or good the city is, it has to be visible from the street scene: the very 'presence' of the city in the city scene has to be ensured and deserves more attention in terms of urban design guidelines.

9.6.1 Narrowing the scale of the city

Measures of the scale of the city have been provided in this study that show that Joondalup is much more coarse-grained than Fremantle. Overall accessibilty (the extension of land actually accessible in a 400 metre walk from the centre against the total amount of land included in a 400 metre radius) amounts to 52 % in Fremantle and 29 % in Joondalup; the relationship between private and public land (the 'efficiency' of the city) is 48 % in Fremantle (ratio = 0.92) and 19 % in Joondalup (ratio = 0.23, thus Fremantle is more 'efficient' than Joondalup); there are also four times as many lots in

Table 9.2 Groups-of-streets averages: a comparison of Fremantle and Joondalup

Indicator	All streets		% Difference	Central streets (*)		% Difference	Main streets (**)		% Difference
	Fremantle	Joondalup		Fremantle	Joondalup		Fremantle	Joondalup	
Sky exposure	0.6378	0.5644	7.3	0.7071	0.6219	8.5	0.6329	0.5674	6.6
Façade continuity	0.6015	0.1667	43.5	0.6614	0.2462	41.5	0.6914	0.0000	69.1
Softness	0.2247	0.0635	16.1	0.2938	0.1133	18.0	0.2769	0.0060	27.1
Social width	0.7736	0.4450	32.9	0.7560	0.5333	22.3	0.6226	0.2000	42.3
Visual complexity	0.5861	0.5045	8.2	0.7463	0.5436	20.3	0.6456	0.4554	19.0
Number of buildings	0.6200	0.4088	21.1	0.7075	0.4069	30.1	0.6646	0.3194	34.5
Sedibility	0.3057	0.2288	7.7	0.5155	0.2478	26.8	0.4798	0.2438	23.6
Detractors	0.8837	0.9182	–3.4	0.9460	0.9198	2.6	0.9358	0.9276	0.8
Average	0.5791	0.4125	16.7	0.6667	0.4541	21.3	0.6187	0.3399	27.9

(*) Fremantle: Market Street, South Terrace and High Street; Joondalup: Grand Boulevard, Reid Promenade and Central Walk.
(**) Fremantle: South Terrace, Market Street and Cantonment Street; Joondalup: Grand Boulevard and Shenton Avenue.

Fremantle (354) as there are in Joondalup (87). This seems to be due to a much larger street network in Fremantle, which at 6711 metres is nearly double that of Joondalup (3950), containing twice the amount of intersections (46 compared to 22). All of this results in a great difference in terms of self-surveillance, land-use diversity and employment density between the two cities.

Policies for urban form have been clearly stated in the DPM, so that 'apart from some larger sites for prime retail and institutional activities, the city's subdivision pattern is comprised of small lots, enabling a larger number of smaller scale developments' (LandCorp, 1994:3). In order to pursue that goal the so-called 'small' lots of Joondalup appear to be too large if compared to those of Fremantle. Moreover, careful thought is needed in order to ensure the best integration of institutional buildings within the fabric of the city. Institutional buildings in Joondalup – like the Australian Institute for University Study, the Wanneroo Regional Hospital, the Police Station and Court House and even the City of Wanneroo Civic and Cultural Centre – are all self-standing 'objects in space'. Institutional buildings are the core of any idea of community: they cannot be the primary exception to the urban rules aimed at the building of the community. A vision is stated in the DPM, so that 'the built form and landscape form of the city will be directed to enclose and protect spaces rather than be object-in-space' (LandCorp, 1994). Institutional buildings should be the main contributors to that, rather than the main detractors.

9.6.2 Ensuring the 'presence' of the city

Very clear, well-structured and up-to-date design guidelines are set up in the DPM in order to direct the development at site planning, building envelop and details level. Nevertheless, no matter what the quality of the buildings and their potential to contribute to street life, they cannot contribute anything if they are not visible from the streets. The street indicators analysis shows that in Joondalup buildings are very often absent from the street scene, much more so than in Fremantle. This phenomenon, the 'withdrawal' of the city from the city's scene, is especially remarkable when the main streets are compared: in Joondalup, Grand Boulevard and Shenton Avenue are on the lower points of the scale for all street indicators, while in Fremantle, High Street, South Terrace and Market Street are at the higher. That makes a great difference indeed, especially when it is considered that Grand Boulevard and Shenton Avenue are not planned to be just traffic roads, but 'medium volume, ceremonial access roads with lower speeds' (LandCorp, 1994:2).

The width of the streets is the first factor that is worth keeping under control. Banal as it may appear, one of the major findings of this study is that the narrower the streets the better, and that streets in Joondalup are simply too large to work well in terms of street life. Street indicators are effective in linking together the quality of the building façades and the width of the streets. The integration of indicators of this kind within the body of the DPM

is not the objective; it is the means. The objective is to develop tools for controlling at the same time both the quality of buildings' fronts and their presence on the stage of the street scene, both for the investigation of existing settings and the direction of new developments.

9.7 Conclusions: pitfalls and perspectives in using the formal indicator concept

The research on Fremantle and Joondalup investigates the potential of the spatial configuration of two real places to contribute to the flourishing of urban life, the intensity of face-to-face contacts and human activities. Moreover, it tells something about which components of the spatial order of the streetscape may favour the full development of what Niklas Luhmann named 'Systems of Interaction', which are that particular form of social relationship based on the sensorial exchange between people on a public stage.

Depending on many different factors, the realisation of a rich, diverse and safe urban life may be affected by the spatial configuration of places, and the study actually found several differences between Fremantle and Joondalup that appear to be crucial in social terms. In order to track the development of the two local systems towards objectives of social sustainability, the spatial configuration of Fremantle and Joondalup was analysed using quantitative measures. Formal indicators actually helped the comparison of the two places and eased the readability of particular urban weaknesses and strengths.

However, at the end of this first, successful field test, it is worth coming back to several theoretical pitfalls in order to favour a better understanding of the applicability of the concept (the formal indicators 'domain'). The most dangerous pitfall in using – and reflecting on – formal indicators is the risk of *determinism*. An ingenuous approach to the relationship between physical settings and social behaviours may easily lead to three contradictions. Firstly, it is possible to make the question of form too comprehensive, to the detriment of other, more relevant factors affecting social cohesion and wellness, such as economic, cultural, legal, historical and properly social factors. The point here is not that the form of public spaces determines anything, but that it is one factor, among others, on the stage.

Secondly, it is possible to take the question of form too seriously, being tempted to draw from quantitative measures a number of 'laws of progress', something like big arrows showing the way to the good future. It is not hard to imagine the relevance that formal indicators could have if they are used as *analytical* tools. Much more care is needed when thinking of formal indicators as *normative* tools for urban planners and designers. Form is a very complex business and may be approached from a number of perspectives, to say nothing of social behaviours and concepts of quality. The appropriate normative dimension for formal indicators is what Clare Cooper-Marcus termed a

'performative urban design guideline'. According to Cooper-Marcus, the advantage of the performative guideline format is 'that the wording is more specific, yet it doesn't restrict the designer to any particular solution; it allows the designer creative freedom by reminding him or her of a need, but not specifying how to fulfil it' (Cooper-Marcus, 1985: 7).

Finally, it is very easy to make the reflection on a list of formal indicators something inherently abstract, detached from the same local communities they are thought for. That would be inconsistent with the most basic assumptions of the observative approach. A middle way should be found and preserved between an ingenuous behaviourism and an ingenuous culturalism. It is the same convincing middle way, between culture and nature, that led Edward Hall to state:

> Even though cultural systems affect behaviour in fundamentally different ways, they are deeply rooted in biology and physiology. (. . .) Even taking into account that great differences are given between spatial needs of different individuals and cultures, nevertheless we can make certain generalisations, and we can define a criterion which will allow us to 'objectively' order the meaning of different spatial experiences. (Hall, 1968: 10, 72–3)

Much of the sense of formal indicators has to do with those 'certain generalisations'.

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10

The role of cycling for women

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10.1 Introduction

Being confronted with the subject of female aspects of cycling for the first time, many people are confused: 'Well, a different saddle, but what else?' is an often-heard reaction. They instinctively ask whether the bicycle plays a special role for women or more generally, whether there is something special about the mobility of women, and if so, what is it? There is a general lack of awareness of the specific transport needs of women. Far too often, they have been assumed to be identical to men's. Gender specific transport needs, especially women and cycling, is a comparatively under-researched area.

Cyclists are young, sporty and healthy, love high-tech products and colourful outfits, ride without luggage – and are male. This is what advertisements and magazines portray. However, this message is misleading. The average woman cyclist in Europe wears normal clothing, and their bicycle is nothing special. Women's bicycles are normally equipped for daily use and daily tasks, comprising a luggage carrier, basket, bag, mudguards, chain guard, a child seat or two, or a coupling for a child or cycle trailer. This is obvious, because relatively few women cycle purely for recreation. For many women, the bicycle is a daily means of transport, and an important one too – although there are great differences between countries.

The bicycle boom of recent years in Germany has been mainly based on increasing bicycle use by women, who cycle much more in 2003 than 25 years before. While in 1976 men still chose the bike as often as women, by 1989 cycle use by men had increased by 35 %, while usage by women increased by about 65 %. In The Netherlands, women make almost one-third of all trips by bicycle, while men use it for 25 % of journeys (Ministerium für

Verkehr, Wasserwirtschaft und Öffentliche Arbeiten, 1999). In Denmark, women make 17 % of their trips by bicycle compared to 15 % for men. It appears that in countries where cycling is popular, women will cycle more than men, and less than men in countries with a lesser cycle culture – although the general lack of actual statistical data broken down by gender makes such a statement difficult.

These figures, which are perhaps surprising, indicate that there are great differences between female and male mobility. Transport is an important aspect of women's lives. It determines access to a wide range of resources in society, including employment, education, childcare, health, policy, culture etc. Its quality can often decide whether the integration of paid employment and unpaid domestic labouring and caring will be easy or impossible.

10.2 Female activity patterns

There are crucial differences in activity patterns between men and women. Unlike many men, there are very few women who are not responsible for a household. Independent whether they are employed or not, it is women who are predominantly responsible for domestic work, e.g., care for children and grandchildren, housework, elder-care, etc. While the workday of most men is characterised by gainful employment and exemption of domestic work, women have the difficult task of integrating gainful employment – mostly part-time – with domestic work. This is due to traditional social roles.

Women have gradually been adapting their roles. They increasingly combine domestic work and children with gainful employment, but men have not claimed their share of the burden of domestic work. A study from Germany shows that in 1992, women carried out about twice as many hours of unpaid domestic work as men (Table 10.1). A Swiss study from 2001 shows that this trend has not changed and can be indicative of the situation across Europe (Strub and Bauer, 2002) (Table 10.2).

Table 10.1 Unpaid work: division of labour between women and men in hours and minutes per day, Germany (1992)

Status	Women	Men
Without children, both employed	4:54	2:49
With children, husband employed	8:27	2:55
With children, both employed	5:33	2:55
Without children, both not employed (> 60 years)	5:45	4:07

Source: Statistisches Bundesamt (1994).

Table 10.2 Domestic work carried out by men compared to women, Switzerland (2001)

Household type	Per cent (women = 100%)
Single	78
Single father	62
Unmarried couple without children	76
Unmarried couple with children	58
Married couple without children	52
Married couple with 1 child	50
Married couple with 2 children	44
Married couple with 3 or more children	39
Average	53

Source: Strub and Bauer (2002).

10.2.1 Women on the way: female mobility in the twenty-first century

Women's numerous responsibilities involve various activities and specific transport needs with specific female mobility patterns as a result. Women have to be real time managers, especially when employed. They not only have to manage their personal timetables, but also the activities and trips of the persons for whom they care. They have to organise their timetable very carefully and efficiently, because they depend on opening times of shops, authorities, medical centres, kindergartens and schools, as well as such extra-curricular activity as music lessons and sport courses, etc. This timetable is very susceptible to change: music lessons can be cancelled; school can start later or finish earlier; children can suddenly be ill. Women with children have a mobility rate significantly above average. It increases significantly when they combine children with gainful employment (Table 10.3).

Women combine and co-ordinate their complex transport needs in transport chains, typical of female mobility, for example: take son to kindergarten; make remittance order at bank; go to work; go shopping; fetch son from kindergarten; take daughter together with son to piano lesson; go shopping; fetch daughter from piano lesson, etc. Thus, a normal day of a woman is

Table 10.3 Mobility of women depending on their status, Germany (1993)

Status	Number of trips per day
Young single women	5.7
Employed women without child(ren)	5.7
Employed women with child(ren)	7.6
Housewives with child(ren)	6.7
Elderly women	4.8
Statistical average: women	6.2

Source: Stete (1995).

characterised by many different destinations and it is obvious that they have to be within easy reach. In contrast to women, most men do not have to manage such multifarious transport trips. In most cases they commute to work in the morning, over long distances, and come back in the evening. Figure 10.1 shows an average day: a man's on the left; a woman's on the right.

10.2.2 The importance of cycling

Obviously the car has many advantages for juggling these complex transport needs, and one would think that most women would use a car. As a matter of fact, there has been a particularly strong increase in the amount of women obtaining a driving licence since the early 1990s, and more and more women are driving. However, it is not the case that the majority of women are driving. In Western Germany in 1989 women walked for 35 % of trips (compared to only 21 % for men) and drove a car for 23 %, compared to 48 % for men. For two out of every three trips women walked, took a bicycle, used public transport or were passengers in a car, while men used the car for every second trip (Hautzinger and Tassaux, 1989). In Denmark in 2001 women walked for 38 % of trips (compared to 10 % for men) and drove a car for 38 %, compared to 53 % for men. For six out of every ten trips, women

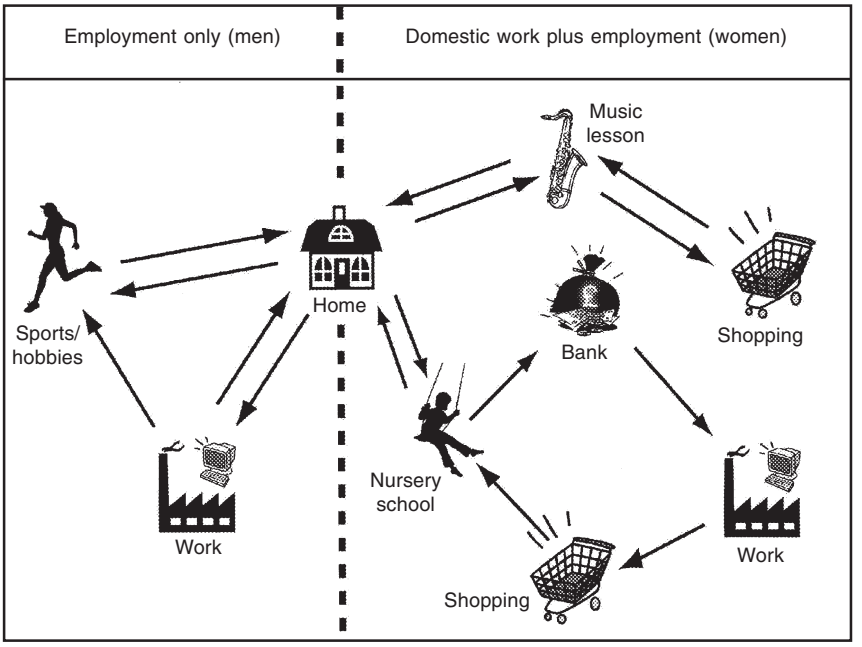

Fig. 10.1 A normal day. Source: Ursula Lehner-Lierz.

in Denmark walked, cycled, used public transport or were passengers in a car (Road Directorate, 2002).

When additionally broken down by age group, data show clearly that, in childhood, the bicycle has much more importance for boys than girls, but that after the age of 17/18, when a driving licence can be obtained, the situation up-ends: the bicycle becomes more important for women than for men. In Germany, between the ages of 35 and 59, women use the bicycle twice as much as men and even women over 60 cycle 50 % more than men between the ages of 35 and 59 (Table 10.4). Between the ages of 30 and 60, Dutch women cycle nearly twice as much as men (Ministerium für Verkehr, 1999). In Germany, this relationship is similar, although on a significantly lower level (six and twelve per cent, respectively) (Deutscher Bundestag, 1996). In Denmark, women make 17 % of their trips by bicycle whilst men make 15 %. Broken down by age, the data show the importance of cycling for women older than 40: between the ages of 40 and 49, women cycle 45 % more often than men; between the ages of 50 and 59 the figure increases to 70 %, and between the ages of 70 and 74, women cycle 75 % more than men (Road Directorate, 2002).

10.2.3 The myth of full motorisation

Why is there such a big difference in the modal choice of men and women? There are a number of reasons, the most obvious being that women generally earn less money than men and therefore often cannot afford a car. Significantly less women than men have a driving licence, or a car available at any given time – and thus principally unlimited access to a car. Even when they do have a car, women seem to choose their means of transport more practically, depending on the actual situation.

Statistics from Germany show that during the 1990s especially younger women up to the age of 40 drew up arrears compared with men, but the most significant increases have been among German women older than 50, and foreign women living in Germany who are older than 40. Nevertheless, there are huge differences between gender, age group and nationality: while 90 % of German men and 54 % of German women between 60 and 64 years have

Table 10.4 Modal share by gender and age group (%), Western Germany (1989)

Age	Walking		Cycling		Car		Public transport	
	Men	Women	Men	Women	Men	Women	Men	Women
6–17	29.0	34.1	31.3	22.9	19.4	20.6	17.0	19.4
18–34	14.5	24.3	8.9	10.9	66.9	52.3	7.7	10.3
35–59	16.4	28.5	6.3	12.4	70.0	48.4	4.3	9.0
>60	36.9	50.9	8.3	9.5	45.1	25.9	7.2	11.5

Source: Deutscher Bundestag (1996).

a driving licence, only 8 % of foreign women of this age group own one (Table 10.5).

Although a paid job, driving licence and car have become self-evident for young women in the twenty-first century, ratios of car availability still show extreme differences between gender. While in 1998, 78 % of men between the ages of 41 and 60, living in Germany, always had a car available, this was true for only every second woman of the same age group, while one-third of them never had a car available (Table 10.6).

These data show clearly that the so-called 'full motorisation', which is often spoken of in Germany, is only true for men. It is a male myth! Only men have a real free choice of means of transport, while most women are

Table 10.5 Persons with a driving licence, by nationality, age and gender (%), Germany (1991 and 1998)

Age	Germans				Foreigners			
	Men		Women		Men		Women	
	1991	1998	1991	1998	1991	1998	1991	1998
18–19	84	74	68	74	71		30	
20–24	91	90	85	82	85	86	43	50
25–29	92	94	90	92	86	84	37	55
30–34	91	93	89	91	80	93	57	66
35–39	92	95	88	88	81	90	30	49
40–44	91	92	79	87	86	74	41	54
45–49	95	94	78	82	71	81	22	37
50–54	92	91	66	76	70	83	13	34
55–59	87	88	51	66	60	78	12	33
60–64	84	90	40	54		70		8
65–69	78	82	32	40		75		21
70–74	70	80	19	35				
75–79	56	74	11	18				
80–84		65		11				

Source: Bundesministerium für Verkehr (1996), Bundesministerium für Verkehr, Bau- und Wohnungswesen (2000).

Table 10.6 Car availability (%), Germany (1998)

Age	Men			Women		
	Always	At times	Never	Always	At times	Never
18–25	59.1	19.5	21.3	44.3	23.5	32.2
26–40	80.3	9.1	10.5	63.6	18.6	17.4
41–60	77.6	5.8	16.2	50.3	14.9	34.7
61–80	71.1	1.8	26.5	24.0	3.9	70.6
Average	75.1	7.8	16.9	47.1	14.3	38.2

Source: Bundesministerium für Verkehr, Bau- und Wohnungswesen (2000).

captive drivers. In 1998, only 50 % of women had a car available at any given time, and only men had a really free choice of means of transport. In their daily mobility, women mostly walk, cycle or use public transport. If the situation for pedestrians, cyclists or users of public transport improves or deteriorates, women are affected far more than men. Changes in quality have a direct impact on their daily time budget and quality of life.

Apart from licence holding and car availability, there are other factors that have an impact on the mobility of women:

- The distinct spatial separation of basic urban functions – living, employment, education, shopping, leisure and recreation – has led to increased trip distances, with the consequence that everyday destinations are more difficult to reach, and some only accessible by car. This process is accelerated by car use.
- This spatial separation produces monostructured areas, which are crowded part of the time, and deserted part of the time, thus creating feelings of insecurity. A lack of social safety can have an impact on women's transport behaviour, as in the dark many women find the streets threatening. This latent fear extends from modification of the individual route, through only going out with other persons, to the complete renunciation of mobility in the evening. The latter is especially the case with older women.

Within these spatial structures, the increase in paid employment of women makes the management of everyday life more difficult. Many women are forced to have their place of work within easy reach, near to their home, instead of choosing a job fitting their qualifications where they can earn more money. However, the situation is similar for men too, as spatial structures impede the combination of a qualified job with equal partnership in domestic work, and thus a change in the traditional roles.

10.2.4 Car traffic steals women's space and time

A transport policy that gives priority to the car not only generates all the well known negative effects, but is above all a very unjust policy: those outside the cars are much more concerned about air pollution, road safety, occupation of space, increasing distances, inhospitality of public space etc., while those in the cars do not even perceive these problems. Therefore, we can state that women are more concerned than men about points such as:

- A transport policy, which gives priority to the car, accelerates men, and hinders those outside the car.
- When women are caring for their children or escorting somebody, public space is their place of work. Due to noise, smell, air pollution, inconvenience, danger and lack of space, streets and places are neither optimised for these tasks nor attractive nor safe for pedestrians and cyclists. As means of transport with low priority in transport policy, walking and cycling get only budgets and space which car traffic has left to them.

- The distinct spatial separation of basic functions has encouraged compulsory mobility over long distances, which is often carried out by car. The lack of road safety has dramatically increased the need to accompany children – and these escort trips are most often done by women: the 'mummy taxi'.
- Women suffer most from the erosion of public transport. In many countries, timetables, networks and distances between stops are optimised for transport over long distances for those with full-time employment, rather than for such groups as housewives with children, people with a part-time job, or old people who have walking problems.
- Although women cause fewer accidents, they are more often victims of road accidents.
- Summer smog, mainly caused by excessive car use, means children have to stay inside, and when they get sick because of high ozone values, it is mainly women who care for them and accompany them to the doctor.

A transport system that gives priority to the car means a spatial and temporal discrimination against women. But there is also a financial discrimination, because in the transport budgets priority is given to the transport systems that are predominantly not used by women. Even public transport does not fit women's mobility patterns because such services are optimised for full-time commuters. A high-quality cycling system could serve women in many respects, as by bicycle they can do many of their transport chains of short trips much more easily. The indirect positive effects of a good cycling system are of still more importance for women: children and old people could move independently, and save women much time.

10.3 Child mobility

For those women who care for children, personal mobility is directly linked with their children's mobility. In the twenty-first century many children can no longer discover their neighbourhood on their own. The main reasons are a lack of road safety, increasing distances and the general inhospitality of the streets. The consequence is that in many European countries the number of children who are accompanied on their daily journeys has increased dramatically since the 1970s – and that as a result, road unsafety has increased for those outside cars, so that, paradoxically, even more parents feel the necessity to transport their children by car.

In Great Britain, there has been a dramatic decline in the independent mobility of children. Between 1971 and 1990, the number of children allowed to cycle without adult supervision decreased from 67 to 25 %; the number of 7–8 year old children travelling to school on their own decreased from 80 to 9 %. In some British cities, 20 % of peak-hour car journeys now consist of school escort journeys.

Often, children's lives exist in isolated islands within driving distance only: residential island, school island, friend's island, playing island, sports island, ballet island, etc. (Fig. 10.2). On each of these islands, they meet different children and adults, often for only one or two hours a week. When they want to meet friends, they have to arrange it by telephone. When any activity starts and ends with a car ride, when little children become young commuters, when they cannot move as much as they want, it is no surprise that there are negative effects in education and child development. This 'islandisation' is a typical phenomenon of our time. Women perform the daily miracle of combining their own and their children's islands – often as their children's taxi drivers.

Scooters, inline skates and bicycles are – apart from walking – the first individual means of transport that a child can use. Wherever children were asked how they would like to move and how they would like to reach their daily destinations, they nearly always preferred walking or cycling. The first essential requirements for these means of transport are safe roads and residential areas, where children can explore their world on their own. With a bicycle, a child can experience individual mobility positively. Walking and cycling, or more generally, independent mobility and regular exercise, are of essential importance for mental and physical health. A Swiss study with five-year old children has shown that children who can do their journeys without accompaniment and who can play outside without supervision, get significant advantages in their travel development. They can trust their mental, physical and social abilities, and in contrast to children who spend their leisure time inside and who are transported by car, they are more active and self-confident (Hüttenmoser and Degen-Zimmermann, 1995; Hüttenmoser, 1996). Another

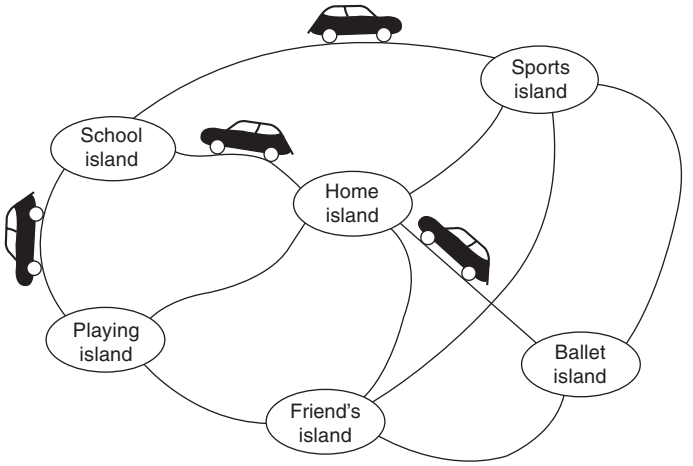

Fig. 10.2 The 'islandisation' of a child's world. Source: Ursula Lehner-Lierz.

health effect of cycling is that regular exercise is associated with a reduced risk of coronary heart disease, hypertension, stroke, diabetes, osteoporosis, obesity and some cancers. Health professionals agree that exercise patterns need to be established in childhood so that people maintain these habits as adults. They recommend 30 minutes of mild to moderate exercise per day to maintain one's health. Knowing the risks of a sedentary lifestyle, it would just be irresponsible to let an unhealthy generation grow up! Walking and cycling are both excellent forms of exercise, and cycling to school and to other daily destinations is a good integration of exercise into daily life.

These arguments have been the basis for European 'Safe Routes to School' initiatives, started during the late 1990s, where the main emphasis is put on improving the safety of cycling and walking, and increasing independent child mobility. It would be even better if these activities started earlier as the Swiss study shows (Hüttenmoser and Degen-Zimmermann, 1995).

Growing up on the back seat of a car, a child will surely desire nothing more than taking the opportunity to advance to the front seat and drive himself/herself when grown up. Naturally, such a young adult will find cycling and walking dangerous in itself and will thus insist on bringing his/her own children by car when an adult himself/herself – a vicious circle. Therefore, safeguarding the independent mobility of children is a good investment towards a healthy future, and a contribution towards improving public health. It also moulds children's attitudes and future modal choice. It is also a fundamental contribution to solving the daily time conflicts of women.

10.4 Mobility of the elderly

Not much is known about the mobility needs and patterns of older people, but those studies and data that do exist show that the bicycle is used up to old age (Münsterjohann, 1999). It helps older people to safeguard their independent mobility and thus independent supply and participation in social and cultural life. Besides that, regular cycling keeps older people fit and makes them feel healthier. Regular exercise helps maintain memory and reduces the likelihood of falls, which are both major health problems in the elderly.

Recent research from Styria in Austria has shown that the bicycle plays a role up to the age of 84, and that women between the ages of 55 and 74 cycle even more than the younger age groups, and between the ages of 65 and 74, women cycle more than twice as much as men of the same age group (Table 10.7). Experience from the 'Bicycle-friendly Troisdorf' pilot project in Germany shows that older people benefited most from the improvement of cycling infrastructure and promotion of cycle use: cycle use among senior citizens aged 60 and older increased by 108 % (from 12 to 25 %, compared with about 20 % in all other age groups (Stadt Troisdorf, 1997).

The Styrian study also shows that the radius of action decreases dramatically after age 64 due to poor transport infrastructure. Compared with an average

Table 10.7 Modal share of main means of transport by gender and age group (%), Styria, Austria (1995)

Age	Total number of investigated trips	Walking		Cycling		Car (as driver)		Car (as passenger)		Public transport	
		Men	Women	Men	Women	Men	Women	Men	Women	Men	Women
6–54	9850	15	26	7	6	55	36	8	16	15	16
55–64	1230	23	36	5	8	63	22	3	27	6	7
65–74	1040	35	50	3	7	51	9	3	14	8	20
75–84	320	38	68	9	1	22	2	10	21	21	8
> 84	50	53	73	5	0	13	0	3	11	26	16

Source: Sammer and Röschel (1999).

Styrian citizen, who is – potentially – able to have access to an area of about 1000 km^2 per day (index = 100 %), persons aged 65–74 have access to an area of only 310 km^2 or 31 % and persons older than 84, only 70 km^2 or seven per cent (Table 10.8; Sammer and Röschel, 1999).

Considering this aspect and the fact that distances have often become too long for safeguarding independent daily supply by walking, it is of increasing importance to create high-quality cycling facilities in a safe traffic environment where older people can reach their daily destinations directly and safely. Independent mobility does not only mean better health and a better quality of life for the elderly, it also means less escort trips for women as the main carers for the aged.

10.5 Research, statistics, planning and policy

Studying the mobility of women and especially women and cycling is a difficult task. There is still a widespread lack of awareness of the specific mobility patterns and transport needs of women, or, more generally, the female aspects of all fields of planning. The bicycle is still lacking in many transport statistics. It seems as if women and cycling are rather unknown phenomena in policy-making. When women and bicycles combine, this problem is still intensified. The subject is invisible – and thus non-existent! Gender specific transport needs, and especially women and cycling, are a comparatively under-researched area. This is no wonder, because different life situations and roles of women and especially their impact on mobility needs or the suitability of spatial structures for domestic and paid work are neither perceived nor transferred into policy. Since the 1970s female architects, town and transport planners, geographers and sociologists from many European countries have done a lot of research and have carried out many studies that prove the specific female spatial use, mobility needs and mobility patterns. However, gender mainstreaming is only just beginning to become part of policies in many countries. Gender mainstreaming was put on the political agenda by

Table 10.8 The potential maximum radius of action and the accessible area, by age group, Styria, Austria (1995)

	Age group					
	All persons	6–54	55–64	65–74	75–84	>84
Radius of action, km^2	18	19	19	10	9	5
Accessible area, km^2	1000	1100	1100	310	230	70
Accessible area compared to all persons, %	100	+10	+10	–69	–77	–93

Source: Sammer and Röschel (1999).

the final resolution decided by the Fourth World Women's conference in Beijing in 1995, and has been adopted by the UN, the World Bank, the EU and some countries. Gender mainstreaming means that in all social projects the different life situations and interests of women and men have to be taken into account, from the outset and regularly thereafter. Even so, cycling is not on the top of the agenda.

10.5.1 Spatial and social science

Traditionally, spatial and social sciences have neglected the spatial effects and needs of domestic work. They have instead investigated a thousand and one criteria, which could have spatial effects, but not gender. Normally, home is not considered as the place of work for a lot of women, but only as a place where the employed husband recovers from work. This andro-centric consideration of everyday activities which relates domestic work to privacy – and thus makes it invisible and therefore no object of research, while gainful employment is something of public interest whose spatial effects are researched intensively, has been criticised by several female scientists (see Spitthöver, 1989; Terlinden, 1990; Rauschenbach, 1993; Rodenstein, 1993; Bauhardt, 1995; Meyer, 1999).

For too long, female transport needs and mobility patterns have been identified to be identical to men's. Nowadays, the classic transport science acknowledges that there is a gender modal choice, which manifests itself in greater car availability for men and more walking, cycling and use of public transport by women. While the classic transport science contents itself by explaining these effects with the fact that women use the family car (registered in the man's name) for shopping, and otherwise public transport because they have enough time available, the feminist perspective identifies the gender hierarchic share of work and the spatial structures as reasons for these differences. Feminist mobility analysis combines traditional sustainable transport science, to include non-motorised ones as well as motorised ones. In this context, spatial structures with short distances between everyday destinations, which support non-motorised mobility, obtain increasing importance (Bauhardt, 1999).

10.5.2 Statistics and surveys

Statistics do not help very much, because only few are broken down by gender, and those that do, do not really describe female mobility. Surveys on mobility put the emphasis on kilometres driven instead of number of trips so long distance car trips predominate over numbers of short distance trips walked or cycled. Trips are counted rather than stages: the trip chains, characteristic for women, disappear in the statistics. Many tabulations exclude very short trips – most of which are made by women, children and older people. If several modes are used, only the means of transport is recorded

which is used for the longest distance: many walking or cycling trips, which are typical for female mobility, are not recorded at all (see Meyer, 1999, and Chapter 5). The recent redesign of the Swiss survey on travel behaviour shows the difference: by ascertaining *all* stages and *all* used means of transport in the survey of 2000, non-motorised traffic has become the strongest mode with 46.1 % (compared with 36 % in 1994), while car use (as driver and passenger) decreased from 51 to 41.6 % (Bundesamt für Raumentwicklung, Bundesamt für Statistik, 2001).

Within the collective group 'women', there are highly important distinctions which depend on, for example, age, income, household, elder- and child-care responsibilities, ethnicity, employment status, degree of disability, education etc. These differences are of essential impact on the mobility pattern, i.e., the number of daily trips. It should be possible to recover them in the statistics. The traditional classification of trip purposes – education, work, supply, leisure etc. – does not do justice to female mobility. There are hardly any data available over dimension and structure of escorting or service trips, because they are not collected as a separate purpose of trip in the official statistics. In German official statistics those trips appear as 'education', 'shopping' (e.g., physician, town hall) or 'leisure' (e.g., sports, kindergarten) (Bundesministerium für Verkehr, 1996).

Transport surveys put too much emphasis on gainful employment and on the car – thus on male mobility patterns. As a consequence of fundamental criticism of the traditional mobility statistics by feminist transport scientists, surveys have been redesigned now in some countries such as Germany, Great Britain and Switzerland. Besides the ascertainment of the data themselves, evaluation and presentation of the data are also of major relevance, if a survey is to fulfil its objective; to be a solid basis for good political decisions and planning. Until now, many evaluations are not done, although the necessary data are ascertained. Statistics often combine just two variables instead of at least three.

10.5.3 Planning and policy: fathers plan for their sons

The wheel comes full circle when we see that the specific transport needs of women are neglected in traffic planning and policy. In many European countries, the number of women in leading positions in transport planning is a tiny minority. Investigations of transport patterns in many German towns – but also in other countries – have repeatedly found that the majority of men between 20 and 60 years are using the car, while children, women and old people mostly walk, cycle or use public transport. This result is very striking, because in the group of men aged 20 to 60 years, we find the decision-makers and opinion leaders of our societies: politicians, town and traffic planners in municipalities and consultancies, journalists, representatives of trade and industrial associations, and other important persons, who project their attitudes and traffic behaviour onto the rest of the world – although they

are only one-quarter of the population. Sitting in their cars, they get more and more insensitive to the needs of those outside cars. While the interiors of cars get more and more comfortable, they do not even perceive the deterioration of public space and road safety for those outside the cars. Most of those male decision-makers are not at all aware of the problems of a mother with a shopping bag in one hand, the pram in the other, and in her third hand the second child, who is crying because she has lost her teddy bear or because she suddenly needs the toilet, while the mother has to hurry up (because she must not miss the bus), or while she tries to load her bicycle.

It is no surprise that our built environment is optimised for the employed man with a briefcase, commuting by car during the rush hour. Even cycle planning is mostly done by men from their point of view – with the result that they put too much emphasis on cycling networks and cycling facilities, which serve young, dynamic (male) people, cycling to work without any luggage or company.

With their extensive practical experience as pedestrians, cyclists and users of public transport, women could crucially contribute to the quality improvement of non-motorised and public transport – provided there were more female politicians and planners in leading positions, and participation procedures were really organised in a way that the involvement of women was guaranteed.

With its land-use and transport policy, a state also pursues structural, social and educational policy. Land-use and transport policy decide whether daily destinations can easily be reached and how easily different tasks can be combined – for all members of society. Under this aspect, transport and land-use policy play key roles.

10.6 Towards a new transport policy

10.6.1 Does the car liberate women?

Considering all the negative effects of excessive car use, it seems obvious that the solution of women's mobility problems cannot be seen in wider car use. Besides that, there will always be women who do not have a car. And for those women the situation deteriorates in the same degree as it improves for those possessing a car. Car-oriented transport policy hinders the employment of women, and especially the combination of employment and children. It supports the existing social structures and division of labour, which discriminates against women. It creates new dependencies for women, and lowers the quality and social safety of public space. The dominance of the car accelerates spatial distinction and promotes destruction of the environment.

Extended car availability has not only led to an extended freedom to move and better access to additional destinations, but, as recent research has shown, it has above all extended the range of duties. Women do not only drive (for) their own children, they also drive grandchildren and sick or older members of the family or neighbours (Buhr, 1999): the extended mummy taxi!

10.6.2 Women: ecological avant-garde in traffic behaviour

Voluntarily or not, women set an example of how we should behave in a future sustainable transport system. They avoid superfluous traffic by combining different trips into transport chains. They remove traffic, as short trips are made by bike or walking: there is a clear preference for the green modes of transport. It is not only the lack of car availability that makes women choose these means of transport. They seem to have already understood that this is the better way (Barth, 1995). Their responsibility for domestic work could be an explanation: they experience immediately the negative effects of excessive car use in their daily life.

10.7 A plea for a new transport policy

Cycling does not have the adverse effects of driving, it is easy to learn and the majority of people can afford a bicycle. It can be available for people without a driving licence or a car: e.g., children, the elderly and foreigners. It can be a solution for those who may not or cannot drive a car for health reasons. The bicycle is the ideal means of transport for all the chains of short trips. A dense network of good cycling facilities and services, including optimised combination with public transport, gives women free room and, above all, free time. A high level of general cycle use improves road safety and regains public space in our cities. This guarantees the independent mobility of children and old people, meaning a great relief for women.

A new transport policy is needed, which really serves the needs of all parts of society and which gives priority to walking, cycling and public transport: in awareness, space on the roads, time at traffic lights and, above all, in budgets. In this transport policy, the main emphasis has to be laid on the needs of the users. For every single user group, the trips from A to B, or better from A to B via C, D and E, have to be analysed. This can be done by asking and observing the users. They will know what they need. If this is done for every single user group and for every single purpose of trip, it will automatically lead to a better transport system, because it is based on the user needs. For cycle traffic, it will find out that a good cycle track may be important. This method will find out that the main obstacle for cycle use is the missing safe, easy-to-reach and easy-to-use cycle parking at home, or the missing shower and cycle parking at the place of work. This method will also find out that a dense network of repair services, which guarantee the continuous availability of bikes, is essential for a daily means of transport. It will also consider that not only old people find it uncomfortable to lean down or to lift up a bike to lock it, whilst placing their shopping bag on the wet ground. It will also find out that bicycle racks at shopping centres should be sheltered, because little children do not like wet child seats. Or that shopping with a bicycle and little children is much more comfortable when there is supervised bicycle parking, where prams can be rented and luggage can be stored. It will

also find out that there should be a good combination of cycling and public transport, including lifts or ramps to the platforms and really good information on time-tables and tariffs (Lehner-Lierz, 1996).

Following this approach, we will see that many woman-specific demands are not strictly woman-specific, but it is women who are more often concerned with specific faults than men. We need to slow down and to curb car use. Besides a new transport policy, we need a new land-use policy. Both have to be integrated and complement one another. We need denser towns, where housing, working, education, shopping and leisure are mixed and where everyday destinations are in easy reach. We must regain 'nearness'. We have to develop general strategies for reducing our need of traffic.

10.8 Integrate the needs of women or forget about sustainable transport

In the framework of sustainable development, the way in which transport needs are satisfied plays a key role, and cycling is an integrated part of a sustainable transport system. Successful stimulation of cycle use is only possible if the needs of all user groups are considered: those of present cyclists as well as those of potential ones. As the majority of present cyclists are women, it makes sense that politicians and policy-makers, who strive for sustainability, make the effort to keep women cycling. A transport policy that neglects female experiences and needs, and thus the experiences and needs of half the population, cannot be sustainable! It is obvious that it must lead to bad results (Lehner-Lierz, 1999).

A sustainable development system cannot be achieved without gender justice and gender equality. This is the clear message from several Agenda 21 pre-conferences for the Earth Summit, 2002, in Johannesburg, which have taken place in many countries balancing the outcome ten years after Rio (Hamilton, 2001; Weller, 2002). The focus on gender shows that the assumption of an 'average person or consumer' is an inadequate abstraction. This – normally unintentional – assumption leads to the average person being young, male, white, employed, healthy and childless, and automatically excludes all other socio-demographic groups, whose specific life situations are not at all or just marginally taken into account. The focus on gender differences also includes a criticism of inadequate generalisations and objectifications in environmental and sustainability research (Weller, 2002).

Another clear message from the Agenda 21 process is that the multifarious local activities in the field of gender mainstreaming need to be supported by the authorities. The bottom-up approach needs to be supplied by the top-down approach, the clear political will of a local, regional, national authority to put gender mainstreaming on the political agenda.

10.9 The role of cycling for women remains underestimated

Although the gender aspect has been recognised in the field of town and transport planning and social and spatial sciences since the 1970s, and although a lot of new knowledge has been generated and many initiatives have been taken, 'women and cycling' have remained completely unconsidered for a long time.

In 1990, women in the German cyclists' federation ADFC (among whom the author) founded the 'ADFC women's forum', which dealt with the role of cycling for women and the specific needs of cycling women. Two years later, the women's forum succeeded with the approval of a motion by the annual general meeting of the ADFC, which intended that the female aspects of cycling should be a new point of emphasis in all ADFC policies – an early form of gender mainstreaming. The ADFC developed a catalogue with the demands of women for cycling facilities, which was broadly discussed inside and outside the ADFC.

In 1992, during the Vélo Mondiale conference in Montreal, the international discussion on women and cycling was started (Lehner-Lierz and Schrödl, 1992). It was very impressive to see that despite very different living conditions in industrialised and developing countries all over the world, there were lots of communities requiring female mobility in everyday life. The participating women agreed there was a need for exchange of information and experiences and for networking. As a consequence, meetings during the Velo-City conference in Nottingham in 1993 and a panel discussion during the Velo Australis conference in Perth in 1996 followed. In Nottingham, an international network, 'Women in Motion' was founded, which also edited a newsletter.

However, the problem of all these initiatives and activities was, and still is, their lack of continuity. The cyclists' organisations did not adopt gender mainstreaming. They regarded the women's activities as additional, free figures, which were left to the women's corner, while the other functionaries and volunteers of the organisations were dealing with the real, important, matters – a phenomenon which is to be found in all parts of political life. That these attitudes still apply to environmental NGOs in general was one of the realisations of the pre-conferences that prepared the Earth Summit, 2002, in Johannesburg.

Although nearly half of the 231 presentations of the last Velo-City conference, 2001, in Edinburgh/Glasgow dealt with 'sustainable transport', there were only 6 presentations on 'women and cycling' – as 'others' in the section on 'health and well-being'. The consideration of gender aspects as a precondition for a sustainable transport policy, as a part of a sustainable development programme, is far away from being mainstream in the greatest European Cycling conference. Future programme committees should adopt gender mainstreaming.

During the 1990s many initiatives were taken on a local level, such as lectures, workshops and study tours. Most were done in co-operation with local women's commissioners. During these workshops, women made an

excursion by bicycle, noted problems, discussed them and extracted proposals for their solution. The Local Agenda 21 processes have encouraged more women to participate in the local process of opinion-making. These Agenda 21 activities have essentially helped to put women's demands on the political agenda.

In The Netherlands, good experiences have been made with cycle training courses especially developed for and offered to foreign women living in the country. Originally initiated in Tilburg, these courses are now being offered in many cities and towns all over the country as a measure to integrate foreigners and to stimulate cycle use: women who do not cycle themselves will not teach their children to cycle (see Kloof, 2001 and Chapter 49). Alas, this positive development has been threatened by the policy of the latest Government.

Women have succeeded so far that their needs have partly been integrated into local transport plans – although they are no longer identified as specific female needs. There is increasing sensitisation for independent child mobility and the health effects of cycling – both subjects with a strong interrelationship to female mobility.

After a decade of many isolated local and regional initiatives, the messages have reached the relevant authorities. There are countries with national cycling strategies, countries with national strategies for sustainable development and countries that have adopted gender mainstreaming as an integrated part of their policies. Germany has all three strategies: since 1999, a national gender mainstreaming strategy, with the commitment of all departments to apply the gender mainstreaming approach in all political, normative and administrative measures; in Spring 2002, the national cycling strategy followed, which also mentions the specific needs of women and equal mobility chances for all parts of the society; and in Summer 2002, the overall concept for sustainable development was decided. Good prerequisites – at least on paper. If all these strategies are really taken seriously and are consequently put into effect – which means that every decision-maker and policy-maker thinks 'gender'and 'bicycle' – the mobility problems of women should be solved in the near future and the role of cycling should receive the deserved priority.

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11

The potential of non-motorised transport for promoting health

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Walking is one of the first things a child wants to do, and one of the last things an adult wants to give up, yet as a society we have been taking walking for granted. (London Walking Forum, 2000)

Cycling is the most energy efficient mode of movement . . . preserving the ability of our planet to sustain a rich diversity of life in the future. (Bloomfield, 2000)

11.1 Introduction

Motorised transport is a relative newcomer in the history of the Earth. For many millions of years, human beings moved around on foot or on the backs of animals, before the wheel was invented, some 5500 years ago. The wheel was used for thousands of years to move people and goods on carts or in carriages, using human or animal power. It was not until the late eighteenth century that the earliest bicycle appeared – basically a scooter in design. This was followed by the 'boneshaker' in the mid-1800s and the air-filled tyre in the 1880s. At this time, all modes of transport were largely non-polluting, and many of them involved some form of physical effort and hence contributed to improved physical health.

The invention of the internal combustion engine in 1894 changed everything. In the (relatively) short time period since its invention, motorised transport has had a profound effect on the way we live. As the car has taken over our roads it has left us with fewer opportunities and less room to use human-powered transport, and enticed us into the comforts of the driver or passenger

seats. Other chapters in this book have covered the implications of motorised transport for the environment, society and the way we plan our towns and cities. This chapter will consider the effect that the dominance of motorised transport has had on our health and the potential that non-motorised transport has for improving and maintaining health.

The chapter will concentrate on walking and cycling as the main modes of non-motorised transport with the potential to make a significant contribution to public health. Other modes such as skateboards or scooters are of limited interest, as they have little potential as serious modes of transport. The same might be said for horse riding, which is largely carried out more as a leisure pursuit than to get from A to B. The one exception may be inline skating (or roller blading), which has seen something of a resurgence in recent years, in that it expends significant amounts of energy and has the potential to cover large distances. Cities such as Paris see thousands of inline skaters take over the streets every Friday night to skate together and stop the traffic, and the first roller-bladed police officers have been appointed to patrol the seafront in Brighton, UK. However, this mode is employed by a tiny minority of people compared to those walking or cycling.

This chapter will set out the reasons why cycling and walking can particularly benefit health. Firstly, it will show that the lack of regular physical activity in most populations represents a serious public health problem that is often underestimated. Secondly, it will demonstrate that cycling and walking are beneficial forms of physical activity with great potential to enhance public health and with significant advantages over other forms of exercise and physical activity. Finally, it will look at the broader public health benefits that would occur from an increase in cycling and walking in our communities.

11.2 Physical inactivity: a serious public health problem

The human body has evolved over millions of years to live a physically active life. People living in prehistoric times after the last ice age had to be efficient hunters and gatherers, capable of expending huge volumes of energy just to exist from day to day. Clearly this is not now the case. Food is more easily available, the car is the dominant mode of transport for many people, and activity through work is continually declining. The result has been seriously damaging to our health.

While medical advances have led to a decreasing threat from communicable disease, most countries of the western world (as well as many cities in developing countries) have seen a rapid increase in the threat from non-communicable diseases such as coronary heart disease and diabetes. This is a by-product of development and urbanisation, a combination of increasing access to calories through food and decreasing access to supportive environments for expending calories through movement.

There is now an extremely strong body of research to support the links

Table 11.1 The benefits of regular physical activity

Regular physical activity improves health in the following ways:

- Reduces the risk of dying prematurely;
- Reduces the risk of dying prematurely from heart disease;
- Reduces the risk of developing diabetes;
- Reduces the risk of developing high blood pressure;
- Reduces blood pressure in people who already have high blood pressure;
- Reduces the risk of developing colon cancer;
- Reduces feelings of depression and anxiety;
- Helps control weight;
- Helps build and maintain healthy bones, muscles and joints;
- Helps older adults become stronger and better able to move about without falling;
- Promotes psychological well-being.

Source: US Department of Health and Human Services (1996).

between regular physical activity and good health. Professor Jerry Morris first showed this in the 1950s when he found that physically active bus conductors had far lower rates of heart disease than physically inactive bus drivers, despite similar backgrounds (Morris *et al*., 1953). Since then, numerous other studies have reported similar observations, which were reviewed in a landmark report by the US Surgeon General (US Department of Health and Human Services, 1996). The main health benefits of physical activity are summarised in Table 11.1.

11.3 Cardiovascular disease

Of particular note is the relationship between physical activity and cardiovascular disease (CVD). The main forms of CVD are coronary heart disease and stroke: about half of all deaths from CVD are from coronary heart disease (CHD) and nearly one-third from stroke. Cardiovascular disease is the main cause of death in Europe, accounting for over four million deaths each year (British Heart Foundation, 2000). It is also the main cause of years lost due to an early death. The Global Burden of Disease study (Murray and Lopez, 1996) points out that in established market economies an average of 31 % of all years of life lost are due to CVD.

Many people underestimate the role of physical inactivity in the development of coronary heart disease, as the popular notion is that a heart attack is often brought upon by stress – and even exacerbated by vigorous exercise. In fact, a lack of physical activity is one of the most important risk factors for CHD. People who lead a physically inactive lifestyle have about twice the risk of developing CHD compared to those who lead an active lifestyle. For an individual, this level of 'relative risk' is at a similar level to other factors such as smoking or having high blood cholesterol.

Studies have consistently shown that reducing the risk of CHD can be

achieved through relatively low levels of activity, and that benefits can be achieved during middle age by replacing an inactive lifestyle with an active lifestyle or increasing cardio-respiratory fitness (Blair *et al*., 1995). In many senses it is 'never too late' to become more active and reap the benefits of improved health.

From the public health perspective, the most important issue is the degree of 'population attributable risk'. This provides an estimate of the true public health burden of any threat to health by multiplying the relative risk by its prevalence within the population. A potentially serious and debilitating disease would have a low population attributable risk if it only affected a small minority of people. Conversely, a disease or condition can become extremely important if it threatens the health of a large number of people.

Figure 11.1 shows that 37 % of CHD can be attributable to physical inactivity – second to elevated blood cholesterol in its importance, and far higher than smoking. This level is particularly high due to the large numbers of people who are physically inactive, and may begin to call into question the low levels of relative investment in walking, cycling and other forms of physical activity, compared to smoking prevention or nutrition education.

11.4 Overweight, obesity and associated conditions

A lack of physical activity also has a profound and highly visible effect on body weight. Levels of overweight and obesity have increased dramatically – some say to epidemic levels – in recent years as energy consumption has increased and energy expenditure declined. More than 50 % of adults in the UK are overweight, putting them at increased risk of hypertension, coronary

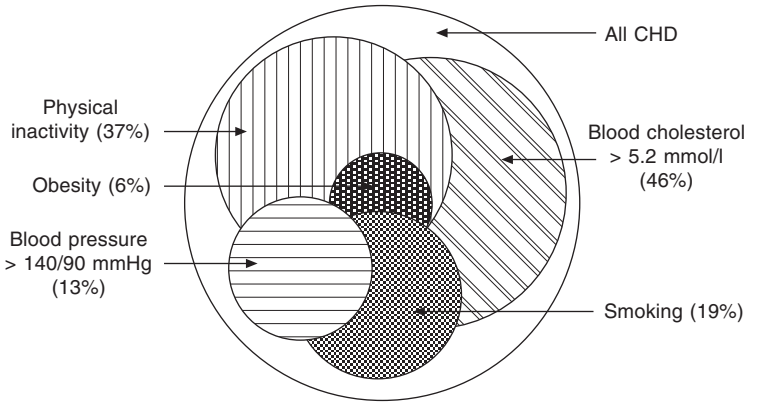

Fig. 11.1 Proportion of all CHD attributable to five different risk factors. Source: National Heart Forum (2002).

heart disease, type two diabetes, and osteoarthritis (National Audit Office, 2001). In many developing countries, excess weight and related disorders now rival malnutrition as major public health problems. The increase in type two (so-called 'adult-onset') diabetes is of particular concern, with some cases now being noted in children (Kaufman, 2002). Obesity occurs when a person puts on weight to the point that it seriously endangers health, and is defined as a body mass index (height/weight^2) of over 30. Levels of obesity have risen dramatically in the UK in recent years: one in five adults is classed as obese, a trebling of levels from the 1970s. These levels are rapidly catching up with the US where obesity has truly reached epidemic proportions.

Among young people too there are worrying signs: the Health Survey for England in 1997 found that 20 % of four year olds were overweight, and 8 % were obese. Among 16–24 year olds 23 % of young men and 19 % of young women were overweight and a further 6 % of young men and 8 % of young women were obese (Dept. of Health, 1998). The cause of this massive increase in obesity is clearly multi-faceted, but experts tend to agree that the decline in energy expenditure through physical activity lies at the heart of the problem.

11.5 Current levels of physical activity

As mentioned previously, the public health burden of CHD, obesity and diabetes is high due to the large numbers of people classed as physically inactive. More than 30 % of adults in Europe are not sufficiently active in their daily life (UKK Institute, 2000) and levels of physical activity are continuing to decline. During the mid-1990s, an international consensus was established on the value of regular moderate intensity physical activity. The World Health Organisation (WHO) was among many international and national agencies that highlighted the importance of moderate intensity activity for health, encouraging at least 30 minutes of daily physical activity. The 30 minutes can be built up over a day, so that two or three bouts of 10 or 15 minutes each provide important health benefits (WHO, 2002). Figure 11.2 shows that around half of all adults in the EU do not meet this guideline level of activity, although there are great variations by country.

Physical activity tends to decline dramatically with age and in most countries, men are more active than women. The Health Survey for England (Dept. of Health, 2000a) found that 37 % of men and 25 % of women are active at recommended levels, with levels of activity declining with age in both men and women, with a marked decline after the age of 54 years. The prevalence of inactivity is higher in women than men and increases with age. In the oldest age group, just over seven out of ten men and eight out of ten women are inactive. Cycling and walking make a large contribution to overall levels of physical activity. Figure 11.3 shows the percentage of adults in EU countries that cycle and walk (for more than 30 minutes) in an average week.

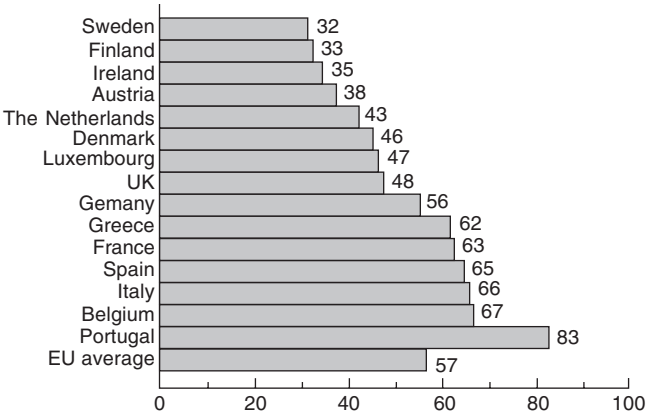

Fig. 11.2 The percentage of adults in the EU that do not meet the current physical activity recommendation (at least 30 min/day). Source: Institute of European Food Studies (1999).

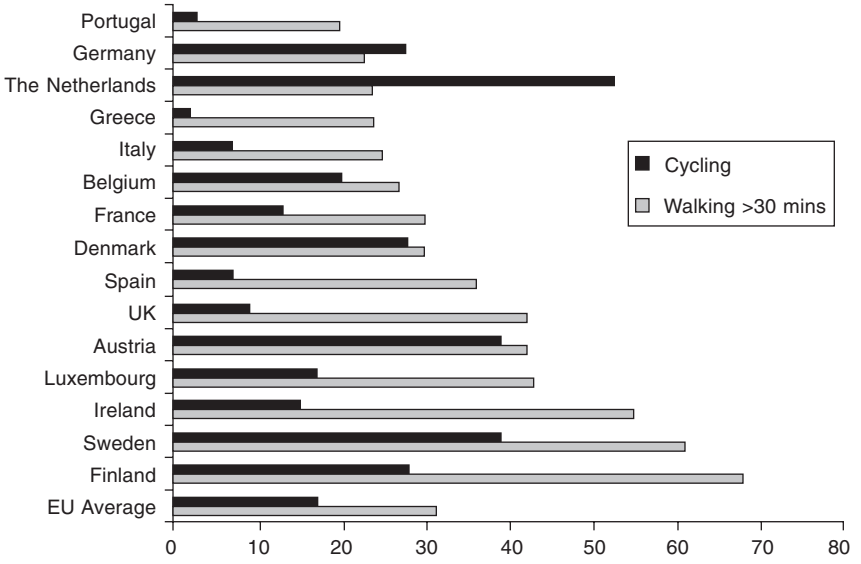

Fig. 11.3 Percentage of adults (15+) in EU countries cycling and walking in an average week. Source: Institute of European Food Studies (1999).

11.6 Trends in activity

Over the course of a generation, the role of physical activity in our daily lives appears to have changed dramatically. There has been a decline in the role of manual occupations, a corresponding increase in desk-bound and other

sedentary jobs, and changing patterns of participation in sport and leisure activities. Data to support this are rare however, as few surveys have been carried out over a long time span. The Health Survey for England (Dept. of Health, 2000a) found that between 1994 and 1998, there was a five per cent increase in the proportion of inactive men and a six per cent increase in the proportion of inactive women, while the proportion of men meeting the current physical activity guidelines remained unchanged, with a three per cent increase among women. The largest difference was observed for men aged 16–24 years, with the proportion active at recommended levels increasing by 8% between 1994 and 1998.

Data from the General Household Survey (Office for National Statistics, 1998) suggest a 20 % increase in the number of men reporting any walking occasions between 1987 and 1996 and a 17 % increase in the number of women. The proportion of men reporting any cycling occasions increased by 50 % but remained relatively unchanged for women. However, it is notable that travel surveys find a contrasting picture: the National Travel Survey suggests that both walking and cycling declined between 1975 and 1976 and between 1998 and 2000. Total miles travelled per year on foot reduced by 27 % and miles travelled by bicycle reduced by 25 %. The distance walked fell by one-fifth, from an average of 244 miles per person per year in 1985–86, to 195 miles in 1995–97. Over the same period, the average annual distance cycled fell from 44 to 39 miles (DETR, 2000). It appears, therefore, that infrequent occasions of long walks and cycling for pleasure have increased in recent years, but walking and cycling for transport have decreased.

Young people are also walking and cycling less, particularly to school. Data on school travel show that the proportion of 5–10 year olds being driven to school has increased from 22 % in 1985–6 to 36 % in 1998–2000 (DETR, 2000), with corresponding decreases in the proportions walking and cycling. The school journey masks a more fundamental issue – that for many young people the opportunities to be physically active as part of daily life are becoming increasingly restricted. Parental concerns over safety mean that many young people are not being given the freedom to explore their surroundings on foot or by bike, and instead spend increasing amounts of leisure time playing with computers or watching television. Coupled with this, pressures on the curriculum have led to a squeeze on the time put aside for physical education and sport. The result is an overall low level of activity among young people: a Department of Health Survey found that around four out of ten young males (aged 4–18) and six out of ten young females are not active for the hour a day recommended for young people (Dept. of Health, 2000b). There is thus a great potential for people to shift to more cycling and walking as a mode of transport, which will significantly enhance public health among both adults and young people.

11.7 Costs of an inactive lifestyle to society

The high prevalence of morbidity and mortality related to physical inactivity has great costs to society. In the UK the National Audit Office produced the first authoritative estimates of the costs and consequences of obesity in England. They estimated that obesity accounted for 18 million days of sickness absence and 30 000 premature deaths in 1998. On average, each person whose death could be attributed to obesity lost nine years of life. Treating obesity costs the UK National Health Service at least half a billion pounds per year, with the wider costs to the economy in lower productivity and lost output amounting to a further two billion pounds each year (NAO, 2001).

In the US, the direct health care costs associated with inactivity have been estimated at between $24.3 billion and $37.2 billion (Colditz, 1999). This is between 2.4 % and 3.7 % of total health care costs. When obesity costs are included, this rises to a minimum of 9.4 % of all direct costs. It has been found that medical costs were on average $330 lower per year for active persons than their inactive counterparts. Thus the costs to society of inactive lifestyles are clearly significant, not only in terms of the pain and suffering caused by premature death and disability, but also in financial terms – especially costs to the health service. Could savings be achieved if people became more active? Table 11.2 shows data from the National Heart Forum, which provide realistic estimates of the likely reductions in incidence of CHD if various risk factors were achieved. They calculate that if all people currently doing no activity or only light activity took up regular moderate activity, this would lead to a nine per cent reduction in CHD. This compares to ten per cent achievable through reductions in high cholesterol.

A study in the US (Jones and Eaton, 1994) has costed these potential savings, finding that $5.6 billion would be saved annually if 10 % of adults began a regular walking programme. In Northern Ireland a recent study (Swales, 2002) estimated that reducing the sedentary proportion of the population from 20 % to 15 % could lead to 121 lives saved each year (among those under 75 years). The value of the associated economic benefit

Table 11.2 Proportion of all CHD that could be avoided if levels of five different risk factors were reduced, UK

Risk factor	Most likely change	% reduction in CHD
Blood cholesterol	All with levels < 6.5 mmol/l	10
Physical inactivity	All light and sedentary become moderate	9
Blood pressure	50 % with levels < 140/90 mm Hg	6
Smoking	Prevalence of 24 %	0.5
Obesity	6 % men, 8 % women with BMI > 30	2
Total		28

Source: National Heart Forum (2002).

would be £131 million, and the direct cost saving to the Northern Ireland health services would be £0.62 million annually.

11.8 Walking and cycling as beneficial forms of physical activity

11.8.1 Walking

Walking is the most natural form of physical activity and our most basic mode of transport. A comprehensive review of the subject by the originator of the exercise/health relationship concluded that 'Walking is the nearest activity to perfect exercise' (Morris and Hardman, 1997). It fulfils all the criteria for healthy physical activity: it is aerobic, uses a major muscle group (i.e., the legs), is weight bearing, and can be carried out at a moderate intensity. Perhaps most importantly, it can be done anywhere, with little or no equipment and by the vast majority of people.

Walking is often included in epidemiological studies of exercise in relation to disease but has seldom been specifically tested. There is, nevertheless, growing evidence of gains in the prevention of heart attacks and a reduction in total death rates. For example, one study found walking just 15 km per week could reduce the risk of death in middle-aged men (Paffenbarger, 1996).

Any amount of walking, at any pace, expends energy. This gives walking an almost unique role in terms of weight control, as it helps people to expend the large volumes of energy necessary to strike an energy balance and prevent weight gain. Walking at a brisk pace will have a greater impact on cardio-respiratory fitness. For example, improvements to fitness among women have been found to more than double with an increase in pace from three to four miles per hour, and double again when the pace was increased to five miles per hour (Duncan *et al.*, 1991).

Other research has shown that walking does not need to be done in one continuous 'bout', as was stressed in previous exercise recommendations. Recent studies have shown that even ten minute brisk walks can increase maximal oxygen uptake. One study found that women walking continuously for 30 minutes, 5 days a week, had almost identical increases in fitness as women who split their 30 minutes into three ten minute walks. Perhaps even more encouraging was that the short walkers lost more weight and reported greater decreases in waist circumference than the long walkers (Murphy and Hardman, 1998). More research is continuing to confirm this, but the findings are encouraging and strengthen the potential for improving health through walking for short journeys.

Walking is healthy, easily incorporated into daily life, via 'bite-sized chunks', and one of the few sports likely to be taken up by people and actually maintained. Walking is by far the most popular recreational activity that can be enjoyed by people of all ages and physical conditions, and requires little

skill or specialist equipment. This is in contrast to sports and exercise that are generally only undertaken regularly by around ten per cent of people.

Indeed, it appears that the so-called 'aerobics boom' has passed by the vast majority of the population, with many people finding the inconvenience, effort and time demands of regular sport or planned exercise too demanding to develop a regular pattern of activity. The situation with swimming illustrates this: although a popular and health-enhancing activity, it requires a significant time commitment to take part regularly enough to benefit health. In addition, a Sport England survey in 1997 showed that there were less than 900 public swimming pools in the whole of the UK – one for about every 60 000 people (Sport England, 1997). This level of provision clearly does not make swimming a viable form of exercise for large numbers of people to take regularly. In addition, vigorous exercise and sports carry an increased risk of injury which may offset the benefits to cardiovascular health. In contrast, walking is low impact, carries a low risk of injury and can be practised daily, allowing a greater potential for participation by large portions of the population. This is borne out by research: a systematic review (Hillsdon and Thorogood, 1996) of physical activity promotion in 'free living populations' (i.e., not in laboratory conditions) showed that of all the randomised controlled trials to promote exercise (including walking, jogging, swimming and exercise to music), those promoting walking had the greatest success. They found that an activity that could take place from home was likely to be more successful and that attendance at an exercise facility was generally not required. They concluded 'Brisk walking has the greatest potential for increasing the overall activity levels of a sedentary population and meeting current public health recommendations'.

11.8.2 Cycling

Cycling also has great potential to be incorporated into daily routines, and it can be argued that the health benefits of cycling are even greater than walking. Cycling is an aerobic activity which uses major muscle groups, expends significant volumes of energy, and has the potential to raise the heart rate to an extent that benefits cardiovascular health. However, the intensity of effort is usually greater than walking. Cycling at only 10 miles/hour (16 km/hour) expends 5.5 METs (MET stands for metabolic equivalent, with one MET being the energy used at rest). Walking would have to be done at a very brisk pace (faster than 4 mph (6.4 kph)) to use the same amount of energy (Ainsworth *et al*., 1993). Also, cycling uses periods of active work alternating with rest periods, which allow recovery from high levels of activity when in motion. These factors make it a highly suitable activity to provide aerobic exercise and thereby to improve physical fitness (Pearce *et al.*, 1998).

Cycling is also low weight bearing. Many people cannot do certain sports (especially activities such as running) because of the pressure it puts on their joints. Because the bike takes the weight of the body, much less pressure is

exerted on the joints whilst cycling. This makes cycling a good form of exercise for those with certain joint problems.

Until recently, there was little evidence from epidemiological studies specifically on cycling, as it was often included in studies among other types of physical activity. However, the Copenhagen Heart Study (Andersen *et al*., 2000) found that cycling has a strong protective effect. The study involved 13 375 women and 17 265 men aged 20–93 years. The study assessed the subjects self-reported health, blood pressure, cholesterol, body mass index and risk factors such as smoking. Even after adjustment for other risk factors, including leisure time physical activity, those who did not cycle to work experienced a 39 % higher mortality rate than those who did.

A well-designed experimental study has also demonstrated the health benefits of cycling. A randomised controlled trial in Finland (Vuori *et al*., 1994) on 68 inactive middle-aged men and women showed that walking and cycling to work increased fitness and improved cholesterol levels, with greater improvements among the cyclists. When one group walked and one group cycled, the cyclists showed an improvement of 7.3 % in VO_2 max (a measure of aerobic fitness) while the walkers showed an improvement of 1.6 %. On the treadmill test, the cyclists improved 13 % and the walkers 9 %, even though the cyclists had started at a higher level.

In the UK, a study of non-exercisers who agreed to take up cycling for at least four days per week found the greatest benefits near the beginning of the experiment, and the more the volunteers cycled, the fitter they became (Pearce *et al*., 1998). Body fat also declined significantly among 59 % of the volunteers who were overweight or obese at the outset.

In summary, cycling and walking have an enormous potential to improve public health. Increasing rates of cycling and walking would have a positive impact on the incidence of major forms of mortality and morbidity, notably cardiovascular disease, obesity and diabetes. As forms of physical activity, cycling and walking are more appealing to greater numbers of people than traditional sports or exercise and there is clearly a great potential for increased participation.

11.9 Other public health benefits of cycling and walking

Of course, the benefits of cycling and walking do not stop at improvements in individuals' physical and mental health. Walking and cycling are pollution-free, environmentally sustainable modes of transport, which make negligible contributions to congestion. A shift (back) to non-motorised transport would be good for the health of communities, and for the environment.

More cycling and walking would significantly improve air quality and reduce greenhouse gas emissions. Road traffic is a major contributor to air pollution. It has been estimated that up to 24 000 vulnerable people die prematurely each year and similar numbers are admitted to hospital because

of exposure to air pollution from particulates, ozone and sulphur dioxide, most of which is related to road traffic (Committee on the Medical Effects of Air Pollution, 1998). Air quality is often worse in more deprived areas and affects vulnerable populations more, including the increasing number of children with asthma. Car drivers also suffer up to two to three times greater exposure to pollution compared to pedestrians (DETR, 1998). A recent experiment among cyclists in Copenhagen demonstrated that even after taking the increased respiration rate of cyclists into account, car drivers appear to be more exposed to airborne pollution than cyclists (Rank *et al*., 2001). Bicycles do not draw on the world's finite fossil fuels. A bicycle travels around 600 kilometres on the energy equivalent of a litre of petrol and the energy source, food, is of course renewable.

A wholesale shift in favour of cycling and walking would lead ultimately to a reduction in the overall risk of road traffic injury. Road crashes are the principal cause of 'accidental' death and injury, with children and people from disadvantaged backgrounds particularly at risk. A disproportionate number of victims of crashes are pedestrians and cyclists, accounting for about 20 % of those involved in serious accidents in the WHO European Region (WHO, 2002). Pedestrians and cyclists have much higher rates of road deaths than car users if measured only in terms of deaths per billion passenger-kilometres. However, the Dutch Ministry of Transport have noted that it is more accurate to compare only the risk for distances that can be cycled, and not consider the kilometres travelled on motorways, which are 'safer' kilometres on average. They found that when motorway travel was excluded, the resultant risk for cyclists was very close to that for car users.

The level of risk also needs to be related to the potential benefits in terms of improved health. The potential loss of 'life years' (the life expectancy at age of death of all cyclists) in cycle fatalities can be related to the potential gain of 'life years' through improved fitness – particularly as a result of a lowered rate of heart disease. An analysis by the British Medical Association showed that even in the generally hostile traffic environment for cycling in Britain, the benefits gained from regular cycling in terms of life years gained outweighed the loss of life years in cycling fatalities (British Medical Association, 1992). One calculation has shown that the ratio is around 20 years gained to 1 year lost (Hillman, 1993). Furthermore, because it is known from countries such as Denmark and The Netherlands that the risks can be considerably reduced, the potential for an overall benefit to public health from cycling is considerable. However, the more important longer term point is that a shift towards more liveable streets with a 'critical mass' of cyclists and pedestrians being allocated (or claiming) a more equitable portion of the road space would lead to lower traffic speeds and volumes, and a reduction in the amount of carnage on the roads.

More cycling and walking would lead to greater social interaction and improve 'social capital', a concept being linked increasingly to health. Motorised traffic contributes to community severance, with people being cut

off from their community, friends and neighbours as well as essential services. Maintaining social contacts contributes to mental health, well-being and quality of life, and is particularly important for older people and vulnerable populations. Busy streets can mean that children cannot play outside and are discouraged from walking and cycling to school. This diminishes their levels of regular exercise, which can affect aspects of physical health, notably obesity. Perhaps more importantly, however, it diminishes the ability of young people to interact properly with their environment, learn about their surroundings and develop an appreciation of risk and adventure. Streets with speeding traffic do not make good playgrounds. As one recent *British Medical Journal* correspondent elegantly stated: 'The sad reality is that most streets are now linear car parks with a central race track' (Guthrie, 2000).

By contrast, 'liveable streets' filled with people on foot or two wheels encourage social interaction and play, build social capital and discourage opportunities for crime as well as diminish the fear of crime. These broader benefits of walking and cycling should not be underestimated. What use is it to have reduced our risk of death from heart disease, and extended our longevity through exercise, only to be too scared to walk out of our front doors?

11.10 Conclusions

Walking and cycling have enormous potential to make a significant contribution to improving public health. As modes of transport they are efficient, non-polluting, non-invasive and healthy. As forms of exercise they are health-enhancing, popular, accessible, and progressive. The promotion of walking and cycling is one of the best reasons for health and transport professionals to join forces and achieve joint complementary objectives.

A wholesale move to swap petrol power for leg power would help to reduce the enormous public health burden and cost to society of physical inactivity, while helping to enhance air quality, reduce congestion, improve social inclusion and reduce road casualties. The potential costs are few, the benefits substantial. As the World Health Organisation has stated 'There are major opportunities for achieving large health gains for the European population by increasing levels of routine physical activity. Walking and cycling as means of daily transport can be a most effective strategy to achieve these gains' (WHO, 2002).

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12

The walking economy

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12.1 Introduction

The original setting for debate on the walking economy was a Walk21 conference in Perth, Western Australia, shortly after the release of Perth's Walking Strategy.[1] This strategy incorporated, among other elements, the Australian Pedestrian Charter, drawn up a year earlier at a Pedestrian Summit in Sydney.[2] Like so many charters before it, from the Magna Carta on, this had spelt out 'a better deal' and like some of its predecessors could easily become yet another useless piece of paper unless it contributed eventually to change. In this instance the desired change involves the promotion and realisation of pedestrian-friendly policies and more walkable environments.

For this to happen, walking has to be taken seriously. Walking is a clean, convenient, demand-responsive, space-efficient and energy-efficient transport mode ideal for distances up to a kilometre or more. It is one of the most popular recreational pastimes. Walking is – most telling of all in the midst of an epidemic of obesity in Western societies – one of our most cost-effective health measures.[3] It is, however, also the Cinderella of transport modes.

It used to be that walking and pedestrians were hardly ever mentioned in transport and traffic studies, other than as problems or impediments, reluctantly acknowledged. Now there is a growing literature attesting to the benefits of non-motorised sustainable modes and a mounting body of evidence pointing to the damaging effects of motor traffic and car-dependency.[4] It would seem as if the argument was uncontested, the issues accepted and the role of walking and cycling acknowledged, yet in practice specific projects for these so-called 'alternative' modes are left scrabbling for the crumbs that fall from the motor lobby's table. Why?

At first sight it would seem fairly obvious why this is so. By comparison

with the motor/oil-based economy, that associated with walking and pedestrians is minute, insignificant and as a result lacks influence – certainly it appears to lack those champions with financial and political muscle. Is that necessarily so and need it always be so?

12.2 The power of money

Whether we like it or not, in the free market capitalist economy that most of us inhabit, money talks. No matter what the flavour of our local politics, the global economy will tend to influence our lives more and more, and in that global economy, oil talks louder than most. There is big money behind the manufacture, sale, maintenance, repair and even the ultimate destruction, of our cars and in the supply of all the infrastructure that supports them. This includes not just the fuel that powers and lubricates them but also the construction and maintenance of the roads and highways on which we drive, and even includes the significant slice of our valuable real estate devoted to these vehicles, whether moving or stationary.

12.3 Political pressure

Faced with such a huge economic juggernaut, local politicians are unlikely to upset the status quo. Which politician is going to turn away the opportunity of 1000 jobs in a car plant or the status of opening a new freeway sold on the basis of not just its transient construction jobs but also its promised travel time savings and economic stimulus? Given the huge sums involved in these projects there is enormous pressure on all involved to demonstrate that, within narrowly defined criteria, benefits outweigh costs. It can be left to others, more economically qualified, to tilt at these particular windmills by suggesting that perhaps there might be an element of futility in some of these community investments. Whether the beneficial impacts of such expenditure are accepted and whether its source is via government (i.e., taxes) or more directly from our pockets, there is no denying the size of this particular branch of the economy and therefore the considerable vested interests pushing hard for ‘more of the same’. In comparison, the walking /pedestrian economy is a very poor relation and so long as that is the perception, progress on implementing such documents as the Australian Pedestrian Charter, and similar well-meaning manifestos will continue to be slow.

12.4 Professional interests

As long as the real and perceived financial clout lies with the vehicle/road lobby and with the big ticket public transport projects, that is where the bulk

of professional and technical support will be directed. Such power imbalance is further reflected in the strength of advocacy groups, so that pedestrian groups (where they exist) and cycling organisations are no match for the motoring clubs and industry lobbyists. Is it any wonder that the sustainable transport message is diluted and rendered impotent and that the perception of what is in the public interest is corrupted? It is no surprise that our role as vehicle beneficiaries (whether driver, passenger or goods recipient) is so closely identified with our role as voters, hence setting up a political feedback loop that is self-perpetuating.

12.5 Self-interest

For this political tide to turn, the voting community has to be convinced that it is in their individual interests to change. This entails, on the one hand, highlighting the benefits of a more sustainable approach and, on the other, identifying the true costs of continuing down the path we are set on and demonstrating convincingly that our financial interests will suffer unless governments, industry and we as individuals change course.

Unfortunately, for such self-interest to be harnessed (after all, it is the most honest of motives) there has to be some alignment of personal benefit and community benefit. Too often the costs fall on one part of the community and the benefits another. Too often the political pain has to precede the political gain. What politicians are going to blow their budget on something that is not going to get them elected in three years time?

Fortunately there have been some far-sighted politicians, backed by enlightened advisers, willing to take that risk. However, when embarking on policies that curb the seemingly insatiable demands of the private car, these community leaders are rarely offering themselves as sacrifices on the altar of environmental correctness. Instead they are banking on the economic as well as the environmental benefits that will eventually flow from their actions. Being altruistic and appealing to our better natures may provide the bonus of a warm inner glow but it cannot be relied on. Better to 'get with the strength' and appeal where we can to our economic self-interest. Greed may not be good, but it can be one of the major incentives to get things done.

12.6 Who gains, who loses?

By revealing the walking economy – identifying who might benefit from more pedestrian-friendly policies and who bears the costs of persevering with unsustainable transport solutions – we reveal not only strategic directions that can be profitably pursued but also potential partners that can be co-opted along the way. Socio-economic and political systems are inherently

complex and their analysis notoriously imprecise. The quasi-science of attributing monetary values to such vague concepts as 'well-being' can be left to others. Instead, an attempt will be made to catalogue the various categories that collectively make up what we may describe as the 'walking economy' (from the personal and wider community levels through a range of commercial and industry sectors) and, depending on the health of that economy, decide who stands to gain or lose.

12.6.1 Individuals

Personal benefits of walking/pedestrian-friendly policies flow through to us as individuals on three levels. We benefit at the most basic level if we do not substitute walk trips for vehicle trips. The health benefits one would get from walking the dog could equally be had at the local gym, except walking would be a lot cheaper and better for the environment. Further benefits flow if we substitute some vehicle trips by walking trips or walk/public transport trips. The greatest benefits, however, flow when the degree of trip substitution allows the purchase of a car to be foregone. For a proportion of inner city residents this may mean no car at all but for other households it is more likely to be the second or third car that is done without. This implies that if the quality of public transport and the pedestrian environment is good enough then one can choose not to drive, and not even to own, a car. For many who are not capable of holding a driving licence, whether through age, disability or financial circumstances, that choice is not a voluntary one. Every additional person voluntarily opting to reduce or eliminate their car-dependency benefits all those in that 'no choice' category. By contrast, each additional driver contributes to the downward spiral of reduced public transport and degraded facilities for alternative modes, leading in turn to further car dependency.

The personal benefits may be financial but there will also be physical and mental health benefits. In addition the environmental and aesthetic benefits that flow from numbers of individuals walking (discussed under community benefits) will also have individual benefits.

12.6.2 Community

The community as a whole benefits from the cumulative benefits to individuals but there are two additional aspects to the benefits as they affect the wider community, although they are often just the other side of the same coin. There are the positive aspects that flow from more people walking, and there is the absence of, or reduction in, negative impacts of motor vehicle (particularly private car) travel.

One aspect for the community is also the 'chicken and egg' conundrum. An improvement in the quality of the public domain can go hand in hand with an increase in the number of walkers using that environment, but which came first? Are more people walking because it is a more pleasant people-

friendly space or is it a better environment because the people themselves add to the atmosphere of the place? Could it also be that people on foot experience and appreciate better their surroundings than when cocooned in a capsule and focusing on the road in front of them and, as a result, demand more of those designing and controlling these spaces?

In addition there is the public safety benefit that flows from more eyes on the street. Such benefits are difficult enough to quantify, although the cost of assaults and the associated policing costs should be able to be estimated. Even more elusive are concepts of 'community' itself, of a more civil (civilised) cohesive society. The Pedestrian Federation of America in its publication 'Walk Tall' used an iceberg to illustrate that beneath the visible official costs of crashes lay a larger array of hidden costs and impacts such as fear of travel and resulting social isolation.[5] An environment that makes independent travel by young or old difficult or dangerous can tie up vast human resources as other family members or friends are forced into the role of chaperone or quasi-chauffeur. This not only diverts time and energy from more economically productive activities, but a limitation on independent travel may also stunt the developmental growth of the young and the quality of life of the old. Can we therefore put a value on a more caring environment and indeed can we link the words 'walkable', 'liveable' and 'valuable'? The 'New Urbanists' believe we can. At least the developers following their lead and attempting to recreate traditional neighbourhood communities are doing so not out of altruism, because it 'feels good' to do the right thing, but because the market-place believes it adds value.[6]

12.6.3 Industry

At first sight those same considerations that commend walking as a non-polluting, cheap and equitable mode of transport are those same factors that cause it to have little political influence – it is cheap. There are few juicy contracts employing thousands of people and injecting millions into the local economy. We are not pushing out the boundaries of science and technology with pedestrian facilities so it does not attract 'hotshot' scientists and fat research budgets.

When we choose to walk we do not directly contribute much to the gross domestic product (GDP), one of the measures of our economic health. The irony is that such paper accounting systems are more likely to indicate benefits if pedestrians are knocked down on the road. Depending on the paper value of our labour, we apparently contribute more to the national economy through the pockets of the medical, legal and crash recovery teams as a road trauma statistic than as a healthy individual safely walking the streets. While personal and community costs and benefits may provide the moral imperative for action and possibly also a political pressure point, the key drivers will be with the 'industries' that might see financial gains in alternative modes. These industries may be divided into suppliers, who are actually supplying

products either directly related to walking environments or which indirectly benefit from such provision, and also professionals who are providing services related to walkers/pedestrians.

Suppliers
The most direct suppliers are the footwear and clothing manufacturers, but others are those building suppliers providing pavers, bricks, light standards and other street furniture elements aimed at pedestrian areas (although in practice it may be the same firms selling and installing materials for roads). Less obvious are the builders providing the land-uses that constitute walkable, accessible environments. Again it may be the same firms providing medium density mixed use and transit-oriented developments around activity centres that are contributing to urban sprawl.

Retailing
Other players in this economic equation are the retailers and the suppliers of retail space, although they have more usually been the contributors to the problem rather than the solution. Small corner stores and neighbourhood shopping centres stand to gain from more walkable environments but large regional shopping centres can also adapt to gain custom by public transport and from a local walking catchment. Rather than pleading for more parking as is their norm, if such shopping centres were to actively encourage alternative travel modes and successfully demonstrate a pattern of mode shift away from private vehicles, then new stores could be built with less parking (which can be expensive to provide) and existing parking areas could be redeveloped for more productive trading space. The 'received wisdom' is that each parking space represents so many customers per day but if an equal number of customers can be induced to walk, cycle or take public transport the trader saves the cost of providing the parking. Some of that saving could be used to subsidise a home delivery service that benefits the non-drivers, but as it stands the non-drivers subsidise the driver's parking through the cash register. Many such centres have the opportunity to diversify and become genuine mixed-use centres with community facilities, entertainment and medium density housing. If so, they can reap further economic benefit through longer trading hours, in some extreme cases 24 hours, hence the return on capital can be considerably greater.

Public transport
A further industry to benefit from improved walking environments is the public transport industry, as for most transit trips there is a walking component at each end that is an integral part of the trip. Improved walkable environments can greatly expand the catchments for public transport systems and hence greatly increase the systems' viability. When we start to see walking as an integral part of the transit industry then it greatly extends its economic sphere of influence (although the public transport operator rarely has any

direct influence over the practical provision, upgrading or maintenance of such walking access routes).

Tourism

Of growing importance to the economy in Australia, and similar national economies, is the tourist industry. It is one area where the importance of pleasant walking environments is sadly underestimated. We are aware of the 'package' tourists who are flown in and spend the bulk of their visit piling in and out of a coach going from photo opportunity to duty-free shopping opportunity to eating opportunity. Independent tourists, on the other hand, tend to do more walking when on holiday than they would normally do at home. Over and above this sightseeing and exploratory tourism, there is the great potential of walking tourism where one of the prime purposes of the trip is walking. This might feature the classic walks such as the Milford track in New Zealand or the Cradle Mountain track in Tasmania, the Pennine Way in the UK, the pilgrim routes of Europe or the Appalachian Trail in the USA. There are countless opportunities in rural, wilderness or urban environments offering rewarding walking experiences.

This industry involves both suppliers of products and professional services. It can require the construction of actual facilities such as graded walking tracks in wilderness areas and national parks, or the construction and running of accommodation facilities and possibly the provision of connecting transport. In many cases, however, it merely involves introducing the public to the opportunities for walking, inspiring people to use the facilities already in existence, planning the logistics of connections and interpreting the experience. The process can involve something as simple as a single page leaflet produced by a local Council to encourage people to utilise a local park, or it can involve a highly professional team of guides and other staff planning and supplying logistical support, catering and accommodation for a five day wilderness trek. It requires, as with any kind of tourism, interesting and attractive places that we want to explore and reasonable conditions under which people can enjoy doing so. Good interpretation and some imagination can transform some at first unpromising sites. Two that come to mind are the 'underground' or basement tours of old Seattle and the outstanding success of walks over the arch of the Sydney Harbour Bridge.

As a growing market, walking can be an add-on, 'value adding' to existing tourist activities but, as discussed earlier, it reaps most rewards when it can displace vehicle trips. We derive maximum benefit when we can confidently enjoy holiday and tourist destinations without travelling by car, or relying on tour buses or coaches. Everyone else benefits too! The best resort and 'get-away' environments assist the relaxation process by keeping vehicular traffic to an absolute minimum.

One of the tests of a city's public transport system is whether visitors can work it out. How do you pay? Where does it go? Does it provide information on and access to walks in the city and its outskirts? My first introduction to

the concept of a city transport system as a tourist resource was through the books describing countryside walks put out by London Transport.[7,8] These utilised its metro trains and buses to access starting and finishing points for walks through the country around London and provided maps and interpretive material for the area covered. It was a concept that was later utilised in Sydney[9] and variants are available in many other cities.

Pedestrian Planners

From devising pleasant and interesting walks utilising existing routes, it is a small but significant step to evaluating pedestrian environments, making recommendations for improvements and additions or planning entirely new routes, environments and facilities. Examples of this are the Pedestrian Action Plan that was undertaken on behalf of the City of Sydney in the early 1970s[10] and many similar pedestrian plans and strategies in various forms produced since in a number of towns and cities. A few recent examples of 'Pedestrian Planning' in New South Wales are the Pedestrian Access and Mobility Plans (PAMPs) jointly funded by local Councils and the State Roads and Traffic Authority.[11]

These studies are generally undertaken by planning and urban design firms, or by traffic planners and engineers but rarely if ever by a firm or sole agent calling themselves 'Pedestrian Planner'. The 'iced tea' (Intermodal Surface Transportation Efficiency Act (ISTEA)) legislation and its successor (the Transportation Equity Act for the twenty-first century (TEA-21)) in the United States have nevertheless done much to create a body of professionals in that country dedicated to pedestrian and (perhaps more so) bicycle issues to the extent that they can support an Association of Pedestrian and Bicycle Professionals with currently close to 400 members (see Chapter 32). This collection of government officers, advocates, consultants, academics, planners, engineers, architects and safety experts does not however constitute a profession with an agreed body of knowledge and a regulated set of standards or entry qualifications.

If we are to develop a profession of 'pedestrian planning' which can provide a balanced career path then we require an 'industry' with sustainable funding. Such funding will obviously vary from city to city and country to country. Despite a greater awareness of pedestrian issues in the community and lip service on the part of politicians to the priority that should be afforded pedestrians, the currently available funding is a sad reflection on the status and importance of pedestrians, at least in the minds of those holding the purse strings. In Australia, for example, funds allocated do not even seem to have been maintained, let alone improved. As a result, either the time and effort devoted to the projects is cut considerably, or the work is cross-subsidised with more profitable projects. Otherwise one goes out of business. This is hardly a recipe for a burgeoning profession!

The alternative is the adaptation of the current situation where a variety of professionals make their contribution to the public and private environment,

one consideration among many on their agenda being pedestrians. An improvement on this would be some formalisation of the educational program to ensure that a body of information on pedestrian planning and design is taught to all the relevant professionals having a role in the public domain design process. This then puts an onus on academics, with the help of active professionals in the field, to develop curricula and promote at least the foundations of an academic discipline.

12.6.4 Advocates

Without formal professional backing, pedestrians lack a champion when resource and design decisions are made. In this environment the role of the informed advocate organisation becomes critical. As noted earlier, however, such advocacy groups as exist have few resources compared with lobby groups for motorists and other road users. Even cyclist organisations, who represent a much smaller constituency, tend to have more active memberships and therefore more resources, both human and financial. A study undertaken to ascertain whether there was a role for a pedestrian advocacy organisation in Australia[12] found that while almost all those interviewed agreed there was a need for a body to speak for pedestrians, hardly any indicated that they would join such a body. They noted that whereas cyclists actively identify themselves as cyclists, pedestrians rarely identify themselves as pedestrians. Even the longest established pedestrian advocacy body, The Pedestrians Association founded in the UK in 1929, has now re-badged itself as 'Living Streets'. While this change may have a little to do with the unfortunate 'mundane' connotation of the word 'pedestrian', it nevertheless has more to do with the recognition of the role of amenable, safe and convenient walking conditions in the creation and maintenance of healthy, liveable, civilised and economically successful street environments. Similar advocacy groups have sprung up in Europe, North America and Australasia since, but few have yet managed to set up and sustain a full-time staff capable of countering the combined lobbying efforts of the roads, oil and vehicle manufacturing industries.

Would it be any different if a major industry was co-opted, if a significant corporate body and fledgling global industry found it had a vital economic interest in improving the conditions for pedestrians and cyclists? Could this be the partner, the champion, the catalyst for change we are looking for? As we shall see, few advocates think so but maybe this 'new kid on the block' may stimulate some of the economic drivers we have been talking about.

12.7 The Segway

In 2001 the personal transportation device, the Segway, was released by the inventor Dean Kamen in the United States.[13] This is a gyroscopically-balanced,

battery-powered device looking somewhat like an old hand operated lawnmower but capable of conveying a standing individual at four times normal walking speed for distances of up to 25 km. Since its launch (and the subsequent enabling legislation pushed through the various US state and federal legislatures), the Segway has come under fire from pedestrian advocates due to its perceived threat to pedestrian safety when permitted to share pedestrian routes and spaces. It is nevertheless worth commenting on here as a potential phenomenon that could have an impact on the walking economy and may serve to illustrate some of that economy's dynamics.

It would appear from the hype surrounding its launch that the Segway has considerable corporate support and backing in North America. If the hype eventually translates into successful sales figures in both the domestic and international market (with a penetration likely, in one commentator's view, to match that of the personal computer) then, at a currently predicted unit price of US$ 3–4000, a huge industry with aspirations approaching that of the motor industry is in prospect. If for the moment the optimistic predictions for the Segway are taken seriously, then we are facing over time a major economic force in its own right. How might that impact on the walking economy?

While in favourable scenarios Segways can supplant many shorter car trips, even its most optimistic supporter would not see it ever replacing the private car. It nevertheless does have the advantage of significantly less energy and pollution impacts. This makes it far more sustainable and, with its inevitable technical offspring, far more likely to outlast the traditional private car as a transport mode. All this does not ignore the possibility that the Segway may be a passing fad and commercial flop like a number of predecessors, but it demonstrates a perceived gap in the transport market between walking and high performance cars. This is a niche currently occupied by pedal cycles and to a minor but growing extent by toy, recreational and mobility-aid devices such as skateboards, in-line skates and electric scooters (of the type classified for use in pedestrian areas as motorised wheelchairs).

The controversy surrounding the Segway has not been to do with the merits of the device itself so much as the issue of where it can operate. A vehicle is usually only one part of a transport system. Such a system usually involves a track or roadbed, storage for the vehicles and all the infrastructure and management systems for controlling, maintaining and fuelling the vehicles. The main concern here is that in the absence of a more appropriate operating environment or track, the Segway is being permitted to use routes and spaces currently occupied by pedestrians.[14]

As noted above, the hype that accompanied its launch included glowing comparisons with personal computers and the use of the Internet. Just as access to the Internet has, until relatively recently, relied on copper telephone lines that already linked most of us, so it seems the Segway will initially rely on existing pedestrian routes for access. Similarly, just as the inadequacies of

the telephone infrastructure have become evident and other technological solutions sought for access to cyberspace, so the weight of numbers of Segways and similar devices will inevitably force other options to the fore.

One alternative is to use cycleways and cycle lanes as the basis for a network of 'slow-ways' that would accommodate a whole category of vulnerable wheeled vehicles including Segways and cycles but also 'toy' vehicles and motorised scooters. A further option would be to permit such vehicles on the general road system much as cycles are at the moment but, in recognition of their inherent vulnerability, to calm traffic on these routes by reducing the speed limit to, say, 40 kph.

In all of these options it will be in the economic interest of the Segway Company, and of the individual Segway owners, for resources to be allocated to provide safe and convenient riding conditions for the devices. It cannot benefit their public relations, and hence sales, to have ongoing conflict and collisions with pedestrians. If initially there are no realistic practical options other than to share space with pedestrians, money will have to be spent providing sufficient width on routes so that walkers and Segway riders can pass each other safely. Greater attention will need to be paid to the initial quality and maintenance of surface materials in order to accommodate the growing range of small-wheeled devices, although the increasing sensitivity to public liability insurance claims from pedestrians should in itself be sufficient incentive.

Should the more desirable option of a comprehensive network of 'slow-ways' be adopted, then the complex engineering, design and traffic management challenges associated with the insertion of a further segregated mode will have to be addressed. This should involve more than the simple line marking operation some authorities have to date considered sufficient to accommodate cyclists. A similar technical effort applied with considerable political dexterity will be required if the shared roadway option is adopted. Whether some of the necessary resources can come directly from Segway users through some form of licensing or whether the growing constituency of Segway users will provide sufficient political leverage for the use of general revenue remains to be seen.

Despite the critics' concern that Segway trips will simply replace trips on foot by lazy walkers, a major objective and opportunity will be to replace shorter car trips and therefore ultimately to claim space currently occupied by both moving and parked vehicles. It would then be even more justifiable to divert resources from cars to more sustainable modes. In this way the Segway, at first seen as a threat to the walking economy, can be co-opted as an ally and partner contributing to the upgrading of both pedestrian and cycle facilities. There are potential benefits from the personal, community and industry perspective but only time will tell whether we can realise that potential – whether the self-interests of individuals and corporate entities can indeed be aligned with the wider interests of the community.

12.8 Conclusions

There will be an element of preaching to the converted in this chapter. For those of us close to the issues, the merits of doing all we can to encourage more walking, both as sole mode and in conjunction with public transport, appear so obvious and the arguments we read in the literature so compelling. We therefore find it perplexing and frustrating that little progress appears to be made and that we, whether in developed or developing nations, whether East, West, North or South, become more car dependent each year.

Currently the economic momentum is with the car and the global, multi- or transnational players that propel and support its voracious appetite. Lest we get into paranoid rantings about the 'evil empire', it should be pointed out that we are willing conspirators. 'They' would not be able to have their way if we as a society were not willing, indeed eager, participants – hooked on the drug of convenient mobility with its promise of power, status and even sex. Some have attempted to make the comparison with smoking – powerful forces pressing a product on a willing customer base, but one which is progressively becoming more aware that the product is doing them and those around them no good, yet reluctant to do much about it. Whether we can see a similar downturn in car use to match the downturn in smoking in western societies remains to be seen.

One way or another the true costs of car dependency and the benefits of walking need far greater airing, but if we are to act on that knowledge we need improved facilities created and maintained by professional well-informed champions within a viable and sustainable industry with demonstrable economic flow on to the rest of the economy.

New entrants to the personal transport market such as the Segway may well eventually change the balance of economic interests in the battle for scarce space in our towns and cities. New champions may emerge from unlikely directions.

In responding to such new technologies we must be alert to the potential 'fatal flaw' in the detail, and also to the wider picture – how we use technologies to interact with each other and to exchange goods and information and how, in turn, our towns and cities over time respond and adapt to that technology. Various technologies, from the wheel to the latest devices such as the Segway, have been used to compensate for the limitations of walking but have never managed to fully supplant it. We ignore the economic significance of walking at our peril.

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13

Planning for cycling supports road safety

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13.1 Introduction

Safety and mobility of cycling are strongly related to each other. Cities and countries that show an increase in the level of cycling, also show a decrease in accidents with fatal or serious injuries. This is partly due to the fact that where cyclists have more presence on the road, other road users increase their vigilance, expectation and anticipation of cyclists. However, more safety can be gained by planning facilities for cycling.

Contrary to the perception that more cycling will result in more traffic deaths, the view is that road safety will increase as a result of bicycle planning. Measures to restore the balance between the interest of motorised and non-motorised traffic not only improve the safety of cycling and walking, but also the safety of motorised modes. An integrated planning system for different modes fits perfectly well with modern road safety policies that focus on the prevention of risk. Proper planning for cycling and walking is a catalyst for road safety.

13.2 More cycling mobility; more cycling safety

More cycling mobility leads to a lower risk of being killed per km cycled. The risk of being killed per km of cycling per country is inversely proportional to the level of bicycle use, according to a comparison in the WALCYING-study between Great Britain, Italy, Austria, Norway, Switzerland, Finland, Germany, Sweden, Denmark and The Netherlands.[1] Table 13.1 illustrates this. One of the reasons for this is that ‘rare events are dangerous’. Figure

Table 13.1 Bicycle mileage per person per day, and killed cyclists per 100 million km in ten countries

Country	Cycling kilometres per person per day	Killed cyclists per 100 million kilometres
Great Britain	0.1	6.0
Italy	0.2	11.0
Austria	0.4	6.8
Norway	0.4	3.0
Switzerland	0.5	3.7
Finland	0.7	5.0
Germany	0.8	3.6
Sweden	0.9	1.8
Denmark	1.7	2.3
The Netherlands	3.0	1.6

Source: WALCYING (1998).[1]

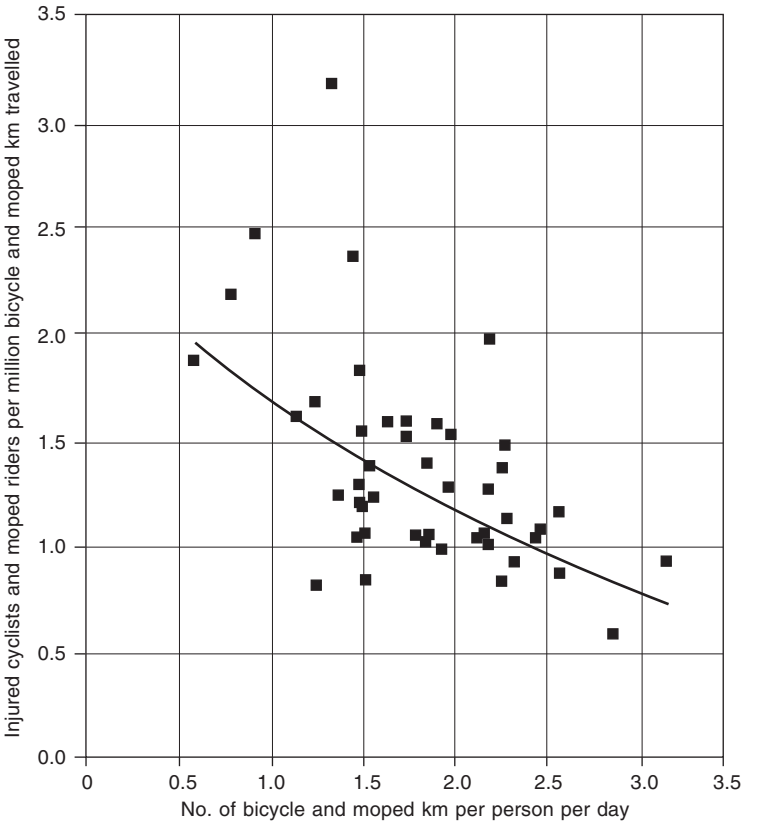

Fig. 13.1 Cyclist safety in 47 Danish towns. The relationship between no. of bicycle km per person per day, and no. of injured cyclists per million bicycle km travelled. Source: Jensen *et al*. (2000).[2]

13.1 confirms this relation, comparing the number of bicycle km per person per day in 47 Danish towns with the number of injured cyclists per million-bicycle km travelled.[2]

Data from different countries show that an increase in cycling use and an increase in the safety of cycling also go together very well. For example, the final report of the Dutch Bicycle Master Plan[3] concludes that in 1998 the number of fatalities among cyclists was 54 % lower than in 1980 in spite of the increase in both car use and bicycle use. The increase of car kilometres was about 50 % and the increase of cycling kilometres about 30 %. The share of cycling of all trips was 28 % and has scarcely changed over the period. In Germany the total number of cyclist fatalities fell by 66 % between 1975 and 1998 while the share of cycling in transport increased substantially from about eight per cent to 12 % of all trips.[4] In the city of York in the UK 15 cyclists were killed or seriously injured between 1996 and 1998 compared to 38 between 1991 and 1993, while cycling levels rose from 15 to 18 %.[5]

How can we explain this positive trend in cycling fatalities, while the risk of being killed on a bicycle is higher than in a car, as road safety statistics show? Is there a general road safety trend that results in less cyclists being killed, and what has more cycling to do with this positive road safety development? For a better understanding, we have to go back to the period of a high growth of motorisation at the expense of cycling use.

13.3 Control of car traffic

13.3.1 A reconsideration of motorisation

All over the world a rapid growth in motorisation has led to planning policies that make cycling and walking more difficult and unattractive. This has continued to the point where motorisation asks too much from society. In western Europe the trend to give full priority to cars started in the 1950s and changed in the early 1970s. In this period the consequences of growing car use for city planning and the huge costs required to invest in all the facilities that cars would need became obvious for the first time. It was estimated in The Netherlands that 15–22 billion Dutch florins (7–10 billion euros) would be needed from 1972 to 2000 to make room for the ongoing growth in motorisation. This calculation had a disastrous political impact as these consequences were political unacceptable.[6] In the 1960s city planners were still prepared to fill in historic canals and to build broad corridors and ring roads in inner cities.[7] Most of the plans could have been prevented in the 1970s and indeed much restructuring of inner cities to make more room for car traffic is regretted now. The start of a policy to control car growth was strengthened by the first oil crises and the first report by the 'Club of Rome', warning us about the limits of the supply of natural resources and the consequences of our growing wealth for the environment.

In the 1960s there was no planning for cycling in The Netherlands. On the

contrary, the view of planners was that cyclists would disappear in the coming decades. The OECD report on vulnerable road users presents a clear statement on the traffic policy in motorised countries in this period.

From the 1960s roads were built to accommodate growing car traffic with often disastrous effects to vulnerable road users and residents of built-up areas. Moreover, the expansion of urban areas led to increasing travel distances from home to work, disqualifying walking and cycling as means of performing a large part of everyday trips.[8]

13.3.2 Road safety in relation to motorisation

What happened to road safety and cycling use in The Netherlands before and after the reconsideration of motorisation?

- The use of the bicycle reached its highest level in 1960. The amount of cycling kilometres thereafter dropped by almost 40 % until 1977. Nevertheless, the number of cyclists being killed per year sharply increased from 1960 onwards, in line with the overall road safety trend. The yearly total of people killed in traffic reached its peak in 1972, when it was three times more than in 1950.
- 1972 onward marked the start of the reconsideration of motorisation; the total of road fatalities started to decrease and in 2002 the total of fatal injuries in traffic was almost the same as in 1950. Cycling shared in this success story after 1977 when the number of cycling km per year rose from less than 10 billion km to 13.5 billion km.

Figures 13.2 and 13.3 present the numbers of fatalities of cyclists and all road users respectively, per year in The Netherlands.[9] Figure 13.4 presents the trend in the use of different modes of transport.[7] In 1976 the Dutch Government introduced two financial sources to support local cycling policies. One arrangement offered a subsidy of 80 % of the costs for urban cycling facilities; the other a subsidy of 50 % of the costs for cycling facilities along

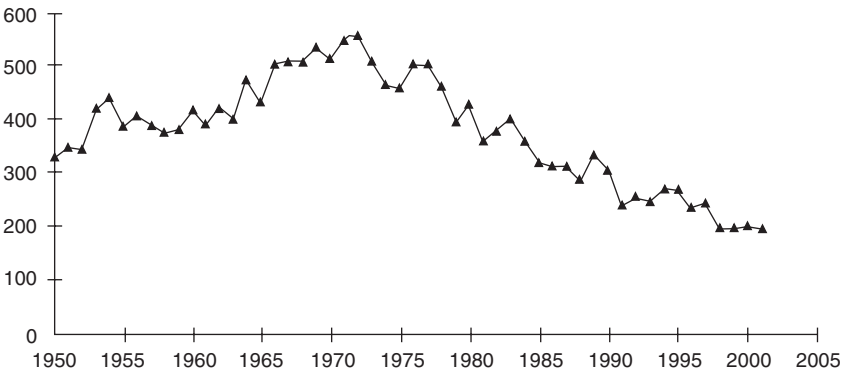

Fig. 13.2 Fatalities per mode of transport (cycling). Source: AVV (2002).[9]

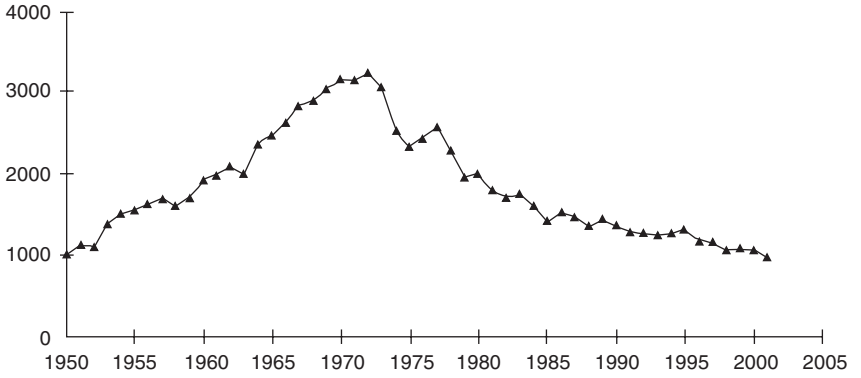

Fig. 13.3 Fatalities per mode of transport (all). Source: AVV (2002).[9]

minor (secondary and tertiary) rural roads. Between 1978 and 1988 the length of cycle tracks increased by 73 % to 16 000 kilometres, while the total length of all roads increased by 11 % to 101 000 kilometres and the length of freeways by 19 % to 21 000 kilometres.[7] From 1990 to 1997 the Dutch Bicycle Master Plan was executed, to promote the use of the bicycle and at the same time increase its safety and attractiveness. However, the positive trend for safe cycling had already started before measures for cycling provisions were taken.

13.3.3 Explanations

A single focus on motorisation correlates with an increase in road safety fatalities, whereas control of the growth in car use correlates with a decrease in road safety fatalities. There are two explanations for this:

1. Road safety scientists emphasise that the risk of being killed per kilometre decreases steadily. This is a result of measures being taken, more experience in policy development and also more experience by road users. As long as motorisation grows rapidly, the absolute numbers of fatally injured road users may still increase, as a lower risk cannot compensate fully for the growth in motorised traffic. However, as soon as the growth of car use is reduced, the traffic system (i.e., road users, policy-makers and designers) manages to decrease the total amount of road fatalities.
2. Transport and traffic policy changed radically in the early 1970s. Control of car use and promotion of public transport reached the national political agenda. Walking and cycling were subsequently valued more positively, car drivers had to adapt their behaviour in residential areas and traffic calming has spread. The planning and design of the roads changed to an orientation towards a mix of traffic modes. Policy started to include different modes of transport, motorised and non-motorised, in the planning system. It was not then very balanced, but at least the sole focus on the needs of cars disappeared.

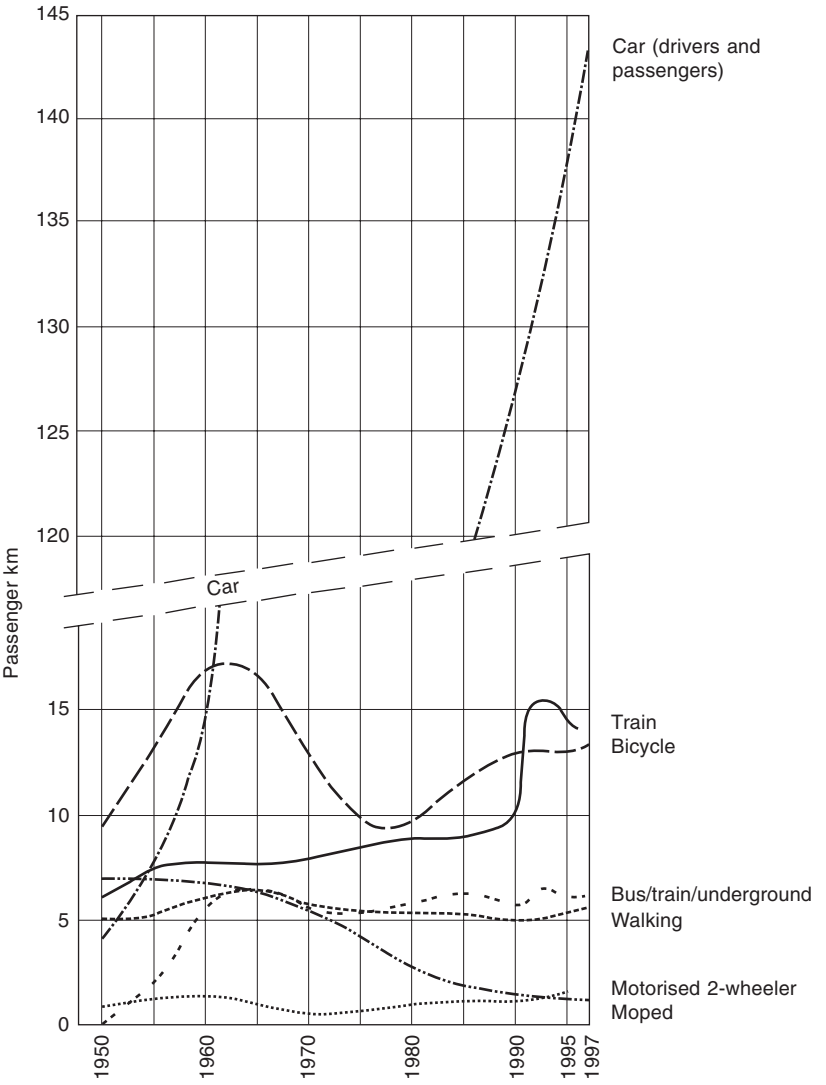

Fig. 13.4 Development of the use of different modes of transport in The Netherlands per passenger km from 1950 to 1997. Source: Albert de la Bruhèze and Veraart (1999).[7]

The second explanation is not contradictory to the first but an addition that in general is being overlooked by the road safety sector. Road safety experts show that the risk of being killed per kilometre cycling is several times higher than for car drivers. They are right, but to a much smaller extent than claimed. Their calculations are not at all sophisticated because they compare all km by cars with all km on bicycles, while they have to focus on the short car trips that can be replaced by the bicycle and they have to include the risk exposed to other road users. Table 13.2 shows how this method results in a

Table 13.2 Risk of a fatal accident per billion kilometres travelled in The Netherlands by car or bike for different age categories. The calculation of the risk of car driving excludes all kilometres on freeways as these roads are not comparable, and includes the risk road users present to other road users

Age group	Car drivers	Cyclists
12–14 years	–	16.8
15–17 years	–	18.2
18–24 years	33.5	7.7
25–29 years	17.0	8.2
30–39 years	9.7	7.0
40–49 years	9.7	9.2
50–59 years	5.9	17.2
60–64 years	10.4	32.1
> 64	39.9	79.1
Average	20.8	21.0

Source: EU (1999).[10]

risk comparison for The Netherlands.[10] Interesting to see is the segmentation by age. We have to take into account that in other countries the risk of cycling will be higher than in The Netherlands. In general, the road safety experts are right in saying that the risk of being killed on the bicycle is higher than in the car although the differences are much smaller when the calculations are more precise.

A change from car driving to cycling may lead to fewer cyclists being killed, as the data show. This has to do with overall road safety developments and these developments cannot be isolated from another way of planning that integrates the needs of pedestrians and cyclists in traffic and transport. This other way of planning can only be developed as a consequence of a policy to promote cycling and walking. The promotion of cycling and walking may therefore be an important element in improving road safety.

13.4 Balancing the needs of motorised traffic and non-motorised traffic

Previous traffic and transport policies have put most of the burden of avoiding serious accidents between motorised and non-motorised traffic on cyclists and pedestrians. In present policy, two approaches regarding the safety of cycling can be distinguished. One is to combine the promotion of cycling use with specific safety measures for cycling. These measures may still to a great extent make cyclists responsible for their own safety. Bicycle helmets are an example of this approach. However, the road safety problems of cyclists and road safety problems in general are mainly to do with the risk exposed by motorised traffic. The second approach is to control motorised traffic and to

let it flow on a selected number of routes and restrict its behaviour on roads with a shared use of motorised and non-motorised modes.

In order to find a better balance between the interests of non-motorised and motorised traffic, the European Union commissioned a study to develop non-restrictive road safety measures for vulnerable road users. The aim was to study the impact of measures that promote the safety and mobility of vulnerable road users together and to recommend a package of road safety measures with priority on these non-restrictive measures. The research was co-ordinated by the Dutch Road Safety Research Institute (SWOV) and the study was called (PROMISING).[11] The findings of PROMISING are based on two approaches:

1. New visions on road safety, to create conditions for prevention of serious risk;
2. Analysis of the special needs of different modes of transport for mobility and safety.

13.4.1 New visions on road safety

New visions on road safety are, for example, the Dutch concept of Sustainable Safe Traffic and the Swedish Vision Zero concept. Both concepts compose far-reaching targets while both countries already belong to the top five countries with the highest road safety standards in relation to traffic exposure. The long-term goal of Vision Zero is a situation with no fatalities or serious injuries in road traffic.

The concepts make tangible progress through their prevention approach compared to the curative approach that is based on accident analysis. Prevention of accidents is possible by a focus on the cause of safety problems. In both concepts a key element is to design a road structure that is adapted to the limitations of human capacity. Streets and roads have a specific function and the design of the roads is adapted to this function so that improper use is prevented. The new road safety concepts distinguish three road categories according to their function to let traffic flow or distribute or to find access to destinations. Desirable behaviour will be evoked by a design in which potential conflicts fall within the expectations of the users. The design makes clear what behaviour is appropriate, which results in predictable behaviour. Speed and observation opportunities are the two key elements to keep behaviour under control.

Recommendations have been formulated about the planning and design of the road network. They explain, for example, how the features of the road categories for cars and those for cycling interact. The working group that formulated these recommendations in The Netherlands was composed of representatives from central and local government, user organisations like the cyclist union ‘Fietsersbond’ and experts from agencies and research institutes. This is a standard procedure in The Netherlands for developing criteria and guidelines for the road network, co-ordinated by the organisation

CROW, which, for example, published the manual *Sign Up for the Bike*[12] and a manual on bicycle parking.[13] The expertise within governments, user groups and expertise centres complement each other. The working group may go in-depth to clarify requirements and to find solutions for different kinds of problem. The result is a rather high level of acceptance of the results and commitment to implementation.

13.4.2 Integrated network of routes for pedestrians and cyclists

The focus on the needs of pedestrians and cyclists leads to the provision of an integrated network for direct connections. Both modes need their own network, given the fact that the great majority of walking trips are less than one km (or at least less than two km) while the range of cycling for most daily trips is easily four times as high as walking.

The five criteria below are the main requirements for bikeway design[12] and aim to offer cyclists the best possible facilities:

- coherence (the cycling infrastructure forms a coherent unit and links with all departure points and destinations of cyclists);
- directness (the cycling infrastructure continually offers the cyclist as direct a route as possible (so detours are kept to a minimum);
- attractiveness (the cycling infrastructure is designed and fitted in the surroundings in such a way that cycling is attractive);
- safety (the cycling infrastructure guarantees the road safety of cyclists and other road-users);
- comfort (the cycling infrastructure provides a smooth surface, allows manoeuvrability and limits the need to come to a standstill).

These criteria can be implemented in relation to the local situation. A perfect situation does not exist; the process of making cycling efficient, safe and attractive will be of a long-term nature. However, these five criteria are the best guidelines for planning and design, at strategic, tactical and operational levels.

Parts of the cycling network may correspond with the main routes for cars but overlap is minor. Different networks for different modes of transport have their own requirements. The best solutions for the different modes have to be combined with appropriate compromises in planning and design. The PROMISING report regarding cycling presents a safe non-restrictive pedestrian and cycle network as well as principles and measures for regulations, vehicle requirements and education. Many measures are presented to illustrate the approach.[14]

13.4.3 Recommendations for the safe design of roads

In the framework of the Dutch Sustainable Road Safety System, recommendations have been developed for a safe design of the road network,

according to the three functional categories for flow of traffic, distribution of traffic and access to destinations. The different demands of different modes of transport have been integrated, and are discussed here, first for urban roads (considering the network for cars and cycles, and solutions for crossings) and then for rural roads outside urban areas.

The road network for cars

- Roads with a flow function for cars need to accommodate relatively high speeds. To prevent accidents while allowing for high speed, predictable behaviour is very much required. Because of the vulnerability of cyclists and pedestrians in relation to speeding, motorised traffic should be completely segregated from non-motorised traffic. These roads are not often present in urban areas.
- In areas where people live or for other reasons stay for long periods, the roads with an access function for cars dominate. The vast majority of urban roads in The Netherlands are going to be designed for just that purpose and have a speed limit of 30 kph. To ensure safety, streets must be designed in a way to focus attention on the surroundings in order to take care of other road users and search for destinations. What must be removed is every design detail that caters for a flow function for traffic.
- Roads with a distribution function mark the transition between the two other categories.
- A limited number of roads should free most of the urban areas from through-traffic. These roads will have a speed limit of 50 kph (or, for very few, 70 kph).

There are different methods of concentrating motorised traffic in built-up areas on a small number of roads. Figure 13.5 compares three methods of distributing traffic. The grid structure has no aim to concentrate and has the worst record of road safety. The organic structure contains culs-de-sac. It is the best for road safety, but not a good compromise with accessibility as it provokes more kilometres of travel. The mixed structure combines safety and accessibility very well. A division of the whole urban area in such sectors that prevent through-traffic strengthens the concentration of car traffic on roads with a distribution function. This supports road safety. By allowing

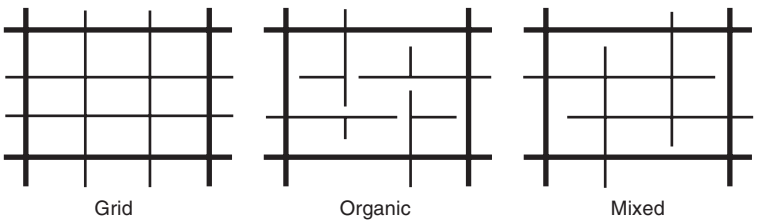

Fig. 13.5 Three structures for the road network in residential areas: grid, organic and mixed. Source: CROW (2000).[15]

cyclists to traverse the sector boundaries, the competitiveness of cycling compared to car driving is increased, which leads to a perfect combination of promoting cycling mobility and road safety.

The road network for cycling

The network of main routes for cycling may traverse residential areas and other parts may be situated alongside roads, which have a connection function for cars, where segregated bicycle tracks or lanes are provided. Bicycle tracks will have a width of between 2 and 2.5 metres. Lanes are permitted when car volumes are below 6000 vehicles per day. Lanes will have a minimum width of 1.5 metres. At every crossing the right of way is arranged by signs and markings. Cyclists on segregated tracks share the right of way with cars.

The speed limits in residential areas allow cyclists to mix with cars, sharing the same space. In general there are no arrangements on right of way, meaning that traffic coming from the right has the right of way. However, cyclists on main cycling routes receive right of way over all crossing traffic. Figure 13.6 shows a crossing between a solitary cycle main route and another road in a residential area.

Crossings

Cyclists and pedestrians can cross roads with a connection function for cars only at a limited number of locations. Crossing cyclists and pedestrians are provided with a refuge in the middle of the road. Where long detours may occur, bicycle tracks allow use in both directions. At crossings between roads with a connection function for cars, two options are available for safety: traffic lights and roundabouts, of which the latter is safer. The recommendation is to provide for segregated bicycle tracks: the cyclists who continue to ride on the roundabout have right of way over cars leaving the roundabout. On roads with an access function for cars it must be possible to cross everywhere.

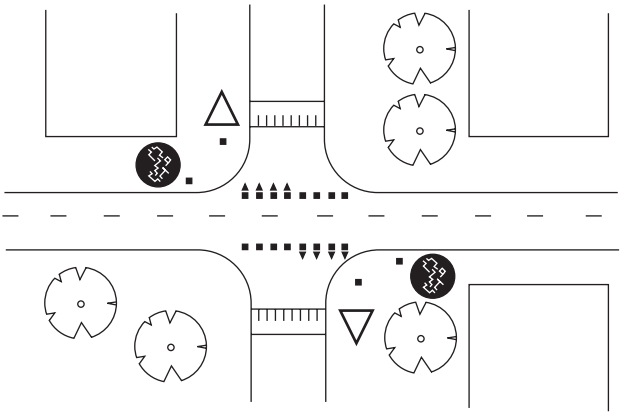

Fig. 13.6 Crossing between a solitary cycling main route and another road in a residential area. Source: CROW (2000).[15]

At certain places crossing might be facilitated by, for example, a raised crossing, in order to help vulnerable groups such as children, elderly and handicapped people.

Outside urban areas
Outside urban areas, main cycling routes will be sparser than they are inside urban areas. Cycling routes alongside roads with a flow function for cars will not exist and cycling routes alongside roads with a connection function for cars will be segregated from motorised traffic. On rural roads that have an access function for cars, the different modes will, in general, share the road, but in cases of relatively high car volumes or roads that have a flow function for cycling, segregated cycling tracks or cycle lanes will be provided. Crossings with roads that have a flow function for cars will be grade-separated. At crossings of routes with an access or connection function, measures will be taken to limit speed, whilst crossings of routes with a distribution function for cars might be at a different level or provided with traffic lights. Where roads with an access function cross, the right of way will be arranged according to the location, and at a crossing between a road with an access function for cars and a main cycling route, the cycling route may have right of way.[15]

13.4.4 Examples of design that integrate the needs of cyclists and car drivers

Below are three examples of design that illustrate how an alternative design of infrastructure measures can maintain the safety and efficiency of cyclists, and ask car drivers to act respectful to non-motorised modes. It turns out that these measures have a significant positive impact on the road safety of cars as well.

Roundabouts
Roundabouts have proven to be an excellent measure for road safety in The Netherlands. The reconstruction of crossings as roundabouts that started in the 1990s has resulted in a decrease of about 70 % of serious accidents. The Dutch roundabouts improve road safety for cycling much better than those with a longer history in the UK and Ireland. The reasons for this are that Dutch roundabouts control the speed of cars much better and they are also better at confronting drivers that leave the roundabout with cyclists and pedestrians at the roundabout, see Fig. 13.7. The number of serious accidents between cars has also dropped by 70 %.

Advanced stop lines
Another measure that has proven to favour road safety is advanced stop lines for cyclists. Cyclists are allowed to take up a position in front of the cars and to cross before cars can do so. Car drivers can observe them much better and the efficiency of cycling improves dramatically, delaying cars for only a few seconds.

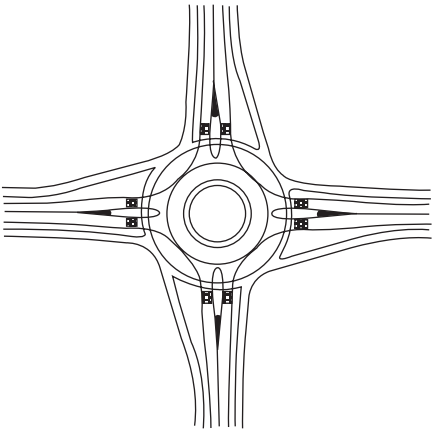

Fig. 13.7 Dutch design of roundabout. The outer circle is a lane for cyclists, who have right of way over cars leaving the roundabout. The inner circle is not for traffic use. Source: CROW (2000).[15]

Speed reduction
Speed reduction has proven to be a very effective measure for road safety. It allows car drivers to anticipate cyclists and pedestrians much better and makes them much more inclined to provide the right of way for them. An important measure to reduce speed is to narrow lanes and, of course, this combines very well with the implementation of cycle tracks and cycle lanes.

13.5 Costs and benefits

Measures to facilitate efficient and safe cycling have a very high cost–benefit ratio. In the EU PROMISING study, cost–benefit calculations were made for single measures. Apart from the investment to implement a measure, only costs and benefits regarding accidents and travel time were included.[16] The benefits exceeded the costs by many times in the majority of cases. For example, for area-wide speed reduction measures in residential areas, the benefits exceeded the costs by a ratio of 1:10. For bicycle lanes it was also 1:10, whilst for advanced stop lines for cycles at junctions it was 1:12 and for roundabouts 1:8.

13.6 Developing countries

There is a growing interest in planning for cycling in motorised countries. National cycling strategies have been adopted in the UK, Finland, Slovenia and Germany. Even in the USA the investments in cycling are growing fast. The bicycle has been rediscovered.

13.6.1 Cycling ignored

In developing countries, however, a sole focus on planning for cars is still the most common policy practice, with the same disastrous effects for road safety as in western Europe in the 1950s and 1960s. Cycling is treated as 'a safety hazard and a menace in worsening traffic congestion. City planners commonly refer to the intensifying competition over street space as the "bicycle problem", suggesting that the bicycle disrupts the car driver's right to the road'.[17] The policy of the Chinese city of Guangzhou has been moving from encouragement of non-motorised transport to restrictions, reducing the share of cycling from 34 % in 1991 to 20 % in 1998. Most intersections in the city have not been designed to handle conflicts between large numbers of bicycles and motor vehicles. The upgrading of city centre routes to primary road status where bicyclists are either not allowed or face increasingly unsafe conditions, severed established bicycle routes. Also, pedestrians have to travel significant distances out of their way as a result of the upgrading of urban roads and the development of new infrastructure. Cyclists crossing major arterials are now forced to share inconvenient overpasses with pedestrians. Safety has deteriorated.[18]

Mohan and Tiwari[19] analysed several transport planning programmes in Asia. The demand for more ring roads, express ways, wider roads and grade-separated junctions had dramatic effects on the conditions for alternatives like walking and cycling. Still the traffic management problems continue. The authors conclude that transport will operate in sub-optimal conditions if the infrastructure design does not meet the requirements of all modes.

The World Bank has acknowledged the need to break with the past:

> An explicit strategy for non-motorised transport is necessary to redress a historic vicious policy circle which has biased urban transport policy unduly in favour of sacrificing the interests of pedestrians and cyclists to those of users of motor vehicles. As a consequence non-motorised transport becomes less safe, less convenient and less attractive, making the forecast decline of non-motorised transport a self fulfilling prophesy.[20]

13.6.2 Dramatic safety prospects

The road safety prospects for the developing countries are dramatic. For 2000, the estimated world total of road traffic deaths was 1.2 million. For 2020 these totals are predicted to increase to more than 1.8 million deaths. These increases will occur largely in lower-middle and low-income countries, as a result of motorisation. However, measures to change this increase to a decrease are well known. The most important measure is road (re) constructions. Annual investments of 0.25 % of the GNP on road safety measures have a potential saving of 80–90 % of the road traffic fatalities. Most important are speed reductions to 30 km/h in residential areas and the reduction of differences in speed, direction and mass between nearby road users. Traffic calming

measures, pedestrian sidewalks and separated cycle lanes are key elements in this approach. The lower-middle and low-income countries should not repeat the error of widening urban roads for through-traffic, as initially was the case in high-income countries, where they have been narrowed in the last decades.[21]

13.7 Conclusions

The integration of cycling and walking in our traffic and transport system requires a change in the planning and design of our roads. It is simply a matter of giving consideration to the needs of different modes of transport instead of giving all priority to motorised traffic. The different needs have to be compromised. However, it is crucial to promote the fact that measures that integrate non-motorised modes on our roads also have a huge positive impact on the motorised modes.

A good mix of motorised and non-motorised modes of transport brings the traffic system onto a more human scale. This fits very well with the modern road safety approaches that aim to minimise the risk of serious accidents. A key element in these modern approaches is the prevention of risk by giving due consideration to the limited abilities of human beings, meaning that conflicts between road users with huge differences in mass and speed should be made technically impossible. When people have to share the same road using different modes, the traffic environment should be forgiving to mistakes that people will make. The traffic system should also allow children and elderly people to meet their mobility needs. It should allow pedestrians and cyclists to enjoy the pleasure of being outside and on their way. The different tasks we need to perform as road users should never become too complex. The traffic environment should enable all road users – with their huge differences in skills and experiences – to behave predictably and respectfully to each other. The consequences for the road network are a categorisation that accommodates the efficient flow of different modes to a certain extent and protects our urban areas from domination by motorised traffic. The vast majority of the whole road network has a low speed limit and is adapted to facilitate cycling and walking in a safe way. A residential function is returned to these roads.

A policy towards a sustainable traffic and transport system is traditionally based on the demand to protect the environment, to increase health and to create an attractive city climate.

The promotion of cycling fits very well with these aims. Safety is often presented as a conflicting aim with cycling mobility since the risk of being killed as car driver is lower than the risk of being killed as a cyclist. However, for an analysis of the effects of more cycling use on road safety, comparing these risks is not a relevant exercise, it is a static approach. The risk differences will always remain, while a promotion policy for cycling may result in a

significant positive change in road safety. We have to look at the dynamics that may be brought about. A significant increase in cycling will only occur when the safety needs of cyclists are catered for. This must be effected by good planning and design and this will bring the road safety problems of all road users down. It may not be primarily the cycling facilities to segregate cycling from other modes on the road that will increase the safety of cycling, but the integration of cycling in the overall design. Cycling is therefore a catalyst for a very successful road safety policy.

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14

Walking and its relationship to public transport

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14.1 Introduction

Walking has always been a fringe subject in transport planning and transport engineering. This is surprising because more people walk than use any other form of transport. It has hardly ever been a decisive part of land-use planning either, which again is odd because when designing residential and shopping areas, walking between and within them is a crucial part of everyday life. There have been some exceptions, for instance, the Radburn street layout developed in the 1920s in the US. This residential housing layout was based on an independent footpath network (Hass-Klau *et al*., 1990: 103–7). The concept has until recently rarely been taken up, and if so only in isolated and small housing units.

In most city engineering departments, and in the practice of many transport surveys, 'walking-and-cycling' is treated as a single mode (called 'slow'), which leads to an impoverished understanding of both, because it conceals their unique and quite different characteristics. Imagine what practical policies could develop if we defined a single mode called 'high-speed, trains and shipping': nobody in their right mind would treat them as if they had the same characteristics. Yet this is exactly what some traffic engineers are doing when aggregating walking and cycling. It leads to bad statistics and evidence, and superficial thinking, such as the illusion that a few improvements for pedestrians, for instance, wider pavements, will increase the willingness to walk and may even increase the modal split in walking. This is not the case. Walking and pedestrian behaviour are complex issues. We are a long way from understanding them, and we will never do so until they are accorded the same professional respect as is paid to motoring or public transport use. Even then, we will never really understand these modes properly unless we

include an understanding of the contribution of walking as a stage, short or long, in virtually all other journeys.

In general it is true that the overall statistics on walking do not provide the whole picture, and may not even be correct. We know that walking is always underestimated in travel surveys, and the counting techniques are not very accurate, but we are not certain that the degree of underestimation has even remained stable over time. We have in most cities no walking time series to enable us to compare the success and failure of transport policies. There is also a lack of statistics on linked trips in general. Only French and Spanish public transport statistics show the distinction between 'voyage' (single trip) and 'déplacement' (origin and destination of a trip) but that does not help us with walking as a linked trip. It is also impossible (or very difficult) to measure those walking trips which have not been made because of fear of accidents and assaults.

Hardly anybody ever considers the relationship between public transport and walking, especially the issue of whether different types of transport modes have an effect on the level of walking either as a linked trip or as a mode in its own right. This will be the main topic of this chapter and is discussed below. However, let us first consider what is known about walking.

14.2 Decline in walking – at best compensated for by cycling

There is no doubt that overall walking has declined not only in the United States, Canada and Australia but also in Europe. For instance, in Britain there has been a 19 % decline in the total number of journeys per person on foot since 1975/76. The decline in walking distance is even sharper and has been reduced by 26 %, from an average of 255 miles per person in 1975/6 to 189 miles in 1999/2001. In comparison, car/van driver journeys (trips per person per year) increased during the same period by 55 % and the average distance travelled increased by 83 % (Department for Transport, 2002: 13).

A similar development can be seen in Germany where 36 % of all trips were carried out on foot in 1976. Only 13 years later (1989) this had declined to 26 % (Monheim, 1995). It can be assumed that walking has declined even further since then, as is the case in most countries. Interestingly enough the average walking distance per journey has stayed the same and is very similar in different countries, being 0.6 miles in 1975 and 1999/2001 in Britain (Department for Transport, 2002: 13). Walking as a main mode has even declined in those cities that introduced large pedestrian and traffic calmed areas decades ago, because the transport policy in the rest of these cities – constituting the majority of the area and, thus, the travel – has remained primarily car-orientated. It seems that this has outweighed traffic restraint in the centre, and the major impact in the centre is diluted when we look at the overall modal split for the city as a whole.

Table 14.1 Modal split (%) in the city of Freiburg (Germany) since 1982

Mode	1982	1989	1992	1998
Walking	35	22	21	21
Cycling	15	18	19	19
Public Transport	11	16	18	21
Car	39	44	42	39

Source: Socialdata (1998), quoted in Hass-Klau and Crampton (2002: 39).

Interesting are those European cities where the decline in walking has been compensated for by other sustainable modes. In Munich, walking declined from 31 % to 23 % between 1976 and 1995 but car trips also declined by 6 % during the same time period. There has been a parallel increase in cycling and public transport. The figures for Münster indicate a similar trend. According to modal split calculations of 1984, 79 % of the inhabitants of Münster used public transport, 25 % walked, 29 % cycled and 39 % were car users. By 1996, walking had declined by three per cent and cycling and public transport had each increased by three per cent, whereas car use had declined by two per cent (Hass-Klau *et al*., 1998: 13–14). Well known too is the small city of Freiburg, which shows that with a consistent environmentally-friendly transport policy, it is possible to reduce car use and increase public transport and cycling within Freiburg. As can be seen from Table 14.1, walking is the only mode that has declined since 1982. However, as public transport trips – mainly light rail in this case – increased, so have the walking linked trips (but again there is no statistical evidence to support this).

14.3 Factors that influence walking

14.3.1 Density

Although walking data are always weaker than vehicle data, when they exist they always give a rich picture of high variation between areas. The Birmingham Travel Survey of 1994 showed that the modal share of walking varied according to whether the people surveyed lived in inner or outer wards. Amsterdam data highlight the variations in walking to shops within the city. For instance, 43 % of residents living in the historic part of Amsterdam walked (39 % used a bicycle) when carrying out shopping. In the inner city areas, this increased slightly to 45 % (with 29 % cycling). However, in the housing quarters built between 1900 and 1940, the walking percentage for shopping dropped to 21 % and in the modern housing estates to just 11 % (Amsterdam Jaarboek, 1995).

These examples also imply that there is a relationship between population density and walking. People living in densely populated areas are much more reliant on walking than households residing in the suburban or rural regions.

This may be one of the reasons why many Spanish cities still have a relatively high percentage of walking, which is often more than 50 % of the modal split. Spanish cities (and many Italian cities) still have very high population densities in the central parts of the city in comparison to most German, Scandinavian or British cities, which are much less dense. North American urban areas have even lower population densities. Daor and Goodwin (1976) found that in London substantially more walking was carried out in the densest areas, and this seemed to apply both to the number of walking trips, and also to walking access for public transport journeys (which themselves were higher in the denser areas because the public transport services were better and the car ownership lower). Hillman and Whalley (1979) found that up to two-thirds of all shopping and educational trips in the most densely populated areas took place on foot. We also know that the location of shops in either a town or neighbourhood centre does tend to affect the level of walking. In Britain, roughly 95 % of all shopping trips to neighbourhood centres are made on foot, compared to 20 % to town centres (Hass-Klau *et al,* 1998: 3).

14.3.2 Size

The Environmental and Transport Planning (ETP) study of 20 cities (Hass-Klau *et al*., 1999) shows a high level of walking to the town centre, especially in small cities, by residents. The population size of the sample cities varied between 22 000 and 1 300 000, with 10 cities having under or around 100 000 inhabitants. In 6 out of these 10 smaller cities more than 50 % of the residents walked to the city centres. In addition, in 2 cities, the proportion of cycling was relatively high and the walking–cycling total came to over 50 %. An exception in town size was Brighton (155 000 inhabitants) where more than 50 % of the users of the city centre still walked there. Brighton has one of the highest population densities, and, by European standards, one of the lowest car ownership levels (341 cars per 1000 population compared to 652 in the Italian city Como in 1990/91).

14.3.3 Car ownership

In 1998 a statistical analysis was carried out, which revealed that the high levels of walking in London boroughs could be explained by high population density and low car ownership levels. However, because of the close connection between density and car ownership, it was not possible to distinguish the relative importance of these two factors: we know they are important in combination, but we do not know their impact separately, from such cross-section surveys (Hass-Klau *et al*., 1998). Over time, car ownership tends to change more swiftly than population density, so it may be that slow changes in density cause (with other factors) faster changes in car ownership, and this will then have the most immediate effect on walking. In the longer run, car

ownership becomes one of the mechanisms by which density changes affect walking. If this hypothesis is true, developments such as increased central and inner area housing densities may bring about both lower car ownership and more walking, by both direct and indirect processes.

The results from an earlier European study are quite different, in that we found that the highest car ownership levels were not related to a lower modal split in walking. In fact, the Italian cities with a very high car ownership also had a very high modal split in walking to the town centres. This may have an important bearing on the discussion about density, as it is another example where it is not true to say that there is an inevitable and simple rule that high incomes lead to higher car ownership and hence less walking. The British National Travel Survey shows this ambiguity as well. When studying the distance travelled per person per year one can see that although the households with the lowest incomes do indeed walk the longest distances (212 miles), the second longest distances are walked by the richest households (Department for Transport, 2002: 33). All this implies that, depending on the urban context, a number of quite different results may follow from increasing income: the classic model of low density, high car ownership, little walking is well established, but there may also be models of high density, high car ownership and high walking, or even high density, low car ownership, high walking.

After having established some interesting relationships, let us concentrate on the main topic of this chapter: the relationship between walking and public transport. This is not a single relationship. One important distinction is between walking as a mode of transport in its own right, and walking as a stage in a journey of which a part – probably the longest part by distance, but not necessarily by time – is by bus or train. Both may be affected by public transport provision, in simple and complex ways.

14.4 Decline in walking – as a mode on its own – because of good public transport

If the public transport network is dense, cheap and has a good penetration into residential areas, this could mean that walking as a separate mode is low. We have some statistical evidence (admittedly, not many examples), which suggests that when the modal split of public transport increases, walking declines. In these cases a simple explanation would be that public transport is actually competing with walking, though this cannot be the whole story as there is little evidence that it is the same trips that are being diverted from walking to public transport. Overall, it is more likely that the two trends do not represent a modal shift of the same trips, but rather a changing pattern of trips. And even if it is true that some walking trips are replaced by public transport we still do not know anything about linked trips.

A public transport network with the same characteristics as the above (high density and good penetration) will generate two walking trips for every

public transport trip. The walking trips will be shorter if the public transport network is dense but the amount of walking will be higher if public transport is attractive and used more frequently. So one can see that in this example there is a three-way relationship between public transport and walking:

- a reduction in walking as a mode on its own;
- an increase in walking trips because of high public transport frequency (because at least two walking trips are carried out per public transport trip);
- longer walking trips because of high public transport use and more attractive public transport (assuming that some used to be car trips).

14.5 Increase in walking – as a main mode – because of unsatisfactory public transport

14.5.1 Reduction in the level of service

A reduction in the level of service by public transport may in the short term force more and longer journeys on foot, by non-car owners, but in the longer term, increase the number of people encouraged to buy cars. This would then reduce the modal split of walking (although there is still walking from the car to the house or possibly to shops etc.). We know from statistics that the main car driver in a household makes the fewest journeys on foot and walks the least distance (Department for Transport, 2002: 33).

14.5.2 Lack of sufficient public transport

The official statistics on walking do not provide a coherent picture in relation to public transport. Most smaller European cities, of up to 200 000 inhabitants, show a higher percentage in walking and a low percentage in public transport. The interpretation could be that those people who do not drive or do not have accessibility to a car are more likely to walk than use public transport. This arises from two quite different reasons – distances to overcome in small cities are normally shorter, and public transport is often not as good and more expensive. Both make walking seem a better option.

14.6 Increase in walking – as linked trips – because of high quality public transport modes

14.6.1 Replacing the bus by light rail services

If bus routes are replaced by new light rail lines there will be fewer stops along routes as they normally have longer distances between stops (400–1000 m) than buses (300 m); hence one could assume that the number of

walking trips to the light rail stops will be less. However, it is known that light rail stops attract passengers over a wider radius than the corresponding radius for bus stops and the number of walking trips may also increase if more people are attracted by light rail. There is some evidence to support this. Surveys carried out in Nantes (France) showed that 45–62 % of all trips to the centre of the city were carried out by public transport and there was a significant difference between bus and light rail corridors with light rail having the highest use. Even for work trips the corridors served by light rail had a six per cent higher use than corridors served by bus (Agence d'Études Urbaines de l'Agglomération Nantaise, 1998). The topic of light rail versus buses is controversial; few facts and statistics are known. There seems to be a difference in the level of walking in city centres between cities largely dominated by light rail and cities only running buses.

14.6.2 Light rail's achievement in creating pedestrian-friendly areas and more walking

In studying light rail, buses and advanced bus systems, it was concluded that most cities that have implemented light rail or modernised their traditional tram systems are politically able to implement more rigorous traffic restraint measures than cities that only run buses (Hass-Klau *et al*., 2000). This does not mean that cities that only operate buses cannot also have large-scale pedestrianisation areas, and successfully implement other traffic restraining measures. It seems that the political forces encouraged by major light rail schemes create more favourable public opinion and the political confidence to make the areas of traffic restraint larger and the parking policies more vigorous. Cities with underground railways have the option to provide space for pedestrians or for cars and buses. In many cases these cities will have opted for pedestrianisation in the city centres but outside this area cars mostly dominate.

The positive role pedestrianisation plays in encouraging walking is well established, but little is known of the indirect impact public transport has on walking. We know that people walk long distances in pedestrian-friendly town centres. Nuremberg, which has both an underground system and light rail, still sees 44 % of its pedestrians walking more than 2 km during weekdays, increasing to 53 % on Saturdays. People travelling by car to the city also walk comparable distances to people coming by public transport (Monheim, 1995).

If we compare cities of similar size, the cities that operate light rail nearly always have longer pedestrian streets than the cities with buses (Table 14.2). On average the tram cities have a pedestrianised area of about 6.5 km and the bus cities only about 3.7 km. One might say that this is a coincidence but in fact the pattern is very stable. Every time a new light rail scheme is planned and newly implemented in Europe, the size of the pedestrianised area increases, and sometimes it doubles or trebles. This is true for the new schemes in the

Table 14.2 Relationship between population size, length of pedestrianised streets and transport mode in cities

City	Population size (000)	Length of ped. streets (km)	Mode
Zürich	361	8.0	Tram
Belfast	280	4.3	Bus
Mönchengladbach	268	2.0	Bus
Karlsruhe	267	2.3	Tram
Strasbourg	264	9.3	Tram
Münster	264	5.3	Bus
Aachen	251	2.9	Bus
Kiel	231	4.3	Bus
Reading	230	2.3	Bus
Grenoble*	210	3.2	Tram
Freiburg	201	8.0	Tram
Basel	192	6.2	Tram
Montpellier**	180	>10	Tram
Heidelberg	140	7.5	Tram
Clermont-Ferrand	137	3.0	Bus
Orléans***	136	2.2	Tram
Vicenza	109	6.2	Bus
Rouen	106	8.6	Tram
Exeter	105	1.5	Bus
Como	89	5.4	Bus

* does not include the main square, Place Victor Hugo.
** 90 000 sqm according to the PTU (2001).
*** does not include the main square, Place de Martroi, or the pedestrian street outside the city centre.
Source: Hass-Klau *et al*. (1999) and Hass-Klau and Crampton (2002).

UK and also in France. For instance, Nottingham is constructing a new light rail line which will run through the city centre. The city centre of Nottingham in 2003 has nearly 2 km of pedestrianised streets but when the light rail line is opened it will have 5.4 km. Manchester has 5.7 km of pedestrian streets. Before light rail was introduced in 1992, it had only 1.2 km (plus 950 m of bus-only streets), and in the mid-1980s there was no plan for more pedestrianisation apart from widening the pavements (Hall and Hass-Klau, 1985: 216). Birmingham had 1.9 km in 1998 and 2 years later the pedestrian streets had increased to 3.2 km, with the opening of the new light rail line in 1999 (Hass-Klau and Crampton, 2002: 124; Hass-Klau *et al*., 1999: 114).

Another example is Strasbourg (France). Before the introduction of its new tram line it had a very small pedestrianisation area. After the introduction of Line A the pedestrian area increased 10-fold. In Nantes, there was a significant reconstruction of the city centre in favour of pedestrian space when Line 2 was built. Light rail corridors also provide more space for pedestrians and cyclists outside the city centre. That is certainly true for most French cities with new light rail lines. In Orléans, a whole street (not far from the university area) in which trams are now operating was pedestrianised.

Access is allowed by car but pedestrians have priority. A sample of 35 European cities (20 of them German), further emphasised these findings. The average length of pedestrianised streets was 3681 m. Of the 12 bus-only cities, 10 had pedestrianisation streets shorter than the average and just two longer. Of the 23 cities with light rail, only 10 had pedestrianisation streets shorter than the average, and 13 longer (Hass-Klau and Crampton, 2002: 124).

Thus, there is now evidence and experience to support the relationship between walking and public transport. Undoubtedly, in cities whose population size exceeds 400 000, the economic and 'social' success of large-scale pedestrianisation seems to depend on a very effective public transport system. Both light rail and underground railways are ideal modes for the city centre as they are nearly pollution free, have a low noise level and a fixed right-of-way. In many German cases, the reason for building the light rail lines underground in the first place was to allow large-scale pedestrianisation at street level.

If it is true that 'light rail' cities can politically push through more restraint measures, this could imply that public transport has priority in many cases over car use (this may also be the case for cities operating underground railways and light rail). They may also opt for more bus lanes and operate traffic lights in favour of public transport. It seems too that these cities' pedestrianisation areas are larger, the cycle facilities longer and the traffic calmed streets greater. All these measures put together provide favourable conditions for walking. In reality it implies that pedestrians walk longer distances more frequently and that they get more pleasure out of doing so than in cities that rely on buses. This is because buses are normally noisier and many cities still have a high number of old-fashioned diesel buses that pollute heavily. Buses do not run on tracks so their movements are unexpected, so that the freedom of walking is infringed. So far research on this issue is fragmented and it is hoped that further research may shed more light.

14.6.3 Light rail cities may be richer

In a recent study on light rail versus buses we found that light rail cities tend to be richer (Hass-Klau *et al*., 1999). Out of a sample of 46 European cities, 21 of the 24 light rail cities had a GDP per capita index of more than 110 (100 was the EU average) whereas out of the 22 bus-only cities we found only eight which had this high level of income (Table 14.3). A high level of income implies better quality shops and in many cases a more attractive variation of shops. We know from our surveys of nearly 8000 pedestrians in 20 European cities that people like particular streets and places simply because of the quality of the shops (Hass-Klau *et al*., 1999: 21–3). Hence the relationship between public transport mode, the level and amount of walking and the types of shops is a very interesting one, because again it shows that the effect of income is much more complex than the traditional transport planners' assumptions imply.

Table 14.3 Cross-tabulation of relative GDP/capita against light rail or bus-only cities

	Light rail city	Bus-only city
Richer (GDP/cap ≥ 110)	21	8
Poorer (GDP/cap < 110)	3	14

Source: Hass-Klau *et al*. (1999) and Eurostat (1993).

From another of our studies we see that Europe-wide, many cities with light rail networks have done better than cities with only buses in increasing the number of public transport passengers over a ten year period (Hass-Klau *et al*., 2000: 21–2). If light rail creates more passengers, then the percentage of people walking may be higher in these city centres or neighbourhood centres than in cities that have only buses because:

- cities that have light rail tend to have more pedestrian or car traffic restraint streets;
- 'light rail' cities have more interesting shops because they are richer;
- walking is more pleasant in traffic restraint streets because of light rail than in the same type of streets that allow the operation of buses;
- the transfer of car users to light rail is normally much more successful than it is to buses, hence more walking is carried out.

14.7 Conclusions

The argument in this chapter has bad and good news. The bad news is that the world is a lot more complex than we would like, and we will need many more data, more research projects, and changes in our professional priorities before we really advance our understanding. The good news is that some of those complexities are helping the success of environmentally sustainable transport policies: 'complex' in this case is not a code word for 'impossible'.

In particular, the evidence suggests that with certain combinations of circumstances, it is possible to achieve high income and economic growth – which everybody wants – with a pleasant environment in which walking becomes a favoured, high-status mode, not a last resort for the poor. This is not to say, alas, that such a desirable outcome is certain, only that it is possible, provided that the complementary conditions are put in place by vigorous and ambitious policy-makers.

Although we see some very positive aspects in some of our cities, overall the decline in walking will continue. The question is how much decline we can afford. We should not delude ourselves; walking cannot be compensated by more cycling, and maybe only in a limited way by better and more attractive public transport. Is it unavoidable that the more 'civilised' we become, the less we walk and the more we drive? If so, we have to be aware that this has

wide ranging effects on both land-use and the type of transport mode we are able to use. On a personal level, less walking affects the health of our children and ourselves, and this important issue is only recently starting to inflict its full negative consequences on society.

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15

Perceptions of walking – ideologies of perception

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15.1 Introduction

Perceptions determine to a large degree our attitudes, behaviour and (political) decisions. In turn, decisions and behaviour determine our perception and our thinking. Over the past 100 years the perception of walking and of public space has been shaped by the motor car and the driver's perspective. The ensuing negative results for pedestrians can be seen on many levels and in many fields, in the form of unattractive public spaces, dangerous roads, lack of data, inadequate allocation of funds, distorted statistics, neglect of pedestrian interests in governments and administrations, etc. This chapter looks at the perception of walking from a historical, philosophical and sociological point of view and attempts to interpret why some people are reluctant to support measures for walking and, possibly, how their hearts and minds could be won in the future.

Despite some progress and improvements in recent years researchers still encounter many paradoxes as well as peculiar arguments with regards to walking. For example, when pedestrians are asked about their wishes, they often give answers from a driver's point of view. The researchers have to work like social archaeologists to unearth the real issues from under a layer of myths. These myths have shaped the perception of walking and, consequently, the situation for pedestrians. The five mechanisms that lead to such myths are:

- converting political issues to individual problems: a process of de-politicisation;
- claiming public pedestrian interests as private, and private interests as public;

- disciplining body and mind;
- turning the advantages of walking into disadvantages;
- underestimating and neglecting walking: a vicious circle.

These mechanisms, or ideology patterns, often conceal problems and distort the image of walking. This chapter is limited to the above mentioned five patterns, which are presented separately even though in reality they often occur at the same time.

15.2 Converting political issues to individual problems: a process of de-politicisation

The first ideological pattern shows how our perception of traffic problems has shifted, and how they appear as individual problems rather than political and social issues. This process of de-politicisation can be illustrated with two examples. Motor traffic restricts the free movement and play of children. Many children are not allowed to play outside anymore and are brought to school by car (Hillman *et al*., 1991). As a result of their lack of movement, children show weight increases and deficiencies in psycho-motoric skills, even resulting in learning disabilities. For progressive teachers and scientists the connection between motor skills and learning disabilities is clear and they put it simply: children who do not learn to walk backwards will not be able to subtract.

In order to counteract these deficits, special training in schools and kindergartens is being introduced (see Fig. 15.1). Instead of discussing the causes and deficiencies of traffic policies, the source of the problem is shifted to the child. We begin to perceive that the child, not traffic, needs changing. Instead of a political debate the treatment of the problem is relegated to the school or the parents.

A similar ideological pattern can be found with regard to the individualisation

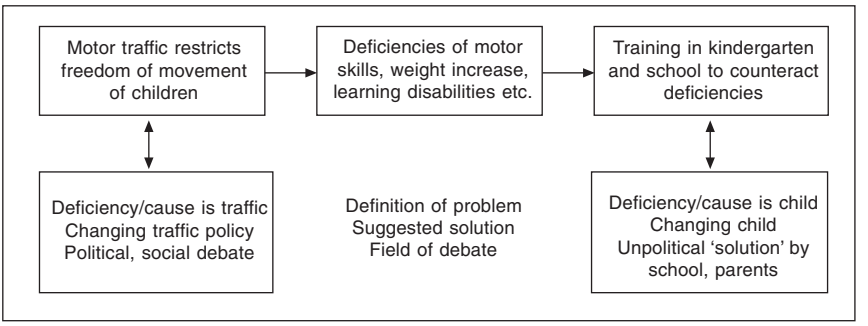


Fig. 15.1 How restricting effects of motor traffic seemingly become a problem of the individual child.

of traffic accidents. Accidents are usually regarded as individual behavioural mistakes of road users. This means that the hundreds of thousands of traffic accidents per year are perceived not as system failure, but as individual human error. Accordingly, most traffic safety measures concentrate on changing the behaviour of the road users. Instead of demanding changes to the traffic system, such as speed restrictions and other measures, politicians and the media suggest more education for children and the elderly, more campaigns calling for tolerance and a greater need for parental accompaniment, etc. The real causes of the accidents and the underlying problems of the traffic system are concealed and de-politicised behind this process of individualisation.

15.3 Claiming public interests as private, and private interests as public

In many situations, private transport interests are claimed as public, and public, democratic interests, such as walking and use of public space, are considered private ones. Walking as a mode of transport does not exclude anyone. It is the most public form of transport, yet it is often treated as a private concern. Demands of parents for safe routes to school, for example, are considered as private wishes, while the interests of land owners or parking lot owners are defended as within the public interest. Walking has the character of a human right. It is elementary evidence of being human, an expression of personal freedom. Politically, however, there is a different perception. Driving, rather than walking, is considered a human right. The political agenda is set accordingly.

This perception is enhanced by advertising. Lorenzo Custer (1999) has pointed out how car advertisements try to suggest that all the elements of public space missing in real life can be experienced in the car. The smaller the space gets for children to play outside, due to motorised traffic, the more the adverts propagate the spaciousness of cars. While pedestrians are restricted to narrow pavements the adverts imply that cars enlarge our living space. The car industry exploits our feelings of misery and void in the public spaces it helped create. The ideology of the adverts takes up our dreams and tries to sell them back to us in a perverted way.

The same can be said about the privatised spaces of shopping malls, which try to re-enact the lost experience of the old city. Such shopping malls, often only accessible by car, exclude many people. Only consuming pedestrians are allowed. Use of public space such as for demonstrations or other signs of democracy is banned. Over time, our perception of public space has gradually changed and we have taken the restricted version as our new point of reference. Private interests seem public and public interests appear private.

15.4 Disciplining body and mind

Historically, people used the street as a living space and a playground for children. In 1922, a Swiss court decided

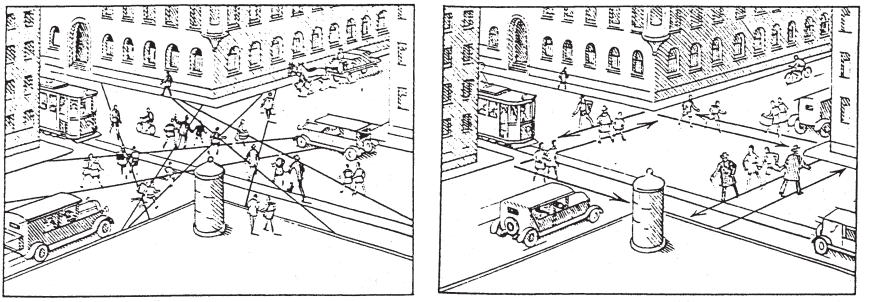
> that a pedestrian on the street is completely free where he wants to walk and that furthermore not only people of normal hearing but also persons with hearing problems, even deaf people and the ones with heavy wooden shoes are allowed to step onto the street. Because they don't endanger other people; the danger is created by the automobile which is moving significantly faster than the pedestrian. (Fischer, 1979)

With an increase in cars this all changed. Pedestrians were instructed to cross the road only at certain places and in a certain way, to be attentive and not to stop in the middle of the road.

The means to achieve this new behaviour was mostly traffic education, especially for children. According to military traditions, children had to learn and exercise their new behaviour (see Fig. 15.2). Their young bodies had to be put under conscious control and behaviour had to become automatic. The French philosopher Michel Foucault (1977) describes this internalisation in detail, remarking that the ruling authorities influence our thinking and – beyond that – the rules become 'inscribed' in our physical movements, into our bodies as well.

Traffic education was much more than a safety measure; it was also used as a means to stop children's play in the street (Huettenmoser, 1991). This had been a goal of the authorities for many years, as they had always been afraid that children on the street would become undisciplined, and that neglect would lead to social disintegration. Therefore, the authorities seized the opportunity of the upcoming car era to ban children from playing on the streets. The city of Zurich forbade playing soccer on the streets and squares as early as 1923, although there were very few cars.

This process of banning children's play took a long time because the



(a) (b)

Fig. 15.2 (a) Before and (b) after: traffic education in the 1930s. Putting the body under conscious control. Source: St Galler Verkehrsbüchlein Haettenschwiler (1990).

houses and apartments of the era were small and the number of children per family large, so the children had no choice but to play outside. The only exceptions were rich families who had large houses and maids to look after the infants, and those children who had to work as labourers. After the Second World War it was gradually possible to clear the streets of children's play for two reasons: one, the number of cars and road deaths had increased and two, the family ideology demanded that the mothers stay home and look after the children.

Traffic education for all road users concerned more than accident prevention. It was a tool to teach individuals discipline and subordination to the ruling authorities. It served as ideology in a time when totalitarian systems were appearing everywhere in Europe. In 1936 one automobile magazine wrote 'we have to anchor it firmly in the public mind that traffic discipline is not a private thing of the individual but a service to the whole of the nation, to the nation's health and economy' (quoted in Haettenschwiler, 1990).

The internal disciplining of all road users and particularly of pedestrians ran parallel to the external disciplining. With the new allocation of transport space, pedestrians lost out. Their network of paths was ripped apart, leaving only small rings of sidewalks around the housing blocks. They were sent through subways and prevented, with chains, from crossing where it was most convenient. Squares and parks became parking lots and the street lost most of its character as a public space.

Authorities have always had an ambivalent relationship towards public space, long before the car came into the picture. Public spaces are perceived as a danger because there is always the possibility that people will assemble for demonstrations, political actions and even revolutions. History is full of political changes that started in public squares. At the same time, the ruling powers need such squares for their own demonstration of power, for military parades, etc. The measures to control public spaces are manifold. In Paris, Baron Haussmann created broad boulevards in order to prevent demonstrating workers putting up barricades and to enable the army to move in faster. In many cities, police, secret agents and/or video cameras keep the public spaces under surveillance. When the first sign of a demonstration appears, the authorities move in (as could be seen in, for example, Tiananmen Square). Curfews are applied when the situation gets out of hand from the authorities point of view. An alternative way to prevent demonstrations is to install a car park in a crucial place, for example in front of parliament or government buildings.

How is this all related to the perception of walking? The ambivalence of the authorities towards public spaces as well as the historical process of internal and external disciplining influence the way we use and behave outdoors to this day. Walking has been largely stripped of its non-utility aspects and is seen only with respect to its function to move from A to B. That is one reason why it is so difficult to demand free, non-utilitarian use of public space. Functional arguments always have to be brought forward saying that improving

the conditions for walking is good for health, for the environment, for business, and will cut down on street crime. Functional and commercial uses are supported by businesses and administrations: city marathons are popular and children are welcome on store-owned playgrounds. Pedestrian zones grow, provided there are large parking areas created nearby. Organised walking programmes in privatised shopping malls replace the stroll through the city. All this happens under the controlling eyes of video cameras. To summarise, public space has always been contentious, even before the car. With the car and the corresponding patterns of disciplining, a particular perception and use of public spaces have been ingrained in our thoughts and our bodies.

15.5 Turning the advantages of walking into disadvantages

The characteristic of the fourth ideology pattern is turning positive aspects of walking into negative ones – making advantages disadvantages. It creates a perception of walking as unattractive, expensive and dangerous. Four examples will illustrate this ideology pattern.

The physical flexibility and climbing power of pedestrians have been used against them to reduce spaces and to divert them through subways and overpasses (Knoflacher, 1995). The inherent advantage of walking is exploited in order to narrow pavements, squeezing pedestrians between parked cars. This makes walking unattractive and excludes the elderly, the handicapped and mothers with children in pushchairs from using the infrastructure.

Pedestrians do not need any technology for their mobility. They do not pollute or consume any resources. This advantage does not pay off, however, when it comes to the promotion of sustainability. Most sustainability programmes – if they exist at all – focus on reducing the negative effects of motorised traffic, preferably by technical means. Millions of euros are spent on corresponding technologies. While these programmes are well meant, they exclude walking by their very nature. The most sustainable form of transport is punished for its exclusive advantage of not needing any technical means.

Table 15.1 Estimate of average investments by the Swiss public sector (€) and total costs according to transport category per inhabitant per year

Category	Pedestrian traffic	Bicycle traffic	Motorised road traffic	Public transport	Air traffic
Public Investments (€)	4–9	7–16	300–350	190–220	no figures available
Total Costs (including external costs) (€)	4–10	9–18	750–780	510–540	no figures available

Note: external costs = accident, pollution and other costs caused by traffic but not paid for by the perpetrator.
Source: Sauter (2002).

The infrastructure costs for walking are comparatively small and they have a good cost–benefit ratio. However, this advantage goes unrecognised when it comes to the distribution of money by the public sector, as Table 15.1 shows in a rough estimation for Switzerland (Sauter, 2002). Most of the money spent for pedestrians is not even a genuine investment in walking but rather follow-up costs of motor traffic. Crossing aids like islands in the middle of the road, for example, are only necessary because of the dangers posed by motorised traffic. Walking as a form of mobility does not require them. Nevertheless these costs are perceived as pedestrian-related and, as a consequence, walking appears expensive.

People who live near their workplace and walk to work put little strain on the infrastructure and on the environment, as well as do something for their health. In most countries this sustainable behaviour is not rewarded but, instead, punished by governments and employers. It is those employees who drive to work, or in some cases use public transport, who can deduct their commuting costs from their taxes. The further away people live and the more strain they put on facilities and nature the more they can deduct. The loss in revenue for the state is substantial and has to be picked up by all taxpayers. In Switzerland it is estimated that people who walk to work pay on average up to €800 per year more in taxes as a result. Walking is punished for its advantage and appears an expensive and unattractive form of mobility.

These advantages turned into disadvantages are not planned evil actions by anti-pedestrian conspirators, but a result of a historical process in which walking has been considered negligible. This process has been frozen into tax laws, traffic codes, transport policies, road building norms etc., and perpetuates the perception of walking and the situation of pedestrians.

15.6 Underestimating and neglecting walking: a vicious circle

The last ideological pattern is the underestimation and neglect of walking. It has the dynamics of a vicious circle. It stems from a lack of data and distorted statistics to underestimation, and from deceiving terminology and distorted imagery to political and financial neglect (Sauter, 2002).

Travel surveys often fall short of accurately reporting trips on foot. The presentation according to distance gives the impression that walking is of minor importance. In reality two-thirds of daily mobility is comprised of relatively short distances (up to five kilometres), and is often done on foot or cycle. In our daily lives we do not make very many trips that go further than 50 km. However, it is the long-distance mobility problems that are predominately discussed in politics and the media – congestions on motorways, air traffic problems, new high-speed trains etc. – while pedestrians struggle with their unmentioned everyday mobility problems (i.e., parents having to bring their children to school because it is not safe enough to let them go

alone, see Fig. 15.3). It is estimated that parents in Switzerland invest 20–30 million hours per year accompanying their children. This is never mentioned

Fig. 15.3 The number of hours spent accompanying children in Switzerland is roughly equal to the number of hours spent in traffic congestion. Source: courtesy of Martin Leuzinger.

in politics. In comparison, the congestions on highways, which amount to about the same number of hours as said accompaniments are highly-discussed figures resulting in millions of euros being spent on new roads and telematics.

Similar problems can be mentioned with regard to accident statistics (Huettenmoser and Sauter, 2001), the effects on children of restricted mobility due to motor cars (Huettenmoser, 1995) or the lack of data on the quality of walking provisions, to name just three examples. In general, the missing and inaccurate data lead to a distorted picture of walking and to inadequate political decisions. Walking is neglected when it comes to the distribution of resources. Money and infrastructure for walking provisions, for safety measures and for improvements of public spaces are lacking. The needs and demands of pedestrians are invisible, giving the perception that their situation does not need any improvement.

15.7 Conclusion

In order to overcome the many obstacles pedestrians face – in the streets and on an administrative and political level – we have to overcome the distorted perceptions of walking. We have to understand the patterns that reinforce and perpetuate the myths, paradoxes and ideologies about walking. This will allow us to come closer to our vision in which walking is acknowledged as an inherent, self-evident human right. In this vision the cities and public spaces will be built in such a way that walking will occur without special promotion, independent of functional needs and ingrained control. It will be free, safe and enjoyable. Pedestrians and life will return to the street. As the Romans said 'via vita est' – streets are life.

15.8 References

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16

Attitudes to walking and cycling

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16.1 Introduction

The proportion of pedestrian travel varies between different countries. One estimate has suggested, for example, that the proportion of trips made by foot in the United States in comparison to other modes of transport is half that of some European countries (Pucher and Dijkstra, 2000). The general trend, even in countries with a relatively large number of trips on foot, is that walking is on the decline. Distance is one reason but not the only one as many 'trips' are considered to be short, i.e., less than 5 km. Another is the adoption of a lifestyle that is very car-oriented, meaning that other modes of transport are very rarely considered.

Nevertheless, when people are asked about walking they are usually very positive. If the distance is acceptable, then it can be seen as relaxing (Heiden and Rooijers, 1994; Forward, 1998a 1998b), pleasant (Wigan, 1995), and allowing a sense of freedom (Heiden and Rooijers, 1994; Forward, 1998a, 1998b), as well as maintaining health and fitness (Forward, 1998a, 1998b). Factors that could reduce walking, apart from distance, include a pedestrian's fear of risk and sense of personal vulnerability (Mitchell and Stokes, 1982; Wigan, 1995).

Travelling by bicycle also varies between different countries but perhaps more substantially. In some countries just 1 % or even less of all journeys are by bicycle, whereas in others the figure is around 30 % (Pucher and Dijkstra, 2000). Cycling is not always regarded as a mode of transport but rather as something associated with play and recreation (Adams, 1993). In many countries – but far from everywhere – cycling has become less popular. As with walking, this decline is associated with an increased use of cars.

Our travel behaviour is influenced by a number of factors such as socio-economic and demographic issues, together with needs and attitudes. An important step in the direction of changing people's travel routines would therefore be to understand the motives behind such actions. This has led to research looking at such factors as attitudes. Surveys have shown that positive attitudes are combined with a high percentage of cyclists, whereas negative attitudes are related to a low percentage (Hansen, 1995). The benefits of cycling include:

- convenience (Finch and Morgan, 1985; Taylor, 1996);
- low cost (Finch and Morgan, 1985; Lei *et al*., 1995; Taylor, 1996; Forward, 1998a, 1998b);
- speed (Lei *et al*., 1995);
- fun (Trevelyan and Dick, 1978; Finch and Morgan, 1985; Lei *et al*., 1995; Taylor, 1996);
- environmental friendliness (Finch and Morgan, 1985; Lei *et al*., 1995; Forward, 1998a, 1998b).

Some of the disadvantages of cycling include:

- the high risk of a bicycle being stolen (Finch and Morgan, 1985; Hansen, 1995; Forward, 1998a, 1998b);
- the fact that it is uncomfortable and strenuous to ride (Finch and Morgan, 1985);
- it is unsuitable for the transport of bulky or heavy loads (Forward, 1998a, 1998b);
- it can be considered dangerous (Trevelyan and Dick, 1978; Finch and Morgan, 1985; Hansen, 1995);
- the fear of an accident may be the cause of many people deciding not to cycle (Hyllenius, 1996).

Studies on attitudes can provide information about the advantages and disadvantages of walking and cycling. Despite this, it is not always possible to draw any direct conclusions from surveys since some of them are descriptive and do not attempt to explain which factors motivate a person to do one thing or another. Before being able to predict modal choice, a deeper understanding is needed of those factors which predict travel behaviour. In addition to this, we need to know in what way people who already use these modes differ from others. Are there sub-groups within main groups of cyclists and pedestrians? What are the barriers to changing attitudes and how can they be overcome? This information will be crucial when trying to design a programme for change. In this chapter an attempt will be made to explore more fully the nature of attitudes, what they are and how they are linked to behaviour. It will end with discussing how this information can help to produce a programme for change.

16.2 Attitudes

Numerous attitudes have been assessed over the years and, as new social issues emerge, additional attitudinal domains are explored. But what exactly is an attitude? As an example, is an opinion about the fuel consumption of your car an attitude? The term attitude has been defined in many ways. Fishbein and Ajzen (1975) stated that the term is 'characterised by an embarrassing degree of ambiguity and confusion'. Despite this there are at least five common features which describe an attitude:

1. It is an internal state and therefore inaccessible to direct observation.
2. It predisposes an individual to respond either favourably or unfavourably to an 'attitude object'.
3. It includes both an evaluative and an emotional component.
4. It is persistent over time but amenable to change. Strongly held attitudes require substantial pressure to change.
5. It is the result of previous learning rather than something innate.

If we go back to the question raised at the beginning of this section, it can be said that an opinion about fuel consumption is an example of an attitude if it also means that the owner also creates some form of value judgement. The car might consume 0.9 litres of fuel per 10 km if the driving is mixed (fact). For the owner of the car this is not only a fact, but has implications based on previous learning. It can be seen as too much or just right, good or bad (evaluation). If the person is concerned about the environment then he/she might consider buying another car (action). In that way an opinion about fuel consumption is also an attitude.

16.2.1 Attitude and behaviour

The utility of the attitude concept partly derives from its assumed ability to predict behaviour. This assumed relationship has been widely debated and the focus of much research. Some early studies found that the correlation between attitudes and behaviour was rather low. Some researchers argued that the link was not strong, whilst others identified the problem as methodological. Hence, increasingly refined methods were developed (Gordon, 1989).

16.2.2 Theoretical models of attitudes

One method widely used within the area of social psychology that tries to establish a stronger link between attitudes and behaviour is the Theory of Reasoned Action (TRA), developed by Fishbein and Ajzen (1975) and its predecessor, the Theory of Planned Behaviour (TPB), by Ajzen (1985). Initially, the main area of interest was related to health (Forward, 1994) but it has also been used to also explain behaviour related to transportation such as traffic safety (Parker *et al.*, 1992, 1995; Forward, 1997) and modal choice (Forward,

1998a, 1998b; Stradling, 2001). The Theory of Planned Behaviour includes three major factors: attitudes, subjective norm and perceived behavioural control. A behavioural intention is regarded as a sufficient immediate cause of behaviour and describes motivation.

The model predicts the personal decisions (intentions) of a behaviour based on attitudes toward the act, subjective norms and perceived behavioural control. Behaviour refers to an observable act. Attitudes include all salient beliefs about the consequences of the act, weighted by an evaluation of those outcomes. Subjective norms are the sum product of an individual's belief about the expectations of persons significant to them, weighted by the motivation to conform to them. Perceived behavioural control refers to a person's perception about his/her own capability to perform an act and does not deal with the amount of control a person actually has. It is a function of control beliefs and perceived facilitation. The control belief may be based on past experience (whether one's own or others) and/or second hand information. Studies using this model in four different cities (Amsterdam, Barcelona, Copenhagen and Gothenburg) found that perceived behavioural control explained most of the variance, regardless of mode of transport, followed by attitudes and then subjective norm. For walking the model explained 21–53 % of the intention and for biking 22–53 % (Forward, in print).

According to the TPB, the effect of variables not included in the model would be indirect. In most instances this assumption has been verified. Socio-economic factors, for instance, will usually not act directly on intention, and when they do, the contribution is very small (Forward, 1998b). However, the same does not seem to apply to habit. Several studies have found that the association between habit and intention is many times higher than the association between variables in the model and intention (Forward, 1994). The same applies to studies on modes of transportation where habit increased the explanatory value (Verplanken *et al*., 1994; Forward, 1998a, 1998b).

16.3 Attitudes towards walking and cycling

A number of studies have revealed different factors that appear to be related to walking and biking. These studies include time, relaxation, independence, cost, safety, effort, health and environment. The question, then, is how important these factors are and in what way they actually predict modal choice.

16.3.1 Time

Time is usually an important factor that influences people's choice of transport. In a study using in-depth interviews asking the participants why they used a car to get to work, time came out as the most important factor (Forward *et al*., 2000). In another study by Forward (1998b) the attitude to time differentiated

the people who would use the bike from those that had no such intention. When both cyclists and drivers were asked about travel time the cyclists believed that it would be faster to bike a distance of 2.5 km than use a car. The drivers believed that it would be much faster by car. Walking, on the other hand, was not related to perception of time since both 'walkers' and 'non-walkers' believed that it would take a long time. Indeed, time is often seen as a disincentive to walking, so, by reducing the distance to business and other destinations, more people could be encouraged to walk. This was also the result of an urban renewal scheme carried out in Toronto, Canada, involving the construction of new houses in the city centre. As a consequence of this a large number of people started to walk to work: 35 % in the summer and 29 % in winter (Zuckerman, 1993).

The distance for pedestrians has to be minimised if walking is to be carried out on a regular basis. Sometimes this requires the reconstruction of cities and towns by moving people and services closer together, which of course is both time-consuming and expensive. In other cases it requires more thoughtful planning, putting the pedestrian first, which, among other things, means fewer, or no, detours. Many cities built around the car usually fail in this respect. It is often the pedestrians who are expected to make the detours rather than the drivers. Since the pedestrians are motivated to reduce the distance they travel, this may well result in their entering areas which are not suitable or safe.

Compared to walking, cycling is considered to be relatively fast, and in some situations, faster than travelling by car. However, not all car drivers are aware of this. When a group of both cyclists and drivers was asked about travel time, cyclists argued that it would be slightly faster to bike a distance of 2.5 km than to use the car. The drivers on the other hand believed that it would be much faster by car (Forward, 1998b). These views were related to whether they perceived cycling in a positive or negative way.

Offering a stimulating and aesthetically pleasing experience can help to change the perception of time. This is because our experience of time is very much influenced by our own subjective reality and not always linked to actual time as shown by clocks. When we are immersed in an experience, time may not be an issue. It is only when the space between departure and destination is left unfilled that we become aware of time. Jacobsen (1994) talked about 'experience time' when the person enjoyed the experience of travel and 'dead time' when they did not. It was only in the latter case that the focus was on how long a journey took. Thus, a person's attitude to how long it would take to travel by different modes of transport tells us something about how the experience is perceived.

16.3.2 Cost

The attitude to cost predicted attitudes to cycling and driving but not walking (Forward, 1998b). In one study, those using either the bike or the car argued

to a greater extent than others that it would be cheap – or at least not as expensive as the others believed (Forward *et al*., 2000). The difference in value of cost was not, as one might expect, related to income. This may well be because cost is another factor, like time, which is not based on real value. In the study by Forward *et al.* (2000), participants found it difficult to estimate the cost of running a car. They even found it difficult to determine the cost of petrol, even though it had increased substantially just before the study and had been widely debated in the press. They found this exercise difficult since they had not really thought about the real cost of running a car. Their responses could be divided into three different categories:

- one group argued that it was expensive to run a car but had accepted it since they had no other option;
- a second group believed cost was not an issue since they believed that by cutting time they would save. 'Time is money' was a common statement;
- the third group argued that a car cost money, regardless of whether it was used or not. Therefore they would cut costs by using the car rather than other modes.

However, for people using public transport, cost was an issue. Some argued that the only reason for not using the car was that they could not afford to own one.

16.3.3 Safety

Factors related to safety that could reduce walking include fear of danger and personal vulnerability. Fear can concern accidents, being killed or injured by a motor vehicle, or it can be about being attacked by another person. Pedestrians are the most vulnerable of all road users. The proportion of pedestrian fatalities range, depending on country, from 10–15 % to 35–40 % (Gunnarson, 1999). However, in some cases the perception of danger associated with walking can be greater (or smaller) than the real danger as measured by accident statistics. As an example, Carreno, Willis and Stradling (2002) found that elderly respondents usually rate personal security and security from traffic as more important than younger people. A person's perception of safety is based on previous experience and that of others. For instance, most underpasses are very safe for pedestrians (statistically speaking), but that does not necessarily mean that those using them feel safe. Some pedestrians will rather cross a busy street than use the underpass, especially at night and in isolated places.

The chances of being attacked by another person are perceived as greater if the area is deserted. In Barcelona, a city where walking is very common, people felt less worried about being attacked as compared to cities were walking was less common (Forward, 1998a, 1998b). In a study by Lynch and Atkins (1988) it was found that women felt very vulnerable when they were out walking on their own, especially when it was dark. In their study more than half of the women would avoid going out after dark (52 %). Another

consequence of pedestrians' vulnerability is that many children are not allowed to walk even short distances because parents are worried that they will be killed or injured by a motor vehicle. An increasing number of parents take their children to school by car, which has made them more dependent and less physically active (Björnberg and Bäck-Wiklund, 1987).

When cycling is compared to walking, more people appear to be concerned with feelings of safety. This fear has been justified on countless occasions, as the risk of a cyclist being injured is six times higher per kilometre than that for a car driver (Thulin and Nilsson, 1994). However, a discrepancy is usually found with regard to cycling, depending on experience and level of cycling. People who cycle on a regular basis are less worried than people who do not. The same applies to people who live in areas with high levels of cycling who are less worried about safety than those who live in areas with a low level of cycling. The reason for this is two-fold. One reason is that the risk of an accident is indeed lower in places with high levels of cycling. In the United States, where less than 1 % of the population cycle, the fatality rate per 100 million trips during 1995 was 26.3. In contrast, in The Netherlands, where around 30 % of the citizens cycle, the same rate was only 1.6 (Pucher and Dijkstra, 2000). The other reason is linked to exposure and the person's own feeling of safety. An accident is still a rare event, and for a person who cycles on a regular basis most journeys will occur safely. Their experience will inform their perception of risk. Not to have to worry about safety is certainly one condition that needs to be addressed in influencing modal choice.

16.3.4 Relaxation

In general walking is regarded as relaxing but cycling is not (Heiden and Rooijers, 1994). This is hardly surprising as cycling involves physical effort and some people therefore regard it as strenuous (Finch and Morgan, 1985). However, other studies have shown that people who cycle on a regular basis perceive cycling as relaxing (Forward, 1998b). This anomaly can be better understood if we also look at effort. If the effort involved in carrying out a special task is unanticipated or unwelcome, it is regarded as inconvenient (Stradling *et al*., 2000). A journey which is inconvenient can hardly be relaxing. If we then look at cycling from a regular cyclist's perspective, the physical effort involved is neither unanticipated nor unwelcome. The effort involved can be an aim in itself, inducing a feeling of relaxation since it helps to empty the mind of other thoughts by the need to concentrate on the task in hand.

16.3.5 Independence

People who walk and cycle on a regular basis believe that it gives them a sense of freedom (Forward, 1998a, 1998b). However, this is not something

non-users tend to agree with. Walking and cycling is compared to driving, which for drivers, outperformed the other two in these respects. In a study by Stradling *et al*. (2000b) 95 % of the participants agreed with the statement that driving gave them a sense of freedom. With freedom they meant that they could travel when and where they wanted. Walking and cycling also enable a person to travel when they want, but not where. For the drivers, the feeling of freedom came from a combination of the when and where, the ability to get away whenever they wanted and to wherever they wanted. For many people this is a dream of leaving everything behind and entering something unpredictable and exciting. However, the reality for most people is that a large number of trips are indeed very predictable. Despite this, the car can be seen as a way of fulfilling this dream.

16.3.6 Health and environmental issues

Health and environmental issues are factors that influence walking and cycling. People who walk believe that it improves their physical health. They also agree that it contributes to a better environment (Forward, 1998a, 1998b). The same views were held by cyclists. This does not mean that non-users would disagree with these statements. Increasing numbers of people are becoming concerned about the environment and may have already started to recycle goods and are willing to pay more for environmentally compatible products. Unfortunately, car use is not always linked to this more general concern (Stokes, 1989). When people are reminded of this, what is often regarded as a form of social 'dilemma' appears, whereby their own interests (convenience, flexibility) come into conflict with general or public issues (increased environmental pollution). Self-interest is often rated higher than public interest, and this subsequently governs actions (Garvill *et al*., 1994). The advantages are here and now, the disadvantages elsewhere and later.

However, an individual's own health must be in their own self-interest. Indeed, drivers know that driving does not improve their health. Nevertheless, it is not seen as a conflict as they do not perceive it contributing to an unhealthy lifestyle. This was confirmed by Stradling (2001) who found that 72 % disagreed with the statement that their level of car use gave them an unhealthy lifestyle. For them, exercise is not linked to transportation. Indeed, the car may often be used to take them to different sporting and leisure facilities. It has become more commonplace to use the car for leisure activities, which in turn is partly responsible for the large increase in car traffic density (Jones, 1993). It could therefore be argued that one important difference between the groups lies in that non-drivers try to combine exercise and travel, whereas drivers do not.

16.4 Attitude change

Attitudes are said to be functional and are held because they meet certain individualistic needs. They are also characterised by an evaluative nature. As an example, a person might believe that cycling is cheap and helps them to keep fit but, at the same time, they also believe that it is inconvenient. The outcome of this process depends on which belief has the strongest effect on the person. When an attitude is being formed, we are usually aware of this process but as time goes by we may act automatically. The behaviour will persist until something challenges the attitudes that underlie it.

The amount of information reaching us is overwhelming and we can only investigate a small proportion of it. Most of it is ignored or only evaluated on a very superficial level. Information is often scrutinised in a biased way with the aim of maintaining current attitudes rather than changing or disregarding them altogether (Shrigley and Koballa, 1992). Different campaigns have tried to link extensive car usage with various environmental threats and poor personal health. The assumption has been that a person who is afraid is easier to persuade. The result of this is that many drivers have become well aware of these problems but that this greater awareness has not always had the desired effect, i.e., of changing their behaviour. The reason for this is not that people cannot change but that the programmes are poorly designed.

One problem with providing factual knowledge is that it is aimed at the intellect (the so-called rational level) whilst at the same time ignoring the emotional side. A message which runs counter to an individual's beliefs may be reinterpreted to become more consistent with those beliefs, or it may be partly ignored, repressed or compartmentalised. Another factor that is important is the persons degree of self-efficacy. A person with a low degree of self-efficacy is more likely to avoid change than others. In contrast, a high degree of self-efficacy has been found to alleviate anxiety and enhance coping ability (Green and Kreuter, 1991). To be effective we need to involve both the intellect and our emotions.

Prochaska and DiClemente (1992) outlined six stages before a new behaviour could be firmly established amongst a group:

1. Precontemplation – where a person has no intention to change their behaviour, and resists change.
2. Contemplation – the person starts to become aware of the problem; the cost and benefits weigh about the same.
3. Preparation – the person starts to prepare themselves for change.
4. Action – behaviour has changed, but there is a high risk that the person will return to their old behaviour.
5. Maintenance – the new behaviour has started to become a habit.
6. Termination – the new behaviour is established and the individual not likely to return to their old behaviour.

A person at the stage of precontemplation would probably be a habitual driver who has not even considered walking and cycling. For instance, to

merely inform this driver about environmental issues will not always have the desired effect. Many people are very knowledgeable about the effect pollution has on our environment including our own health. Despite this very few people are willing to reduce their own driving. One reason for this is that their own car use is not seen as contributing to air pollution (Rossmy and Brown, 1989). The other is that environmental knowledge, by itself, does not predict behaviour (Grob, 1995; Stokes, 1989; Nilsson and Kuller, 2000). How a message is evaluated depends more on the receiver's own underlying beliefs. In a study by Forward (1998b), it was found that women were more motivated by environmental issues. Other studies have found that men and women are equally interested in questions dealing with the environment, but that women are more emotionally concerned. They perceive the threats as more serious than men do, hence, appealing to environmental issues can have an effect if it involves both the intellect and the emotions. DeBono (1987) found that a message was persuasive if it was functionally relevant. In his study, subjects became convinced that their attitudes were redundant and failed to serve their function, and that a different attitude would be more useful.

Indeed, other research has found that the person is persuaded by arguments that will have an impact on their own lives. If the issue is of personal relevance, the person will be more motivated to listen to the message and be affected by it. In a study by Steg and Vlek (1997), a variety of measures intended to have a direct effect on the person were discussed. They divided them into two different groups: 'push' or 'pull' (or sticks and carrots). Stradling (2001) found that it was mainly the young and those driving small cars who would reduce their driving if they were offered attractive alternatives (pull). The old and those on low incomes would reduce car use if it became more expensive and/or if they were penalised by using it (push). The third group, who Stradling described as people with medium or large cars and who were required to drive as part of their work, would not respond to either. In another study by Stokes (1989) one-third of the sample were labelled 'persuadable' since they could be persuaded to change, and one-quarter 'no-hopers', since they resisted change. Such studies suggest that for some people both push and pull are needed, although most studies seem to suggest that pull measures appear to be more effective (Stradling *et al.*, 2000c).

Thus, before they move on to the second stage of contemplation, a great deal of effort is needed to make individuals aware of the problems and the role they themselves play. To encourage this, the inconsistency between their own needs (independence, freedom and so on) and more general or public needs (a better environment and quality of life) needs to be highlighted. If this is successful, it will create a form of social dilemma which would make them dissatisfied with their own behaviour, resulting in the desire to change. However, if other alternatives are seen as unattractive, or indeed not practical, then the chance is very small that they will change, despite this new understanding. People at the stage of contemplation are open to new information

and want to know more. DeBono (1987) found that a message was persuasive if it was functionally relevant. In his study, subjects were persuaded that, if convinced their attitudes were redundant and failed to serve their function, a different attitude would be more useful. However, if this failed the person might get stuck at this stage and would then need a push from others. We do not live in isolation and therefore the views and behaviours of others are important. In a theoretical context using the TPB, this has been described as subjective norm. This reflects the perceived pressure from others to behave in a certain way.

If this stage works, the person should now be willing to move to the third stage of preparation. They now start to prepare themselves for action. At this stage the circumstances surrounding the person become important. What are the facilities for walking and cycling and how will they be perceived by others? Once action is taken, it is very important that the new experience is rewarding otherwise the risk is very great that people will return to their old behaviour. The fifth stage is maintenance, when the new behaviour has started to become a habit. The final stage is termination, when the new behaviour is established, and people are not likely to return to their old behaviour.

16.5 Conclusions

It is clear that for walking and cycling to grow in popularity, the infrastructure supporting them must be effective. As an example, planning for pedestrians must involve cutting down the distance and time they need to walk as much as possible. However, as this chapter has argued, changing attitudes is equally important, not least because attitudes help to determine how individuals perceive and evaluate the time required for walking or cycling. Attitudes are complex and uninformed attempts to change them are frequently unsuccessful. This chapter has considered both the general determinants of attitudes and, specifically, research on attitudes to walking and cycling. It has reviewed studies of attitudes in such areas as cost, safety, relaxation, independence, health and environmental issues, which together help to determine whether an individual's attitudes to walking and cycling are positive or negative. Understanding these perceptions is critical to attitude change.

Building on this foundation, the chapter has analysed the key stages in effecting attitude change and suggested some ways forward in effecting such change. An educational programme trying to increase the use of environmentally friendly modes of transport needs to rest both on a sound theoretical basis and an understanding of the target groups' needs and motivations. If we as humans were not adaptable and willing to change we would not be here today, as '. . .even the most obvious occurrences in daily life might be utterly transformed if we were inventive enough to construe them differently' (in Adams-Webber and Mancuso,1983). Attitudes to walking and cycling can be positive and they can become much more positive with experience. The

challenge is to change attitudes and reinforce the change in a way that allows individuals to build upon that experience.

16.6 References

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17

Overcoming the attitude barriers to greater cycle use

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17.1 Introduction: cycle use in Great Britain

This chapter discusses individual, social and institutional attitudes to cycling, what influences them, and how they can be changed to encourage more use of bikes, with particular reference to Great Britain, a country with relatively low levels of cycle use. Use of bikes for trips to work in most of Great Britain is relatively low. For example, 3.4 % of trips to work by men and only 2.4 % of trips to work by women were by bike at the time of the 1991 census (DTLR, 2002a). However, cycle ownership is much higher and has continued to increase over the last 30 years (DTLR, 2002a). The higher level of ownership, combined with the fact that one-quarter of car stages are less than two miles (3.2 km) long (DTLR, 2002a) suggest considerable potential for more cycling, given the right conditions. There are some places, including Cambridge, York and Oxford, where there is much more cycling. For example, in Cambridge, one-quarter of men and nearly one-third of women usually cycle to work (DTLR, 2002a).

Leisure cycling levels are higher and have grown in recent years, from 15 % in 1987 to 19 % in 2001 of General Household Survey respondents. Cycling is indeed one of the top five sporting activities for each age and sex (DTLR, 2002a). On the other hand, as Lawson and Morris (1999) have noted, 'There are differences between utility and leisure-only cyclists and that someone who cycles only for leisure is not necessarily more likely than a non-cyclist to be encouraged to become a utility cyclist'. Cycling also fluctuates by season, as can be seen from Fig. 17.1, being highest in the months from May through to September.

In places such as York and Cambridge, lying on the flatter and drier eastern side of Britain, levels of cycle use come near to those found in many

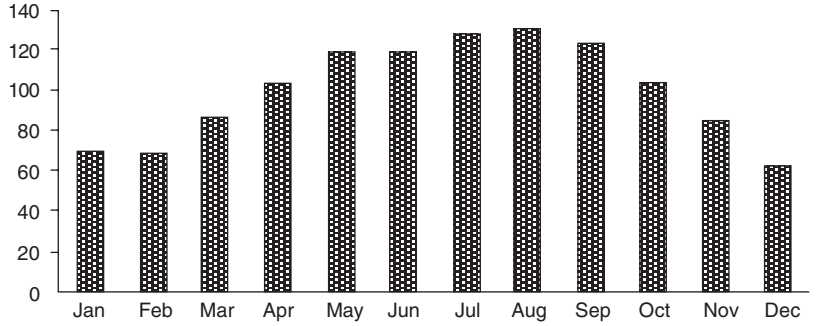

Fig. 17.1 Bicycle traffic distribution by month (index: average month = 100). Source: DTLR (2002a).

other north-west European countries. As the Commission for Integrated Transport (CfIT) pointed out in a report on European Best Practice in Transport: 'Other European countries have been strikingly successful in encouraging cycling as a realistic and effective alternative to the car for short journeys. Our research has shown that cycling can be an important mode of travel in some European countries'. (CfIT, 2001a)

17.2 The importance of attitudes towards cycling and cyclists

It is important to appreciate that attempting to change people's travel behaviour means 'a gradual process of change, from raising awareness to achieving a lasting change in behaviour . . . Successful campaigns begin by understanding the existing attitudes and behaviour of target groups and identifying the potential for change' (Jones, 1999: 5). The same author has also stressed that there must first be awareness of the problems among target audiences and acceptance of the need for change before achieving a shift in attitude towards various transport modes. Also important in changing attitudes is a combination of soft and hard policies, i.e., the provision of infrastructure in combination with efforts to change attitudes and behaviour (Jones, 1999).

If we are to understand why many people do not ride bikes and what might make them do so for some of their trips, we need to understand general attitudes and behaviour towards cycling and cyclists. This means understanding both specific attitudes to cycling, negative and positive, and also the wider attitudes of other road users that can, both directly and indirectly, affect the attitudes both of cyclists and, perhaps even more importantly, non-cyclists, whether or not they show any potential implication to become cyclists (Duerden, 2001; TRL, 2001).

The formation and maintenance of attitudes arises in part from individual preconceptions and motivations but is also very much influenced by people's

social and cultural context, i.e., the groups they mix with, their friends, families and colleagues. Peer pressure and societal norms are very important (Davies *et al.*, 1997), as are people's life cycles, for example, whether they have young children or whether they are elderly and frail. Individual (and social) attitudes are also influenced by the official attitudes of institutions such as employers and governments, at different levels. Individual attitudes can be influenced directly and indirectly, for example through increased environmental awareness and international events such as oil crises or evidence of increases in the rate of climate change.

For many people, cycling still tends to be associated with childhood, a pastime that they enjoyed when younger but gave up in their teenage years and would not dream of taking up in adulthood (Reid, 2001). However, the fact that for many the bike is associated with a pleasant and significant part of their childhood does give some basis for promotion and for returning to bikes in adulthood. For men, the advent of the all-terrain bike (mountain bike) in the 1980s eroded some of the juvenile and boring image of cycling, helping to create a more 'macho' image for cycling. However, this has been less the case for women, possibly because cycling does not generally fit in with self-consciousness about appearance, particularly when the desired image is one of sophistication (Kent County Council, 2001). For some women, cycling is regarded as unladylike and indeed many adults regard cycling as undignified. On average, men do more than three times the annual cycle mileage of women (DTLR, 2002a). Fear of personal attack when cycling can also be a strong disincentive for women (Pearce *et al*., 1998). However, as the same authors point out, it is also true that in areas of high levels of cycling, there are often more women cyclists than men.

It is important not to be too superficial in the assessment of attitudes to cycling. For example, a common response to cycling is that it is dangerous because of the danger from motor vehicles and should not be encouraged, and this perception is widely confirmed by research (DETR, 2000a; DTLR, 2002b: A.8). Local perceptions of road safety are particularly important in influencing attitudes (Waldman, 1977) although lower speeds, with greater speed enforcement, and also driver training, can do much to reduce danger and perceptions of danger (RDRF, 2001). Individuals may therefore understandably give this as a reason for not cycling, or not cycling more, in certain conditions, but at the same time may not so readily admit that they hesitate to cycle because it will affect their social image. Some reasons for cycling are more socially acceptable than others. As Davies *et al*. (1997) observed: '. . . There are many factors involved and there are 'layers' of motivation, reasoning and behaviour change involved . . . These other factors include the practical convenience of cycling, the image and status of cycling, fear of cycle theft, fear of personal attack, the physical effort involved, and enjoyment of cycling.'

These comments underline the complexity of factors that affect attitudes to cycling and the need, therefore, to examine each of these in turn, appreciating

the indirect as well as direct influences on them. These influences vary greatly between different countries but can vary even within a country like Britain, which has a generally poor image of cycling. These contrasts are reflected in widely varying levels of cycle use in different parts of the country, for example, as mentioned above; levels that are influenced not just by the extent and quality of cycle infrastructure provision but by the local topography and climate, the compactness of land-use in the area, cultural attitudes and the presence or absence of further and higher education facilities.

17.3 Factors influencing the development of attitudes to cycling

Some people have argued that the image of cycling and, furthermore, the development of official policies on cycling, has been marked by an excessive preoccupation with danger and that this is mainly responsible for negative attitudes to cycling, individual, social and official (Franklin, 2001). Franklin argues there should be much more focus on the benefits of cycling and this is supported by others such as Jackson (2001). These benefits particularly include its convenience, its low cost, its basic enjoyment, its environmental benefits (not contributing to air or noise pollution) and its great fitness and health benefits, including its vital role in helping to reduce heart disease, weight control and stress. Other, more public, benefits that can be stressed are cycling's potential to help reduce traffic congestion and accidents, and to increase travel choice.

As well as focusing on the benefits of cycling, it is important to appreciate that attitudes can be changed by directly, and consistently, attacking the possible disadvantages, some of which are more amenable to action than others, at least in the short term. These more negative factors include, as well as safety, the weather, terrain and distance. The disincentive of weather can be eroded by giving people accurate information on the extent of poor weather and also by advice on the range of weather-proof clothing available. Similarly, the disadvantages of gradient can be at least eroded by use of bikes with multiple gears and advice on how to use them correctly. The length of trips is certainly a potential disadvantage, particularly in countries with predominantly low density development such as the USA and Australia (Newman and Kenworthy, 1989, 1999) but there is scope, especially in the longer term, to erode this through higher density development and redevelopment and the provision of more local facilities within easier cycling distance. The adverse effect of distance can also be modified through the development of arrangements to encourage combined use of bikes and public transport, in terms of safe and easy access routes to stops and stations, secure bike parking facilities (short-term and long-term) and access arrangements for bikes on public transport services, especially long-distance ones.

It is certainly true that attempts to stress the great potential health benefits of increased cycling, in terms of both individual and public health, can be undermined by an undue emphasis on dangers. However, fears about dangers, both imaginary and real, clearly need to be acknowledged. A balance must be struck with doing this and taking action to reduce dangers, on the one hand, and, on the other, projecting a too negative image. Some regard publicity about helmets, for example, as being counterproductive, as urging the use of helmets can easily imply that cycling is dangerous (Franklin, 2001). The need for promoting the positive benefits of cycling – speed, fitness and pride in learning a new skill – with a focus on getting adults to cycle a few trips they currently drive, has also been emphasised (Wardlaw, 2000).

Feelings of freedom and independence among cyclists, and a sense of achievement derived from a satisfying journey, have been reported in several surveys (Davies *et al*., 1997; Finch and Morgan, 1985; Hillman *et al*., 1990). These positive attitudes can also be built on to encourage more people to cycle.

Perceptions of cycling are too easily dominated by a poor social image and association with traffic danger, and these and other often-exaggerated perceptions must be addressed, as well as stressing the many benefits. Some of these exaggerated perceptions have been clearly revealed by surveys of the attitudes of new cyclists, comparing their attitudes before and after taking up cycling (Davies and Hartley, 1998; Pearce *et al*., 1998). These show that many fears, particularly about the amount of effort involved, the lack of facility to take any luggage, or the physical effort involved, turn out to be imaginary or greatly overestimated.

The Transport Research Laboratory (TRL) survey of new cycle owners (Davies and Hartley, 1998) revealed a number of other interesting points. When asked their main reasons for buying a bike, three-quarters said 'leisure', although this term included 'getting around', an important sub-theme. Comments on the timing of their purchase were also interesting. Often this was during some important lifestyle change such as moving house, children growing up, partner interested in cycling or even the onset of summer. By and large the majority were happy with their experience of buying a bike, feeling fitter and having a sense of well-being. All were pleased they had bought a bike and nearly all wanted to cycle more. Their main anxieties about cycling – lack of fitness, distance and carrying luggage – largely disappeared.

On the other hand, three main concerns remained; poor weather, pollution and injury. There were other specific negative comments, for example on theft, the lack of accessories such as lights and carriers (on mountain bikes, which featured predominantly in the responses) as well as uncomfortable saddles and a lack of good cycle parking. There were many negative comments about cycling on main roads, often found to be thoroughly unpleasant because of noise, speed, intimidation and cars cutting corners. The risk of traffic injury is of particular concern to female cyclists, as is pollution (Pearce *et*

al., 1998). Moreover, heavy goods vehicles certainly discourage many of the 'leisure' cyclists from crossing over into 'utility' cyclists. This clearly shows the need, still very inadequately addressed in most of the UK in comparison with many countries in mainland Europe, for more effective efforts to reduce traffic volumes and speeds, and to give more priority to road safety and traffic law enforcement, as well as modifications to road design to help cyclists.

It is also important to remember that cyclists differ in their attitudes and experience. An obvious distinction is between child and adult cyclists but even the latter will differ in terms of their experience of traffic and their confidence. Some will prefer to avoid traffic altogether, only cycling on off-highway cycle paths, whereas, at the other extreme, others will have no qualms about cycling in traffic and will always take the most direct route, on grounds of speed and directness, regardless of the amount of motor traffic or other dangers.

There is a strong case for targeting more support to new and returning cyclists, both practical and psychological (Davies *et al*., 1998). This should include assistance with choice of cycle, accessories and maintenance; information about routes; cycling techniques; benefits of cycling; and various other aspects, as well as employer support through incentives such as cycle mileage allowances and priority parking spaces.

That many people are prepared to cycle, as well as use public transport if the conditions were more favourable, is confirmed by other surveys, for example the survey of Public Attitudes to Transport in England carried out in 2001 by the Commission for Integrated Transport (CfIT, 2001b), based on opinion surveys by MORI. In this, 44 % said they would cycle more if the conditions were more favourable. Moreover, the same survey found that half the population identified issues that, if addressed, would encourage them to cycle more. It also found that more cycle routes, better facilities for parking bicycles and a more considerate attitude by drivers were the factors most likely to encourage more cycling.

Although the political influence of car manufacturers and motoring groups is very strong, politicians often do not realise how public attitudes are changing and how they increasingly see the need for the restraint of traffic and the need for more preferential treatment to be given to cyclists as well as pedestrians and public transport. For example, support for giving priority to pedestrians and cyclists over cars in towns and cities was shown in a recent survey (DTLR, 2002c). Two-thirds of respondents agreed with this priority even if it made travel more difficult for other road users. There was also strong support for measures that could be introduced on residential roads to benefit non-car users, including 20 mph (30 km/h) zones and speed humps. Only 22 % thought local cycling provision was good.

That there are even some regular motorists who would be willing to cycle was shown clearly by a survey by the Automobile Association (AA, 1993). It found that almost all drivers (92.5 %) had learnt to cycle at some time and

that many are attracted to both utility and leisure cycling. As a first step, motorists should be encouraged to buy a bike and then to develop the habit of cycling.

On the other hand, it seems that many drivers do not seriously consider using any other means for some of their trips. They believe that their lives are busier, less structured and less predictable than earlier generations and that these characteristics led to a need for transport to be 'individualised, reassuring, flexible, convenient and immediate', all of which favoured car use (URS Thorburn Colquhoun, 2001). It seems that there is much to be done to make car drivers more aware of the benefits of cycling. Clearly, many people cycle for leisure who would never use a bike for other trips.

17.4 Developing more positive official attitudes to promote cycling

Since the mid-1990s official policies on cycling in the UK, at both national and local level, have gradually become much more positive, especially since the publication of the National Cycling Strategy (NCS) (DoT, 1996) and the Government's Integrated Transport White Paper (DETR, 1998), and the subsequent introduction of Local Transport Plans (DETR, 2000b). A number of factors contributed to this change, including a much greater awareness of the enormous individual and public health benefits of cycling, as emphasised by the British Medical Association Report (BMA, 1992), and a series of international and national environmental and political developments (Goodwin *et al*., 1991; RCEP, 1994).

The late 1990s also saw the parallel development of green commuter plans by some local authorities, which soon got official backing at national level, and did much to help change the attitude of employers to greener travel in general and cycling in particular. A survey in 2000 by the Transport Research Laboratory (Davies *et al*., 2000) showed that both local authorities and employers were becoming 'significantly' more positive in their attitudes towards cycling, which now seems more likely to fit in with a sought-after corporate image. Both the public and transport practitioners had come to accept the need for more sustainable transport policies including company and school travel plans, as well as good facilities for cyclists at the workplace and good cycle routes. The report also underlined the point that attitudes of individuals to cycling are partly influenced by the attitudes of organisations. These more favourable attitudes by employers have come about because of their increased appreciation of the many benefits of increased cycling. These include:

- reduced car parking demand and peak time congestion leading to reduced costs and time lost;
- improved environmental image;

- improved health and fitness of the workforce leading to better performance;
- greater potential for securing planning permissions;
- greater transport choice, enabling staff to arrive on time and giving greater access to the workforce (NCF, 2001a):

School Travel Plans have also become much more widespread since the mid-1990s (Cleary, 2002), recognising the need to both reduce traffic levels in the vicinity of schools, and take measures to promote directly the health of children so much put at risk by modern sedentary lifestyles, including a high level of dependence on cars for many trips.

However, the extent to which this has made a real difference in terms of improving the lot of cyclists in different areas is questionable, and the quality of many efforts greatly varies. The extent of dissatisfaction among many cycle users was made clear, for example, in the series of regional seminars on marketing that the NCS held in 2002. These showed that cyclists in Britain often feel that they are given low priority by local politicians and council officers and that this is reflected in poor quality physical provision and weak consideration (Jones, 2001). Cyclists often felt that they were still regarded as second rate road users and that many officials had a poor understanding of their needs, despite the proliferation of technical guidance on cycling in recent years from the Government and other organisations such as the Institution of Highway and Transportation (IHT) and the Cyclists' Touring Club (CTC) (IHT, 1996, 1998).

A more positive official attitude to cycling should result in more willingness to take seriously the views of cyclists and to take account of these views in assessing the need for further improvements. Getting the views of cyclists is now taken more seriously as in the case of a TRL report on cyclists' perceptions of particular types of roads (TRL, 2001). In this, cyclists cited safety, the attractiveness of the route and the smoothness of the road surface as the most important determinants in shaping their perceptions.

Good cycle parking is also an example of a positive official attitude to cycling that will be appreciated by all types of cyclists but is still often lacking at workplaces, outside public buildings and in public spaces like shopping centres, despite the provision of plentiful guidance (DETR, 1999). However, cyclists will respond well to cycle stands sited with regard to convenience and security, particularly if they also offer weather protection and have safe access. Given the widespread prevalence of cycle theft and vandalism of bikes, itself a significant deterrent to cycling, good cycle parking is all the more essential as a basic means of making theft less likely (NCF, 2001b). Cyclists also respond very well to good quality secure long-term cycle parking provision such as the facilities offered by purpose built bicycle centres in places such as Leicester (Gardner and Guthrie, 1998).

Good quality cycling provision also means developing and maintaining good signing systems, plentiful and readily accessible up-to-date and attractive information on cycling, including routes. Also required is a serious attitude to traffic law enforcement, to discourage bad driving and especially the

infringement of speed limits. Responsible attitudes to road safety and behaviour can be promoted among drivers and cyclists, for example through Adult Cyclist Training Schemes, which also give people the confidence to cope with riding in busy traffic (RDRF, 2001).

Measures such as these should be promoted in partnership with a range of private, public and voluntary bodies, including Health Authorities, Tourist Boards (NCF, 1999; Sayer 2000), local authority departments, employers, the police, leisure and health agencies, and cycling organisations. Development of a co-ordinated approach has recently been encouraged by the CTC through its Benchmarking Project, developed since 2000 in close partnership with a number of local authorities (Russell, 2001). This recognises that the provision of infrastructure alone is insufficient to achieve a substantial shift in cycling, especially from car trips, and those positive promotion initiatives, and safety schemes, are also essential. All aspects of cycling policy are therefore audited within the project, from promotion to engineering design and from training to maintenance of cycle paths. The framework used for this audit is based on ten headline criteria:

1. Leadership;
2. Policy and strategy;
3. Resources;
4. User Focus;
5. Infrastructure for Cyclists;
6. Danger Reduction;
7. Integration with Public Transport;
8. Promotion and Education;
9. Other Partnership Projects;
10. Monitoring and Evaluation.

Leadership in developing and implementing cycling policies is greatly helped by having a champion to co-ordinate approaches consistently and widely over several years. This means not just in terms of 'cycling' policies as such but also in terms of encouraging a wider bike-awareness perspective in many other planning, environmental and other policies, especially transport policies, where such issues as speed reduction, traffic law enforcement and traffic restraint should be addressed. This wider context is indeed vital to a serious promotion of cycling (Wardman *et al*., 1997; McClintock, 2002).

One approach to the development of more favourable attitudes to cycling is to set targets for increasing different types of trip such as trips to work, to education and for leisure, and so on. Alternatively, some have urged the need for campaigns to alter travel behaviour to focus on people's needs and perceptions and not just on trip types, in order to achieve fundamental changes in attitudes (IEEP and Adrian Davis Associates, 2000). This report, based on lessons provided by health promotion, suggested targeting specific groups and encouraging them to change their travel behaviour rather than providing a blanket message which can be counterproductive. It recommended the use

of approaches such as the 'Bikemate' scheme used by the London Cycling Campaign which links experienced cyclists with those who wish to cycle more but who feel nervous about doing so, as one example of approaching a target group. Particularly important is to encourage people to give cycling a try without making them feel that they are taking on a major commitment. Many people still do not own bikes and may be tempted by a trial period with leased bikes (Pearce *et al*., 1998).

It is also important not to appear to demand too great a change in travel habits too quickly. In the short term it is a worthwhile advance to get people to use bikes for some of their trips, for example to cycle to work on one or two days a week, or to try using bikes for some shorter shopping or leisure trips. This can help people see the value of doing more of their trips by bike and make them feel they have taken a worthwhile step in the right direction of lessening car dependence, i.e., becoming more selective in their use of cars without feeling that they are being made to give up car use altogether.

Also useful in changing attitudes and behaviour is to encourage non-cyclists to try cycling for a limited period, with various incentives and careful monitoring (Pearce *et al*., 1998). This was the basis of the Cykelbusters Project in Aarhus, Denmark, which focused on habitual car drivers (Bunde, 1997). They were given access to a high quality bicycle and associated clothing and equipment, for a trial period. During this period, car use per participant declined by 50 % and cycle use increased sixfold. The promotion of group rides can also help (Hughes, 2000). This can help get across the enjoyable social aspects of cycling, as well as its great benefits as a form of moderate exercise to help people keep fit, and in a way that can meet the demands of people who cite 'lack of time' for cycling by being relatively easy to fit into a normal daily routine.

Emphasising improved health for the young, along with cost benefits for the elderly, has been suggested in another report, focusing more generally on the greater use of non-car modes (George Street Research, 2000). This can be linked to both broader travel awareness campaigns to encourage at least partial replacement of car trips by non-car ones, and the substantial health benefits, and pollution and congestion savings that this shift can bring about, particularly if these trips are transferred to cycling or walking trips. Good quality information on the alternatives available, including local cycle routes, cycle parking and cycle shops, can add to the incentives to change.

This information can be made available in various forms – in print, the Internet and local media, for example, but does need to be kept up-to-date and be repeated at regular intervals, and also be readily available and widely publicised. In turn, the impact of these measures on individual travel should be monitored, to obtain a clear idea of the impact of individual scheme measures and identify barriers to further change. For employers with a relatively high level of staff turnover, messages about greener travel, and the incentives for its take up, need all the more to be repeated and renewed.

The prospects of a positive response to employers' incentives to encourage cycling will also be more likely when there is co-ordination of a range of approaches. For example, the provision of extensively improved cycle parking facilities and showers, at a worksite, will greatly assist green travel plan commitments, and the effect of these will also be greater with financial incentives such as mileage allowance for cycle use and subsidies for the purchase of bikes and bike accessories. With such co-ordination, the development of favourable attitudes to cycling is much more likely and will be all the greater if these are in turn co-ordinated with attempts to improve the safety of cycling conditions in the vicinity of particular worksites, on routes most likely to be used by employees.

Another approach to increasing cycle use is to focus on those groups in the population who might be most encouraged to cycle, starting with an examination of the section of the population who currently cycle and their characteristics. This can then give an indication as to who in the rest of the population displays similar characteristics and who might therefore be encouraged to cycle. Davies *et al*. (1997) segmented the population according to current cycling habits and developed the following four characteristics:

- those who cycle already;
- those who would not take much persuasion to change;
- those who would take a lot of persuasion to change;
- those who would always try to stay in their cars whatever measures are introduced.

Certainly, targeting can be productive in encouraging more cycling. Targeting campaigns carefully, so as to focus more precisely on groups who show some sympathy with the idea of cycling, and not wasting time and resources on those who clearly will not, has been the basis of very successful approaches in Western Australia (Ashton-Graham *et al*., 2002; Walsh, 2002).

Attitudes are also more likely to become positive if people are given co-ordinated and consistent messages. For example, any incentive in terms of good quality cycle routes to stations will be undermined by insecure and inconvenient cycle storage at stations or by the failure to modify the layout of busy and dangerous junctions on the route or to take action to reduce speeds on road sections used by cyclists.

Local authorities have a key role in the promotion of cycling but it is again essential that any policy statements are matched by practical implementation and that this is sustained, if attitudes are to be changed on a permanent basis. There is a danger, for example, that efforts to introduce new cycle routes will be publicised widely, but that subsequent maintenance action will be accorded a much lower priority, giving cyclists the feeling that they are still being treated as second-class road users. Poor road conditions, along with parking and security and cycling image, have tended to feature as the main concerns in attitude surveys (Finch and Morgan, 1985; Environ, 1993; TRL, 1996). Tackling such detailed matters, as well as co-ordinating policy approaches,

is all vital to the consistent and comprehensive approach needed to encourage cycling.

Finally, it should be mentioned that the need for changes to details of the design of bikes in encouraging more people to cycle has also often been stressed (Davies *et al.*, 1998; Guthrie, 2001; Toy, 1996), for example, to make it easier to take luggage. Since traffic noise is clearly a deterrent for people, it has also been suggested, for example, by Davies *et al*. (1998) that there is a need for changes in engine design to make motor vehicles quieter and less likely to injure cyclists.

17.5 Conclusion

Individual attitudes to the use of bikes are formed by a number of complex personal, social, cultural and institutional factors, but they can be changed, directly and indirectly. There is particular potential over the longer term by a consistent and co-ordinated emphasis on a number of different approaches, developed and implemented in partnership by a variety of organisations, at national and local level.

The approaches mean not only physical provision for cyclists – safer and generally high quality on-road provision and a much stricter approach to speed reduction and enforcement of speed limits, and secure cycle parking provision – but also co-ordinated action by local authorities, local employers, police, education, leisure, tourist and health agencies. It is especially important to avoid too negative a preoccupation with traffic dangers but rather to stress the enormous positive advantages of cycling, in terms of health, the environment and economy. These must be promoted by effective partnerships at different levels and partnerships in which the voices of a variety of cyclists themselves are taken seriously, in which their views are listened to and acted upon, so that cyclists too can feel that they are really no longer regarded as users of a second-rate form of transport.

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18

Social and cultural influences on the future of walking – the experts' opinion

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18.1 Introduction

The research discussed here is a survey of considered judgement of a panel of experts on the likely developments in walking in Europe in the near future. The Delphi Technique is one often used in marketing for forecasting futures and the idea of this study was to identify a consensus as to what the new millennium will bring for walking in the way of planning, policy, strategy, image, status, attitudes and behaviour. The outcome is what experts in the European walking world think the future holds for walking. This output will be a vital resource for all of those concerned with the role of walking in future society.

Walking as a form of transport and an integral part of everyday life is an area that is becoming a more important aspect of policy than in previous decades. For example, in the UK there is now government advice to local authorities on the importance of walking, in an integrated approach to transport. All authorities are now expected to produce a walking strategy as part of their Local Transport Plans. Within this context, a partnership of the UK's leading walking policy-makers, researchers, campaigners and practitioners organised an international conference, Walk21, in London in February 2000 for interested individuals and organisations (Tolley, 2000). Walk21 aimed to:

- confirm the importance of walking issues at political and policy levels;
- provide an international platform for an inclusive discussion of walking issues;
- acknowledge the research, practice and promotion undertaken so far and to highlight best practice;

- identify the need for future research and opportunities for funding future networking.

In order to anchor the focus of the conference and to direct the discussion, the partnership, funded by the Department of the Environment, Transport and the Regions (DETR) and the Countryside Agency (CA), commissioned research in order to provide a judgemental forecast of the future of walking throughout Europe during the first decade of the twenty-first century. The study included all aspects of walking from policy issues to the provision of infrastructure, in the realms of utility and recreational contexts.

The results showed that across Europe, by 2010, there will be:

- less walking by everyone overall;
- more walking for leisure and health, but less everyday walking;
- more facilities, infrastructure, information and money for walking;
- a consensus that everyone will see walking as being more important.

The results were presented to the Walk21 Conference and are available in the proceedings (Tolley, 2000). There is no intention of repeating them here: however, there is great value in disaggregating expert views and interpreting their subtleties and complexities. Where experts' views resonate widely, they may be of interest to an international audience. Accordingly, this chapter elaborates on one aspect of the conclusions, the effect of broad socio–cultural influences on walking trends, as interpreted through the comments of the experts.

18.2 Interpretation

The Delphi Technique was established in the 1960s and seeks to achieve a consensus between experts on a number of factors about any given subject, but in particular it concerns the prediction of future events or scenarios (Green *et al*., 1990; Linstone and Turoff, 1975; Witt and Moutinho, 1989). An iterative approach is adopted whereby first an expert panel is asked for its views on a range of subjects. A measure of average response (e.g., the mode) is calculated and the same questionnaire sent out a second time. If the panellist had provided a score that was different to the consensus of opinion as reflected by the modal response they were asked to consider changing their response accordingly in light of the feedback. The underlying assumption is that by adopting an iterative process the range of responses will stabilise and converge towards a consensus. The responses were collated on an SPSS file and analysed. The results represent a consensus of European experts' views on the future of walking in Europe until the year 2010.

Experts were carefully selected from all EU countries and from a number of professional groupings including research, practice, policy and advocacy. This was cross-referenced by selecting experts whose main professional

interest in walking ranged from everyday/utilitarian/transport, leisure/recreation, health/exercise, to tourism. A series of statements of opinion was presented and respondents asked to indicate their view on the subject by choosing a point on a Likert-type scale.

One of the advantages of the Delphi Technique is that it is capable of producing valuable supporting contextual comment from the experts. Specifically, if experts wished to maintain a different position from the mode they were requested to comment as to why they wanted to retain their opinion. This enabled the researchers to augment the statistical analysis by the inclusion of explained reasoning by the expert and thus to extend the analysis by giving consideration to written comments, rich in detail (Nelms and Porter, 1985). During both the first and second rounds, experts were also offered the opportunity to make additional comments regarding any aspect of the survey and this encouraged a considerable amount of comment, which supports the overall pattern of decision-making of respondents. One particular strength is the process of ongoing deliberation revealed by this material, with individuals thoughtfully reflecting upon their original responses in the light of the consensus view.

These comments are not presented as representative of the whole expert population sampled: they are purely the comments which respondents chose to make to support their responses. The importance of this material is in the qualitative detail it provides, with its potential to illuminate the patterns revealed through the survey. The researchers thus have at their disposal a large quantity of thoughtful, intelligent and relevant observations from a group of people who can be thought of as the most knowledgeable Europeans on walking issues.

In terms of the broad pattern of comments, at the European level most participants in the first round believed that the trend in walking over the first decade of the twenty-first century would be downward. However, these aggregated patterns of change appeared to mask a much more complex picture – with considerable variation depending on a range of factors, such as national distinctions, social and cultural difference, the purposes of walking, the characteristics of the population, etc.

Although walking was widely expected to decline for utilitarian purposes, there was an extremely strong body of expert opinion predicting an increase in walking for leisure and health. Health in particular (and often in association with leisure), was seen as a very strong source of motivation (personal and societal) for increased walking in the future. For some this reflected the desire for activity lost in daily routines, and thus a form of exercise substitution. The overwhelming opinion was that walking to school would increase and the link between school travel and health (as distinct from walking) was a prominent theme. On the other hand, with the exception of a few optimistic – almost hopeful – comments, the potential for increasing walking to work was seen in a much more pessimistic light.

Explanations of these views involved a range of issues that were seen as

important barriers (and, to a lesser degree, prompts) to an increase in walking. Safety emerged as a prominent barrier to increased walking, and on environmental issues (and specifically air pollution) worsening conditions were seen as a likely disincentive. In contrast, there was a good deal of optimism about the provision of transport infrastructure over the next ten years and experts identified any decrease in traffic speed, both in rural and urban areas, as an aspect of transport context that would be likely to encourage greater walking.

In all of these explanatory comments there is rich detail of observation that can be analysed to support and illuminate the statistical outcomes. This database – measuring over 16 000 words – can provide a deeper understanding of all of the major issues and trends identified by the Delphi. Most usefully, subsets of the material can be examined to throw light on particular issues of interest to different audiences. For this chapter, it was felt that it would be of greatest value to focus on the broad social and cultural context to forecast changes, rather than to try to cover the full range of issues. These socio-cultural barriers to walking as perceived from Europe may facilitate contrasting or comparative perspectives from other areas, allowing the breadth and depth of the socio-cultural barriers that face us in promoting walking to be seen. From this position the chapter will seek to draw out some key conclusions; in particular how this kind of qualitative insight can develop understanding of long-term trends in walking, and the implications of this knowledge for better challenging current trends and improving walking policy.

18.3 Discussion

Four interlinked aspects of social and cultural context were particularly commented on by participants:

- the car culture;
- the image of walking or walkers;
- lifestyle issues;
- political context.

These will be examined in turn, although it is important to bear in mind that the experts' comments often range widely across related issues and as a result resist precise or exclusive categorisation.

18.4 Car culture

One prominent impediment to an increase in walking was described by many in terms of the car culture:

'Transport walking is still suppressed by the overwhelming car culture'.

> 'I think our dependence on motorised transport is very deep as we live in a speed-driven society and so we'd probably have to be paid to take up walking (for transport) in a bigger way'.

In this context, many considered the current and predicted rise in car ownership – widely anticipated across the expert group – as a fundamental barrier to increasing (or even stabilising) the level of walking:

> 'I fear the majority are over optimistic. Every indication is that car ownership will continue to grow, which means that walking will almost certainly continue to decline. The efforts being put into promoting walking may have some effect – but only on slowing the decline'.

In some cases, respondents saw contradictory trends at work with areas of increase in walking acknowledged, yet the balance of the two processes was invariably towards decline:

> 'The single most important factor is car ownership levels. These are likely to increase with increased prosperity, and so walking is unlikely to increase in spite of measures to provide better facilities'.

> 'I think that although the 'culture' relating to transport will start to change, there is still significant latent demand among women with children and the elderly for increased car ownership and use – primarily at the expense of walking and public transport trips'.

In this context, a prediction of 'no (net) change' by a number of respondents was, in itself, conceptualised as a positive and realistic goal for the ten year period:

> 'I would suggest that simply stopping the current decline in walking from continuing should be viewed positively and is all that can reasonably be expected in the next ten years'.

> 'I don't think that the positive moves likely to promote walking will be enough to reverse the decline by 2010 overall – but could halt it'.

18.5 Image of walking and walkers

The poor image of walking (and indeed walkers) presented the converse side of the 'car culture effect', associated with affluence, social status and fashion, and was seen as a considerable barrier to a widespread increase in future walking. In this sense there was a genuine pessimism that little could be done to effect a change in the image of walking:

> 'In too many circumstances, the car is seen as the preferred mode of choice for all journeys – I know people who make car trips of, say, 400 metres. This is reinforced by the attitudes of the media and public perceptions generally – walking (and other sustainable modes) is something that people do if they don't have cars'.

> ‘Style consciousness, image, desire to show wealth [is] on [the] increase – walking [is a] poor image statement’.

> ‘Changes in patterns of leisure: just walking in your leisure time is not trendy, better you visit a fitness-centre. Walking will be substituted by other sports’.

> ‘Walkers – people like the concept of walking, not necessarily the people’.

Somewhat paradoxical is the number of comments that predicted an increase in sales of walking products over the ten year period. Such evidence is indicative not only of the split in journey purpose (leisure as distinct from utilitarian) but also of walking products seen as fashion items rather than functional necessities and thus not an indicator of walking. The situation arises that walking products can carry a positive image but walking as an activity does not:

> ‘My view of a substantial increase in the sale of walking-related products is perhaps somewhat cynical but based on the fact that there seems to be an increasing range of products aimed at the ‘walking for leisure’ market, some of which are purchased by people who don’t actually do much walking’.

> ‘People are making less distinction between work and leisure clothes’.

In some countries there appeared to be evidence of the general push to walking as a way to increasing the health of society:

> ‘People will eventually begin to question the ‘status’ value of driving and accept the status value of better health’.

> ‘The leisure purpose is the easiest field to increase the walking trips during the next decade because of their clear connection with new fashions in the way of life (healthy and sporty habits)’.

Indeed, walking was seen to fit into, and be part of, a wider ‘environmental lifestyle’ trend – with a shift to more sustainable, localised activity spheres:

> ‘I expect walking to shops to increase as these trips are combined with school journeys, and also because of a growing backlash against supermarkets. I expect people to buy more food locally because of concern about GM foods, BSE etc. and because farmers’ markets make local organic produce available’.

18.6 Lifestyle

The previous comment leads to lifestyle issues as the third dimension of social context. A number of trends and themes were identifiable from the open comments.

18.6.1 A reduction in the need to travel

A reduction in the need to travel (and the status of travel), linked to new technologies and patterns of activity:

> 'Initiative at the local level including widespread use of virtual/IT services will see a decentralising effect to support local (urban/rural) communities'.

> 'A computer and a mobile phone will replace a car as a status-symbol'.

> 'There are many changes in patterns of leisure – young people are spending more time in front of TV, Internet etc. which means slight decrease in walking'.

18.6.2 Changing activity patterns

Activity patterns also indicated quite contradictory patterns of walking:

> 'New hobbies and ways to use leisure time more often take place far away from home, which means that a car and public transport are used more often'.

18.6.3 The growing pace of modern life

The issue of time produced contradictory views on the impacts for walking. On the one hand, some were positive:

> 'I see a counter movement in lifestyle coming in this decade. In The Netherlands we already have a word for it: 'onthaasten' which means 'dehurry' or 'dishurry'.

On the other hand, more were orientated towards a decline in walking, identifying a lack of time as a key issue:

> 'Faster pace of life, lack of time, greater affluence will all reduce amount of time walking'.

Some respondents made broad connections between issues that relate to 'work time' and those connected to short-term, diurnal rhythms (family responsibilities etc.), usually referred to as 'necessary time':

> 'Quality of life' as far as having time to walk is an important factor for levels of walking. All sorts of hard measures (engineering, infrastructures . . .) and even soft measures (information, education, publicity, awareness . . .) will not work right if people do not have the opportunity to walk. Therefore, an integrated approach trying to take into consideration employment, and particularly speaking the daily working times (starting and ending hours that allow Europeans to have time) and schedules are vital. This aspect particularly applies for the case of Latin (and most Mediterranean) countries where schedules get

quite long into the evening/night hours making impossible the trip back home by walking for most of the working population (which includes that parents cannot pick up children after school and have a nice family evening walk)'.

Growing levels of stress and the strategies adopted to relieve them attracted comment. Some felt they would lead to more walking:

'Congestion/frustration [is] likely to push people onto foot'.

Others disagreed:

'Stress, frustration – could encourage people to stay in their own private space as much as abandoning their cars'.

'It seems that growth in congestion and conflicts between different travel modes drives many people into their cars rather than out of them – to get away from the unpleasant, dangerous and noisy walking environment. The feeling of taking personal space with them, shelter from the elements, the convenience etc. seems to be more important than the time lost sitting in traffic jams or looking for places to park. This would only change if the real and perceived cost of each car trip would increase substantially'.

Still others saw all transport as increasingly stressful:

'Growth in stress amongst transport users will on the other hand also make walking less pleasant and people will search for other ways to help their stress'.

'The growth in stress amongst transport users will probably encourage them to change their behaviour and their motorised vehicle, but probably not to change to non-motorised transport'.

Once again the issue of substitution of leisure walking for utilitarian walking was raised:

'Although undoubtedly the growing pace of modern life has meant that walking has decreased in recent years, we believe the climate is now changing and any decrease caused by this will be offset by an increase in walking as a result of increased environmental awareness/improved infrastructure etc.'

'Changing the pace of life would change the type of walking from utilitarian to leisure. Overall there would be little change, if any'.

18.7 Political context

The fourth dimension that we have termed 'political context' is concerned with the perceived views – and the implications of these views for walking

– of politicians, different stakeholder groups and, in particular, the public at large. The influence of these groups permeated many expert comments about current constraints and future prospects for walking, revealing the political undercurrents that affect current and future trends in walking. Detailed analysis reveals some of the complexity and difference in these patterns: the next section considers the nature and policy implications of the attitudes of politicians (national and local), professional stakeholders and public opinion.

18.7.1 Politicians

For some respondents the current attitudes of decision-makers emerged as a major barrier to more walking, if not a cause of the current and predicted decline:

> 'Secular trends for overall walking have declined consistently in the past decade, public policy has not supported different modes of walking promotion'.

> 'My sceptic answers reflect the consistent lack of political awareness among decision-makers in education, economy and finance'.

> 'Walking does not have strong political voices (cycling does)'.

Many comments indicated that the revival of walking would be a long-term process. Whilst there were positive attitudes among certain groups in relation to walking, this would not be matched by a shift in political attitudes (or at least the necessary policy) within the ten year period of a magnitude sufficient to halt or reverse current trends:

> 'The other [i.e., utilitarian] purposes need a more radical change in urban and traffic policies, and therefore need more time to implement'.

> 'Their [policy-makers] views will strengthen but not greatly affect policy for another ten years or more'.

Politicians were seen to be out of touch with public opinion:

> 'Local politicians – I think across Europe they will still be out of step with public and national views'.

> 'Political will appears to lag behind changes in public opinion'.

For some, the apparent political apathy and reluctance to take action was inextricably tied to vested interests:

> 'Power of motor lobby unlikely to be diminished by 2010 and so the power of their advertising'.

> 'I would still argue that politicians' (both national and local) concerns about the motorists' vote will limit the amount of pro-walking policy'.

18.7.2 Other stakeholders

The view of walking by other professional groups involved in health, leisure, and environmental management was considered to be already high and thus significant increases in influence were felt unlikely:

> 'Health practitioners – They regard walking as important now – so a little change perhaps'.

> 'We believe that a great deal is being done already by health practitioners to promote walking. Similarly by environmental managers and recreation and countryside managers – we feel it will be an increasing awareness amongst politicians and a subsequent increase in awareness amongst planners and engineers that will now have a greater impact'.

These professional groups were presented as a pro-active force – an image that contrasted strongly with that of politicians. There was, however, some scope for improvement, reflecting uncertainties and confused health reports. In other words, there was seen to be a lack of consensus in the messages being presented to the public about the benefits of walking. The need for partnership in these fields becomes strongly apparent:

> 'In the UK, I feel that health services have not promoted the health benefits of walking as much as possible – there are conflicting reports about this – e.g., some people say walking as exercise is not beneficial until you break sweat. Therefore I think there is a need for a coherent, correct, message'.

> 'Environmental managers already have begun understanding. Transport engineers are a problem – car-orientated and slow to change'.

18.7.3 Public opinion

As earlier comments indicated, public opinion was seen by a number of 'experts' to be the critical factor in influencing likely trends in future walking. For many, public opinion was conceptualised as a critical barrier to increased walking, with politicians keen not to appear anti-car. Whilst the attitudes of politicians were seen to be crucial in encouraging walking, this was very much contingent on changes in public attitudes.

> 'I think that the attitude of politicians could be a very important factor in encouraging walking but as their attitudes are so much swayed by public opinion and they will not wish to be seen to be 'anti-car' they will not do as much as they could to promote walking'.

Policy decisions would only be taken to encourage walking if public opinion was favourable. In this regard an important role was suggested for campaigns to effect a change in public attitudes/awareness:

> 'I think there is a big potential if public awareness will rise. When decision-makers feel the public opinion is on their side, they are much more willing to decide'.

> 'Experience has shown that education and awareness, especially amongst the young, can lead to significant increases in pedestrian numbers'.

However, concerns were raised in relation to the utility of this kind of education and information provision approach (particularly in isolation):

> 'These don't tend to influence behaviour. Public awareness will not change much'.

In a number of cases the efficacy of education/awareness was linked to consideration of target audiences and in making links with other areas of policy (and vice versa – linking other policies with awareness raising):

> 'Different groups will be affected by different (education/awareness) programmes. Again, it is action at a number of levels that influences change – advertising campaigns alone do not change behaviour'.

In this regard, for many the role of hard infrastructure measures was a much more important (or the only important) consideration in changing public opinion in relation to walking:

> 'My thinking: physical measures are much more effective comparing to educational and awareness campaigns without physical measures. People then wish to walk, but they are saying: walking is not attractive due to car-parking, safety, lighting and so on. A high quality supply is the only condition of use'.

18.8 Conclusions

Turning to the substantive results, the walking Delphi has shown that across Europe, there is a consensus that:

- all organisations, whether governmental, academic or NGOs, will see walking as being more important by 2010;
- specifically, there will be more facilities, infrastructure, information and resource commitments for walking;
- there will be more walking for leisure and health, there will be less everyday walking;
- there will be less walking by everyone overall.

This produces a conundrum, an opportunity and a challenge. The conundrum is that whilst it seems there will be more discussion of walking, more provision for it and more planning around it, the amount of walking will continue to fall across Europe. In short there will be less walking, but more talking about

walking. The experts are, it seems, identifying a critical phase in what has been a long, secular decline in everyday walking and recognise that this will not be reversed without specific action. As the amount of walking continues to fall, so concern about the effect on the quality of life in our cities rises proportionately.

The opportunity and the challenge follow. The experts present a negative picture of the future of walking in Europe which is not one that fits with concepts of environmental, social and economic sustainability. There is a need to change present trajectories in order to create more appropriate futures. The discussion suggests that the increased interest in, and discussion of, walking might bring an unparalleled advance in policy, strategy and practice. The challenge will be to translate this into practice to reverse existing trends.

A number of key conclusions can be drawn on the basis of the discussion that has been presented here and they have implications for walking policy. Overall, and on a methodological level, the comments made by the expert panel help us to understand and interpret the surface findings revealed by the main Delphi survey. In other words the broad trends tell us only a small part of the story and can mask more complex processes occurring at a finer level. One notable example was the consensus that walking for leisure and health would increase against a background of general decline (focused on utilitarian walking) – and perhaps more importantly why this trend was predicted to occur. We also see in many spheres of action or policy conflicting trends in predictions (or in what is already happening), at the same time promoting and diminishing walking. Decline was usually the net outcome of this balancing act. Again, a focus on the outcomes alone can mask a more complex situation on the ground.

This qualitative insight not only develops our understanding of prompts and barriers to walking, but raises questions for future inquiry. Are the increasing leisure walkers the same people as the declining utilitarian walkers? Or are new leisure walkers appearing, masking the decline of established walkers on daily activities? It is only by exploring the issues and questions raised by this kind of analysis that we will be able to develop improved walking policy as well as more effectively promote behaviour change.

In terms of the findings of this review, many current impediments to walking were inextricably tied to the wider cultural context, in particular the values and attitudes associated with different modes of transport. The ‘car culture’ was seen to be all-pervasive and to overwhelm any progress being made – or anticipated – in provision for walking. There is a marked contrast between a negative perception of walking and walkers, linked to issues of social status, and a background of increased walking for leisure and the growing popularity of walking products as fashion accessories. Our discussion also underlines the crucial importance of lifestyle issues – revealing the contradictory processes shaping current travel behaviour. Clearly anti-car and pro-walking messages at the exclusion of broader issues are less likely to be effective than joined up thinking and implementation that weaves walking messages within a cross-section of policy frameworks.

On a political level there was a general feeling that the fundamental policy decisions needed were not considered likely within the near future. Although attitudes (public and political) to walking have become more favourable, there was a danger that action would be tokenistic and partial and thus inadequate to tackle the strong trend of decline. Only if political awareness is raised will there be resource commitment to tackle the decline of walking and the quality of life in urban areas. The research did not explore the links between walking and healthy living in this context, but they are obviously of considerable importance.

On the basis of analysis of the open comments of experts participating in the Delphi study, the general outlook for walking and walking policy is not optimistic. Increased walking for leisure and health and progress in provision of infrastructure appear fairly insignificant against a background of growing dependency on the motor car and a more general penetration of the values emblematic of the 'car culture' within society. These survey findings exacerbate the known in-built demographic time bombs which will systematically depress background levels of walking, as sedentary children become sedentary adults and car-driving adults become the first generation of elderly car drivers.

More detailed analysis of the broad pattern of comments does, however, reveal some finer level trends which offer cause for optimism, suggesting a number of areas with potential to challenge the walking futures forecast by the expert panel. In terms of turning around current trends and predictions a more concerted approach by politicians was seen to be needed and is very much contingent on a shift in public opinion in favour of walking. The socio-cultural barriers revealed in this discussion also demand a much fuller understanding of lifestyles and of the often contradictory processes driving current transport patterns. In this sense, blanket awareness-raising or educational campaigns are unlikely to be effective and a much closer targeting in relation to issues of health and quality of life, leisure, work patterns etc., will be essential to progress.

Efficacy here will depend on progress in two principal areas. First, it is necessary to achieve a better understanding of the complex 'reasoning' processes (and the motivations and barriers involved) by which different target groups make decisions about walking and to build this knowledge into awareness-raising campaigns and policy delivery. Secondly, there is a need for a more co-ordinated and consistent programme of action by all professional stakeholders involved in walking. Soft measures (awareness-raising) have to be spliced together with hardware, or infrastructural measures. In this sense it is not the individual policies that are key to challenging current predictions of 'walking futures', but a combination of the two. This reinforces the need for co-ordination across disciplinary and professional boundaries.

18.9 Acknowledgements

This chapter is based on a presentation made to, and appearing in the proceedings of, the conference 'Australia – walking the twenty-first century', held in Perth, Western Australia, 20–22 February 2001.

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19

Cars and behaviour: psychological barriers to car restraint and sustainable urban transport

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19.1 Introduction

This chapter analyses the phenomenon of the motor car and driving behaviour in terms of current psychological theories, particularly the motivation theory of Henry A Murray (1938) and the acceptability/availability model of behaviour as described by Rose (1990). These theories contain a set of concepts for the analysis of car ownership, car use and driving behaviour and for the development of intervention strategies to influence these. Psychological and social/contextual aspects of human behaviour are partly the product of previous developments in the meanings, functions and appraisal of that behaviour. Behavioural analysis of car use and driving, therefore, would not be complete without an initial examination of the phenomenon of the motor car in a historical and social–cultural perspective and of the extent to which historically defined meanings and motives determine the current car culture and driving behaviour, such as has been done by Sachs (1984). This will be followed by a detailed analysis of the most significant motivational functions of the car. In as much as ownership of a car is an excellent way of satisfying basic human motives and needs, current car ownership, use and driving habits can largely be explained in terms of the acceptability/availability hypothesis (Rose, 1990), on the basis of which recommendations for reduction and control can then be made. In the context of democratic market-based economies, the extent to which reduction and control of car ownership and use can be achieved, however, is modest at the most. For the car–industrial–cultural complex is both an economical and psychological force of enormous magnitude as well as a factor and expression of contemporary types of personality.

**The views expressed in this chapter are those of the authors alone and do not represent the policy of the Ministry of the Environment.*

19.2 Attitudes to cars

Measures to restrict or influence car use can rarely count on broad public support. On the contrary, the more effective they are, the more resistance they evoke. Every initiative that limits the freedom of the car driver runs up against a fierce lobby defending an alleged freedom of movement for motorists. The arguments for cars are well known: convenience, speed, comfort, individual freedom and, not least, their economic significance. These rational arguments and functions cannot, however, explain why measures to restrict car use generate such strong emotions, not to mention the wide range of paradoxical behaviour that surrounds the car. The following questions testify to this:

- Why do most car owners use their car when in many cases (in The Netherlands about one in three car trips) it would be more cost-effective, sensible and feasible to go by bicycle or public transport?
- Why are car owners prepared to spend such large sums of money on their cars at the expense of the basic needs of themselves and their families, and why do they drive so uneconomically?
- Why do most car drivers think that they drive far better and more safely than the average car driver in their country?
- If 90 % of Dutch people are prepared to make an effort to preserve the environment, why are 70 % not prepared to use their cars less (despite a bicycle fleet twice the size of the car fleet)?
- Why does the 'social dilemma paradigm' (Vlek *et al*., 1992) play such a dominant role in car use?
- Why are politicians apparently so unconcerned about the fact that over 40 000 people die in road accidents in the European Union every year and about 1 million globally?
- Why do most transport researchers neglect the role of psychological motives for car ownership and transport choices, despite their dominance in car culture and in car marketing?

The phenomena implicated by these questions cannot be explained simply in terms of the enormous demand for mobility or the actual function of the car as a mode of transport. Nor can the social–cultural developments that have led to the present individualistic techno-culture explain the success of the car. We must dig deeper and seek out the emotions and motives that this inanimate piece of machinery summons up. To do this we have to return to the early years of the motor car.

19.3 History

In the summer of 1902 the German author Otto Julius Bierbaum drove from Berlin to Italy and back in an open Adler Phaeton. In his account of this trip,

Bierbaum describes in unmistakable terms why the car is usually favoured above the train:

> The train merely transports us; it bears no relation to real travelling. We are forced to be passive – whereas travelling is the ultimate expression of the freedom of movement. The train subjects us to a timetable, makes us the prisoners of a schedule drawn up by someone else, shuts us up in a cage that we cannot even open, let alone leave if we wish to . . . Anyone who calls that travelling might just as well call a military parade a walk in the woods. (Bierbaum, 1903)

As Sachs (1984) explains, the advent of the train in the second half of the nineteenth century caused our conceptions of distance and time to shrink. The train was faster and more comfortable than any other form of transport. However, the wealthy could enjoy these benefits only at the expense of their traditional privileges, such as a 'sovereign' mode of travel, whereby the vehicles in which they travelled were entirely their own domain, equipped according to their own status and taste, as saloons, boudoirs or even bedrooms. The coach, with its coats-of-arms and emblems, was a symbol of nobility and power and was therefore a way of keeping the common people at a respectful distance. It enabled its occupants to come and go as they pleased. To enjoy the benefits of the train (speed, comfort and distance) the upper classes had to subject themselves to the timetable and network of the railways. They had to use the same personnel, carriages, schedules and stations as the common people.

In short, the aloofness and the social (and physical) superiority guaranteed by the coach was not possible in the train. Then came the automobile. Suddenly it was possible to benefit from the transport revolution without having to forfeit the advantages of travelling by coach. Only the nobility and the wealthy could afford the first automobiles, which were built by hand and constructed, fitted out and used in almost the same manner as coaches. Even the terminology of the coach era was adopted and is still used (coachwork, horsepower). The automobile culture was born among the upper classes – the nobility, bankers, manufacturers, theatre stars and prominent academics. The rich demonstrated to the astounded masses what the motor car signified: social status, freedom and independence, and – above all – an opportunity to escape from the crowd.

From the early years of the automobile, the belief that the car was a symbol of social superiority and individuality became deeply embedded in the soul of elite and mass alike. Motor racing added to this a sense of sport and adventure. Many car drivers still consider themselves superior to those who use a less powerful form of transport or a less powerful type of car. Once behind the wheel of a car, the driver is often – for himself and for others – no longer just the 'man in the street'. He demands and is given priority, which implies superiority and sets him apart from cyclists and pedestrians. In The Netherlands, for example, car drivers had priority over cyclists

approaching from the right from the 1940s (a rule set by the occupying German Army!) until May 2001 when it was changed.

Initially, the popularisation of the automobile – starting with the Model T Ford and symbolised by the Volkswagen – seemed to have adversely affected its position as a status symbol. The car industry, taking its lead from General Motors, responded by producing a wider variety of models and accentuating the differences between them. Such a wide range of models with varying engine capacities and features is now available that there is something to suit everyone's real or imagined status. Some makes of car and the images associated with them exist purely as a reflection of the status assigned to them, as illustrated by a slogan from a Jaguar advertisement: 'A car built to standards that start where everybody else stops'. More of a paradox was the once BMW 7 series slogan: 'a car you buy not for status but for driving!' The symbolic value of the Mercedes star, or the renowned BMW or Alfa Romeo grills are unrivalled. In the allocation of company cars, the close link between the status of the car and the position of the employee within the company is jealously guarded as though it were a system of military ranking.

The car has also become a widely available means of exercising power, whether it be a Mini or a top-of-the-range sports car. This function of the car is a permanent feature of American television series' and action films where cars are used to perform spectacular stunts and to humiliate adversaries. With abundant horsepower at his disposal, the car driver is able to escape from others, hunt them down and defeat them. Every motorway is a breeding place for conscious and unconscious power games, played by adults who seem to have regressed to an infantile stage of development. The car has acquired such psychological power that, for many people, the superior qualities of their own machine over those of their neighbours and other road-users no longer has to be proved on the road. The car and its features, described in turbo-speak using sacred codes like V8, 16V, GTI, ABS, ASR, ESP, CBC, EBD, TCS and 4WD, radiate superiority. Inflated this might be, some top class models offer no-code versions, leaving green light competitors in doubt about engine size and performance. Meanwhile, all car models are continuously upgrading their engine size and power/performance levels, thus widening the gap between safe speeds and the right foot's lack of self restraint. Never have there been as many fast cars on the market and never have the possibilities of testing them to their limits been so restricted.

19.4 Motivational aspects

This historical examination of the popularity of the car has already shown that, in addition to economic factors, psychological motives play a significant role in the development of ownership and driving behaviour. Box 19.1 shows the most important psychological motives affecting ownership and driving behaviour and may explain the car's epidemic effect throughout the world

(see also Diekstra, 1993). In analysing these motives it is important to realise that, although they can be distinguished from each other, they cannot always be kept separate. Motives vary from individual to individual and from group to group (man/woman, young/old, etc.). The examples given are illustrative and no general conclusions can be drawn from them. Most readers will most probably only recognise the car-fanatic who lives next door. Nevertheless, studies by Steg *et al*. (2001), using new social research methods and avoiding socially desirable response patterns, reveal that the symbolic–affective motives are as relevant as traditional instrument-reasoned motives based on cognitive-reasoned behaviour models.

The sequence in which the following symbolic–affective motives are discussed is not inflexible, nor is it based on the idea of fundamental versus superficial nor innate versus learned. As Murray's motivation theory makes clear, such distinctions are more difficult to make for humans than for animals. From a primate's stick as a primitive instrument to the 6-speed gear stick is a giant psychological leap for top-mammal man, who may enjoy following 'auto feelings' shown in Box 19.1.

19.4.1 Cars and autonomy

Perhaps the most important motivation for driving a car is that it puts an end to dependence on Nature's own forces to move from place to place. Complete

Box 19.1 Cars and behaviour: symbolic–affective motives

- 'Auto' regulation: freedom of movement and autonomy (Man as nomad/hunter)
- Archetypal meaning: chivalrous/macho/heroic/superior 'Autobahnkrieg' (Motorway War)
- Power motive: dichotomy of the desire for power and community spirit
- Territorial/possessive aspect (car as mobile territory)
- Individualism/status/communication: I am what I drive
- Anthropomorphism: the personification of the car, identification
- Emotional/relational aspect: the car as an object of desire or love (car as a toy)
- Social cohesion function: the car as a common interest
- Neuronic stimulation: speed and neurobiochemistry (narcotic effect, 'speedaholism')
- Pilot or engineer function: the skill and fun of handling a complex machine
- Structuring the day: the car as a time-filler
- Protective function: the car as a second skin, womb or friend

freedom from this (animal) dependence was achieved when humans succeeded in moving over land, across the sea and in the air, faster, and carrying greater burdens, than any other living being. With the compact combustion engine, running on fossil fuels, they have acquired the most advanced form of individual mobility. In short, with the car, humans have reached a provisional peak in their 'auto'-regulative capacity. Because *Homo sapiens* was originally a nomadic hunter–gatherer, our response to the opportunities for mobility offered by the car is a direct extension of tendencies anchored deep in our genetic and neural make-up. In addition, the car makes our 'auto' regulative capacity available on an individual basis. Both lower and higher animal species (including humans) almost always prefer situations and devices with the most 'auto' regulative potential or opportunity for autonomy. The individual freedom that the car offers is therefore not a by-product but the principal motive for car ownership and use.

19.4.2 Cars and power

An increase in individual freedom of movement means an increase in power. Driving is a 'magnifying technique', a technique that magnifies and reinforces qualities that human beings already possess, such as the power of mobility, the ability to mark out territory or to attack and to defend. The car increases human power and speed to such an extent that it also constitutes an increase in a qualitative sense. With the aid of the car, humans are capable of claiming territory practically anywhere in the world. This is a completely new phenomenon. Never before have so many people had the opportunity to claim territory – albeit temporarily – simply by driving there or by parking.

Another aspect of the territorial character of the car is its function as a second living room, which, like the traditional coach, we can take with us wherever we go and furnish with sound systems, carpets, colourful upholstery, climate-control, a (mini) Christmas tree in December, telephone, PC, DVD or coffeemaker. In the car, each individual can lead his or her own life, including the physical expressions of one's personality. For this reason alone it is naïve to hope that traffic congestion will drive many people out of their cars. The advertising slogan for car telephones – 'This is a mobile estate agency' – illustrates clearly that, even when it is not moving, the car is an extension of our 'fixed' territory. New market trends, such as the massive introduction of once-luxury accessories like air-conditioning, hifi-sets and GPS navigation systems in 'ordinary' cars, and the growing popularity of 4WD, SUV and MPV types of cars are a tribute to the need to extend one's territory into all terrains, without loss of home comfort.

The consequence of the car as a mobile territory is that – unlike in the past – 'car-man' with his territorial urges can – and does – become embroiled in territorial conflicts at any place and any time. Using a variety of visual, audible and verbal signs and signals, the car driver can chase his rivals off his provisional territory. This was once referred to by the German magazine *Der*

Spiegel as 'der Autobahnkrieg' – the motorway war: everyone has seen the BMW and Mercedes warriors chase each other down the fast lane. This motive can explain the highly emotional character of any debate about establishing a speed limit for German autobahns: it is limiting territorial conquest, competition and defence. However, even this cannot explain the almost taboo reactions of German politicians and car drivers when one tries to raise that question. Let us now look at the unconscious effects of current power levels under our right foot.

As Alfred Adler (1929) and others have explained, the greater the desire for power, the less human behaviour is motivated by community interests and empathy with others. In that sense, when driving a car, people undergo a personality change and a motivational reverse, no matter how little they may themselves be aware of it. The caring parent, the safety-conscious airline pilot, the Christian or Buddhist attempting to live an exemplary life; all of them may become aggressive and take all kinds of risks once they are behind the wheel of a car or driving a motor cycle. Different motives and behaviour patterns take over. The extraordinary psychological effect of the speed and power that the car and motor cycle give to their driver does not receive enough attention in traffic studies and transport policy (Steg *et al*., 2001; Kroon, 1996). In the car, the individual has an instrument, a weapon – for which a driving licence is the only form of permit required – with which they can threaten the lives of other road-users. Finally, we see real bullets being used for conquering a parking place, aggression that may have begun by raising a middle finger.

With the advent of the car, a lethal weapon has become generally available without any form of control whatsoever. The freedom enjoyed by the driver – compared, for example, with the restrictions imposed on air traffic – and the speed, design and materials from which the car is constructed make it a costly piece of machinery in terms of human lives. In the current car culture, this and the power motive are justified by legislation that imposes light punishments for negligent homicide or aggressive behaviour on the road compared to offences committed with 'real' weapons. An endless range of technical safety features such as ABS, ASR, ESP, SIPS and collision impact zoning succeeded in making people believe modern cars are safe cars, while in the USA big cars are labelled as 'safe' anyway. Despite sustaining casualty levels and differing risk statistics all over the world, even road safety experts neglect the increasing evidence of risk compensation and power and performance-related risk profiles of individual vehicle–driver combinations. Moreover, car manufacturers cover up the potential risk character of the most powerful modern family cars, using – like Volvo and SAAB – safety records for lower powered models as the overall selling argument for high powered new models (Kroon, 1996). The new Porsche Cayenne SUV with 450 HP and 0–100 km/h in 5.6 seconds is no doubt the ultimate level in weaponry and 'macho-ism' a modern car can offer for those who need to compete with and show-off to all others in a so-called 'means of transport'!

19.4.3 'The brotherhood' motive

The car's potential to impress satisfies another significant motive – the desire to be heroic. This is known as the 'archetypal' motive, symbolised by the knight in shining armour. It is best illustrated in terms of a variation on the car – the motor cycle. Motor-cyclists seem to prefer to operate together in groups or gangs which closely resemble medieval orders of knights. Some time ago, one of the authors experienced a clear example of this when passing a coffee bar where a Harley Davidson club had gathered. There were seven tough-looking choppers parked outside, some with 'sawn-off' exhausts (acoustic power!). The riders were dressed in black leather suits decorated with chrome studs so as to give the appearance of chain mail. They all wore boots with silver spurs. Their enormous gloves were also covered with studs, like the gauntlets that medieval knights wore for jousting. Their black helmets bore the name of the club – *The Gauntlets*. As they left on a tremendous wave of noise, the image conjured up by the departure of the last bike was striking. Behind the driver, whose long blond hair flowed out from under his helmet, sat a young blonde girl, without a helmet and with her arms around his waist. Substitute the bike for a horse, the rider for a knight and the young girl for a damsel and you can see how twentieth century technology fulfils ancient, archetypal psychological needs.

Related to the need to be heroic and admired is often the desire to belong to an elite group. This brings us to the social-cohesion function of the car. In pubs, at parties and on other social occasions the car is a popular topic of conversation. The car itself is also a major source of communication. A new car in the street will attract massive attention from the neighbours unlike a bike or washing machine. Throughout the world there are clubs for owners of particular makes of car or motor cycle. As with medieval orders of knights or religious sects, the members are predominantly men, they adopt emblems and coats-of-arms, and membership often involves lifelong dedication to a specific make or type of car or bike (and its restoration). In extreme cases this can lead to a celibate existence.

19.4.4 Car personalities and the personalities of cars

There is yet another psychological aspect to the car: the process of fusion through which driver and car acquire a single identity. One striking phenomenon linked to the car has been the creation of a new kind of personality typology, which is largely ignored in the scientific literature but is bread and butter to marketing people. It is quite common to hear people's personalities described in terms of makes of car. For example, 'he's a real Volvo type', 'a typical BMW driver' or 'a Fiat Panda woman'. People also apply the typology to themselves. They think that they suit a certain make or type of car. The car itself also acquires a personality, becomes a companion or even a partner. This is known as 'anthropomorphism'. The star of the *Herbie* films, for example, is a VW Beetle with eyes for headlights, a mouth for a grill, a

friendly character and a life of its own. All cars have a face. Car designers are anxious to create individually distinctive faces for every new model in a family of cars, from which every interested 'car-man' can tell which car type and year of birth or 'facelift' it is.

Drivers express their emotional bond with the car by talking to it, thanking it, cursing or caressing it, and by feeling guilty for not devoting enough attention to it. Thus the car is even more than a toy; it lives. On the other hand, we can treat our cars as slaves. They will obey and never protest, even if we torture them and treat them without mercy, as is the case with cold winter starts for short trips. Though we might be treated as slaves ourselves at work, in our cars we are the boss.

19.4.5 Hedonism

Not infrequently cars have a kind of erotic effect on their owners and on onlookers. Expressions like 'hot', 'sexy' and 'exciting' are often used to describe them. Certain models, like the Renault Twingo, are cute and cuddly while sports cars often possess more obvious sexual attributes, such as oval air inlets, huge exhausts, short, racy gearsticks (the ultimate phallus symbol) and wide wings. The macho jargon in car magazines ('nice tail', 'sleek body') leaves the reader in no doubt at all about the intended associations. Indeed, the possession of a car (and in particular certain models) increases the chances of successful seduction and of engaging in 'autosex'. The car can also be an expression of self-love – when somebody feels they deserve a big or expensive car to reward themselves (for a full life of hard work) – it is a grown-up way to caress oneself.

19.4.6 Cars and speed as 'speed'

In addition to being an object of desire and vehicle of happiness, the car – at high speed – is also a source of stimulation for the central nervous system. The sensation of speed, the sound of the car, the rhythm of the wheels and the continually changing lights and colours induce a trance-like state in some drivers. Many people see driving a car as a form of meditation, feeling at one with the machine. Others are excited by the thrill of speed. Though for many people driving a car in modern traffic is no thrill at all, the experience of manoeuvring this complex machine through demanding and risky traffic conditions is one that only modern times can offer to the masses.

The car – and the motor cycle – allow individuals to expose themselves to exactly the level of danger they want. It is not an overstatement to say that, at these times, drivers are experiencing a kind of narcotic effect, which can produce the same addictive response as more conventional drugs. There is sometimes a very fine line between 'speeding' and 'speeding'! This addiction to speed among some drivers is excellently expressed in the term 'speedaholic'.

19.4.7 Cars and time-structuring

The car also helps to satisfy another fundamental human need, of structuring one's time – an antidote to boredom; the quest for new excitement and stimulation; driving for the sake of driving. Every Sunday evening, for instance, between 10 p.m. and midnight, in Los Mochis, Mexico, half of the local inhabitants cruise around the town in their cars, a ritual 'constitutional' on wheels. Business, social or shopping trips can serve the same purpose.

19.4.8 An antidote against vulnerability

Lastly, the car fulfils the human need for protection and security. As well as being a second home, the car is also a second skin, a suit of armour that is stronger than our own vulnerable skin – the weakest part of our bodies – that can protect from the perils of the outside world. Familiar, warm and rocking gently back and forth, the car is the adult's womb, albeit a womb of metal. And so, the feminine Peugeot 205 was labelled by its marketeers: 'comrade, partner and friend', expressing the emotional protection female drivers may be looking for. Less romantic, during the Yugoslav and Kosovo crisis, cars were the last protection against the cold and the enemy for thousands of homeless refugees.

19.4.9 A device of psychological superiority

Rarely, as our analysis shows, has technology provided a more successful satisfier of basic humans needs and motives than the car and it is very unlikely that the feat will ever be repeated. Neglecting the car's psychological assets, common in transport research, may lead to considerable harm and ineffective political choices. Large investments in either roads or public transport, when primarily based upon economic reasoning and considerations of public acceptability, let alone pressure from the car–industrial–cultural complex, will not contribute to restraint and control. Furthermore, it may prevent the necessary research and development into new behaviour-modifying technologies such as ISA (Intelligent Speed Adaptation) and new forms of road pricing. Public transport is clearly at such a great and insurmountable psychological disadvantage that it can never hope to close the gap on its own.

19.5 Interventions

The question then remains, how are humans to protect themselves against the car when it poses such a threat to them and their environment? A psychologist's answer would be to see the 'car-man' as a predator and the pedestrian and cyclist as its prey. It is up to the latter to devise methods of increasing their freedom of movement – and at the same time reducing their

fear – while restricting that of the predatory car. These methods must be designed to keep the 'car-man' at a distance, because in hand-to-hand combat, the pedestrian would, of course, always be defeated. The following physical and psychological solutions might be effective.

19.5.1 Psychological measures

The use of psychological weapons and methods would give those without cars greater power. This would involve devising a system of signs and gestures enabling pedestrians and cyclists to clearly communicate their wishes to car drivers, such as 'slow down', 'stop', 'I want to cross the road', etc. Ignoring these signals would be an offence comparable to driving through a red light. Such empowerment requires changing traffic laws so that the weaker always have priority over the strong and slow traffic over faster, and the introduction of strict civil liability for injury or damage to non-motorised traffic.

19.5.2 Technical measures

Technical measures are those that would make cars (and drivers) less powerful – and therefore less attractive – including speed limiters, ISA and restrictions on engine power and capacity ('vehicle self-control', Kroon, 1996). Light signals – and aggressive music levels inside cars which cause drivers to speed – should definitely go and be replaced by instruments that give direct feedback on driving behaviour and its effects, such as an econometer or on-board computer, an emission meter and a 'taximeter' giving the total cost per km. Acoustic feedback should be reintroduced by the introduction of statutory minimum noise levels inside cars travelling at high speed. Finally, very strict CO_2 emission limits must bring about the necessary downsizing of all relevant features of modern cars that are not needed for transport purposes, such as very high rates of acceleration. Furthermore, since most four wheel drive and SUV-type cars are rarely used for their original function as off-road vehicles, manufacturing and purchasing of these particularly environmentally-unfriendly types of vehicle should be severely limited. A first step towards downsizing these non-transport features could be a EU-directive for built-in speed retarders set at 130 kph (80 mph), the general speed limit in many countries.

19.5.3 Infrastructural measures

Infrastructural measures are designed to restrict the freedom of movement of cars and to keep them at a greater distance from people. These include speed ramps, cycle tracks and separate lanes on roads for cyclists, and extension of existing car-free zones and times. Free-of-charge parking should be limited to rural areas. Decreasing highway speed limits and more effective enforcement

of all existing speed limits should be given more political and policing priority, as part of a civil and safe society.

19.5.4 Distributive and fiscal measures

Distributive and fiscal measures would make the car less attractive than its alternatives. Car owners could each be given a basic kilometre quota per year. If they required more than this they would have to submit an application or pay a surplus charge. If they used less they would receive a certain amount back in the form of a tax rebate. A differentiated kilometre charge could be a first step towards such a system. Every car would be fitted with a black box, which could also be used as evidence of speeding offences. Tax relief could be given on collective ownership and use of cars. Public transport could offer the option of reserving a place in the train or bus for a season or at certain times, providing one's own territory in the train, perhaps with facilities for working while travelling. Reducing business car fiscal benefits is a precondition in countries with high rates of business car sales, such as Sweden and The Netherlands.

Ultimately, these measures result in cars that are slower and less powerful, offer less freedom of movement and less fun, while at the same time travelling on foot, by bicycle or by public transport would become more attractive and safe. People would then be more inclined to leave the car at home. The problem then arises: where are all these cars to be parked? As long as they are outside the front door, abstention will be difficult, given the theory of acceptability/availability, according to which the more acceptable and available something is – like cars, guns, drink or food – the more we will use it. That is why people usually drink more in pubs than at home and why, for example, the use of firearms has reached epidemic proportions in the United States compared with The Netherlands (where they are less easily available).

As long as the car is under our noses, it is very probable that we will use it more often than is necessary or desirable. It must therefore be removed from the street where we live and left at a collection point somewhere further away than the shops, school and church, to which we ordinarily travel by car. In short, we must no longer be able to see our mobile living rooms from our homes or our offices, because – being the territorial animals we are – we will always take the road of least resistance and greatest autonomy.

19.6 Conclusion

A psychological analysis of the strengths and weaknesses of measures aimed at controlling car use is no guarantee that psychologically effective instruments will be applied. The measures described above would lead to a considerable reduction in car use, affecting not only the primary transport function of the

car but even more so its psychological functions and values, as described above. Given the mass popularity of the car, the effectiveness with which the values associated with it are protected and the economic and other instruments involved, it would be illusory to expect that in a parliamentary market democracy, decisions will be taken that will have any real impact on these values and interests. Taking into account the above-mentioned motivational assets of cars can also help political scientists to explain the 'automobile voting behaviour' of citizens and politicians alike (an area which has hardly been explored) or, in other words, to establish why politicians pay lip service to measures to protect road safety and the environment while doing their utmost not to set effective barriers to the suffocating use of an ever growing armada of cars.

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Part II

Strategies

20

Infrastructure planning for cycling

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20.1 Planning for bicycles in an integral traffic and transport system

When bicycles were first introduced, planning was no problem at all. The only road-building worry was the surfaces and it was not for nothing that Dunlop used its first pneumatic tyre for a bicycle. The first cycle tracks were designed mainly for improving the cyclists' comfort. Planning for cyclists would be easy if the motorcar had not arrived. The arrival of the car caused an enormous change to the road network. In 1938 a bicycle advocate in The Netherlands argued in a pamphlet against bicycle taxes that 'cyclists who in early days could ride on public roads without danger are nowadays pushed aside the road by the increasing and still faster car traffic' (Reitsma, 1938). In the same year, traffic victims were presented as a specific group in statistics of accidents for the first time. Subsequently, for reasons of road safety, cyclists and motor vehicles were separated more often. Though cycletracks were also constructed to ensure a faster, unobstructed flow of more rapid forms of traffic, the approach to bicycle traffic was purely technical in terms of highway management, and definitely not integral.

Developments over recent decades have changed the way transport is viewed (CROW, 1992). Rapid increases in living standards have led to an enormous growth in (car) mobility. The other side of this has been the enormous pressure put on the environment in terms of health and safety. Traffic problems can only be solved by an integral approach to transport as a system and although in the present situation all elements of integral planning are included in the construction phase, the system is still far from perfect (Ploeger, 1988). This is demonstrated by the great social cost of the system demonstrated by

a lack of safety and high environmental costs. To achieve good design in bicycle infrastructure, an integral approach is necessary, where account is taken of planning scale and the function of a cycle route. In 1993 the Design manual for a bicycle-friendly infrastructure was published in The Netherlands (CROW, 1993). In this chapter a brief summary is given of the design principles to create an optimal bicycle infrastructure. The Design manual concentrates on the design process as a creative process instead of using examples and stereotypes that just ask to be copied without any further consideration. A designer of bicycle friendly infrastructure has to concentrate on the cyclist as a future user of the design and has to bring form, function and use into a combined balance.

20.2 Basic design principles

20.2.1 The cycle–cyclist system

The designer of a cycle-friendly infrastructure should be familiar with the technical possibilities and limitations of cyclist and bicycle. The cyclist is driver, equilibrist and power plant all at the same time. This combination of tasks includes a number of more or less conflicting features, which give the cyclist a special position in traffic. Muscle power, for example, functions as a natural speed limiter, while at the same time a certain speed is indispensable in giving the bike stability. Also, a bicycle is vulnerable, yet manoeuvrable and very flexible in traffic. The next seven characteristics of the cycle–cyclist system lead to as many design principles:

1. Bicycles are powered by muscle. This means that in a cycle-friendly road design energy losses are kept to a minimum.
2. Bicycles are unstable. Bicycles are held up by only two wheels: sidewinds, the slipstream of heavy trucks, unevenness in the road surface and being forced down to low speeds, all help determine stability and with that the necessary room for manoeuvre.
3. Bicycles have no crumple-zone. The vulnerability of the cyclist is obvious from accident statistics. The road designer can, however, give the cyclist a 'spatial crumples-zone' which acts as a space for emergency manoeuvring. Indeed, a cyclist can balance on a strip 20 cm wide, but the need for acrobatics certainly should not be a starting-point for design. When a car door is flung open the extra space on a cycle lane could prove life-saving. Cyclists' vulnerability also means that they should not be mixed with fast moving cars and intensive heavy goods traffic.
4. Bicycles have hardly any suspension. Therefore, a smooth road surface is a minimum condition in meeting the requirements for bicycle-friendliness.
5. Cyclists ride in the open air. This has disadvantages, but also advantages. Shelter from wind and rain take away some of the disadvantages.

Advantages should be maintained by the design. Therefore, it is necessary to pay attention to the attractiveness of the surroundings through which the cyclist rides.

6. Cyclists are social beings. Therefore, cyclists should be able to ride two abreast. This is certainly true when a large number of cyclists cycle for recreation or pleasure. In addition, the possibility of cycling two abreast gives parents the opportunity to supervise their children safely.
7. A human being is not a machine (neither is a cyclist). There are certain limits to the number and complexity of tasks that can be carried out by the cyclist. A designer should respect these limitations, while taking account of less experienced and less able-bodied road-users.

With the design of roads for motorised traffic the characteristics and limitations of vehicle and driver are recognised starting points. Comfort and safety go hand in hand. A similar approach is equally valid with the designing of facilities for bicycle traffic. For that it is necessary to set a number of limiting conditions that must always be complied with:

- the profile of the clearance;
- cycling side by side;
- the resistance experienced by cyclists while riding;
- limits to the physical workload and mental stress endured by cyclists;
- bicycle-traffic as an integral part of a traffic and transport system and the accompanying policy.

Requirements are conditions that are dependent on the use and function of a design; they can be split up into criteria, which in turn have parameters and limits. From the characteristics of the cycle–cyclist system also flow five essential requirements for cycle-friendliness. These can be summarised as follows:

- minimise resistance, leading to criteria for the main requirements of comfort and directness;
- optimise the mental stress, leading to criteria for the main requirement of comfort and safety;
- take account of the vulnerability of cyclists, leading to criteria for the main requirement of safety;
- take account of the cyclists' appreciation of surroundings and planning, leading to criteria for the main requirement of attractiveness;
- ensure a full and clear infrastructure, leading to criteria for the main requirement of coherence.

20.2.2 Profile of clear space

Cyclists need a certain amount of space to be able to participate in traffic. This space is determined by the dimensions of the bicycle, its rider and by the sideways motion (deviating path). Bicycles are held up on a single line

and stability is attained by speed. At about 20 km/h it is possible to maintain stability by light steering and body movements but the lower the speed, however, the more body movements are needed to maintain balance. At speeds of over 11 km/h the width of track needed due to course deviation is 0.2 m. Side-winds and road surface disturbances here only have a limited influence on course deviations; they necessitate the widening of the track to 0.3 m. If cyclists are forced to cycle slower than 11 km/h, they need more clear space to keep their balance by movements of the handlebars. This occurs for example at traffic lights where cyclists need to move off from a standing start. The bicycle manufacturers and the cyclist determine the dimensions of a bicycle and this together with the course deviation determines the profile of clean space needed (Fig. 20.1).

20.2.3 Resistance

Bicycles are driven by the muscle power of the rider. The power that a cyclist can generate is limited: extra resistance is not overcome by simple pressure on the accelerator pedal, but requires extra physical exertion and effort. Without this, the result is loss of speed. A cycle-friendly road design is aimed at limiting the energy loss to as little as possible and therefore, it is worth taking a closer look at the major components, which cause a loss of energy. These are:

- loss through friction in bearings and chain;
- rolling resistance between the tyre and road;
- wind resistance (including a possible head wind);
- loss through vibration of frame, saddle and tyres;
- brakes and gears;
- gravity on riding up an incline.

With a well-maintained bike the friction component only comprises a fraction (1–1.5 %) of the total resistance. The road designer has no influence here. How much the other components occur is, however, (partially) dependent on the road designer. This means that the road designer has an important influence on how much effort is required by the cyclist (Fig. 20.2).

The rolling resistance and vibration losses are mainly caused by the condition of the road surface. The effect of air resistance only becomes important at higher speeds (over 20 km/h), though wind against is already an important factor at low speeds and this increases greatly with wind speed. In contrast to sailing boats, cyclists cannot take advantage of side-winds, which cause a lot of friction that is felt by the cyclist as resistance. Turbulence of wind and changes in wind strength, as occur, for example, between buildings, can be even more troublesome for cyclists. The road authority can have an important influence on limiting the amount of energy lost by cyclists. Every time a cyclist is forced to stop at traffic lights or other traffic obstacles, the kinetic energy built up by pedal power is lost.

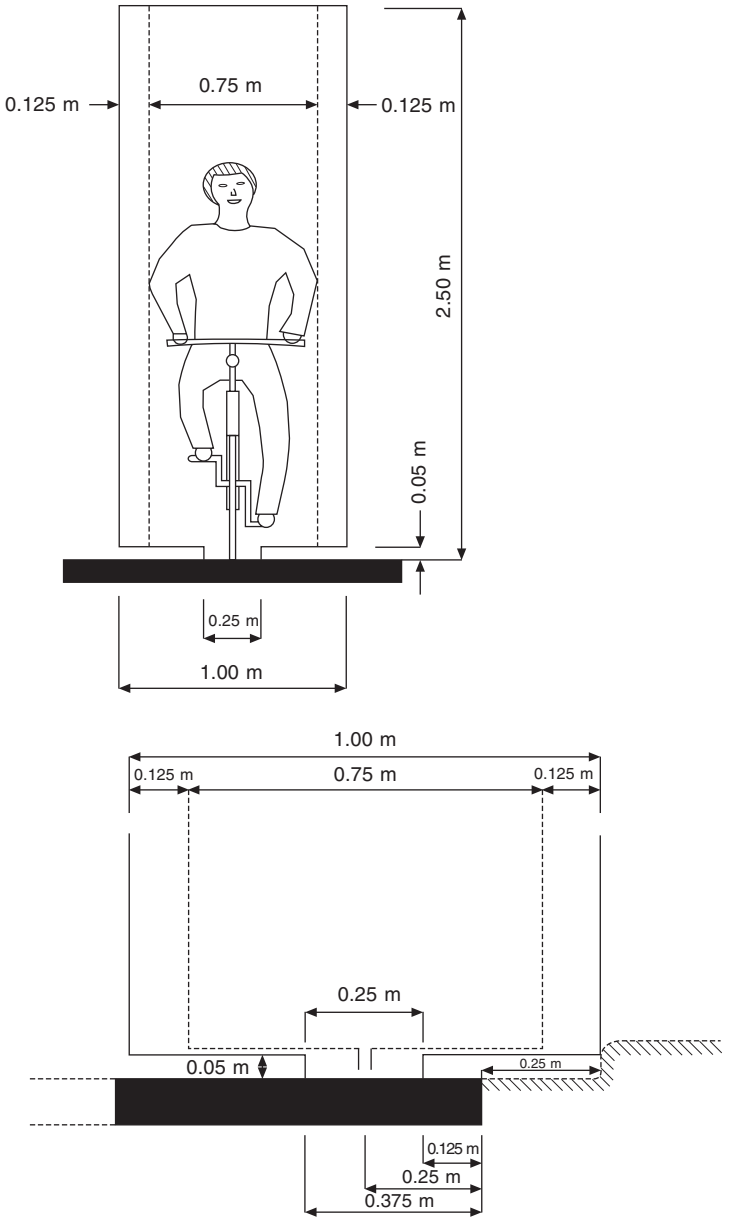

Fig. 20.1 Profile of clear space. Source: CROW (1992).

20.2.4 Stress and work load

Cycling requires mental as well as physical effort from the cyclist. The physical capacity is needed to keep the bicycle in motion whilst the mental capacity is necessary to negotiate traffic safely. Cyclists have no standard

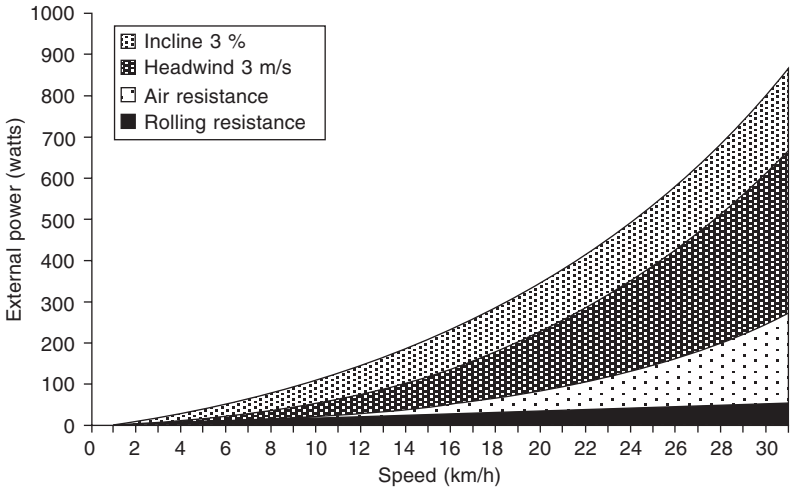

Fig. 20.2 External power needed by a cyclist to overcome the various forces of resistance, depending on speed. Source: CROW (1992).

characteristics. In some circumstances the rapid commuter cyclist is a standard for design (for example, regarding the design speed) however more often the older cyclist who has a more limited physical capacity will determine standards (for example, with regard to gradient percentages and crossing times). In yet other cases the design will be largely geared to young, inexperienced and sometimes inconsiderate cyclists (e.g., with regard to eye level, red light discipline and complexity of intersections).

Physical limits to workload

The limit of dynamic muscle power is referred to as maximum power output or 'stressability' (Whitt and Wilson, 1974). Stressability decreases in time, according to a logarithmic value. Thus, the speed a cyclist travels at is not only dependent on the resistance to be overcome, but also on the duration of the power output. Van Laarhoven (1984) has compiled a large amount of data on the stressability of cyclists and has developed velocity models from these. For planning purposes the male cyclist in the age category of 50–60 years old is used as a standard. In a 4–5 minute period the maximum power generated is about 100 watts. For peak power output levels (about 1 minute) absolute stressability lies at between 150 and 200 watts. During a somewhat longer cycling trip, the maximum stressability for men of between 50 and 60 years old is approximately 85 watts. The stressability for women in the same age category is approximately 80 % of that of men.

Mental stressability

Cyclists are not only loaded physically, but also mentally. Steering a bike, keeping balance and holding course all require a certain amount of mental effort. In addition, the negotiating of other traffic requires the ability to

concentrate. It is not for nothing that a cyclist is most comfortable travelling at 16–20 km/h on a quiet cycle track without any oncoming or crossing traffic to worry about. It is easy to carry on cycling for hours. Discomfort is strongly related to feelings of unease, which occur in traffic conditions that are complex, unclear, threatening or tiring. The critical level is reached earlier when the road-user finds it less easy to cope with the demands through lack of experience (youth) or through a reduction in functionability (old age). There is a relationship between comfort and traffic safety. When stress increases there is more chance of making mistakes. A concentration of accidents indicates that form, function and use are not in balance with one another at that location. Other signals too can indicate that there is something wrong with this balance, such as where the road-user behaves in ways other than how the designer had anticipated. Depending upon the level of the design in question (network level, connecting level, facility level), stress is manifested in different ways:

- Network level: discomfort may already play a role at the moment of the decision to go somewhere or when choosing the means of transport. For example, reduced mobility amongst the elderly may encourage them to stay at home because they cannot cope with the tempo of modern traffic.
- Route level: people who do venture into the traffic can nevertheless still demonstrate stress limiting, deviating behaviour. For example, they may re-route their journey to avoid unsafe points, traffic lights or 'scary places'.
- Facility level: deviating traffic behaviour may also be observed at the facility level in a stressful traffic situation. Signs of this situation include:
  - older cyclists getting off their bicycles, even though they have priority;
  - cyclists going *en masse* though a red light since waiting there is considered pointless;
  - specially planned bicycle lanes left unused because another route is considered quicker, handier or more attractive.

Comfort and discomfort can hardly be measured objectively, although stress avoiding behaviour and near-accidents are good indicators. Actually, road users are in the best position to judge when components of the infrastructure get out of balance. They can indicate the limits of their own physical and mental capacities best. A survey of the public opinion can give useful information to a designer about discomfort and feelings of unsafety.

20.3 Requirements for cyclists

All requirements and wishes of cyclists can be placed under five main headings. These main requirements are:

1. Coherence: the cycling infrastructure forms a coherent unit and links with all departure points and destinations of cyclists.

2. Directness: The cycling infrastructure continually offers the cyclist as direct a route as possible (so detours are kept to a minimum).
3. Attractiveness: the cycling infrastructure is designed and fitted in the surroundings in such a way that cycling is attractive.
4. Safety: the cycling infrastructure guarantees the road safety of cyclists and other road-users.
5. Comfort: the cycling infrastructure enables a quick and comfortable flow of bicycle-traffic.

In the following sections the main requirements are worked out in criteria and the relationship between each criterion and the main requirement is indicated, i.e., why a criterion gives a good description of the main requirement.

20.3.1 Coherence

The requirement of *coherence* embraces all the requirements connected with the necessity of arriving at a destination. At the network level this means that there should be routes that connect to the cyclists' departure point and destination. At route and facility level it means that a cyclist can find the way and understands the logic of the network, so that in town planning terms a cyclist can form a 'mental map' of the network of cycle routes.

20.3.2 Directness

When a journey time by bicycle is longer than that by car, this becomes an important reason for using the car and not the bicycle. On the other hand, many motorists appear to be prepared to use the bicycle instead of the car for shorter journeys when it is quicker and more convenient to do so. All the factors that influence journey time are included under the requirement directness. The criteria for this are speed of flow, delays and detour distance. The design speed of a cycle track should never be less than 10 km/h out of consideration for comfort as well as safety (stability). The recommended design speed is 25–30 km/h. The criterion delay is expressed in seconds per kilometre. The detour factor is the relationship between the shortest possible distance by road and the distance as the crow flies.

20.3.3 Attractiveness

Cycling behaviour is determined by a great number of factors. However, these factors can differ widely from one individual to another when making decisions on whether or not to go by bicycle and also in their choice of route. Certain aspects of cycling may even be regarded positively by one person and negatively by another. Under the requirement of attractiveness the psychological factors are summarised that are generally expressed in terms of 'experience'. It is difficult to give limiting values for the parameters of the various criteria. This is partly due to the fact that appreciation is a matter of

personal opinion. The pattern of complaints gives the designer the best indication of which places should be improved in terms of social safety by changing the spatial layout or planning of an area.

20.3.4 Safety

On evaluation of a traffic situation and inspection of existing facilities, the incidence of traffic accidents forms a good criterion for judging the requirement of safety. In the planning phase it is difficult to judge accurately the effect any measures taken will have on road safety. A criterion for the requirement of safety, expressed in limiting values for road accidents, has little value: in the design phase no accidents have yet happened that could be measured. A designer has more use for statistics on encounters. In general it can be said that to attain a lastingly safe traffic situation, encounters with large volumes of fast moving motorised traffic should be avoided. When bicycles and motorised traffic use the same traffic space, the complexity of the confrontations between them should be governed by limits. The cyclist sets the upper limit of the complexity. Human constraints mean that only a limited quantity of actions can be carried out within a certain time.

20.3.5 Comfort

All factors related to obstructions or delays caused by bottlenecks and/or shortcomings in the infrastructure, which demand extra physical effort from the cyclist, are included under the requirement of comfort. Any discomfort caused by undue mental stress is mainly related to safety and is therefore included under that requirement as the criterion 'complexity of riding task'. The requirement of comfort stems from the knowledge that with a high or irregular workload (stopping and starting again and again), cycling becomes less comfortable. Hindrance caused by vibrations also makes cycling less pleasant.

20.4 Functional design

Before designers can start designing, they must first carefully consider what the (intended) function and what the (expected) use are for that which they are planning. To attain successful results one requirement is that the form complies with the demands of function and use. First of all a designer chooses a form which best suits the (intended) function and the (expected) use. The (expected) use can be investigated. Depending on the phase of the planning process (preparation or evaluation), this investigation will be based on calculating (future situation) or observing (existing situation). The (intended) function follows from the programme of requirements. The limiting values mentioned indicate the conditions that the design must comply with.

Unfortunately, in practice numerous situations occur where form, function and use are not well balanced. There are three ways of restoring the balance:

- modify the design;
- influence use or behaviour;
- adapt function (and with it use).

Form
The most obvious way to begin the design process is to look for an acceptable form to fit the function and the use. In practice, the desired form, based on function and use, can sometimes simply not be achieved due to spatial claims by other parties. In such a situation, the relative interests of the other parties must be considered. For example, how functional is it, in terms of the other modes of transport, for the bicycle to claim road space, be granted the right of way, or have priority at lights?

Use
If the interest of the external factor is important enough not to execute the design of the bicycle infrastructure according to the most bicycle-friendly solution, the next step is to look into whether the use of the facility can be influenced. Obviously, use of the facilities by other means of transport can also be influenced. For example, if the intensity and speed of car traffic makes it desirable to create a bicycle lane but there is not enough room to do so, reduction of the amount of car traffic and/or speed of it is a viable alternative.

Function
Finally, the function can be modified. In practice, this means that the facility will actually be of a lower quality than was desirable according to the specifications. Water is added to the wine as far as the bicycle-friendliness of the facility is concerned. Such a decision should only be taken after all other alternatives have been examined and it must also be well argued.

Cycling infrastructure can be designed for three planning levels: the cycling network as a whole, cycle routes and cycling facilities. Each level has its own specific design problems. The task of the designer is to constantly find the right balance on each level between form, use and function. In Table 20.1 the function is described as a combination of a use objective and a quality level. It must be clear by now that the balance between form, use and function is achieved by way of an iterative process. Over and over again, the three ‘setscrews’ have got to be adjusted until the design actually passes the ‘spirit level’ test. However, it is of course the cyclist who will ultimately judge the bicycle-friendliness of the infrastructure.

Table 20.1 Link between form, function and use

Form	(Intended) function	(Expected) use
Network • links • nodes	Make direct and safe travel by bicycle possible in a coherent system	Origins and destination matrix (observed or calculated)
Route • district • local • neighbourhood	The quality resulting from level of connection in the network • connect • distribute • access	Volume (observed or calculated)
Facility • intersection • road section • crossing • racks/storage	The quality resulting from the level of the connection • deal successfully with encounters • deal successfully with traffic • connect up facilities • make available racks/storage	Behaviour and manoeuvres of road users (observed or calculated)

Source: CROW (1993: 35).

20.5 Planning process

20.5.1 Introduction

To make a functional design it is not enough to master the design process as an engineering skill. The long haul from main objective (more and safer cycling) to the realisation (a cycle-friendly infrastructure) runs through a course that also includes the interests of other parties all striving for a share of the scarce resources available. The only way to achieve the objective is to employ a logically planned approach. The task of the designer is to help arrive at a fair and open decision-making process. The moments at which decisions are made are an important part of the planning process. They mark the end of one design period and provide a foothold for the next phase. An important reason for keeping to a structural plan for more than one year is that cycling policy is often distinguished in practice by an improvised character. In spite of its many obvious advantages the bicycle has to fight constantly for its place in traffic and transport policies. This is due in great measure to the fact that bicycles cause few problems in themselves; they often only come into the reckoning if the problems of other road users need to be solved.

20.5.2 A plan as a basis

When planning for cyclists, use can be made of existing knowledge and techniques. There are often statistics available on the travel habits of cyclists or data can be easily obtained from current research material. An integral transport policy pays attention to the interests of cyclists at all levels of planning: from the main structure plan to details at individual street level. A

plan for a cycle-friendly infrastructure should be part of an integral traffic and transport plan (Ministry of Transport, Public Works and Water Management, 1991). Only then is it possible to consider thoroughly the relative interests of different road users and to apply the different modes of transport where they will be most efficient. The planning process is composed of five phases (Table 20.2):

1. Starting phase: national objectives are translated into local objectives, criteria and limiting values. The project organisation is set up.
2. Cycling structure phase: the transport relations of present and potential cyclists are analysed and the most used routes in the network are identified.
3. Priorities phase: the network, existing routes and facilities are judged on coherence, directness, attractiveness, safety and comfort and it is determined which improvements are the most urgent.
4. Realisation phase: it is established which improvements are necessary to attain the quality formulated in the programme of requirements.
5. Execution and evaluation phase: the desired facilities are carried out according to an order of priorities, which include costs and profits (effectiveness).

Basic information is collected and processed, and decisions are made.

Starting phase

The process starts with the decision to draw up a plan for cycling facilities. It is advisable to appoint a project manager to co-ordinate and supervise the whole process from start to finish. The project manager should be approachable from concept to execution and should be involved in everything within the local authority that (possibly) concerns cycling policy. Experience in The Netherlands and abroad has shown that paying permanent and structural attention to the cyclist within traffic planning bears fruit in time. The development of a 'bicycle culture' within the government organisation is sometimes even more important than financial resources. On deciding to set up a plan for cycling facilities, general objectives and considerations should be included that indicate why the plan is desirable. It is very important to quantify these objectives. If it is remotely possible then abstract objectives should be expressed in assessable values that will eventually be incorporated into the programme of requirements.

Cycling structure phase

The main structure of the cycling network is designed after the starting phase. This main structure follows the desired lines of the bicycle traffic as much as possible. To establish these, insight is required into the pattern of departure points and destinations of cyclists. New routes are selected on the basis of a network analysis, which significantly limits detours, reduces encounters with motorised traffic and promotes a coherent network structure. It is advisable to make a computer model of the cycling network. With this

Table 20.2 Phases in planning and decision-making

Phase	Document	Contents	Decision-making	Involvement
Starting phase	Starting document List of bottlenecks	Strategy, objectives procedures Bottlenecks, missing links, black spots	Hearing city council Technical commission	Cyclists' union Cyclists, citizens
Cycling structure phase	Masterplan	Main structure, network and basic solutions	Council commission	Cyclists' union Interested parties in transport
Priorities phase	Bicycle plan	Final plan, programme of facilities, budget	City council	
Realisation phase	Project plan	Detailed technical design	Technical commission	Cyclists' union, residents
Execution and evaluation phase	Research document	Outcome and survey	City council	Cyclists' union, citizens

the various effects can be quantified and the objectives tested more efficiently. After the network analysis, the existing and selected new routes are linked (on paper) to a coherent network. Once again there is assigning of the matrix of origins and destinations, possibly with variants. The most used routes in the network are later carried out according to the highest quality requirements. It is guaranteed that investment in these through routes has the greatest effect.

Priorities phase
In the priorities phase the quality of the roads and cycle tracks is tested against the programme of requirements. The more important the route is to the main structure, the higher the quality of the execution should be. If an inventory has been made of all bottlenecks, then they are ordered according to urgency, so that a solution is sought for the worst bottlenecks first. In this phase of the design process it is also possible to look for alternative layouts. This could happen, for example, if the shortest route is of such a poor quality that improvement of this would lead to an unreasonably high investment. There is little point in improving a threadbare route if a slightly longer parallel route is of a much better quality, e.g., if there is an absence of traffic-lights. Also, questions related to alignment through shopping streets and car-free shopping areas are considered in this phase of the planning process. Therefore, there is feedback to the cycling structure plan, which can lead to a (partial) revision of this plan.

Realisation phase
To improve weak or poor elements of the network (road section, intersection, bridge, etc.) facilities are introduced. These can be in the form of cycle tracks, but other measures are also possible, such as:

- construction of a split-level crossing;
- reduction in the amount of motorised traffic;
- lowering the speed of motorised traffic;
- construction of cycle lanes;
- improvement of road surface;
- construction of bicycle storage facilities.

It is clear that the term ‘cycle track plan’ does not cover a good cycle structure plan with a programme of facilities. There are many possibilities for improving the safety and comfort of cyclists other than the construction or improvement of cycle tracks.

Execution and evaluation phase
After a programme of facilities has been drawn up, a rough budget is put together of the total costs of executing the plan. This leads to the setting up of a cycling fund and an estimate of the annual deposits in this fund. An execution schedule is also set up annually of concrete measures according to

a priority calculation. The priority of a measure is determined by weighing up costs and effectiveness against one another. The effectiveness is a product of the quality improvement gained by a measure (the ability to solve major problems) and the number of cyclists that gain from it. The costs consist of costs of construction, land acquisition and of procedures. Including the various criteria under one heading and weighing up each one can best be divided into a multi-criteria analysis. A cycling structure plan has no everlasting value but should be regularly assessed on its topicality. After a period of five to eight years a cycling structure plan should be subjected to an evaluation. It is important with this to investigate whether or not the structure of the network of main routes is still in harmony with the demand of bicycle traffic. It is also possible that through developments in planning and traffic engineering, bicycle and motorised traffic flows may encounter some bottlenecks other than those assumed in the original plan. Finally, the objectives can also change. If this concerns structural changes, then it must be put to the local council that the plan be (partially) revised. The procedures start anew.

20.6 Conclusion

A prerequisite for increased use of the bicycle is that the cyclist must be in a position to compete with other forms of transport for short distances, in terms of time as well as from the point of view of safety and comfort. An infrastructure is required, therefore, which makes direct and comfortable travel by bicycle possible in an attractive and safe traffic environment. An infrastructure that offers cyclists the desired quality is, in other words, bicycle-friendly. A well functioning bicycle infrastructure is, moreover, the key to a safe road traffic system.

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21

Creating a better walking environment

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Towns, cities, regions and countries that provide safe and attractive places for people to live and work will be the winners. For Britain to prosper, we need to make such places the rule, not the exception.
(Tony Blair, British Prime Minister, 24 April 2001)

21.1 Introduction

Tony Blair, the British Prime Minister, gave a major speech in April 2001 that has become widely known as his 'Liveability Speech'. In it, the Prime Minister set out his vision for streets where parents feel safe to let their children walk to school; an environment which fosters rather than alienates a sense of local community and mutual responsibility; streets that are safe, clean and well managed; a community where specific measures are taken to tackle danger wherever children face it and where there are high standards of design in both the public and private sectors. The concept of 'liveability' is used as a short hand for all the things which improve a community's daily experience of life.

Following the Prime Minister's speech, the Government carried out an inter-departmental review of policies, funding streams and targets that have an impact on the public realm as part of the Spending Review 2002, the Government's budget setting process. It also convened a major Urban Summit in October 2002. The outcomes were published in *Living Places – Cleaner, Safer, Greener*,[1] which promotes transport measures aimed at improving the quality of public places, including Clear Zones that use innovative technologies

to reduce road traffic and Home Zones where residents and motorists share road space.

This chapter aims to demonstrate how improving facilities for walking, and the conditions that pedestrians experience, can contribute towards enhancing liveability, public space and quality of life. It describes ways in which the walking environment can be assessed and improved.

21.2 Policy context

The British Government's priorities for transport are: reduced congestion, better integration and a wider choice of quicker, safer, more reliable options for travellers and other transport users.[2] Sustaining and enhancing urban centres in their shopping and economic roles is also an important policy objective. Encouraging this is the key weapon in checking and reversing the trend for out of town retail and employment development. Improving choice and encouraging people to access and move through urban centres using alternative transport modes to the car is a fundamental requirement.

Promoting movement by means other than the car lies at the heart of current urban thinking. Walking is one of these alternative means. It has obvious relevance to the creation of sustainable communities and to addressing the widespread concern that the needs of communities are all too often subordinate to motorised transport.

21.3 Putting people first

The overall objective of transport policy is to secure the earliest possible delivery of better transport services for citizens while protecting the environment and providing value for money for the taxpayer. Continuous improvement in safety, environmental amenity and operational performance lies at the heart of this. Policy-makers and practitioners must respond to the growing reality that they need to serve people, not vehicles. The secret to putting people first is to be user-responsive rather than provider-driven. It is crucial that transport providers deliver what the user really wants rather than what transport providers would like to provide.

Understanding and knowing the user – the person for whom a service is provided – is essential if policy-makers and practitioners are to successfully provide for each mode of transport. This involves making the effort to understand users' needs and, more importantly, to respond to them in a prompt and cost-effective manner, taking due account of the inter-relationships between each transport mode and the land-use patterns – the distribution of development, services and activities – that result in the need to travel.

21.4 Context

Planners and engineers have endeavoured to provide facilities for walking throughout human history with varying degrees of success. However, viewing walking as a valued travel mode in its own right and taking a strategic approach to encouraging it, is a relatively new phenomenon in British transport policy and practice. This integrated approach requires new ways of thinking. Traditional engineering techniques, such as pedestrianistion, pedestrian crossing facilities and controlling pedestrian movement by means of physical barriers, are increasingly being augmented and superseded by approaches that tackle the causes of problems rather than the symptoms. These include more holistic approaches such as reducing vehicle speeds and traffic density, giving pedestrians more space in the transport network through wider footways and changing priorities such as increasing time for pedestrians at traffic signals and signalised crossings.

21.5 Walking and well-being

Visibly successful and liveable places are often characterised by properly planned pedestrian provision and attractive, safe environments that encourage visitors to stay longer and, quite often, spend more in local retail and service outlets. The economic and social well-being of local centres, towns and cities depends upon the people who use them for shopping, leisure, living and employment. For businesses and attractions situated in urban areas, access is about who is attracted and in what numbers. It is largely quantitative: the number of pedestrians able to access the centre and pass along the streets, so-called 'pedestrian footfall', and the number of visitors with money to spend.

However, from the point of view of shoppers, visitors, residents and workers, access is about the quality of the journey to reach town centres and local centres – from residential areas, car parks and public transport facilities – and the quality of the environment they find once there. Safe and convenient conditions for walking are important because – if properly designed, constructed and maintained – they contribute to making places better for people by improving the quality, environment, amenity, viability and vitality of a place. There is a strong business case for improving walking conditions. Life takes place on foot; people take part in social exchanges and economic transactions on foot when they leave their vehicles and stop moving.

The bulk of journeys by foot occur over short distances, usually of less than one mile. As a result, proximity, good access to local facilities and convenient interchange between different transport modes largely dictates the viability of, and enjoyment derived from, walking. Accordingly, there are opportunities to be seized through the land-use planning and development control systems. Influencing the location and layout of new development –

shops, schools, housing and employment – can significantly improve how easy it is to walk to them.

21.6 Quality and quantity

Quality and quantity of access are linked. The better the quality of access, the greater the quantity of movement that is encouraged. But, conversely, the greater the quantity of movement, particularly by motorised modes, the greater is the threat to quality, in terms of the environment, safety and transport efficiency. Practical and positive measures to assist pedestrians create room for people to move and can be seen as achieving a sustainable balance between quality and quantity. Such measures should be seen as pro-people rather than anti-car; they provide for the most inclusive and least environmentally damaging form of access – walking – in urban centres where human activity is often at its most concentrated, and where concern about the adverse impacts of road traffic, congestion and pedestrian–vehicle conflict is often greatest.

21.7 Urban renaissance

Promoting and enhancing the pedestrian environment has a major role to play in securing much needed urban regeneration and renaissance. The primary aim of urban renaissance is to create people-friendly urban areas by enhancing quality and improving amenity, viability and vitality. The creation of safe and attractive pedestrian environments in our towns and cities is a necessary condition for success and is central to improving urban areas for shoppers, visitors, workers and residents alike. This includes encouraging walking to local centres, community facilities, schools, employment areas and the like. Copenhagen, where there is now seven times more space allocated to people than in the 1960s, is a good example of this pro-people approach.

21.8 Walking and health

There is an important health dimension too. Human beings are built to walk. Medical evidence indicates that regular walking contributes to reduced rates of heart disease, diabetes, osteoporosis, colon cancer, obesity and depression. Walking is about more than just transportation – it can make an important contribution to healthy living and physical fitness, thus saving expenditure on health provision (see Chapter 11).

21.9 Decline in walking

21.9.1 The importance of walking

Walking accounts for one-quarter of all journeys and four-fifths of journeys less than one mile. Around half of all education journeys, one-third of all shopping journeys, one-quarter of social/entertainment journeys and one-eighth of all commuter journeys are made on foot. Walking is the main form of access to public transport services. The average person walks just under 200 miles per year on public roads.[3] We are all pedestrians at some time, whether or not we own or use a car; thus encouraging walking is also good for social inclusion. Furthermore, pedestrians are not just people travelling by foot. They are employers, employees, shoppers, users and visitors, all of whom contribute to the viability and vitality of an urban area.

21.9.2 The decline in walking

Despite the importance of walking, the amount of walking has declined. In the 20 years prior to 1995/97, the number of journeys by foot fell by 10 % whilst the average distance walked fell by 24 %. This trend has been steepest over the last 10 years and has occurred despite – or perhaps because of – the average person's total travel mileage increasing by 38 % over this same period.[3] The decline has been most notable amongst children; this is of particular concern given the links between physical activity and acknowledged decreasing fitness levels amongst children, and the lack of exposure to good road safety behaviour and the level of child casualties.

21.9.3 Obstacles to walking

In order to remove barriers to walking it is important to appreciate the practical obstacles that exist. There are many real or perceived deterrents to walking.[3] Amongst the most important are:

- land-use patterns that are unsuited to walking;
- unpleasant pedestrian environments;
- poor design of access to and within developments;
- access to a car, and perceived cost of its use;
- danger from vehicular traffic;
- personal security fears;
- inconvenient pedestrian facilities, including poor accessibility on public transport vehicles and facilities.

The secret to success is to understand the general and specific needs of all pedestrians. The aim must be to provide access and mobility for all pedestrians, including people with impaired mobility and the growing proportion of older pedestrians. The Institution of Highways and Transportation (IHT), based on opinion research findings, characterised the physical problems faced by pedestrians in respect of three strategic themes:[3]

1. A poor quality pedestrian environment:
   - inadequate footway maintenance and reinstatement;
   - lack of snow clearance and de-icing;
   - litter and the general appearance of neglect;
   - dog-fouling;
   - splashing by passing vehicles;
   - buildings that 'turn their backs on streets' and present pedestrians with blank walls;
   - ugly street scenes;
   - lack of reassuring surveillance;
   - culs-de-sac housing layouts that create mazes and increase walking distances;
   - lack of benches and public toilets;
   - the absence of road signs for visitors on foot;
   - steep gradients and steps.
2. Inadequate pedestrian safety:
   - fear of road accidents;
   - aggressively designed and driven vehicles with 'bull-bars' and high powered headlights;
   - obstructions on footways such as road works and refuse sacks;
   - poorly sited traffic sign poles and bus shelters;
   - locked bicycles and parked cars;
   - inadequate or broken street lighting in residential streets and at crossings on main traffic routes;
   - lack of, or inadequate, footways – particularly in or between villages, and the narrower streets of older towns and cities;
   - illegal cycling on footpaths and the sharing of some paths with cyclists;
   - inadequate pedestrian crossing time at signal controlled crossings.
3. Inadequate personal security:
   - fear of assault, graffiti and lack of police presence;
   - highly publicised child killings and abductions that have made some parents fearful of letting children walk unaccompanied;
   - dangerous dogs;
   - the presence of beggars (some of them intimidating) and intimidating drunks.

The liveability agenda, and the Government's report *Living Places – Cleaner, Safer, Greener*,[1] demands a stronger focus on effective street management aimed at tackling most of these concerns. This requires a cross-cutting approach from central and local government – and other partners – embracing crime and disorder reduction; traffic danger reduction (vehicle speeds and densities); better security; and clean and well-managed streets.

21.9.4 Universal design

One important user satisfaction issue relates specifically to older people. The fact that populations are ageing is well recognised. This is the result of people living longer and women having fewer children. The ageing of the population is perhaps best illustrated by some examples:[4]

- by 2021, 41 % of the British population will be over 50;
- by 2032 the proportion of people aged over 65 compared with those of working age will have increased from about 35 % to about 55 %;
- a generation ago there were some 300 centenarians in Britain. In a generation's time there will be around 30 000.

Traditionally, very little attention has been paid to the mobility needs of older people. Today's elderly people are diverse in many respects – income, fitness and mobility, for example. In the future, policy-makers and practitioners will have to devote much greater attention to what older travellers require, how to meet their demands and better serve their travel and social needs. There are no cars available in 43 % of households aged 65 and over. With many more older people remaining active for much longer it will be of even greater importance to ensure that their particular needs, and fragility, should not be overlooked. Tackling today's problems tomorrow is not a sound approach. Policy-makers and practitioners must tackle tomorrow's problems today.

Older people represent a travel market that the transportation sector must continue to nurture and develop. There are some simple measures that can be taken. The presence or absence of properly designed seating is a key determinant of the distance that older people can walk. The ability to rest on comfortable seating, preferably in a pleasant setting, enables longer walking distances to be achieved and, not to be overlooked, greater enjoyment to be derived. In this respect, policy-makers and practitioners should avoid being too 'functional' – reducing decisions to objective factors capable of cost–benefit analysis. It is important to create places that people enjoy. The bare minimum level of provision is not sufficient to produce places of which a community can be proud.

Breaking down the barriers to increased levels of walking is vital to offering wider transport choice. Therefore, it is also important for transport providers to identify and prioritise the needs of women and children, particularly concerning personal security, both on discrete journeys and as part of the whole journey, i.e., taking safe and convenient interchange between modes into account. Again, this represents a substantial existing and potential travel market that the transportation sector should target in a planned and pro-active way. The Department for Transport has published guidance on personal security issues for pedestrian journeys.[5]

21.9.5 Appreciating diversity

The failure to appreciate the diversity of elderly and disabled people means that not all of them benefit equally from new policies or facilities. About

8.5 million people in Britain currently meet the Disability Discrimination Act (DDA) 1995 definition. In addition, around 1.5 million people have had a disability in the past and would also be protected by the Act.

Disability is a high priority area, particularly due to the obligations placed by the DDA and human rights legislation across the European Community. In the UK, the DDA introduced far-reaching provisions to ensure that disabled people are treated fairly in all walks of life including the provision of services, employment opportunities and access to premises and facilities. The DDA enables disabled people to challenge organisations that fail to observe the Act in the courts and the employment tribunals. The DDA has major ramifications for local authorities and organisations such as infrastructure providers. From 2004, transport providers in the UK will be required to remove physical obstructions to their premises and facilities. Much work has already been undertaken to ensure that transport authorities and providers comply with the letter and the spirit of the law. However, for implementation to succeed, institutional and attitudinal change will be required in respect of valuing human diversity, widening and managing access to services and facilities, and building on existing good practice.

Not surprisingly, the European Commission has also been active in this area, demonstrating its commitment to provide equal rights for people with disabilities in Article 13 of the Amsterdam Treaty of 1999. This sets out objectives that the Commission believes should be pursued to improve access in a wide sense, and hence to promote full participation for all Europeans living with disabilities. They include, amongst other things, promoting accessible transport for people with disabilities and removing architectural barriers to mobility. The Department for Transport has published a guide to best practice on access to pedestrian and transport infrastructure.[6] The Strategic Rail Authority has also published guidance concerning train and station services.[7]

21.10 What should be done?

There are a number of factors that influence the amount of walking. A pedestrian review is an approach that can help to examine existing conditions in a systematic way. A pedestrian audit can help with the examination of planned arrangements (i.e., associated with new development or proposed transport infrastructure and systems). It is important that these approaches are adopted and applied comprehensively and systematically by highway authorities and practitioners to improve the pedestrian environment.[3]

21.10.1 Pedestrian review

A pedestrian review is a systematic procedure to assist with the assessment of existing walking environments and conditions in relation to the factors

that are most relevant to pedestrians. The purpose is to identify problems and prioritise action areas; enable levels of service to be assessed and communicated to stakeholders; identify solutions and opportunities for improvements; and to provide a framework for policy development, presentation, implementation and monitoring, including consultation and community involvement. These procedures are best undertaken with input from local pedestrian interest groups and other relevant stakeholders.

21.10.2 Pedestrian audit

The pedestrian audit process aims to ensure that designs for new transport schemes that would change existing travel patterns are 'pedestrian-friendly'. The central premise of the pedestrian audit is that prevention is better than cure – it is easier and cheaper to change a few lines on an engineering drawing than to face the cost and public embarrassment of modifying a transport scheme or development once built. The IHT recommends that the pedestrian audit should precede the safety audit in the scheme development process. It should typically cover the project brief; pedestrian routes and surfaces; accessibility, road crossing opportunities and facilities; and lighting and street furniture. A checklist example can be found in ref. 3.

Encouraging walking: advice to local authorities[8] recommends using the '5 Cs' as a checklist to assess the overall quality of the existing environment for walking to check if it is:

- connected;
- comfortable;
- convenient;
- convivial;
- conspicuous.

Other important factors affecting the quality of pedestrian routes include:

- directness;
- comprehensiveness;
- effective width;
- obstructions/misuse;
- surfaces/maintenance;
- crossings;
- personal security/safety;
- pleasantness;
- signing;
- suitability.

A sample pedestrian review form can be found in ref. 3.

21.10.3 Future developments

The IHT is exploring the optimal way to blend different types of audit and review, e.g., for cycling, walking and quality streetscape, into one computer-based tool. Preliminary discussions about the nature, scope and extent of the tool have taken place with the Department for Transport and leading consultants in the field, namely Arup and TRL Ltd. The outcome may be to produce proprietary software if the business case is favourable.

21.10.4 Necessary conditions for success

People-friendly environments can be achieved through good design, imaginative management, persuasive promotion, efficient maintenance and by understanding the sometimes conflicting needs of everyone likely to be affected. City squares, pedestrianisation (and pedestrian priority), Home Zones, measures to restrain traffic, speed management, harmonisation of walking and public transport, management of freight and distribution, urban design and improved safety and security all have important roles to play in a local walking strategy. The precise approach to be adopted in particular situations will depend on local circumstances and needs which can be determined through pedestrian review and pedestrian audit techniques. However, humanising our urban centres must be at the heart of any intervention if liveable communities are to emerge and prosper.

21.10.5 Joined-up thinking, joined-up action

Encouraging walking contributes to wider transport, environmental and health objectives through mechanisms that include a diverse range of statutory and non-statutory functions and processes:

- health improvement;
- traffic reduction;
- speed management;
- air quality management;
- housing;
- economic development;
- local transport plans;
- public transport;
- cycling;
- policing and community safety;
- safer routes to schools;
- local agenda 21;
- community strategies;
- public realm strategies;
- land-use and development;
- sustainable distribution.

Accordingly, the management and improvement of walking conditions and infrastructure need to be integrated into corporate policy-making and operational plans at national, regional and local levels. It is simply not possible to bolt on satisfactory facilities for walking as an after-thought or late in the project life cycle. They must be proactively considered at the outset during the feasibility and conception stages.

Walking and cycling, whilst having many different needs and requirements, are also closely linked as major non-motorised transport modes. Policy-makers and practitioners concerned with walking will, most likely, also be concerned with promoting cycling and improving conditions for non-motorised transport modes more generally. Whilst respecting the different needs of both, there is a strong case in favour of considering walking and cycling requirements in an integrated way to avoid the danger of compartmentalising transport modes and areas of professional responsibility to too great an extent. The overall aim is to solve transport problems and produce integrated and sustainable transport solutions that create a better built environment. This requires practitioners with a broad toolkit of skills and competencies that are able to take an interdisciplinary and multi-modal perspective of transport and land-use issues. Producing balanced outcomes and making the best of every situation is what really counts. The aim should be to produce networks and routes that are fit for walking and cycling; simply providing new facilities is not a worthwhile end in itself.

21.10.6 Planning and development control

One particular opportunity arising from a pedestrian audit and the stronger focus on the needs of pedestrians is to ensure that the mistakes of the past are not repeated. This is particularly true of any new development that offers the opportunity to provide new choices and facilities, and enhance existing walking networks and provision. The overriding objective should be to design land-use patterns and activities that encourage journeys on foot and enable walking to be undertaken in a safe, convenient and enjoyable way.

Providing for the needs of pedestrians should be an integral part of the development planning process. At the time of writing, new guidance on transport assessments is expected from the British Office of the Deputy Prime Minister (ODPM) that will provide comprehensive advice on accessibility measurements and planning for pedestrians in the development process. In March 2003, the ODPM published a report by the Social Exclusion Unit on transport, accessibility and social exclusion.[14]

21.10.7 Improving the quality of the environment

The interventions needed to provide better walking environments will depend on, and respond to, local circumstances and concerns that will probably be identified through public consultation, community feedback or a pedestrian review. The toolkit available to policy-makers and practitioners is diverse.[3]

To achieve more liveable communities the walking environment needs to be more than just functionally adequate; it needs to be of high quality and foster a pleasant experience. This will require actions to provide cleaner pavements; improved footway surfaces; less graffiti and vandalism; more attractive hard and soft landscaping; appropriate levels of service in respect of usable footway width; and ongoing financial provision for management and maintenance.

21.10.8 Improving safety and security

Reducing fear, intimidation and traffic danger – real and perceived – is central to success. This will require measures to manage vehicle speeds and identify, reduce or remove conflicts, obstacles and hazards; improve lighting, visibility and surveillance and CCTV monitoring; improve policing to address crime and disorder and bring more people onto the streets.

21.10.9 Hierarchy of measures

The appropriate solution will depend on the local circumstances and transport strategy. However, the IHT recommends that options to improve the walking environment be considered in accordance with the following hierarchy:[3]

1. reduction of speed and volume of motorised traffic;
2. reallocation of road space to pedestrians;
3. provision of at-grade (surface) crossings where road crossing is the main problem;
4. improved routes on existing desire lines where pedestrian routes are identified as inadequate;
5. new alignments for pedestrians and grade-separation.

21.10.10 Skills and training

There is widespread concern about the constraints on delivering better walking environments on the grounds presented by a shortage of skilled practitioners. There is also a need to improve pedestrian skills, particularly amongst children, and driver skills in the general population. To this end, agencies responsible for educating future practitioners should develop programmes to ensure that transport professionals have a proper understanding of the diverse needs of pedestrians. In addition, highway authorities and agencies will need to give greater emphasis to walking in their strategy development, human resources plans and budgeting process – both capital (for new construction) and revenue (for audit, review, scheme development, consultation and community involvement and whole-life management).

21.10.11 A commitment to maintenance

Public attitude surveys undertaken by local authorities and others often reveal high dissatisfaction rates with the standard of footway maintenance. Well-maintained highways (including footways), signing, road markings and street lighting are essential for all highway users. Encouraging walking demands proper maintenance of existing and new assets that directly improve walking conditions. This requires a strong management focus on footway defects, intervention levels and response times.

More and more people in Britain are claiming financial recompense from highway authorities and property owners for personal injuries they sustain whilst using the highway network or public places. Slipping over, tripping up and falling down due to uneven surfaces represent the majority of claims. Poorly designed schemes and inappropriate, inconsistent or badly implemented maintenance regimes add to the likelihood that the courts will uphold such claims.

The financial impact of such claims is a major burden on highway authorities in the UK. Particular attention should, therefore, be paid to infrequent routine inspection; inadequate record keeping; safety auditing; levels, kerbing and edge delineation; obstructions; experimental layouts (that can lead to claims simply because less attention to detail has been paid than would be the case in a permanent scheme); and vehicle manoeuvres (in particular, swept paths and reversing in areas where pedestrians might reasonably assume they have priority). Further information on the maintenance needs of pedestrians and associated responses can found in refs 3 and 9.

21.10.12 Action by individuals

It is also important to positively encourage and promote the benefits of walking. This should be achieved through wider initiatives to raise the awareness of transport users about the consequences of their travel choices, both positive and negative.

21.11 Government policy

The UK Parliament's Select Committee on Environment, Transport and Regional Affairs conducted an inquiry into walking in towns and cities in 2001. The Committee concluded in their report[10] that walking in towns and cities is a very important mode of transport, but is under threat because people are spending more time in their cars and less on their feet. The Committee's main recommendations included that Government should:

- ensure that land-use planning policies are implemented;
- make small schemes to promote walking a higher priority for funding;
- publish a national strategy that would send a message to local authorities

and others that walking is a priority; make local strategies mandatory; set national targets; and establish a national forum.

21.11.1 Political commitment

Many groups, including the IHT and the Select Committee, were disappointed that the British Government issued 'advice to local authorities'[8] rather than a National Walking Strategy in 2000. Encouraging walking – and making it safer and more convenient – is unquestionably a good thing. It is good for people, good for communities (so long as exposure to risk can be controlled, i.e., road safety) and an essential part of most journeys. However, there is concern that, because of political tensions associated with the Government being perceived as 'anti-car', walking is not receiving the priority and encouragement it deserves in the UK. Walking needs to be positively championed at all levels of government if liveable communities are to be delivered.

The status of walking in the planning process needs a high priority. Walking should be properly reflected in legislation, planning policy guidance and investment programmes, particularly those concerned with casualty reduction, speed management, responsible driver behaviour, and creating compact, people-friendly land-use patterns and designs. Pedestrians feature significantly in the nation's road casualty figures – in particular, the UK's child pedestrian record is relatively poor.[11] Pedestrian training for children (by parents and schools) has an important contribution to make but should not reduce the onus on motorists to drive considerately and responsibly, nor transport authorities to provide safe walking environments.

Clear priorities are needed. As a guide, the IHT recommends that the following priorities be adopted in developing transport and land-use strategies and investment:[12]

1. Pedestrians;
2. Cyclists;
3. Public transport passengers;
4. Deliveries to business;
5. Other business traffic (by car);
6. Shoppers and other visitors (by car);
7. Commuters (by car).

21.11.2 National strategy and targets

There is a growing consensus in Britain that the adoption of a National Walking Strategy would provide greater purpose and direction. It would strengthen the focus on, and commitment to, practical actions to improve conditions for pedestrians. In terms of targets, it is questionable whether existing data – at national and local level – are sufficiently robust to permit meaningful targets to be set and monitored. However, targets focus the mind

on action. The national target for increased cycling in Britain has stimulated local authorities to establish local targets, often in conjunction with local groups, that have been helpful in focusing and co-ordinating action. Accordingly, if data constraints can be overcome, there is a strong case in support of introducing challenging, measurable and achievable targets for encouraging walking based on modal shift (people switching from car to walking) rather than absolute levels of walking.

21.11.3 Next steps

In its response to the Select Committee Inquiry,[13] the Government has agreed to publish a new edition of *Encouraging Walking*[8] as a national strategy document, with implementation monitored through local authorities' annual reports on local transport plans. Its publication is eagerly awaited.

21.12 Conclusion

Tony Blair, in his 'Liveability Speech', introduced at the outset, said that to improve local environments it is necessary to 'tackle the small concerns which can turn into big problems. It is important that we break the spirit of fatalism about parts of our public sphere – everywhere we can make a start we will make a difference.' What better place to start than by creating better walking environments?

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22

Making pedestrian facilities more usable and safer for all

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22.1 Introduction: changing demographics and conditions for pedestrians

The United States faces new challenges for providing a transportation system that meets the needs of all users. Recent transportation and civil rights legislation created requirements for providing a more balanced transportation system and opportunities for people with disabilities. In the United States' population:

- twenty per cent have a disability that limits their ability to perform daily functions;
- seventy per cent will, at some time in their lives, have a temporary or permanent disability that can make stair climbing virtually impossible;
- nineteen per cent are expected to be over the age of sixty five in the year 2020, and as people age, there is a greater chance of developing disabilities;
- between the years 2000 and 2030, the elderly population will double.

Improved health measures have given older people and those with disabilities a better quality of life and more longevity than in past generations. Increased longevity also increases the chance of developing more than one disability. It is not uncommon for an older person to have a loss of vision and require the use of a walker or wheelchair for getting around.

Even though one in five people have a disability, it is rare to see a true representation of people with disabilities out and about conducting their daily activities. This is most likely due to many barriers that must be overcome to carry out these tasks. Environments all over the world have been built without much thought to how they should perform for people who cannot walk, see, or hear. Consequently, people with disabilities have been isolated and segregated from the rest of the population.

Globally we are becoming aware that not only should physical barriers be removed, but also that there is a need to provide information in alternative formats to people with visual and hearing disabilities. There are new technologies for providing text and symbol information on signs and signals in audible message and vibrotactile (vibrating message pad) formats that are usable for people who have visual disabilities. This technology can greatly improve the accessibility and safety of street crossings where signal phase information is crucial, and interactions with cars bring higher risks. It is understandable that in these situations, where information is not accessible, it can have an affect on one's sense of safety and security.

22.2 A new direction for research

There is one set of accessible design standards in the US that are to be applied in both the architectural and pedestrian environments, and they are developed by the federal agency, the US Access Board. These design standards, the Americans with Disabilities Act Accessibility Guidelines (ADAAG), are based on research that has been conducted in controlled architectural environments. New research is proving the need to develop separate standards for sidewalks and street crossings. This makes sense because of pedestrian interactions with motor vehicles, the faster pace of outdoor activity, the need for sign and signal information in alternative formats in order to cross the street, and weather and other outdoor elements that cause defects to concrete, asphalt, brick and other materials. Also, just crossing the street has become much more complicated for almost all pedestrians because of wide lanes, multiple lanes, and right turns on red lights at intersections. Safety becomes a greater issue in this environment. If a facility is not accessible, it is probably not safe for most pedestrians, especially people with disabilities.

The outdoor environment has common design problems not usually found in the indoor environment that create safety hazards, such as:

- The replacement of vertical kerbs with kerb ramps can make it difficult for persons who are blind to know where the boundary is for the street and sidewalk. Kerb ramps are necessary for people who use wheelchairs but they create a safety problem for someone who cannot detect when they have left the sidewalk and entered the street.
- Unlike building surfaces that tend to be in one plane, many outdoor surfaces are warped, causing one or two wheels of a wheelchair to lift off the ground. These situations can cause balancing and tipping problems for the user.

We are starting to understand what the most useful designs and technologies are for creating accessible pedestrian environments. Research has been conducted on wayfinding systems, underfoot detectable warnings, and audible

sign and message formats for people with visual disabilities. Best practice designs are also being sought for people who have mobility disabilities.

22.3 Who are the users?

Design standards need to change to encompass a wider range of people with disabilities. Most of the design standards were developed from research conducted with returning war veterans. These standards do not take into account the forward and side reach ranges for children and women, and the differences in upper body strength. There are also different degrees of mobility for stronger, younger males when compared to people who are elderly and have more frailties and incidence of multiple disabilities.

People over the age of 65 make walking their second choice of transportation in the US. Walking is often a necessity for older people when driving is no longer a safe activity and transit is not an option. Many elderly people want to continue living in their homes and remain independent for as long as possible, so this means services and infrastructure need to be made available for them to do so. However, the lack of well-designed sidewalks or sprawling land-use can make walking difficult, and if a person develops a disability, these issues can make walking virtually impossible. Good planning for future transportation needs is necessary to meet the needs of the older population.

It is important to ensure that people of all abilities can use the pedestrian transportation system. This is made possible when there is knowledge of how people use space. Care must be taken when planning, designing, and retrofitting facilities. It is important to understand the answers to such questions as:

- Can this facility be used safely and easily by people with diminished eyesight and hearing, limited stamina, or wheelchair users?
- Will young children or persons with limited cognitive ability be able to understand how to use the facility intuitively or with limited instructions? Are the instructions simple and easy to understand?

22.4 Solutions to addressing current and upcoming issues

Walking is the oldest and most basic form of transportation, and almost every trip includes a pedestrian element. Walking is also healthy for people and the environment. Considering this, it is surprising that very few universities offer curricula on pedestrian design in engineering and transportation planning programmes. A basic knowledge of human factors and how pedestrian facilities must perform for a wide range of users is needed in order to provide truly usable facilities. There are also conflicting design issues among various users. A design that is useful for one user may be a problem for another.

Examples of a competing issue among wheelchair users and persons who are blind that affects the usability for both user groups include:

- Competing interest: kerb ramps allow a wheelchair user to move easily from the sidewalk to the street, but the ramp may make it difficult for a person who is blind to detect where the street begins and the sidewalk ends.
- Solution: add a detectable warning strip with a truncated dome pattern at the bottom of the ramp. Truncated domes are a unique pattern not duplicated by any other design patterns in transportation environments or facility defects, which make the domes highly detectable by the user. The domes should run along the full width of the ramp.
- Problem: wheelchair users may need a running start from the street in order to make it up the ramp and the domes may slow the momentum of the wheelchair.
- Solution: the domes should be placed 153–200 mm away from the bottom of the ramp. By not placing the domes at the very bottom of the ramp, this allows the wheelchair to gain some momentum up the ramp. The domes should run along the full width of the ramp in order for detectability by a white cane user. The length of the domes should only be 610 mm, which is approximately the distance between the front and back wheels of a wheelchair. Keeping the length of the domes at 610 mm will prevent the front and back wheels from traversing the dome strip at the same time. Also, if the domes are placed in a grid pattern the wheels of the chair may be able to straddle between the domes.

Engineers and designers are trained to be problem solvers. Their expertise is greatly needed in finding solutions to these types of problems. For a design ultimately to be useful for a wide number of users, a combination of design solutions (such as the example above) may need to be applied. This concept of designing for all users is called Universal Design. Though Universal Design has been acknowledged in the architectural field for some time, it may be a new concept to many transportation providers and may inspire a change in how transportation facilities are traditionally designed and implemented.

Not only is knowledge required on how people with various abilities use space, but also an attention to detail on how materials and design features fit together. For example, placing a strip of truncated domes next to a surface of exposed aggregate rock would make the domes far less detectable than if they were placed on a smooth surface. Combining two textured surfaces side by side defeats the good intensions of providing truncated domes. Achieving a highly usable facility or system starts with the practice of laying out the minimum space and operational requirements, then overlaying best practices for optimum ease and safety. The end result is a Universally Designed system or facility that performs more comfortably for all users.

22.5 The social costs of inaccessible facilities

Some may ask, 'can we afford to build this way?' Looking past the human rights aspect, there are far reaching social and economic benefits to developing Universal Design concepts. Eliminating barriers can provide opportunities for equal access to education, jobs, housing, transportation and health care services, and help resolve unemployment problems.

The question needs to be turned around to ask, 'can we afford *not* to build this way?' The population of people over 65 years of age is rapidly growing. Disabilities are more prevalent in older populations, and travel options often diminish with age. What we build must last for decades and provide the types of services and access needed for the future. Can we continue to design systems only for those that are fully able? The answer is no. Large segments of the population cannot be left out of social economic activity without serious consequences.

We live in an environment with a multitude of barriers for people with disabilities. In 1990, the US enacted a comprehensive civil rights law, the Americans with Disabilities Act (ADA) that prohibits discrimination against people with disabilities in all aspects of life such as employment, communication, recreation, health services, housing, education, transportation, and access to public services. The lawmakers recognised that a disproportionate number of people with disabilities fall into a lower economic and education status and have a higher unemployment rate. It was also recognised that discriminatory practices and policies, and social, physical and information barriers were preventing a large segment of the population from participating fully in everyday life. These barriers created a lack of equal opportunity. The ADA significantly awakened the consciousness of public policy. It brought into focus how infrastructures and attitudes must be examined for possible discrimination. Historically, people with disabilities were not considered able to make significant contributions to society. The US president Franklin D Roosevelt is one of the most beloved American figures. He was not able to walk in the last years of his presidency. His disability was hidden from the public for fear that social prejudice would prevent him from being given the opportunity to serve as president. Most people do not aspire to be president, but they have the ability to make significant contributions and often the ability to do great things. This ability is related to personal will and intelligence, and should not be related to the ability to walk, see or hear. Being denied the opportunity to contribute to society not only hurts individuals, but society as a whole, because it wastes valuable human resources. This issue goes back to the question: 'how can we afford not to build in a way that promotes opportunities for everyone?'

22.6 Creating accessible environments through changes in policy and funding

In going about our daily functions we move through various built environments. They are interrelated, and the ability to move easily from one place to another is often taken for granted. The average work trip may take people from their front door, through sidewalks and street crossings, onto a transit system, through more sidewalks and street crossings and into a building to a workplace or service. The need for access to all these environments is vital to perform daily activities regardless of the travel modes used and the activities performed. The authors of the ADA understood these relationships and created a law to eliminate the barriers in all environments. Access is the key to opportunity and the ADA requirements open the door to opportunities that must be implemented on many fronts.

Knowledge and sensitivity to the issues of people with disabilities need to evolve into institutional changes in policy, funding priorities, training and education, and design practices and standards. Political will to implement the necessary changes and create opportunities will take time to cultivate. For example, older persons develop a higher proportion of disabilities, and this age group is growing significantly. Viable transportation for older people, who may have one or multiple disabilities, is a long-term proposition. There needs to be political will to implement policies and provide funding opportunities to meet the future transportation needs. This can be a challenge to politicians who are focused on issues pertaining to the next four or five years. It is also a challenge to transportation agencies that have more demands than funding resources. Often the focus is on quick solutions rather than sustained long-term goals of developing the type of community people want to live in. This can lead to missed opportunities for providing an adequate system that is usable by everyone. Some of the missed opportunities have resulted in separate and expensive para-transit systems designed for only one user group. Para-transit is necessary in some circumstances, but it should not be a substitute for a Universally Designed transportation system, as it often has been in the past.

In order for ADA regulations to be implemented, almost every federal, state and local government agency needs to make shifts in policy and examine how funding is used. Transportation agencies must work together in exploring how conditions need to be improved and make sure that funding is not used in a manner that would discriminate against people with disabilities.

Many would agree that the US has an unhealthy dependence on the car that dominates all other modes of transportation. However, in recent years federal transportation legislation has been enacted to provide funding incentives for pedestrian facilities and help balance the transportation choices. The US Federal Highway Administration (FHWA) is an agency of the US Department of Transportation with a leadership role in providing expertise, resources and information to improve the quality of the highway system, which includes

pedestrian systems. The FHWA has been developing research and best practices for making pedestrian environments more safe and convenient for all users. This effort helps implement the policy and accessibility design provisions of the ADA.

22.7 Developing new standards for the pedestrian environment

New minimum design standards were developed as part of the requirements for complying with the ADA. These standards are basic one-size-fits-all design requirements that were originally developed for buildings and surrounding facilities, but are to be applied to all environments. These standards are evolving as the result of research and development of new technologies. The standards continue to expand to encompass more appropriate designs for various environments. The pedestrian sidewalk and street-crossing environment is an area that has had extensive examination and research.

The US Access Board formed a committee represented by researchers, various transportation agencies, and disability rights organisations to develop recommendations for new design standards for the pedestrian transportation system. The committee recognised that the existing architectural standards may not necessarily take into account the safety risks, walking speed, pedestrian storage, and interactions with motor vehicles of the outdoor pedestrian environment. Careful thought went into developing the recommendations that would address these situations (see Box 22.1). The recommendations are being developed into a proposal that would add new pedestrian design standards to the ADAAG (PROWAAC, 2001). These standards will affect all local public government agencies and require them to build and alter facilities in a different way, and provide alternative communication formats to some existing street signs and crossing signals. The process for adopting new standards is very democratic, and allows the public an opportunity to make comments to the proposal before the standards become law. This adoption process may take up to two years before there is a final rule-making.

Meanwhile, many local governments are considering the new recommendations and incorporating them into their local practices and policies. Consistency in the design and operation of the pedestrian environment is crucial for it to be functional – this is one of the reasons why standards are developed. Knowing what to expect is especially important for people with disabilities. It makes sense to apply the new recommendations now, rather than waiting for the legal requirements, when building and altering facilities. This will improve consistency throughout the pedestrian system.

Sharing transportation innovations has always been a common practice throughout the world. The committee did not create the recommendations in a vacuum. International research and committee work were evaluated. Some

of the recommendations were a compromise between conflicting issues of pedestrians and motor vehicles, and various needs that differ among people with disabilities. All things considered, this body of work represents the most up to date examination and recommendations for the minimum design requirements for laying the foundation for the pedestrian environment.

Box 22.1

Summary of the Public Rights-of-Way Access Advisory Committee's (PROWAAC) recommendations for new minimum design standards for pedestrian sidewalks and street crossings

New construction: minimum requirements

Public Sidewalks

Sidewalks shall contain the following provisions for a pedestrian access route:

- Clear Width
  - the minimum clear width of the pedestrian access route shall be 60 inches (1525 mm);
  - the clear width of the pedestrian access route may be reduced to 48 inches (1220 mm) at driveways and alley crossings, accessible parallel parking locations with constraints where necessary to make building entrances accessible, and at street fixtures.
- Cross Slope
  - the maximum cross slope on the pedestrian access route shall be 1:48 (2 %).
- Grade
  - grades may follow the running grade of the adjacent roadway;
  - grades can be no steeper than 5 % if pedestrian access routes are not adjacent or within the right-of-way of the roadway.
- Surfaces
  - surfaces on pedestrian access routes shall be firm, stable and slip resistant;
  - be as free of joints and as visually uniform as possible;
  - utility covers and grates are not allowed within the 48 inch (1220 mm) reduced vibration zone;

Box 22.1 (continued)

  - at rail crossings, allow a 2.5 inch (63 mm) maximum gap with an exception for a 3 inch (75 mm) gap for freight lines. This allowance expires four years after adoption of the final rule;
  - detectable warnings are required where rail lines cross non-vehicular pedestrian facilities.
- Changes in level
  - changes in level on pedestrian access routes shall not be more than 0.25 inch (6.4 mm);
  - 0.25 inch (6.4 mm) up to 0.5 inch (13 mm) is allowed if it is bevelled with a slope not more than 1:2 (50 %).
- Stairs
  - stairs shall not be a part of the pedestrian access route;
  - visual contrast is required at edges of steps.
- Elevators and Lifts
  - shall remain unlocked during operating hours of the facility being served.

Protruding Objects

- Post and wall-mounted objects
  - protrusions from walls and posts shall protrude out no more than 4 inches (100 mm) between 27 inches (685 mm) and 80 inches (2030 mm) above ground level;
  - where objects or signs are mounted between two posts spaced more than 12 inches (305 mm) apart, a cross bar 15 inches (381 mm) above the ground connecting the two posts is required.
- Reduced vertical clearance
  - railings or other barriers with a leading edge no more than 27 inches (685 mm) high are required if the vertical clearance is less than 80 inches (2030 mm).

Street fixtures and furniture

- Requirements for accessible street furniture
  - street furniture must be accessible and adjoined to the pedestrian access route;
  - where appropriate, clearances for toes 6–17 inches (150–430 mm) and knees 27–30 inches (685–760 mm), and forward and side reach ranges (see age appropriate reach range charts in Proposed ADAAG at the US Access Board website);
  - clear floor or ground space for street furniture shall not encroach into the pedestrian access route by more than 24 inches (610 mm);

- at benches without tables, at least 50 % of benches at a single location shall have a back and armrests and the clear ground space shall be positioned to allow wheelchair users to be seated shoulder-to-shoulder with an individual seated on the bench.
- Drinking fountains and water coolers
  - a minimum of two drinking fountains is required unless the single fountain is a high–low type combination;
  - more design features are explained in the Proposed ADAAG at the US Access Board website.
- Public telephones
  - must be wheelchair accessible, with a maximum side approach of 10 inches (255 mm), and a maximum forward approach of 20 inches (510 mm);
  - one compliant phone where two or more are clustered together.
- Tables and counters
  - when fixed tables or counters are provided, the counter height shall be 28–34 inches (710–865 mm) maximum;
  - exceptions are made when tables are provided for children's use.
- Depositories, vending machines, change machines and trash receptacles
  - where provided at a single location, at least one of every type of these facilities shall be accessible to people with visual disabilities and wheelchair users;
  - more design features are explained in the Proposed ADAAG at the US Access Board website.
- Street identification and other pedestrian signage
  - street identification signs, including bus stop signs, shall meet readability criteria;
  - readability criteria include: eggshell finish; minimum 70 % visual contrast; character size based upon intended viewing distance; character width 60–100 % the height of the character; tactile characters with rounded or trapezoidal cross section; minimum stroke thickness of 0.8 mm; mounting height 60 inches (1525 mm) above adjacent clear landing space.
- Changeable or variable message signs
  - changeable or variable message signs shall be legible from the same distance as conventional print; short messages shall be static, with no paging messages permitted.
- Audible signs
  - where there are audible signs, a visual equivalent shall be provided;

Box 22.1 (continued)

- remote Infrared Audible Sign (RIAS) requiring personal receivers for wayfinding have additional recommendations in the *Building a True Community* report.

Sidewalk/street transitions

- General
  - a kerb ramp or flush landing is required wherever the pedestrian access route crosses a sidewalk/street transition;
  - if at least one corner of an intersection has a public sidewalk, then all corners require kerb ramps or flush landings;
  - a separate kerb ramp or flush landing is required for each direction of travel;
  - a landing is required at the top of each kerb ramp, except at unsignalled driveways.
- Placement
  - the sidewalk/street transition shall be aligned within a legal crosswalk or parking access aisle;
  - there shall be room for a 48 inch by 48 inch (1.22 × 1.22 m) manoeuvring area in the crosswalk, adjacent to the sidewalk/street transition;
  - kerb ramps and flush landings shall be wholly contained within the public sidewalk and not protrude into the vehicular way;
  - kerb ramps are permitted to protrude into accessible parking aisles if they do not intrude into the manoeuvring and unloading areas.
- Kerb ramp directionality
  - recommended that the kerb ramp align with the expected path of travel, providing the cross slope of the ramp does not exceed 1:48 (2 %).
- Width
  - the minimum clear width of a kerb ramp shall be 48 inches (1220 mm).
- Landing size
  - landings must contain a 60 by 60 inch (1525 by 1525 mm) square or 60 inch circle;
  - landings may serve multiple ramps or overlap with other landings.
- Running grade
  - the maximum running grade of any portion of any curb ramp or transition ramp shall be 1:12 (8.33 %);
  - kerb ramps are not required to exceed 15 feet (4.6 m) in length.
- Cross slope and warp
  - the maximum kerb ramp cross slope shall be 1:48 (2 %);

  - the maximum cross slope for landings shall be 1:48 (2 %) in any direction;
  - warping is to be minimised.
- Grade changes/counter slope conditions
  - the maximum grade change shall not exceed 11 % at the transition points from the street – gutter – ramp – sidewalk;
  - multiple grade breaks shall be separated by at least 24 inches (610 mm).
- Kerb ramp flares
  - kerb ramps shall have flares if pedestrians might walk across them;
  - flare length along the kerb line shall be at least ten times as long as the adjacent kerb height.
- Surfaces
  - the surface of kerb ramps and landings shall be firm, stable, smooth and slip resistant;
  - gratings, access covers and similar surfaces shall not be located on kerb ramps, landings, or adjacent gutter pans at sidewalk/street transitions.
- Vertical grade breaks and lips
  - no vertical changes in level or lips are allowed on or between components of kerb ramps, landings, the street, and the gutter.
- Detectable warnings
  - sidewalk/street transitions shall have detectable warnings in the form of truncated domes;
  - truncated domes shall be applied the full with of the ramp, 24 inches (610 mm) deep, and placed 6–8 inches (150–205 mm) back from the bottom of the ramp.
- Vehicular obstructions
  - It shall be illegal to block sidewalk/street transitions with parked cars.

Pedestrian street crossings:

- Pedestrian signal push buttons
  - push buttons shall be at least 2 inches (51 mm) across in diameter, have a locator tone, require activation force of no greater than 3.5 lbs (15.5 N), be operable with a closed fist, have visual contrast of at least 70 % and provide audible and visible indication that the button has been pressed;
  - push buttons shall be located adjacent to a clear level landing on the access route leading to the crosswalk, with a maximum mounting height of 42 inches (1070 mm), parallel to the direction of the crosswalk, within 10 feet (3 m) of the kerb line;

Box 22.1 (continued)

  - where there are two accessible pedestrian signals (APS) on the same corner, the push buttons must be at least 10 feet (3 m) apart, with exceptions;
  - tactile arrows on controls shall indicate directionality;
  - when a map of a crosswalk is provided with a push button, it shall be visual and tactile;
  - Locator tones, where required, shall be 2 dB–5 dB greater than ambient noise, be 0.15 seconds in duration, have one second repetition intervals, and deactivate during flashing intervals.
- Accessible pedestrian signals (APS)
  - accessible pedestrian signals are required in certain situations:
    - where pedestrian phase timing is pedestrian actuated;
    - where there is a leading pedestrian interval (LPI);
    - where there is a pretimed signal with pedestrian signal information provided in text.
  - accessible pedestrian signals must indicate unambiguous directionality in audible and vibrotactile format, must have a locator tone if pedestrian-activated, be audible from the beginning of the walk interval, must differentiate between walk interval and locator tones, shall be 2 dB–5 dB greater than ambient noise, and not be limited in operational hours;
  - audible beaconing, if provided, shall be during walk intervals only.
- Crosswalks
  - the crosswalk cross slope (road grade) shall be a maximum of 1:48 (2 %);
  - the crosswalk running grade (road crown or superelevation) shall be a maximum of 1:20 (5 %);
  - crosswalk markings are required at signalised intersections;
  - the minimum crosswalk width is 8 feet (2.44 m).
- Crossing times
  - pedestrian signal phase timing shall be calculated with a 3.5 feet per second (1.1 m/s) or less pedestrian walking speed;
  - crossing distances, when calculating timing, shall include the length of the crosswalk and one kerb ramp.
- Medians and pedestrian refuge islands
  - cut-throughs or kerb ramps are required;
  - detectable warnings are required.
- Detectable warnings
  - detectable warnings shall be provided only:
    - where a pedestrian way crosses a vehicular way, but not at unsignalled driveways;

    - where a rail system crosses a pedestrian way;
    - at reflecting pools in the public right-of-way;
    - at cut-through islands and medians;
    - at transit rail platforms.
  - specifications are provided for size, location, dome spacing and size, alignment, and visual contrast in the *Building a True Community* report.
- Pedestrian overpasses and underpasses
  - overpasses and underpasses must connect to a pedestrian access route;
  - an elevator is required if more than 5 % grade is required for greater than a 5 foot (1.5 m) vertical rise;
  - signs must be tactile and visual.
- Roundabouts
  - barriers must be provided where pedestrian crossings are prohibited;
  - a cue must be provided to locate the pedestrian crossing;
  - a pedestrian-activated traffic signal must be provided at pedestrian crossings.
- Turn lanes at intersections
  - a cue must be provided to locate the pedestrian crossing;
  - a pedestrian-activated traffic signal must be provided at pedestrian crossings.

Vehicular Ways and Facilities

- On-street parking
  - one in eight, but at least one, accessible spaces must be van accessible;
  - accessible stalls shall be dispersed within a project area; clustering is allowed if it provides equivalent or greater access;
  - spaces shall be a minimum of 8 feet by 18 feet (2449 by 5490 mm) long;
  - access aisles are required: 8 feet (2449 mm) for van accessible spaces, 5 feet (1500 mm) for others;
  - maximum slope in accessible space is 1:48 (2%) in any direction;
  - signage is required;
  - adjacent areas must be free of obstructions.
- Parking meters
  - controls shall be mounted no higher than 42 inches (1065 mm) above the sidewalk;
  - controls shall have an operating force of less than 5 lbs (22.2 N);
  - a clear space of 30 inches by 48 inches (760 by 1220 mm) in front of the controls is required;

Box 22.1 (continued)

  - accessible meters shall be placed within 3 feet (915 mm) of the head or foot of the accessible stall, with an exception for centralised collection;
  - instructions may not be displayed solely on the horizontal surface of meter.
- Passenger loading zones
  - kerb ramps are required at least every 100 feet (30 000 mm);
  - the minimum dimension of a passenger loading zone shall be 8 feet by 20 feet (2440 by 6100 mm) long;
  - a 60 inch (1525 mm) wide access aisle is required.
- Motorist aid communication systems
  - controls shall have an operating force of less than 5 lbs (22.2 N), be located a maximum of 48 inches (1220 mm) high, labelled in Braille and centred on clear ground space;
  - a minimum of 72 by 72 inches (1830 by 1830 mm) clear ground space is required;
  - a minimum of 1 by 23 feet (300 by 6900 mm) level turnout connected to clear ground space is required;
  - any 2-way communication must provide text telephone (TTY), voice carry over (VCO) and hearing carry over (HCO);
  - handsets, volume control and TTY specifications are included in the *Building a True Community* report.
- Motor vehicle turnouts
  - recommended minimum paved area 16 feet by 23 feet (4880 by 6900 mm), slope exceeding 1:48 (2 %) in any direction, to allow turnout to be used by person with disability needing to service vehicle.

Temporary facilities and construction

- Alternate Circulation Path
  - an alternate route (alternate circulation path) shall be provided whenever the pedestrian access route is blocked;
  - the alternate shall be parallel to the disrupted access route on the same side of the street when possible;
  - there shall be no protrusion into the path of travel below 80 inches (2030 mm).
- Barricades
  - barricades shall be provided when construction occurs in the public right-of-way;
  - barricades shall provide a continuous path of travel with a solid toe rail edge of 6 inches (150 mm) minimum, to a height of 36 to 42 inches (915–1065 mm) with diagonal stripes at least 70 % contrast;

  - support members may not protrude more than 4 inches (100 mm) into the path of travel.
- Warnings and signage
  - warnings shall be provided when an alternate circulation path is provided or a barricade is constructed. Speech broadcast messages should be considered.

22.8 Acknowledgements

This chapter has appeared in *World Transport Policy and Practice*, vol. 4, 2001, 28–32.

22.9 References and further reading

PROWAAC (2001), *Building a true community, final report of the Public Rights-of-Way Access Advisory Committee (PROWAAC)*: www.access-board.gov.

The US Federal Highway Administration has a comprehensive 504 page report on planning and designing accessible pedestrian facilities, *Designing Sidewalks and Trails for Access, Part II, Best Practices Design Guide*. The report is a useful tool for designers, engineers and planners on how to create accessible pedestrian facilities. The report is available without charge by faxing a request to FHWA Report Center at 301-577-1421. Please include your name, street address, city, country, and fax number.

23

Walkable towns: the Liveable Neighbourhoods strategy

Evan Jones, Government of Western Australia, Australia

23.1 Introduction

The Western Australian Government is countering suburban sprawl through a new policy called Liveable Neighbourhoods. The policy promotes sustainable growth practices at the urban fringe of Perth and country regional centres through a holistic approach at regional and local scales. Liveable Neighbourhoods introduces a compact urban structure based on walkable towns and neighbourhoods, and includes the mixture of land-uses, and the interconnecting of street patterns to facilitate all modes of movement. Residents are encouraged to walk because facilities and amenities can be provided in reasonable proximity to most houses, and routes are made direct, safe, amenable and interesting. If many people are encouraged to walk in pleasant and safe streets for everyday needs as well as recreation, it is argued that community life is improved, and personal safety levels increase. Liveable Neighbourhoods promotes safe, stimulating and sustainable urban environments, and ones that are friendly for pedestrians.

23.2 Background to Liveable Neighbourhoods

Perth has a unique planning and development history compared to other Australian capitals in several respects. The residential base of Perth has a comparatively small traditional inner suburban component, due to rapid suburbanisation occurring later than other Australian cities in the 1960s. The spatial layout of these suburbs was very responsive to the garden city movement, segregation of land-uses and modern transport engineering principles to

cater for a rapid increase in car ownership and usages. Perth has embraced suburban development much more strongly than other cities in Australia and its influence on lifestyle and quality of life is pervasive.

The Western Australian community is changing and planning needs to respond to these changes. The majority of households consist of one or two persons and yet the majority of houses built are three and four bedroom residences, with two car garages. This does not reflect as good a fit as is needed. In Western Australia, 95 % of new jobs are now in the service sector. Of new businesses, 97 % are small firms, and 21 % of all businesses are home-based, with self-employment increasing by 59 % between 1976 and 1991. Older women aged between 45 and 54 now constitute a major proportion of the workforce. By 2010, some sources estimate that the majority of the workforce will be part-time. It is likely that more people will work at, or near, home, and will demand more goods and services at the neighbourhood level.

The design of Perth's residential suburbs has a direct influence on the issues that Perth faces, and, in turn, on the sense of community and quality of life. Conventional suburban subdivision and development in Perth and elsewhere is characterised by several factors that are increasingly being questioned. These include enforced segregation of land-uses through zoning; low residential density; lack of local employment and long commute distances; lack of services; high car dependence; disconnected street systems; limited public transport; and poor walking environments.

There has been considerable community discussion on the need for planning to respond to these issues and, at the same time, improve the design of suburban development to make it safe, sustainable, attractive and memorable. We need to create a strong site responsive identity supportive of local community. Although re-urbanisation is taking hold, the majority of the production of the built environment in Perth still occurs at the metropolitan fringe. Therefore it was for greenfields developments that sustainable development policies were first created and applied through Liveable Neighbourhoods. The policy is also sufficiently flexible to be used for cities and towns in regional Western Australia where climatic conditions vary considerably, but the need for community and walkable environments does not.

23.3 Urban form comparison

There are two organisational systems for the structure of urban places. The first is the 'traditional' city that has been with us for many hundreds of years. It includes those cities and areas of cities that were based on walking and, when it became available, fixed transit. These places were characterised by nodes of development on streets that connected to other places in the district, a concentration of uses and activities that were often densely mixed, a network

of streets and lively public places, and ease of pedestrian movement throughout the whole system. The second urban place structure is the rigid system of conventional suburban development (suburban sprawl). This structure typically has hierarchically-based, curvilinear residential streets with dead-end culs-de-sac, segregation of land-uses, large single ownerships and privatisation of public meeting spaces into shopping centres surrounded by car parks.

The comparison of urban structures has been graphically portrayed by Duany and Plater Zyberk as shown in Fig. 23.1. In the figure, land to the north of the arterial is structured on the conventional suburban development (suburban sprawl) model where access from one land-use to another is only available by driving via a busy arterial road, forcing congestion, pollution and social isolation. Land to the south of the arterial is configured in the traditional urban structure where the same uses are compatibly mixed on an interconnected street system. Access to facilities and services are within

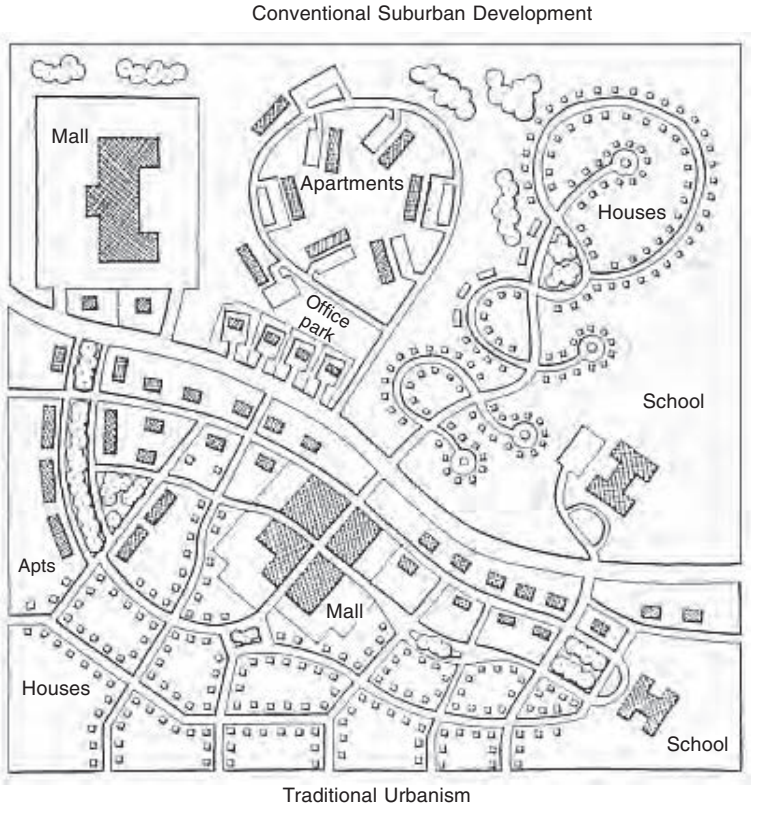

Fig. 23.1 A comparison of conventional suburban and traditional urban development. Source: Duany and Plater Zyberk, in Krieger and Lennertz (1991).

walkable proximity of where people live. Traffic congestion is relieved through less need of the use of cars and by diffusion throughout the street network.

Evidence of the comparative performance of the two types of urbanism is also portrayed graphically for Perth in Figs 23.2 and 23.3. They show a comparison of the availability of daily needs (such as milk) in the conventional and traditional suburbs of Perth. Figure 23.3 shows Perth's northern suburbs, which have been designed on the conventional suburban development model. Figure 23.2 shows the Perth central business district and traditional neighbourhood suburbs.

Fig. 23.2 Availability of daily needs (milk) in Perth's northern suburbs.

Fig. 23.3 Availability of daily needs (milk) in Perth's central business district and traditional inner suburbs.

Access to shops in the conventional suburbs is very difficult for people without a car. Here the shops are infrequent, virtually impossible to access other than by car for most people, often even if they live nearby. The young, the elderly, people with disabilities that prevent them from driving, and those without the financial means to afford a car (or a second car) are isolated from essential facilities. Access to local shops for daily needs by people without access to a car is relatively easy in the traditional suburbs, as the shops are frequent and well located in accessible locations. However, even if shops are nearby, access to the front door by non-car means may not be easy.

23.4 Ped sheds

Walkable catchments, sometimes referred to as 'ped sheds', are maps showing the actual area within a five minute walking distance from any centre, or ten minutes from any major transport stop such as a railway station. The centre could be a neighbourhood or town centre. The walkable catchment is simply a technique for comparative evaluation of how easy it is to move through an urban area in order to get to and from these centres or facilities. These maps are the best estimates of walkability, and as such are an indication of energy efficiency.

Walkable catchment calculations are expressed as the actual area within five minute walking distance as a percentage of the theoretical area within five minute walking distance. The theoretical 5 minute walking distance is shown as a circle with a radius of about 400 m drawn around any particular centre. This is an area of 50 hectares (ha). When calculating a ten minute walking distance, the radius used is about 800 m, resulting in a circle with an area of 200 ha.

The higher the percentage, the better the walkability and hence the likely energy efficiency of any urban area. A good target for a walkable catchment is to have 60 % of the area within a 5 minute walking distance, or 10 minutes in the case of stations. Figure 23.4 compares the walkability performance, using ped sheds, of a new Perth neighbourhood (Ballajura), based on the conventional development pattern, and a traditional neighbourhood (Shenton Park) in an old established suburb in Perth.

In the case of the Ballajura neighbourhood centre, the ped shed is very poor, at only 17 %. The curvilinear road system and culs-de-sac make accessibility from the adjacent housing very difficult. The measured performance could be increased if the existing pedestrian access ways were included, but these have been excluded as they are considered unsafe for many users because of their narrowness, the lack of sight lines and surveillance, particularly in the evenings and at night. Footpaths are generally not available, making the journey less comfortable for those people who do choose to walk. The neighbourhood centre of Shenton Park performs dramatically better with a ped shed of 65 % due to more direct street

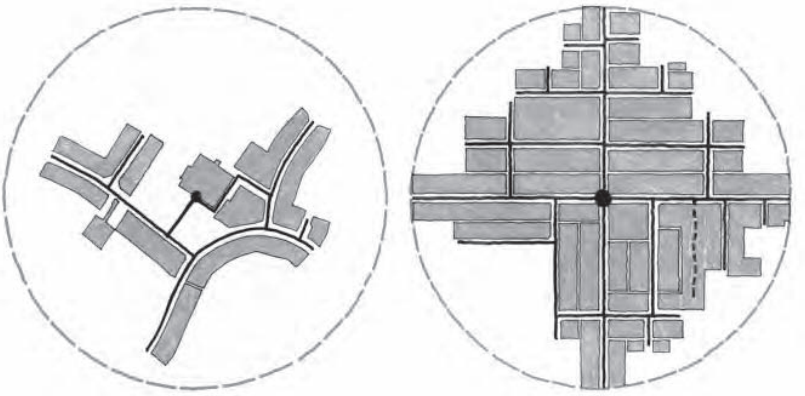

Fig. 23.4 Ballajura neighbourhood centre; Shenton Park neighbourhood centre.

connections. Walking is supported by the detailing of the street with footpaths and shade trees. The considerable challenge facing Liveable Neighbourhoods is to reverse the post-war urban structure of conventional suburban development and reintroduce traditional neighbourhood structures in contemporary circumstances.

23.5 Liveable Neighbourhoods

23.5.1 Structuring at the regional level

A contemporary approach to traditional urban structure has been developed in Liveable Neighbourhoods to achieve relative self-sufficiency for likely densities on the urban fringe of Perth (Fig. 23.5). The Liveable Neighbourhoods approach calls for an urban structure based on walkable, mixed use neighbourhoods with locally based employment and facilities. Neighbourhoods cluster around a town centre to give sufficient population catchment to support main street retail, offices and community facilities. The neighbourhood and town centres are located at junctions of arterial routes or important local streets, rather than having such roads define the edge of development. For transit oriented development, a rail station anchors one end of the town centre main street, if rail is available.

Arterial streets are well managed as ‘integrator’ streets and traffic lights provide for safe pedestrian crossing across arterial roads to neighbourhood centres. The town centre acts as a district level community focus with a compatible mix of uses that provide a range of weekly shopping needs, community facilities and local employment, whereas the neighbourhood centre caters more for the daily needs of a community.

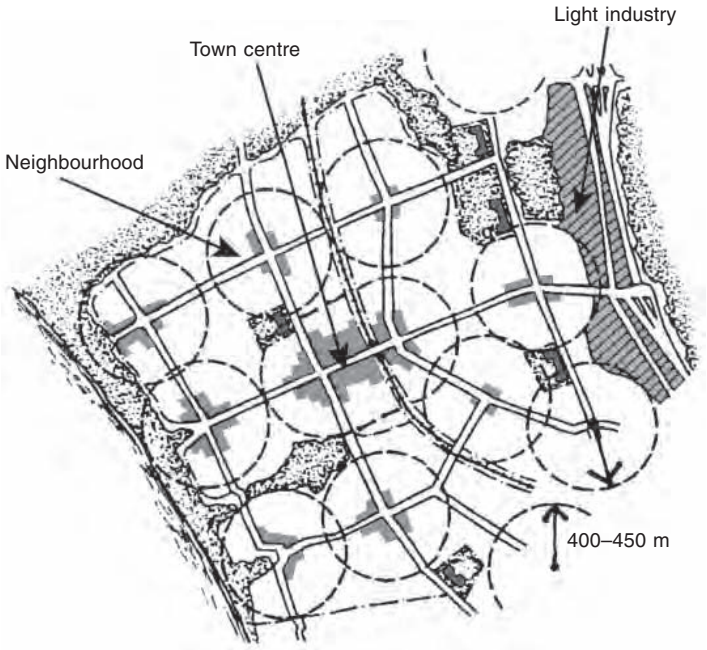

Fig. 23.5 Liveable Neighbourhoods – regional structure.

23.5.2 Movement network

Liveable Neighbourhoods promotes several major differences from conventional suburban street systems. It emphasises connectivity, amenity and integration to achieve safe, efficient and attractive street networks. The priority is to develop a street network that not only works for vehicles and public transport provision but specifically aims to attract a high level of use by pedestrians, cyclists and the disabled. The street system in Liveable Neighbourhoods is highly interconnected. Arterial routes generally form the core or spine of neighbourhoods and towns, rather than the edges. Arterial streets are detailed to 'integrate' rather than divide with the use of service roads or other lot layout techniques to enable development rather than developing plots with their backs to the front of arterial routes. Culs-de-sac become less frequent, are located on the edge of neighbourhoods and are connected by a minor street or laneway, which has good surveillance, enabling safe pedestrian and bicycle access. Traffic is distributed more evenly through a flatter hierarchy of streets. Bus routes are provided in a 'spider network' focused on the town centre, with as many neighbourhood centres as possible connected *en route* to other destinations.

23.5.3 Pedestrian network

In recent conventional development walking has been made difficult or is simply not a feasible option for many journeys because of the disconnected

street system, lack of footpaths, unsafe routes (such as pedestrian access ways and segregated linear trails) and long distances to most destinations (Fig. 23.6). To encourage people to walk, a place must have high pedestrian amenity and efficiency, be stimulating, legible and safe for pedestrians. Liveable Neighbourhoods recognises the complexity of daily movement patterns and the need to make pedestrian trips as short and pleasant as possible.

The primary pedestrian network in Liveable Neighbourhoods is the street system, which is detailed to support pedestrian movement. Streets have a significant role to play in relation to social interaction, public safety and amenity, but require contiguous development frontage to do this effectively. Development with frontage onto streets provides surveillance, activity and visual interest and, on busier streets, exposure, which can assist commercial viability. Provision of frontage helps build community focus and enables streets to act as an integrating element within neighbourhoods and towns, rather than as a divider, which has often happened in conventional development.

Narrow pedestrian underpasses with poor sightlines are discouraged because of personal security problems. Traffic signal control, rather than roundabouts,

Fig. 23.6 Conventional design.

is encouraged on major roads to improve pedestrian crossing opportunities both at the lights and in breaks of flow mid-block. Footpaths should ideally be provided on both sides of all streets. However, for cost reasons, footpaths may be omitted from one side of a street where vehicle volumes and speeds are very low, and where use of the street is considered safe and comfortable for pedestrian use and by people with disabilities. Footpaths should have ramps at all kerb corners for wheelchairs and pram access and cater for people with disabilities. Street lighting should be present in all streets. Pedestrian crossing distances in local streets should be limited through kerb extensions and tight turning radii, which can cause vehicular traffic to slow to negotiate the tighter corners.

23.5.4 Safe routes to schools, bus stops and stations

A network of quiet local streets focused on schools should be traffic calmed to ensure safe use by young pedestrians and cyclists. Secondary and private schools should be located to benefit from good public transport access with safe pedestrian routes between transport stops and schools. Safe routes to stations require more consideration of surveillance to provide night time safety. Main routes should be fronted by housing and uses that are open at night (e.g., delis, gyms, recreation centres), with minimal gaps in surveillance. Bus stops and approaches should be located with good surveillance and provided with adequate lighting.

23.5.5 Cyclist movement network

Good cycling conditions and encouragement of cycling should be designed into the urban fabric. This includes such measures as bike parking facilities, slower vehicle speeds and low traffic volumes, appropriate lane widths along local streets to allow cyclists to share travel lanes with cars, wide kerbside lanes on busy streets, and routes parallel to arterials with less traffic. Much cycling for daily activities will be on streets. On busier streets close to schools, wider footpaths designed for dual use by cyclists and pedestrians are appropriate. Long distance commuter cycling and recreational cycling may justify provision of special dual use paths, usually in accordance with a regional structure plan.

23.5.6 Movement network for users with disabilities

Access to and ease of use of the movement network for users with disabilities is an important emphasis of Liveable Neighbourhoods. Journeys can be carried out with dignity on the street network rather than through a separate open space network which is often poorly maintained and lacking surveillance. Footpaths are required for most roads on at least one side of the street, making journeys more comfortable and safe. Access to public transport should

be easier, more direct, closer and at grade. Finally, public transport should be more efficient and therefore more frequent.

23.6 Jindalee comparison

An 'inquiry-by-design' exercise was undertaken to demonstrate a design based on the sustainable development principles being promoted in Liveable Neighbourhoods. This approach was compared to the built form that would result from conventional planning based on the present subdivision policies. To make these comparisons, a 453 hectare site was chosen at Butler in the north west corridor of Perth. The site was chosen as it is at the next stage of one of the fastest moving development fronts and because there were preliminary conventional design proposals available for comparison. These design proposals were indicative of the likely form of conventional development that would result from the current suite of Commission residential policies. The site became known as Jindalee during the design exercise. The designs were measured and the relative performance of the conventional and Liveable Neighbourhoods designs were compared to establish the relative performance between the two approaches. The design approaches are summarised in Table 23.1.

A Liveable Neighbourhoods option (Fig. 23.5) was developed that had regard to the natural land form and vegetation, gave a central rail station

Table 23.1 Comparison of designs for Jindalee: conventional vs Liveable Neighbourhoods

Characteristic	Conventional design	Liveable Neighbourhoods design
Land-use diversity	Single use: predominantly residential, with designated areas of clustered retail; segregated use base	Integrated mixed-use: neighbourhood based with integrated residential, retail, commercial and service industrial
Street pattern and type	Curvilinear and hierarchical from district distributors, to collectors, to access streets, to dead-end culs-de-sac; traffic collected and channelled	Inter-connected network; flatter hierarchy of types; traffic dispersed
Residential lot size and housing density	Average lot size: 600 m^2 Typical density: 11 lots/ha	Average lot size: 500 m^2 Typical density: 14 lots/ha
Dominant retail type	Regional, serving 'big box' shopping centres, chain stores	Neighbourhood, serving independent retailers
Dominant planning	Create comfortable housing	Create community; create affordable housing; jobs containment

Table 23.2 Self-containment comparisons: conventional vs Liveable Neighbourhoods

Factor	Conventional design	Liveable Neighbourhoods design
Population	29 259	30 234
Dwellings	9 753	11 768
Jobs needed	14 629	17 652
Proposed jobs	2612	11 306
Containment factor	18 %	64 %
Study area	1883 ha	1883 ha

catchment, and was best able to be structured into an efficient system of towns and walkable neighbourhoods. It also afforded the best employment opportunities and was therefore the most likely to be optimally self-contained for community, economic and environmental sustainability.

In the Liveable Neighbourhoods option, 9 neighbourhoods of around 50 hectares, totalling around 20 000 people support a town centre located near a railway station. This size is sufficient to attract key retail components such as a discount department store, and a large supermarket. Work places have many locational opportunities, including at neighbourhood centres, clustered in the town centre, or by taking advantage of the exposure and mobility for regional distribution, offered along the highway. Significant retail and work places enable the development to become more than a dormitory suburb and be a town in its own right.

Neighbourhood centres were located at crossroads, on relatively main streets, to help support their local retail output. They are capable of supporting a deli, next to a bus stop, as well as a number of work places that choose to locate locally, and within walking distance. Highly interconnected streets, small street blocks and perimeter block development are used throughout the design. Land form was carefully considered with streets leading directly to the ocean to create a sense of place and identity and to share this significant amenity throughout the area.

Qualitative and quantitative measurements of the performance of the two design approaches indicated that the Liveable Neighbourhoods design approach was a more efficient layout for pedestrian movement with ped sheds ranging from 41 % at the coast to 75 % at the town centre, compared with 33 % and 55 %, respectively, in the conventional design approach. Solar orientation, lot diversity and access to public transport were all far superior in the Liveable Neighbourhoods design approach. In terms of employment, Liveable Neighbourhoods communities should see significant improvements in levels of self containment, as shown in Table 23.2.

23.7 Conclusion

Liveable Neighbourhoods is on trial and will need to earn its place to overturn conventional design practices and approaches. The trial has engaged many

developers to test the policy on actual projects, and the response of the market has been encouraging. Developers have also been responding to changing household sizes and new employment and work practices, with the creation of new house types and the inclusion of work spaces for home-based businesses.

The provision of sustainable communities on the fringe of Perth requires a paradigm shift away from conventional development practices. Using traditional urban forms in a contemporary way, Liveable Neighbourhoods provides for an integrated approach that provides for walkable towns and neighbourhoods, employment and mixed use, the promotion of public transport and pedestrian-friendly environments, based on safe and amenable streets. It is a model that should be useful for similar circumstances in other cities.

23.8 Reference

KRIEGER, A and LENNERTZ, W (eds) (1991), 'Andres Duany and Elizabeth Plater Zyberk: towns and town-making principles', Harvard University Graduate School for Design, and Rizzoli, New York.

24

The role of pedestrian precincts in adapting city centres to new lifestyles

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24.1 Introduction

Pedestrian precincts in city centres are the places where walking reaches its highest intensity. However, walking within such precincts is not just a technical means for moving ahead to reach certain locations. On the contrary, the ways of life of people in a city are expressed by how, where, and why they walk. This changes continuously: the trend towards the car-city discouraged walking and spending time in urban streets and squares; in North America, people seldom meet in public squares but mostly in privatised 'reservations', such as malls or convention centres. In Europe on the other hand, city centres and their public realm have been rediscovered as places where people's increasing leisure time can be spent. Pedestrian precincts provide a stage where people can see and be seen. Last but not least, this is an important aspect for our cities competing for tourists (who usually also shop), entrepreneurs, developers and a qualified labour force. In times of globalisation, attractive city centres in European cities embody a special cultural value, as a distinctive identity helps them to be successful under competitive pressures.

24.2 Development of pedestrian precincts

Pedestrianisation cannot be understood as an isolated technical measure. It is strongly interrelated with the models of how a city should work. These models have experienced changes during recent decades corresponding to the transformation from a purely functionalistic approach to a post-modern welfare society. As a consequence, the character of pedestrian streets and

precincts has changed over time. (For more information on pedestrian precincts in Germany, see Andrä *et al.*, 1981; Baier and Schäfer, 1998; Bundesforschungsanstalt für Landeskunde und Raumordnung, 1996; FGSV, 1993, 2000; Lehmann, 1998; Monheim, 1980, 1987, 1992b, 1996, 1997, 2000, 2002a; Seewer, 2000.)

Pedestrian streets in Germany were, at first, isolated measures within a car-oriented environment. After a few forerunners in the 1930s, such as Essen and Cologne, several cities reconstructed their city centres, which had been destroyed during the war by air strikes (e.g., Chemnitz, Kassel, Kiel, Magdeburg and Stuttgart). Their rapid diffusion started in the late 1960s, with about 100 pedestrian precincts by 1969. In the beginning, pedestrianisation was limited to the streets with the highest concentration of large shops and pedestrian volumes, and was designed according to the model of a suburban shopping mall. It was argued that distances would otherwise be too great for people to walk. Later, the great popularity of pedestrian precincts encouraged planners and politicians to expand them step-by-step.

A new model of a leisure- and pleasure-oriented pedestrian precinct, transforming the city centre into a 'living room' for city residents and visitors, was first realised in Munich in 1972, related to the Olympic Games. The diffusion of the new model was pushed by the rediscovery of the importance of urban conservation (European Conservation Year, 1975: 'A future for our past') and the establishment of leisure-oriented lifestyles (Frehn, 1998; Monheim, 2000, 2001). In many cities pedestrian precincts were expanded through a continuous learning and bargaining process. Citizens, on the one hand, are strongly in favour of pedestrianisation: on average, 81 % of all Germans rate pedestrian precincts as very good or good, as opposed to 5 % rating them as bad. Retailers and the car lobby, on the other hand, often still oppose further expansions. These conflicts are analysed in detail by Seewer (2000) with the examples of Zürich, Bern, Aachen and Nuremberg. The differing perceptions of city centre visitors and retailers are shown by Heller and Monheim (1998) and Monheim (1992a). Notwithstanding controversial discussions, the leading cities in the 1990s have developed networks of pedestrian precincts of up to 4–9 km long (Aachen, Bonn, Bremen, Cologne, Essen, Erfurt, Freiburg, Hannover, Lüneburg, Munich, Nuremberg, Regensburg and Stuttgart).

Many pedestrian precincts are complemented by traffic calming measures throughout the city centre. In small cities and district centres, as well as in the areas surrounding pedestrian precincts, priority can be given to pedestrians with cars driving at walking speed; such streets are called 'traffic calmed areas'. Sometimes this regulation is operated as a time-sharing measure within a pedestrianised street, as in Marktredwitz for example. If the volumes of car traffic require a separation from pedestrians (generally, if there are more than 250 cars/h), the speed of cars can be restricted to 20 km/h or even 10 km/h by the use of so-called 'traffic calmed business districts'. In several cases this regulation applies to entire historical city centres (e.g., Dinkelsbühl,

a medieval walled town), sometimes only on weekends, and particularly in tourist cities (for examples see FGSV (1993) and Monheim (1987, 1997)).

The planning principles for the accessibility of city centres are summarised in Fig. 24.1, which shows the external accessibility from the starting point of a trip to the city centre, and the internal accessibility, i.e., the trip from the point of arrival to the different activity locations and back to the point where the car is parked or public transport stops. The attention of planners and pressure groups generally was restricted to the parking issue (Monheim, 1997), whereas the importance of good internal accessibility had for a long time been neglected (a good example of a broader approach is given by DSSW (1998)). One reason has been the dominating idea of 'one-stop-shopping', according to the model of suburban shopping malls. The other reason was the dominating functional approach where trips are only seen as an effort to reach a destination, mostly motorised. Walking was not considered to be an issue for planners, especially not under the aspect of its environmental and social qualities and the importance of strolling. The lesson was learned only where well-designed pedestrian precincts, together with changes in society, provoked the rediscovery of public open spaces as a good place to spend time (see Gehl, 1987).

One important argument for a better consideration of pedestrians is simply their number. Pedestrianisation began to occur mostly where high pedestrian volumes exceeded the capacity of sidewalks. This resulted in an increase in pedestrian volumes, mainly during noon and the afternoon when the new pedestrian street encouraged leisure-oriented usage (Monheim, 1980: 87–92, 1998). Improved accessibility and retail outlets offering updated quality and presentation strengthened this trend.

Even more important as a sign of improved urban quality are the numbers of people spending time in public open spaces, many of them sitting (on a bench, in a street café, on a wall) or standing (talking, looking at an event or shop window). Unfortunately, these are hardly ever counted in empirical research. One exception is found in the studies by Gehl (1987), especially on

External accessibility (trip from the starting point to the city centre)	**Internal accessibility** (trips after the arrival in the city centre to all activity locations until leaving the city centre)
Access roads Parking facilities Public transport (net, stations and service) Access for pedestrians and cyclists	Pedestrian street Traffic calmed/shared street (without/with separation of vehicles and pedestrians) Boulevard Area-wide speed reductions (10/20/30 km/h)

Fig. 24.1 Accessibility of city centres.

the development of the Copenhagen pedestrian precinct (see Chapter 8). The doubling of its size led to a doubling of the persons present, although the numbers of those walking along the main shopping street increased only slightly.

Despite the limited significance of peak pedestrian numbers, an international comparison may demonstrate the prominent position of German city centres. This is reflected not only in the very high volumes of pedestrians in a few outstanding cases but even more in the multitude of attractive city centres going far beyond the examples mentioned in Table 24.1. The ranking of pedestrian volumes is not necessarily proportional to the size of the city. In some cases, this is due to differences in attractiveness, in others, to the urban design of retail locations. The examples from other countries refer to the leading city of that country. Most of them outrank the German cities in importance, but pedestrian volume levels are generally lower.

High pedestrian numbers are generally considered to be proof of successful planning. However, they can also create problems, one being an increase in shop rents, especially in prime locations. Many local retailers cannot survive the competition with national or international chain stores pushing into the pedestrian street. Some fear that, as a result, the local identity of the city centre will disappear. Furthermore, high pedestrian densities result in complaints about overcrowding. One has to remember this when the success stories of increasing pedestrian volumes are proudly reported. For the benefit of the

Table 24.1 Pedestrian volumes in main shopping streets in Germany and other countries on Tuesday and Saturday (in one hour)

Germany			Other countries		
City	Tuesday	Saturday	City	Tuesday	Saturday
Frankfurt	14925	21241	Milan	8402	25995
Munich	13747	20507	Hong Kong	9981	13938
Hamburg	7307	12829	Warsaw	11892	14351
Cologne	7838	12127	London	8065	12895
Dortmund	5640	12222	Paris	7815	–
Hanover	6168	8793	Sydney	6380	11890
Stuttgart	5856	8981	Madrid	8382	11134
Berlin	4635	8683	Barcelona	8267	8415
Mainz	3838	9468	Tokyo	6661	7645
Essen	4438	8064	Brussels	4906	8092
Nuremberg	3356	8236	Amsterdam	3494	8188
Wiesbaden	4314	6937	Zurich	4495	5572
Heidelberg	4943	6138	New York	7028	4586
Bremen	3660	7246	Copenhagen	4078	6385
Dresden	4035	6767	Moscow	4936	3376

Notes: Germany Tue: 4–5 or 5–6 pm (higher no.), Sat: noon – 1 pm. Other countries: Tue: 3–7 pm, Sat: noon–6 pm (lh) (peak hour). All data 2000 except Warsaw, Sydney, New York (1998).
Source: Blumenauer (2000).

entire city centre, it is important to distribute pedestrian flows more equally over a larger number of shopping streets.

24.3 History as a starting point for modern lifestyle – Nuremberg as a model

Nuremberg provides an excellent example of the goal of 'giving the past a future' (see Monheim, 1986 and 2002a, Seewer, 2000, and Stadt Nürnberg, 2000). Its historic town centre was almost totally destroyed by air strikes during the Second World War. When rebuilt, its identity was preserved by maintaining the street pattern and building proportions without copying what had been lost, except for some public monuments. Initially, this seemed to hinder 'progress', but now it is ideal for modern lifestyles and sentiments. The development of a pedestrian precinct of about 9 km in street length is an important contribution to this success (Fig. 24.2). The first pedestrian street, Breite Gasse, was closed to cars in 1966 and redesigned for pedestrians in 1970. Its great success encouraged the City Council in 1972 to adopt a far-reaching plan, despite the objections of traffic planners. In the following decades it was implemented stepwise together with a new subway running

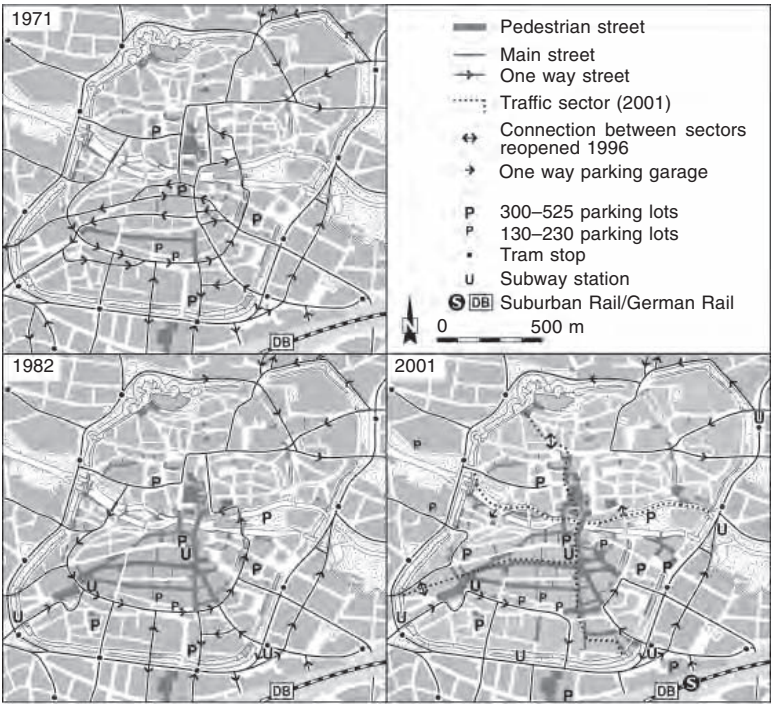

Fig. 24.2 Main infrastructure for accessibility in the city centre of Nuremberg.

under the main shopping district and new parking garages. In 1988 and 1992 a system of five traffic sectors was introduced where cars could not drive from one sector to the other without returning to the ring road. In 1992, the speed within the city centre was limited to 30 km/h as a means of traffic calming. In 1996, however, a newly elected Conservative city government reopened four roads connecting the traffic sectors. In 1999, a dynamic parking guidance system was installed with displays showing parking availability. Despite the relaxed car accessibility, the traffic within the old town remains tolerable.

Contrary to the fears of retailers, traffic calming strengthened the attractiveness of the city centre. This success is simultaneously the result of and the precondition for the establishment of major retailers (Fig. 24.3): in 1978 the high-quality department store *Karstadt* marked the beginning of the new era (after expansions, it now has a 24 100 m^2 shopping floor area). Many more initiatives followed. A run down department store has been replaced by a shopping centre with 58 shops (12 000 m^2); in 2002 a further shopping centre (9200 m^2) located in the railway station opened for business. In 2003, *Breuninger*, another notable department store (15 000 m^2), will follow, and Wöhrl (a large fashion chain store) will expand its business.

A multiplex cinema opened in 1995. Because of its great success it was enlarged twice and now offers, together with its IMAX-cinema, 5000 cinema and 1200 restaurant seats (in addition to 600 open-air seats). This is part of a 'Culture-Mile', developed on the south east edge of the old town along the town wall. It contains 18 institutions such as the famous 'Germanisches Nationalmuseum' and the 'Street of Human Rights'. The apperception of the widespread monuments by visitors is facilitated by a 'Historical Mile'.

The attractiveness of Nuremberg for shopping is based on the blend of large and small, and simple and sophisticated stores. They are spread along several shopping streets, which are well connected with each other. In addition, a wide range of catering offers everything from take-away food to speciality restaurants. In summertime, many eating establishments put tables on the street, which enlivens the streetscape. These outdoor cafés and restaurants have contributed much to the great popularity of pedestrian precincts.

The position of the city centre as a public focal point is supported by a wide range of events. These are organised in public–private partnerships and refer mostly to local traditions (e.g., the 'Christkindles Market' or a toy festival remembering the traditional toy industry.) The model of Nuremberg demonstrates the ability of a traditional city centre to resist extra urban developments by presenting a broad mix of activities based on its historical identity, without becoming a museum.

24.4 Activities and perceptions of city centre visitors

The necessity for, and effects of, a broad concept for traffic calming and pedestrian-friendly urban design may be illustrated by some results of surveys

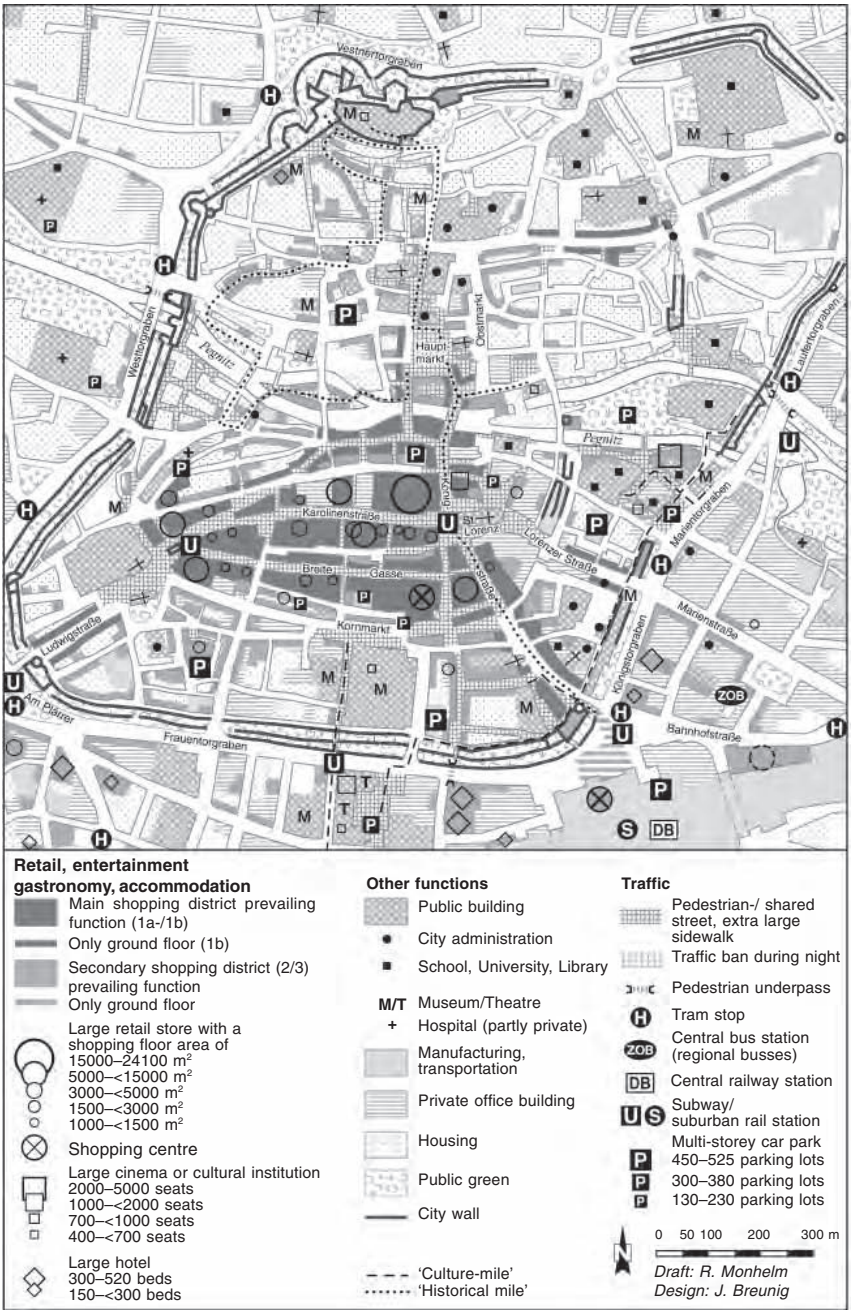

Fig. 24.3 Traffic infrastructure and function in the city centre of Nuremberg.

among city centre visitors (Monheim, 2001, 2002b; Bahrenberg *et al*., 1998; Heller and Monheim, 1998; Monheim *et al*., 1998). City centres are characterised by their multi-functional character. As a result, visitors on average participate in two different kinds of activities during their stay (Fig. 24.4). Most of them combine shopping and leisure, the latter nearly equalling the former. Shopping for necessities increasingly takes place at the new large-scale stores in the urban periphery (Frehn, 1998). In the city centre the character of shops changes continuously, following a demand that serves first of all to mirror the lifestyles of the population. This type of shopping requires an adequate, appealing environment, not only within the shops

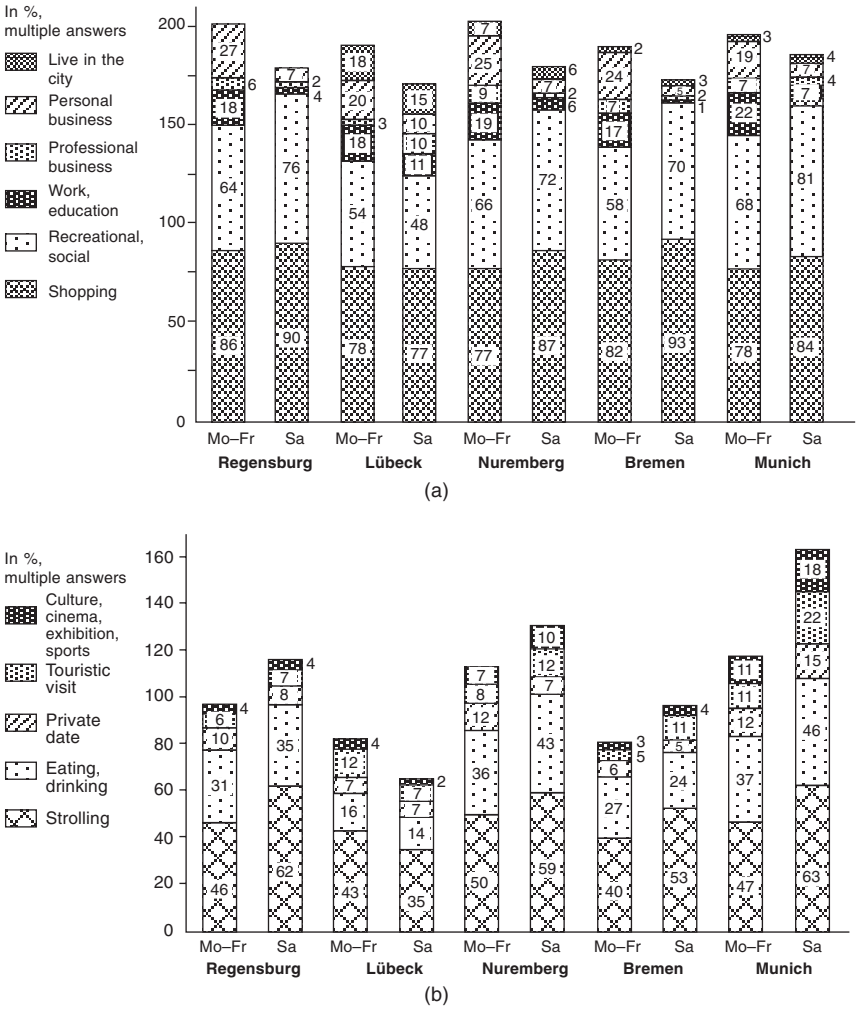

Fig. 24.4 Activities (a) general and (b) leisure of city centre visitors.

themselves, but within the entire city centre, and is now the main reason for expanding and upgrading German pedestrian precincts.

Leisure activities have considerable importance, not only just strolling and window shopping but often also eating. Planned shopping centres have reacted to this with food courts. Meanwhile, city centres have also adapted to this demand with new offerings, as we see with the example of Nuremberg. A detailed look at leisure activities shows us that visitors often combine several activities, usually strolling and eating (Fig. 24.4). This is the case particularly on Saturdays. The total volume of leisure activities indicates how successfully the city centre has adapted to the demand of a post-modern society. Among the city centres surveyed, Munich is at the top, Lübeck (and to a slightly lesser extent, Bremen) at the bottom.

Shopping itself is also considered by many visitors to be a leisure activity. As a result, most shoppers visit a large number of shops – on Saturday about half visit five or more. Many do not have a fixed plan of what to buy. Therefore spontaneous purchases are frequent, as is visiting shops without purchasing anything. The walk from one shop to the next, together with strolling as an activity in itself, means that the visit is lengthy. Most visitors stay two or more hours, with only a few spending less than one hour.

During their visit, most visitors walk long distances, especially on Saturdays, where more than one-half of visitors say that they walk more than two km (the only exception is the old city of Lübeck where, for political reasons, the pedestrian precinct extends only 1.5 km). A large majority of visitors feel

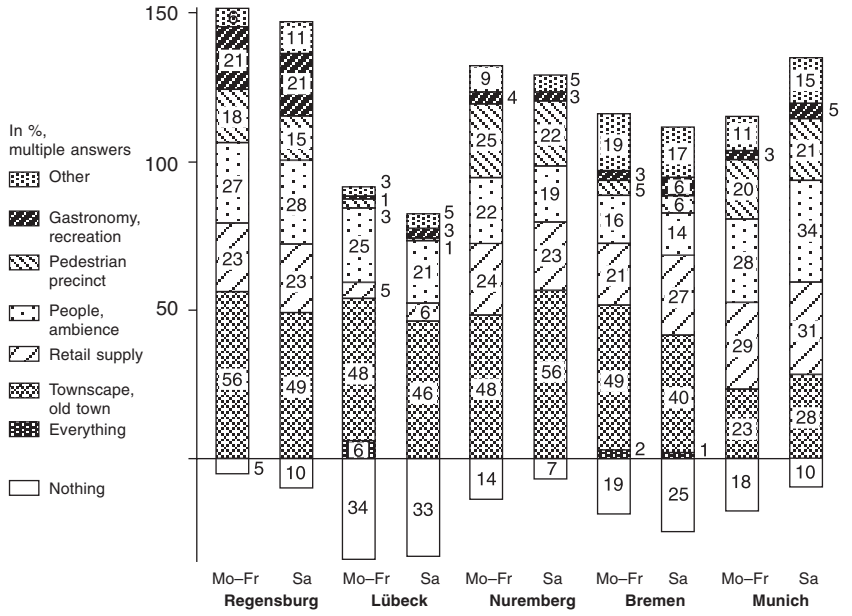

Fig. 24.5 Particularly appealing aspects of the city centre.

good or even very good about their walk; very few feel bad. Longer distances are not linked to negative feelings, sometimes even the contrary occurs. Lübeck and Bremen have the lowest proportions of 'very pleasant' walks, due to deficiencies in their public realm. Discontent is stronger on Saturdays, primarily due to excessive volumes of pedestrians, especially in Munich. The major risk for large German city centres and their pedestrian precincts is overcrowding, especially during peak hours.

When visitors are asked what they like most, in all cities except Munich, the historical townscape was mentioned most frequently (40–56 %) (Fig. 24.5). Shopping is much less important. People and ambience have about the same importance. They are connected with the pedestrian precinct as a stage where the visitors can see and be seen. In those cities that have large pedestrian precincts in their centre, the precinct is often mentioned spontaneously as an advantage. The percentage of those not liking anything in particular shows a clear reaction to the overall quality of the townscape: it is highest in Lübeck and Bremen, where the centres have been adapted more rigidly to the perceived needs of modern city functions, including traffic.

The percentage of those not particularly disliking anything is quite high (33–50 %), which is a good sign for the city centres (Fig. 24.6). In Bremen and Munich most criticism refered to overcrowding, especially on Saturdays (21–33 %). Deficiencies in car accessibility and parking are rarely mentioned as a problem by city centre visitors, which is in complete contrast to the perceptions of retailers and politicians allied to them. The only exception is Lübeck, but this is mainly the result of misleading publicity. Notwithstanding

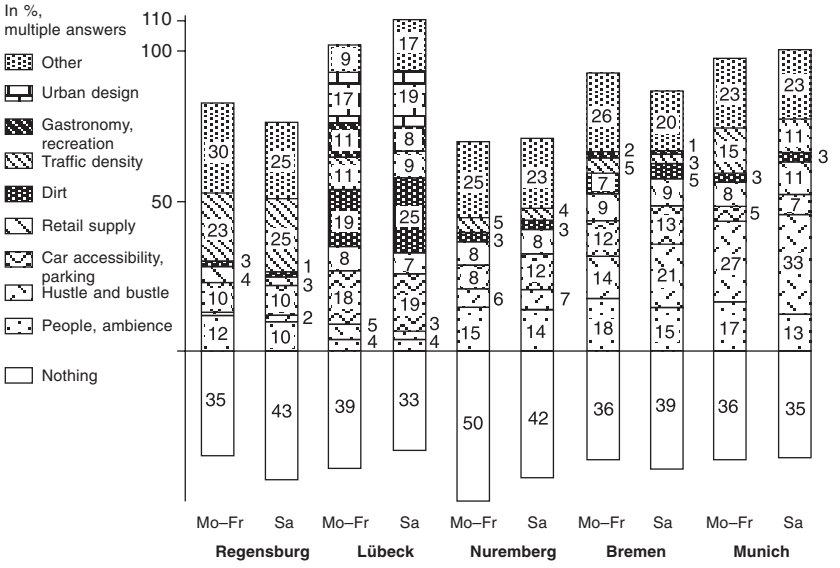

Fig. 24.6 Particularly unappealing aspects of the city centre.

extensive traffic calming, in Lübeck, Munich and particularly Regensburg, people remain concerned with traffic.

24.5 Conclusion

German city centres have maintained their leading position to a large extent. They are all the more successful when they have incorporated inherited principles rather than rebuilding along purely functional rules for urbanism and transportation. This means overcoming the car-orientated 'Mall-model' of the suburban example, in favour of the complexity of forms and functions, which are possible with pedestrianisation. This will be the case even more in the future when traditional retailing will be challenged by e-commerce and a new blend of functions will have to be developed for the city centre.

With respect to accessibility, the most successful cities are the ones where the 'environment-compound' dominates instead of the private car. Pedestrian precincts are simultaneously the result and the enforcement of this new orientation. With respect to future planning discussions, it must be emphasised that, at present:

- the importance of external accessibility to the city centre is overestimated and the potential of an adequate parking management policy is underestimated;
- the importance of internal accessibility, i.e., the conditions for walking within the city centre, is underestimated, including the benefits of good urban design;
- the importance of an attractive mix of functions, including leisure and entertainment, corresponding to modern lifestyles, is underestimated as well as the marketing and management of the city centre.

Planners should not try to merely copy shopping complexes and urban entertainment centres. They should, however, learn some principles to strengthen the competitiveness of traditional city centres. This is best achieved by emphasising their identity and uniqueness, as there is no chance to compete successfully with respect to car accessibility. On the contrary, only excellent accessibility by public transport will facilitate the density and mixture of functions required for an attractive urban centre.

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25

Safety of pedestrians and cyclists in Europe: the DUMAS approach

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25.1 Introduction

It is generally agreed that increasing motor car use, and its related environmental and safety problems, must be tackled at both local and national level throughout Europe (European Commission, 2001). As far as cities are concerned, a second common issue is the need to co-ordinate traffic planning with urban planning, since the city needs to be seen as a complex and interrelated entity (Fleury, 1998; Busi and Pezzagno, 2000; Tira and Ventura, 2000). In this frame, safety is (or rather should be) at the top of the political agenda.

More than half (sometimes up to three-quarters) of road injury accidents occur in urban areas, with a disproportionately large number of vulnerable road users (pedestrians, cyclists and moped riders) being killed by cars, totalling some 25 % of all road deaths. Even though the total amount of fatalities has decreased since the early 1990s in most European countries by some 30 %, the ratio of fatal to all injury accidents in urban areas still remains a major concern (CARE, 2002). Moreover, the number of fatalities per 100 000 inhabitants varies among European countries sometimes by a factor of 3 (IRTAD, 2002), raising questions about the reasons for these differences.

Incomplete information may be one factor. As an example, in some countries a national reference about road safety is still missing (DUMAS, 2001). Reducing more serious accidents will require a focus on vulnerable road users, particularly pedestrians and cyclists. It is generally agreed that much work still has to be done to create, maintain and use databases that offer reliable information about those most unprotected groups and thus tackling their urban traffic safety needs. Problems like data availability and accuracy, misclassification of accident severity and under-reporting as such are

particularly sensible when vulnerable road users are concerned (Tira and Ventura, 2000). However, the limited information available suggests the following:

- so-called vulnerable road users are not one entity, but a category of different groups of people with different characteristics, travel habits and behavioural patterns, having in common a difficulty to cope with motorised traffic in an environment that has seldom been primarily designed for them (OECD, 1998);
- among vulnerable road users (i.e., pedestrians and cyclists, if we exclude moped riders), children, the disabled and the elderly are most vulnerable;
- of the increasing proportion of elderly people in European society, increasing numbers will be among the city users in the near future (Yerpez, 1998; Busi and Pezzagno, 2000);
- a strong – but not obvious – relationship exists between accidents and exposure, the desire for travel, the opportunity for travel, and the volume of trips undertaken (Busi and Tira, 2001).

25.2 The need for new concepts on safety to promote walking and cycling

The safety of vulnerable road users is a major concern in many European countries (European Commission, 1997; ETSC, 1997). Traffic accidents cause not only physical injury, loss of life and trauma to individuals and their families, but also economic loss to society and social costs in reducing freedom of movement for the most vulnerable sections of the population (OECD, 1997). Many European countries have extensive experience of implementing road safety measures, but some stakeholders complain they are not always implemented successfully or just on a limited scale (PROMISING, 2001).

The most traditional approach is that of treating the 'clustered' accidents. Analysing accidents and their location leads experts to identify so-called black spots. Engineering solutions are available that research has shown to work in a variety of environments. However, local conditions often prevent them being fully implemented or completely effective. Moreover, the proportion of 'scattered' accidents (accounting sometimes for 50 % of the total) increases the importance of area-wide techniques. In this context, an 'area-wide safety approach' is of particular interest.

More generally, conventional approaches to promoting the safety of walking and cycling emphasise the development and improvement of dedicated facilities for pedestrians and cyclists (see, for example, the EU funded projects ADONIS, WALCYING, PROMISING, PROMPT and COST Action C6). This approach has had several safety benefits. Many studies show that an increase in cycling goes together with improved safety for cyclists (Jensen *et al.*, 2000). This

fact seems counter-intuitive, in that an increase in activity would normally increase risk. However, the underlying phenomenon is clear: there is a multi-faceted link between safety, the number of cars and the number of non-motorised road users.

The issue of car dependence has been tackled, among others, by Dupuy (2002). From the point of view of safety, it is clear that, when there are fewer cars, speeds tend to be higher and risks increase for pedestrians and cyclists. Conversely, congestion in car traffic increases safety because vehicles are slower. In both cases, a higher number of pedestrians and cyclists is usually a positive factor, acting as a signal to car drivers to drive more carefully. The blend of lower speed and a better mix of modes becomes an important factor in improving safety.

Walking and cycling create a sense of moving in a shared space. All the five senses are active and give pedestrians and cyclists the feeling of sharing an urban environment with others. The perception of space from a car is totally different. Drivers and passengers have the feeling of being in a private cell moving on a dedicated track. There is a strong sense of separation from the outside environment. Even though the road is a public domain, it is perceived as an exclusive place. An accident is perceived as a conflict between two opposing 'private users' for the use of this exclusive space.

We can therefore see a very different attitude towards urban space between cyclists and pedestrians, on the one hand, and car drivers on the other (even when they are the same people). This attitude reflects a very different perception of the relationship between public and private interests. One of the main consequences of promoting walking and cycling would be returning urban space to citizens and shaping towns for them, rather than just providing space in addition to roads (Busi and Ventura, 1995; Tolley and Thomas, 2001; Bonanomi, 2002). As an example, the implementation of traffic calming measures, such as classifying the whole of town centres as 30 kph (20 mph) zones, not only helps to manage speed and congestion, but has the side effect of repossessing urban space as shared space (CETUR, 1990, 1992). The main concept behind these solutions is that of mixing all the different road users within a context of overall speed restriction. Such solutions can provide more space and more safety to pedestrians and cyclists than just the provision of dedicated pedestrian walkways or cycle tracks separate from roads (Premartin, 1990; CERTU, 1994).

A key issue in identifying and implementing these much broader safety measures (the 'area-wide safety approach') is the right strategy, particularly in 'target setting' for an urban area at the planning stage, and the emphasis on 'shared interests' involving all relevant stakeholders in that area to achieve implementation (DUMAS, 2001). In 'target setting', the responsible authority commits itself to achieve a fixed road safety target within a certain period of time, so that the traffic system has to be dimensioned in such a way that possible conflicts or accidents that might cause injury never result in a pre-defined level of unacceptable loss of health to be exceeded. The strategy is

effective in keeping the safety issue on the political agenda and is an easy means of communicating priorities (DUMAS, 2001). It can also be vital in gaining the financial support for the implementation of safety programmes and packages of measures. In a 'sharing interests' strategy, common goals of different policies are achieved by the combined efforts of a coalition of interested parties committed to the agreed targets. The forming of such coalitions could be especially successful in alliance with environmental (OECD, 1997) and well-being policies (UNICEF, 1996). Both strategies require, among other things, long-term comprehensive action programmes, reliable organisational structures, monitoring procedures and information transfer, as well as clear roles and responsibilities for all parties involved (DUMAS, 2001).

25.3 A safer mobility for a safer town

'Urban areas form a complex, dynamic system in which various factors interrelate in many different ways. What is the place of road and transport safety within this system and how does it link with other system components?' (DUMAS, 1999). Several key issues, referring to both mobility and town, can be listed, such as:

- transport network;
- urban structure;
- traffic management practices;
- planning policies;
- transport policies;
- parking strategies;
- employment;
- social policies;
- town image;
- environmental concerns.

These issues correspond to political processes that are critical to urban development and hence the safety of the road network (Fleury, 1998). There is now considerable effort to combine the planning of land-use and transport in many European countries, but mainly because pollution, in the form of car-emitted gases, noise, water or land pollution, has become a crucial issue. This fact can often be used as a catalyst for change and it may lead to a reduction in car trips that can benefit road safety and vulnerable road user comfort.

It is worth reflecting on what could be a strategic lever to start those different processes to a safer town. Several different ideas are included in the up-to-date concept of sustainability that could influence the management of urban public space of European towns in the twenty-first century. One of the main concerns is urban quality (i.e., architectural quality, quality of materials,

etc.), but also the matter of public interest where safety plays a key role: in a word a better civilisation and a new concept of 'citizenship'. It seems that the same emphasis given to the housing demand after the Second World War is nowadays put to the preservation of the environment, in particular the urban environment: mainly public space and common heritage. Urban public places in the meantime become more and more a space for mobility, where the greatest proportion of room is given to cars. In this space, public transport networks, cycling lanes and pedestrian facilities are meant to develop modes of transport alternative to the car.

Like housing demand has been the lever of urban development, marking a great portion of actual urban public space, mobility management and road safety can play the role of a lever for decision-making in town management, where both the procedures to prepare the project and the way decisions are made at the urban institution level are crucial. Nevertheless the two dimensions are quite different. The housing demand means that private areas and citizens are in a sort of public competition; road safety issues involve mainly public space and citizens are still in competition but a more inner one (the conflict is between being a car driver and a pedestrian at the same time). The solution of the conflict between the personal interest and the collective good (public space is a collective good) must then be at the heart of the application to local problems of comprehensive policies.

Again, safety can be a lever to consider public good as an urgent issue and a way to deal with conflicts in the use of space. Some reasons why safety is generally not yet a main concern when considering different ways of moving and consequently different schemes for planning have already been defined. In the following sections a delineation of a possible way out is given, as taken from the experience of the DUMAS project.

25.4 The Urban Safety Management (USM) concept

Urban Safety Management (USM) is an area-wide approach to road accident prevention and casualty reduction that integrates all the disciplines found in town planning and management (IHT, 1990). These include traffic management, enforcement, education, public transport, town planning, etc., as well as road safety. By bringing all parties together to tackle the safety problem, a far larger range of possible solutions is available. Effective USM goes further than the integration of professional disciplines by utilising two more sets of key players – politicians and the public. It identifies fundamental principles for working on an 'area-wide' or town-wide basis, which include:

- the inter-dependency of safety and mobility;
- the 'knock-on' effect of changes in one part of the town to neighbouring areas;
- the effect on safety of different policies such as engineering, education, enforcement, traffic management and transportation (OECD, 1990).

The USM framework comprises six stages:

1. Local policy and decision-making;
2. Problem diagnosis and assessment of targets;
3. Goal setting;
4. Design of the integrated programme;
5. Operations and implementation;
6. Evaluation.

The framework treats an urban area as a series of local area safety schemes (IHT, 1990). Each of these schemes considers issues under two headings: safety strategy (such as enforcement and the implementation of technical measures) and other policies influencing safety (such as road construction and maintenance, public transport, environment, land-use, health, welfare and education). The need to fit in with existing programmes is also a key issue in balancing safety and other objectives. At the base of this last process, socially acceptable levels of safety must be set.

25.5 Developing Urban Management and Safety (DUMAS)

Developing Urban Management and Safety (DUMAS) follows on from earlier studies including the Organisation for Economic Co-operation and Development (OECD) report on 'Integrated Traffic Safety Management in Urban Areas' (OECD, 1990) and the UK 'Guidelines for Urban Safety Management' (IHT, 1990). The DUMAS project combines existing knowledge on the effects of safety measures with the overall planning and management of urban safety programmes, particularly the interactions between engineers, politicians and the public, and the interactions with other urban initiatives.

DUMAS is a European Commission funded project in the Fourth Framework programme, run from 1997 to 2000 by ten partners:

1. Transport Research Laboratory (TRL) Ltd, UK (co-ordinator);
2. Institut National de Recherche sur les Transports et leur Sécurité (INRETS), France;
3. Institute for Road Safety Research (SWOV), The Netherlands;
4. Danish Road Directorate (RD), Denmark;
5. Development and Engineering Consultants (DENCO) Ltd, Greece;
6. University of Brescia (UdB), Italy;
7. Bundesabstalt fur Strassenwesen (BASt), Germany;
8. Kuratorium fur Verkehrssicherheit (KfV), Austria;
9. Centrum Dopravniho Vyzkumu (CDV), Czech Republic;
10. Aristotle University of Thessaloniki (AUTh), Greece.

The Municipality of Larissa (Greece) also entered the consortium at the start of the Town Study phase.

The DUMAS programme consisted of three phases:

1. Collection, collation and reporting on research findings and current practice relevant to urban safety management. This produced individual country 'state of the art' reports, along with an overall summary.
2. Investigation of specific important issues in detail. Issues included the role of traffic management, accident data collection, speed management, vulnerable road users, political factors and linking safety with other initiatives such as the environment.
3. Involvement of towns and cities in partner countries, where safety initiatives have been or are being implemented. These experiences were embedded into the DUMAS frameworks.

The objective of the DUMAS project is to encourage the implementation of USM projects in two ways:

1. By creating a positive political environment where support and funding can be obtained.
2. By encouraging engineers and urban managers by making available information, guidance and encouragement to undertake a USM programme.

There are a number of widely accepted principles towards strategy setting (DUMAS, 2001), which are illustrated in Fig. 25.1, which represent the DUMAS vision of effective USM.

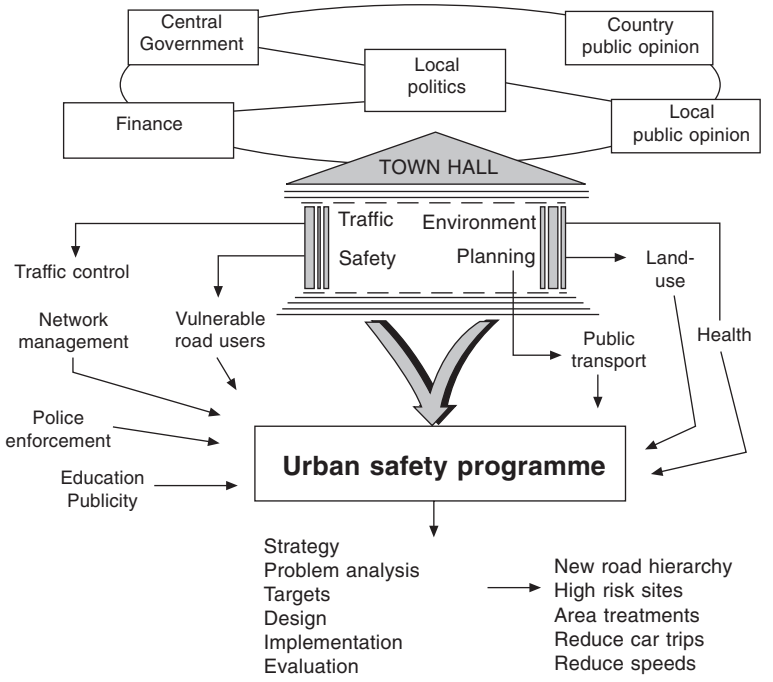

Fig. 25.1 The DUMAS vision of USM. Source: adapted from DUMAS (2001).

25.5.1 Political will and public opinion

Experience has shown that getting the support of local politicians for a safety programme is one of the most important requirements for success. Implementing measures will not always be popular, so it is vital that safety remains a high priority with the decision-makers, compared to public criticism or votes. Actions for safety should be a relevant issue when searching for votes, so time spent convincing the important local politicians to support the programme is time well spent.Getting local politicians' support can be made a lot easier if there is general support for safety at central government level.

It is unlikely that local political support can be achieved without first getting public interest in and support for casualty reductions. Experience has shown that in many towns and cities, people know very little about the accident risk and underestimate some risks over others. A fear of being attacked, for example, is felt to be a much higher risk by the elderly than being the victim of a road traffic accident, even if such attacks account for far fewer victims.

25.5.2 Funding

Lack of finance is often thought of as a stumbling block to planning and implementing a USM scheme. Indeed, USM schemes do require significant resources. However funding is obtained, it will generally be easier once political and public opinion have been won over. It is also likely that funding will be easier if a comprehensive plan exists that is ready for implementation. Even though funding might not be readily available, developing a plan and strategy will still be useful as it will allow setting clear priorities and prevent resources being wasted.

25.5.3 Legal issues

Special attention needs to be given to the institutional and legal frame of each country, namely:

- the institutional framework at national, regional and local level;
- the legislative framework;
- the rules and regulations for technical measures.

Five general areas of legislation related to safety management in an urban environment need to be considered (DUMAS, 2001):

1. Exogenic factors: economic and social measures (e.g., taxation relating to transport costs).
2. Urban development: urban planning codes (strategic plans, master plans, actuative plans), transport policies (circulation planning, parking policies, etc.).
3. Management policies: traffic, transport, energy, environment.
4. Quality of life: accessibility, handicapped people, living conditions.

5. Hazards: environmental qualities (pollution, noise), urban hazards (insecurity, congestion, delinquency).

25.5.4 Setting up the management structure

Bringing the diverse skills together is the first step in setting up the management process. Historically, in many countries, the safety department has been separate from the road building and maintenance departments, which in turn have been separate from the building and planning departments. These barriers must be broken down and staff from all these areas formed into a team. Often the best safety task force is shaped from personnel from different areas and backgrounds. This is a necessary first step and it is vital that all parties are involved from the start, especially in the formulation of the objectives and targets for the project. As well as the design, implementation and assessment should directly involve other parties, including, at the local level, residents, disabled associations, businesses, bus operators, taxi representatives, the press, parking suppliers, emergency services, health providers and action groups. The management team would then be responsible for formulating the agreed casualty reduction targets and setting the strategy, and also for leading the implementation of the schemes. A strong alliance between the political leadership and the technical management team is crucial.

25.5.5 The analysis phase

The analysis phase looks at the current situation in the city and links with the formulation of the strategy to set the casualty reduction targets and the strategic direction. Generally, it will follow a standard safety accident analysis process, where accident data for the city and immediate surrounding area are analysed under different headings, including road user type, type of road, accident type and road condition (wet, etc.). This type of analysis allows common types of accident to be identified and measures designed to reduce them.

As well as the accidents, the analysis phase will also need to consider traffic flows and speeds. Data will need to be collected if they are not already available. Safety can easily be improved at the expense of mobility (especially of pedestrians and cyclists and – among them – of the disabled first), so this trade-off is a vital part of the strategy formulation. Is the aim to improve safety whilst keeping flows at existing levels, or are reductions desired? A key step in this process is the analysis of road hierarchy, which considers the design of the road, the existing flows and the desired function and flow levels. It is common for cities to have roads used inappropriately – usually higher flow levels than the road was designed for – due to weak links between the planning process and travel demands.

25.5.6 The strategy phase

Having analysed the accidents, road function, speed and flow data, the strategy can then be formulated. Following this, targets can be set and the design process started. As stated above, the main factors when considering the strategy are:

- the overall casualty reductions;
- casualty reductions by road user group;
- casualty reductions by area;
- changes in flows to attain the required road hierarchy;
- casualty reductions by discipline (i.e., those achieved by publicity, safer routes to school, etc.).

The strategy should also link to other urban objectives, such as environmental improvements. The strategy should also consider timescales, be realistic in defining objectives and include a monitoring phase, which is seldom undertaken in practice, which is a great shame. Without proper monitoring it is difficult to establish robustly those programmes that do work and therefore should be put forward as best practice. The procedures of 'safety audit' and 'safety review' in which the impact on road safety is systematically assessed at the decision stage (audit) and at every improving of the existing network (review), might be useful tools for the monitoring process. Implementing safety schemes is a time-consuming and costly process, with the supply of funds and expertise being limiting factors. In order for a scheme to succeed, it must have local backing. This will involve a great deal of consultation, which will inevitably slow down the process.

25.6 Conclusions

This chapter has had one central theme: that the safety of pedestrians and cyclists can best be achieved by placing it in a wider context of urban safety management. The evidence suggests that an area-wide approach is more successful than individual initiatives dealing with local accident 'black spots'. This wider approach is successful because it reclaims urban areas as a shared space for pedestrians and cyclists. Increasing levels of walking and cycling paradoxically improve levels of safety as motorists adapt their behaviour to accommodate their cycling and pedestrian partners. Building on this principle, initiatives such as DUMAS have emphasised the importance of a broader and more inclusive approach to pedestrian and cyclist safety within the umbrella of urban safety management. Success can only be built on a multi-disciplinary approach and broad consultation within a clear strategic framework. The DUMAS approach both enables interested parties to agree on the right targets and measures, and makes it more likely that these will have the support, resources and planning to be effectively implemented. It provides the framework

within which individual initiatives discussed elsewhere in this book can flourish.

25.7 Acknowledgements

The DUMAS project described in this chapter is an EC funded project within the Fourth Framework Programme, led by TRL (UK). The author wishes to thank Chris Lines (co-ordinator of the DUMAS project) for his kind suggestions and his friendship. The views expressed herein are solely those of the author.

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26

Traffic safety for walkers and cyclists: the danger reduction approach

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26.1 Introduction

Road safety is something we all identify with. However, society seems to accept as inevitable the increasing number of fatalities and injuries from road accidents, as if this is the price of our freedom to travel. The real social cost of our current transport system is even greater than the reported road accident statistics. The Road Danger Reduction Forum (RDRF) was set up in 1993 to tackle this problem and, in particular, the dominant road safety ideology of that period. Explained simply, the danger reduction approach seeks to identify the sources of danger on our roads and then control them to reduce the danger. Danger is defined as the potential to do harm. On the road, motor vehicles have by far the greatest potential to do harm. Controlling their use is the best way to reduce danger. It is here that the danger reduction philosophy is allied to the movement for sustainable transport. The most effective way to reduce danger on the roads is to reduce vehicular traffic.

26.2 The traditional approach to road safety

In 1987 the UK Government set a target of reducing the total number of reported road accident casualties by one-third by the year 2000. This target was to be measured against the annual average for the years 1981–5. Road safety engineers, police and educational bodies adopted a ‘casualty reduction’ strategy using the reported road accident statistics as their key (and sometimes

only) source of information. There were two problems with this casualty reduction strategy. The first was flawed data. Reported accidents are simply that: accidents reported to the police. A series of studies has shown that less than half of accidents involving pedestrians and cyclists are reported. There is also a significant under-reporting of moped and motorcycle casualties. Moreover, accidents brought to the attention of the police are often incorrectly recorded. The main mistake is in recording the severity of injury. A comparison of hospital and police casualty data by the UK Transport Research Laboratory (TRL) found that, if official statistics were adjusted to take account of misreporting, the number of serious casualties would be increased by 52 % (Transport Research Laboratory, 1996). The same report concluded that the level of incorrect recording had increased significantly over the preceding 20 years.

Existing casualty statistics do have a role to play in identifying patterns and trends in road accidents. However, the 2000 casualty reduction target also arrived in a world where the car was the dominant mode of transport. The second problem with the casualty reduction strategy was that experts concentrated only on improving in-car safety. They welcomed the shift from walking and cycling to travel by car where travellers would have a greater degree of protection. Indeed, the UK Department of Transport's Road Safety Division even sought to discourage people from cycling. A high number of pedestrian casualties was seen as a 'pedestrian problem' which required controlling pedestrian movement and keeping pedestrians away from the roads where possible. Road safety engineers concentrated on laying anti-skid surfacing to make it easier for drivers to get round bends and crash barriers to deflect them if they did not. In such cases, the real source of danger – driver behaviour – was ignored or excused. There is currently a furious debate in France about the trees Napoleon ordered to be planted along many rural roads, as hundreds of French drivers kill themselves each year by crashing into them. Some want to remove the trees. In Britain, engineers suggest using collapsible lamp posts, or moving them to the back of pedestrian paths to reduce injuries. Large reflective warning signs are erected and speed cameras are even painted bright yellow to excuse drivers from paying attention to road conditions. There are now proposals for 'pedestrian-friendly' car fronts which allow motorists to knock down pedestrians without causing such serious injuries.

In spite of the millions of pounds of investment in engineering solutions, both in and out of cars, the total number of reported casualties from road accidents has changed very little since the early 1980s. The severity of reported injuries has reduced, reflecting the shift from walking and cycling to driving in cars which offer better protection than ever. However, insurance claims data show that the number of crashes has increased in line with growing car use, and at times even faster. Similarly, reported car occupant casualties have also increased in line with greater car usage. Cyclists and

pedestrians perceive that roads are therefore more dangerous and use the roads less. Lower numbers of pedestrian casualties do not signify that there is no 'pedestrian problem' but rather that there is a problem for pedestrians in using the roads. They are excluded from much of the road environment because it is dangerous. The casualty reduction approach cannot grasp this point.

The reason why car crashes and casualties have increased in line with greater car use is because drivers have consumed most of the secondary safety benefits devised by engineers for their protection. Drivers feel safer and so drive with less care. Anti-lock brakes mean that they can brake later. Improved suspension and road holding means they can drive faster. Airbags and side impact bars mean that they can crash harder. This phenomenon is known as 'risk homeostasis' or, more commonly, risk compensation, and is accepted as a factor in driver behaviour by many road experts. It also has its positive side. If you can make drivers feel less secure, they will drive with more care. An excellent example is provided by Sweden which changed from driving on the left to driving on the right hand side of the road overnight in 1967. Contrary to the predictions of many road safety experts, the number of crashes reduced rather than increased. Drivers took more care until, after a few months, they had become accustomed to the change, at which point the crash rate assumed its previous level.

Since safety improvements have not been accompanied by measures to make drivers take more care, the real losers have been the more vulnerable pedestrians and cyclists. Faced with an increasing number of cars on the road, driven with less care, they see the roads as more dangerous and are using them less. In the 3 years between 1989 and 1992, The National Travel Survey revealed that there had been a 16 % reduction in the average annual distance walked per person in the UK. Since then, levels of walking and cycling have fallen even further. Children in particular have walked and cycled less, as parental fears have reduced their freedom to do so. Adams *et al*. (1991) observed that between 1971 and 1990, the proportion of 7–8 year old children walking to school unaccompanied fell from 80 % to just 9 %. The casualty reduction approach has encouraged greater car use at the expense of healthier and more environmentally-friendly modes of travel. The British Medical Association calculated that the health benefits of cycling outweighed the potential risk of accidents by a factor of 20 to 1 (BMA, 1992).

A casualty reduction target is wrong because it can be achieved by actually increasing danger on the roads. It has concentrated too much effort on secondary safety measures that reduce the effects of crashes once they have happened. It has not reduced the number of crashes but rather made the road environment less safe for cyclists and pedestrians. Unfortunately the Labour administration of 2003 repeated earlier mistakes by replacing the 2000 target with a new casualty reduction target to be achieved by

2010. By concentrating instead on the needs of pedestrians and cyclists, the Government would have set more effective targets, more likely to reduce casualties on the roads.

26.3 Danger reduction: a strategy for change

Danger can be measured in many ways. The volume of traffic can be a measure of danger. However, a high volume of motor traffic does not necessarily preclude pedestrians and cyclists from using the road. If traffic is moving slowly, and more vulnerable road users are given equal priority, the level of danger can be quite low. Indeed, probably the most accurate measure of the level of danger is the number of cyclists and pedestrians using the road, especially in urban areas. The Road Danger Reduction Forum (RDRF) has always contended that the real test of the safety of the road environment is the presence of pedestrians and cyclists, particularly the young and the elderly. The RDRF sees significant increases in walking and cycling as the best road safety target. This means controlling motor traffic which would also increase safety for motorists. The Transport Research Laboratory (TRL), for example, has calculated that for every mile per hour reduction in average speed, there is a five per cent reduction in the number of casualties.

In 1989 York City Council adopted a new transport strategy that essentially followed the danger reduction approach. The strategy involved a hierarchy of road users that placed pedestrians, disabled car users and cyclists at the top and motorists at the bottom. The council took this radical approach because it recognised that York, with its medieval street plan, could not cope with the growing levels of car traffic. In practice, the York strategy meant introducing a park-and-ride scheme in the outskirts of the city, a pedestrianised city centre, cycle-ways and other improvements for cyclists and pedestrians, and widespread traffic calming in residential areas. The council participated in the pilot Safe Routes to School project in partnership with Sustrans and, in 1991, adopted a child road safety audit policy which set targets for increasing the proportion of 20 mph zones in residential areas, and initiated survey work to set targets for greater compliance with speed limits.

York's strategy has been successful in restricting the growth of traffic within the authority to 25 % of the growth seen in the rest of the UK. Levels of cycling have been maintained, with increases in peak hour commuter cycling. Pedestrian commuting to the city centre has increased too, in contrast to a decline in commuting by walking and cycling nationally. The most dramatic success has been in reducing reported casualties from road accidents. By 1994 total road casualties had reduced by 46.5 % against the 1981–85 base, compared to a 2 % reduction nationally. This reduction has

been maintained, and the authority is on course to meet its 2010 target. It is fortunate that the policies York has adopted are becoming national practice. The Government has requested that all local authorities prepare cycle and pedestrian strategies and speed management plans. The financing of Local Transport Plans includes proper funding for these policies. Good practice in danger reduction can be found across the UK.

26.4 Good practice

In 1991 the RDRF published a good practice guide: *Safe Roads for All: a Guide to Road Danger Reduction*. The guide has four main sections covering the following themes:

- creating safer spaces;
- promoting modal shift;
- changing behaviour;
- looking forward.

The guide provides examples of good practice in engineering, education and training, publicity, enforcement, travel plans and management, all drawn from across the UK. The existence of the guide both demonstrated the spread of danger reduction practice and helped to accelerate further change. A full implementation of the danger reduction approach will, however, require nothing short of a complete change in road use culture. Schemes in busy towns like Borehamwood in Hertfordshire and Wood Green in London have demonstrated that, given the right conditions, drivers will give way to pedestrians crossing the road. Both schemes feature widened footpaths and narrowed vehicle lanes with speed restrictions where the pedestrian crossing demand is highest. Although there is no formal priority for pedestrians, motorists give way to allow pedestrians to cross. Similar schemes throughout the UK produce the same behaviour.

The most fundamental change can be seen in the growing number of 'Home Zones' now being implemented in Britain. Designed in partnership by local residents and local councils, Home Zones involve a redesigning of residential streets to create an environment where people enjoy an informal priority over motor vehicles. Whereas standard traffic calming and 20 mph zones have not encouraged significant increases in walking and cycling, Home Zones offer the prospect of a much more radical change in road use. By the end of 2002 more than 20 schemes will have been completed. A further 60 will be built by 2004 with funding from the Government's Home Zone challenge fund. This progress still falls far short of countries such as Holland where Home Zones ('woonerven') have been common practice since the 1970s.

A cultural change is also underway in professional road safety education. Traditionally, road safety education has concentrated on the victims of road danger, particularly children. Its approach was to warn vulnerable groups about the dangers on the roads and to teach them the skills to survive these dangers. The danger reduction approach is to tackle the dangers themselves. The RDRF, for example, has been closely involved in setting up Young Transnet, an Internet-based resource for young people to share their experiences of making the road environment safer (www.youngtransnet.org.uk). Set up in partnership with the Children's Play Council and the Sainsbury's Family Charitable Trusts, the project is now receiving substantial funding from the Department of Transport. The website features an online travel survey where young people can register data on their school journeys. This has now become a major source of data which can, amongst other things, be used to measure how well danger reduction targets are being met.

26.5 What next?

The danger reduction approach has now forced itself into the mainstream of road safety practice. It is not the dominant force, but the strength of its position means that it will continue to gain in prominence. Changes in government funding of transport make it possible for proper danger reduction programmes to be introduced. However, whilst the UK Government has created much of the framework for sustainable transport policy, and even required local government to adopt sustainable transport policies at local level, its rhetoric and temerity in the face of the car lobby has undermined those trying to implement danger reduction initiatives. The Government wants more people to own cars, and has invested in improving the road infrastructure for motorists, yet it also wants people to use cars less. This simply does not add up. The Government has yet to grasp the opportunity to explain why we have no choice but to follow a radical sustainable transport policy. What the RDRF would like to see is an acceptance that national policy should not be that everyone should have the choice to own and use a motor car, but that everyone should have the choice to *not* have to own and use a car. By engaging communities in schemes like Home Zones, a climate can be built in which the public demand and support this approach to transport. As traffic congestion increases, creating a road environment where everyone has the choice to walk or cycle is becoming more necessary than ever. The longer change is delayed, the more necessary it becomes. Change is underway and must accelerate.

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27

Walking and cycling: what to promote where

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It is solved by walking. *(Latin proverb)*

Cycle tracks will abound in Utopia. *(H G Wells, Utopia, 1900)*

27.1 Two modes or one?

This chapter argues for greater attention to be paid to planning for walking and cycling as separate modes of travel. At the same time, it argues for a more integrated approach to the planning of all modes of travel. This may seem like a contradiction, so an explanation is necessary. For decades, transport planning has been dominated by the demands of accommodating increasing volumes of private motorised transport (the car and the lorry). Walking and cycling were not treated as alternatives, and such planning as took place consisted of trying to mitigate the worst impacts of motorised traffic on the safety and well-being of those on foot and cycle. In this context, as a more positive approach was advocated, walking and cycling were often lumped together and typically given to junior professionals to attend to. Cycle planning grew on the basis of lobbying by enthusiasts and environmentalists, while planning for walking (where it existed at all) dwelt almost exclusively on issues of accident prevention.

Grouping cycling and walking together in land-use and transport plans was a matter of convenience: neither deserved a chapter in its own right, and authors were lucky to be heard at all in the clamour for new roads and traffic management schemes. Togetherness was fostered also by various classifications such as ‘the slow modes’, ‘non-motorised modes’ or ‘by foot’. The problem

is that walking and cycling are very different modes that are in many respects incompatible, and deserving of more careful attention than typically has so far been given. Now it is time to cut the umbilical cord that connects them in the minds of planners and decision-makers.

So what of integration? The need for an integrated approach to the planning of all modes of travel is based on the simple fact that people cannot travel by more than one mode at a time. The number of trips that people make is, for most practical purposes, fixed at around three trips per person per day. It follows that if trips by one mode increase, this will be at the expense of trips made by other modes. A failure to plan for all modes can therefore produce undesirable and unintended results.

There is evidence that if cycling increases, this is often at the expense of public transport use, or walking. Similarly, if public transport use increases, this is often at the expense of walking, cycling and car passenger travel (Pharoah, 1993). In both cases it might look like a move towards more sustainable transport, but it leaves the amount of car driving the same as before. In the context of this chapter, if increases in cycling were won only at the expense of walking, effort and resources would be wasted. There is some argument for switching public transport use to the bicycle on grounds of personal health benefits, but if this leads to a decline in public transport services, this could push other passengers into cars, producing a larger community disadvantage. To the extent that modes can be combined for policy purposes, the crucial distinction is between car and non-car modes. The reason for this is that provision for the car makes provision for all other modes more difficult: the car is an 'intolerant mode'. In addition, the car is the mode of first choice, such that provision for it automatically reduces the use of other modes. In this light it is clear that aspirations to improve all modes (often favoured by politicians as a means of pleasing both the car and non-car lobbies) will inevitably perpetuate the dominance of the car in personal travel. The aim should be to plan walking and cycling as separate entities, but within an integrated strategy that covers these and all other modes.

27.2 Working to a purpose

Investing in transport measures should have some explicit purpose. Because of the interdependence of different aspects of transport, there is merit to deciding precisely the outcomes that are intended. This may sound obvious, but in fact this 'objectives-led' approach is very rarely followed in practice. This is especially true of planning for walking, which is still in its infancy, and still marginal in the great majority of authorities. The main issue concerns the intended mix of modes, and how trips are intended to be shifted from one mode to another. Promotion of walking and cycling usually will serve a number of possible objectives:

- personal health;
- social inclusion and greater independence;
- reduced car use and thus indirectly reduced pollution, road danger and other negative impacts of motor traffic.

Increased walking and cycling, without reducing car traffic, meets only the first two objectives. Increased walking and cycling without car reduction will be at the expense of public transport, and so would not reduce the negative impacts of car traffic.

A second issue is how to assess whether objectives have been achieved. When the name of the game was 'predict and provide' for the car, you simply forecast a rise in traffic (not difficult to do given a steadily rising trend line over several decades), and then sat back with satisfaction when the roads you built filled with traffic: 'Ah look, we built that new road just in time to carry all that extra traffic'! A less banal approach is now demanded, where the trend line itself must be bent to meet policy expectations. Regarding car traffic, the aim now is to bend the growth trend downwards, to achieve a slowing of the growth rate, or even in some places to bring about absolute reductions.

With walking and cycling it is not so easy. Walking data are rudimentary in most places, while cycling is at such a low ebb in countries such as Britain that statistics do not work. For example, there is a national target to increase cycling trips between 2000 and 2010 by 300 %. How is this to be handled in a local authority area where cycling trips amount to no more than a hundred or two a day?

With car traffic it is easy, at least in urban areas – 'if you build, they will come'. With walking and cycling, the connection is not automatic. British towns are littered with bits of cycling infrastructure that are barely used. Even whole networks are rejected in favour of the car, as in the new town of Milton Keynes. Likewise, comprehensive footway and footpath provision in most areas of Britain has not prevented a 24 % decline in the distance walked per person in just 13 years. In the mid-1970s, walking accounted for one-third of all trips; now it accounts for only one-quarter (DTLR, 2001).

Two points emerge from this. First, it is not just the quantity but also the quality of infrastructure provision that influences people's travel choices. Second, cultural attitudes are a determining feature. In Britain, cycling is still regarded by many as an inferior mode of transport, demonstrating that the rider has not made a success of things. Thus we find that where cycling has increased, it has done so amongst wealthier and better educated groups. Some places have a tradition of cycling, like Cambridge and Oxford, where by riding a bicycle you can pass for a respected member of the academic community! However, in places where cycling was a prominent working class mode of travel to work (for example, dockyard towns), a generation of people has made it their business to abandon the bicycle as a symbol of becoming middle class.

A third factor has already been touched on, namely the role of walking

and cycling *vis-à-vis* other modes of travel. It makes no sense to have targets to increase walking, cycling and public transport, when at the same time car use is also increasing. Any increase in trips by one mode will be at the expense of trips by other modes. That is the logic of the 'mode split' concept. The totality of trips is given (for a given population); the issue is how these trips are split between the different available modes.

Targets to increase cycling are common in Britain, mostly because of the lead taken in 1996 by the National Cycling Strategy (Department of Transport, 1996). These are followed blindly, however, with little or no thought given to whether more cycling will be at the expense of walking or public transport. Thus, even where measures succeed in increasing the amount of cycling, there is no indication as to what benefits have resulted.

Walking is still treated as the Cinderella of transport modes, despite being the most important of all. Targets to increase it are rare, with a British transport minister at one stage claiming that because walking was 'a matter of fact business', a national walking strategy would be 'overblown'. (Environment, Transport and Regional Affairs Committee, 2001). Even that most methodical of cities, Munich, which has targets for all other modes, has only an implicit assumption that the walking mode share will remain static over time.

It is time that transport planners sharpened up their act and addressed the realities of mode choice. The following questions have to be answered:

1. What is the total of trips? (If it is much different from three trips per person per day, some explanation will be needed as to why.)
2. What is the current mode split?
3. What is the target mode split at some defined point in the future, ensuring that a figure is given for all modes including walking, cycling and car passenger?
4. What measures will be taken, and what are the 'causal links' between the measures taken and the achievement of the mode split target?
5. How will these outcomes be measured?

The causal links between infrastructure and travel outcomes can often be tenuous, for example where a cultural change is necessary alongside an infrastructure change, or where changes in travel behaviour will not be obvious until an entire network has been built. To provide sufficient incentive and accountability in the short run especially, it may be sensible to adopt measures of output rather than outcome.

Output is concerned with measures achieved, such as kilometres of new cycleway, or square metres of footway rebuilt, or households targeted for a 'travel blending' campaign. In a report on walking strategy for a former London planning body, out of 32 recommended targets, 28 were concerned with outputs, and 4 with travel outcomes (London Planning Advisory Committee, 1996). The advantage of this is that achievements can be measured 'along the way', whereas changes in travel behaviour may take many years

to come to fruition, and in any case are always much harder than outputs to measure accurately at the local level.

27.3 Do walkers and cyclists get along?

There are circumstances in which walking and cycling blend very well, even when sharing the same space. Anyone visiting the market-places in Groningen in The Netherlands or Freiburg in Germany (See Fig. 27.1) can marvel at the way in which pedestrians and cyclists move in harmony and without inconvenience to each other. The Sustrans network of shared paths in Britain also seems to accommodate pedestrians and cyclists alongside each other without too much fuss.

Yet cycling on footways is universally disliked by pedestrians and is a hot issue in many British towns. The riding of bicycles in pedestrianised shopping areas is banned in many cities. In busy streets with high densities of pedestrians, cyclists will tell you that people stepping into the carriageway can be a much greater hazard than that posed by motor vehicles. King's Road in Chelsea, London, is a case in point.

There are a number of potential conflicts between people on foot and cyclists. These include:

- competition for trips (discussed above);
- danger of cyclists to those on foot where their paths cross or are shared;

Fig. 27.1 Freiburg, Germany. Pedestrians and cyclists can mix, but only when they respect each other's presence. Source: Tim Pharoah.

- competition for space – if cycleways are provided at the expense of footways this can make walking more difficult or less pleasant, while parked bicycles can be obstructive and unsightly (Figs 27.2 and 27.3).

The ability of pedestrians and cyclists to mix is dependent on a number of factors, the key ones being:

- the type of area and density of activity. In urban areas it is unlikely that shared paths will be free of problems, unless pedestrian densities are insignificant;
- the type of cyclist. There is a world of difference between someone cycling slowly to the local shop with a shopping basket, and someone with a sports bicycle aiming to beat their record time for the journey to work. There are at least five different categories of cyclist, and only the first two have any reasonable chance of mixing with pedestrians without causing danger or annoyance to them:
  - child cyclist with small machine and guided by an adult;
  - local cyclist, e.g., shopper, perhaps with a standard machine;
  - time and speed conscious cyclists, typically with fast machines and purpose-made clothing and other equipment;
  - leisure cyclist, out to enjoy the view and the air;
  - racing cyclist.

Fig. 27.2 Nantes, France. A cycle lane is of no use in a pedestrian priority area such as this. Source: Tim Pharoah.

Fig. 27.3 Oxford Street, London. Buses and cycles hinder one another when they share the same space. Source: Tim Pharoah.

People may cross these categories, and there are degrees and variations. A leisure cyclist might enjoy a bit of speed at times, while a commuter cyclist may be considerate of people on foot.

It is important to recognise that space for people on foot is not solely for the purpose of walking from A to B. London's first walking strategy document identified four categories of activity on foot:

- access mode – where walking is used as the sole mode between two places;
- access sub-mode – walking is a necessary adjunct to other modes, for example, getting to and from bus stops, stations and car parks;
- circulation/exchange mode – includes the use of public space for meeting people, window shopping, use of street cafés, and many other activities that cannot be described as traffic or travel;
- recreation/leisure mode – includes long distance and local walking for the sake of it, often without a particular destination. Dog walking is included.

Despite this variety of purposes, people on foot mix without problems, except when densities are excessive or the available space inadequate. Adding cyclists to the mix can work successfully, but only if the cyclists are pursuing the same purposes, and give way to people on foot in every way. The difference in speed between pedestrians and cyclists is crucial to whether the two modes can mix. Pedestrians usually move at no more than about 6 kph, whereas that is about the minimum speed that a cyclist can travel without becoming unsteady. Cyclists travelling at speeds above about 15 kph are certain to cause annoyance even if not an actual danger to walkers. In addition, even at low speeds and when cycles are being pushed, pedals, panniers and other protuberances can hurt people.

These are not simply technical issues. A great deal depends on the cultural context of both walking and cycling. In The Netherlands, the culture has absorbed cycling as a normal means of travel. People on foot (and in cars) accept the presence of cyclists much more readily than they do in Britain. In Dutch, Danish and German towns, most people use fairly sedate machines, and they are not ridden furiously. In Britain this is often not the case. The author undertook a survey of bicycle types in a German town and in a British town. In the German town the proportion of 'sedate' machines was 80 %, while racing and mountain machines accounted for only 20 %. In the British town these proportions were reversed.

In some cultures it is expected that cyclists should stick to the facilities provided for them. This is very marked in Germany where it is mostly illegal to ride on the carriageway when a cycle way is provided, and where people will remonstrate with cyclists riding on the footway. In Britain there are few cyclists, they are not well tolerated by other road users, and provision of cycling facilities is minimal. In this context many cyclists are perceived as having a deviant streak, unfortunately encouraged by the dangerous and thoughtless riding behaviour of some cyclists (see Fig. 27.4).

A plan to replicate in a British town the happy mix of walkers and cyclists described in Groningen, therefore, would be unlikely to work unless at the same time an effort was made to change attitudes. In Britain, a confrontational approach is more evident, with strong antagonism towards cyclists leading to cycle bans in some city centres such as York. These tensions and conflicts

Fig. 27.4 Clock House, London. Poor design leads to poor discipline. A cyclist rides on the footway, whilst a pedestrian walks on the cycle track. Source: Tim Pharoah.

between walking and cycling require us to plan specifically for both modes, and to consider marketing, participation and enforcement programmes alongside infrastructure plans. In the following sections it is considered how these issues might inform our approach to the planning of walking and cycling in different areas.

27.4 Rural rides

William Cobbett wrote his review of agricultural life, *Rural Rides* (Cobbett, 1830), long before the bicycle was invented. However, the title serves us here to consider the role of walking and cycling in Britain's rural areas. It is often assumed that because of low development densities, and dispersed settlement patterns, rural dwellers have longer distances to travel than urban dwellers. This is not always the case, however. If rural areas support their own employment and community facilities, distances need not be great. The distances travelled by residents of rural areas these days are inflated due to the disappearance of rural services and the take-over of dwellings by people who live urban lifestyles. In Britain, walking serves 19 % of trips in rural areas compared to 25–30 % in towns, while average trip distances are around 50 % higher in rural areas than elsewhere.

Rural areas are ideal for cycling, at least potentially. First, the distances involved mean that cycling may be more feasible than walking. Second, there is usually plenty of space to provide cycle paths. Third, pedestrian densities are low, especially between settlements, so there are less pedestrian and cycle conflicts than in towns, and shared paths become feasible. Oxfordshire has provided many of these, for example, and they enable relatively safe cycling without great inconvenience or danger to the occasional walker. Leisure use of paths, however, is a different story. There are places where walking has become unpleasant and hazardous due to mountain biking. The South Downs Way in Sussex is a case in point. Decisions are long overdue on how to provide for cross country cycling in a way that satisfies the participants in that sport without diminishing the quality of walking in the countryside.

The main problem for cycling in rural areas (or more accurately 'non-urban' areas) is the danger posed by motor traffic. Cycling in rural areas usually means sharing the carriageway with motor traffic, which is legally entitled to travel at up to 60 mph (70 mph on a dual carriageway). With such speeds it is impossible to guarantee either the safety or the comfort of cyclists. The accident statistics unfortunately prove the point. Although cycle densities are low on rural roads, the crash fatality rate is twice that in urban areas.

The provision of separate paths alongside busy roads is essential both to protect cyclists from danger and to improve the quality of cycling sufficiently to attract people to this mode away from the car. However, it is unrealistic to expect separate provision alongside all rural roads. Even if this were affordable, the impact of this on the appearance of rural lanes would probably be unacceptable. Rural traffic calming has been helpful in reducing the speed and hence the danger from motor traffic, but it is very difficult to control speeds outside villages. Speed reduction measures tend only to work where their purpose is clear to drivers, and a road across open countryside without a person in sight is not such a circumstance.

The author proposed a solution for a rural area of Oxfordshire that would create a network of paths to link a number of villages to their local market town (Witney). These would be formed from a mixture of existing public footpaths (upgraded to be suitable also for bicycles), bridleways and country lanes. The country lanes would be severed at key locations so that they could not be used for through movement by motor vehicles. Pedestrians and cyclists would thus have to share lanes and paths with each other and also with vehicles gaining access to farms and properties. The aim in this case was twofold: first, to reduce car travel between the villages and hamlets to Witney, for work, shopping and other purposes; and second, to promote walking and cycling for leisure purposes, by Witney as well as village residents. There was no way of assessing what the potential demand might be, since people in the area have no experience of such facilities. Promotion campaigns would be needed to explain the benefits and to change travel habits.

27.5 The suburban dream

Suburbs can be characterised partly by their physical structure (low density, single family dwellings, private parking, zoned and separated non-residential land-uses) and partly by reference to the particular qualities of life to which suburban dwellers aspire (privacy, car parking, quietness, good air quality, good neighbours, good schools, and plenty of indoor and outdoor space). For people with cars, suburban life can be relatively convenient, but for those without access to a car (including children and poor or disabled people) the suburbs can be lonely and limiting.

It was not always so. Up until the 1960s most suburbs were well provided with bus services, while low traffic volumes made walking and cycling easy. In Britain at least, car dependency has been the result not so much of the structure of the suburbs, but the changes that have occurred in response to rising incomes and car ownership. These changes include:

- a restructuring of the retail industry, leading to a decline in local shops and suburban parades, and increased car dependence – the car accounts for 85–95 % of travel to typical British out-of-town retail or business facilities, compared to less than 50 % of travel to mixed used centres (Departments of Environment and Transport, 1993);
- reduced bus services;
- road and traffic changes that make life difficult for pedestrians and cyclists.

The suburban way of life is under threat for two main reasons. First, the very qualities that people seek in the suburban way of life are being destroyed by the travel consequences of low densities and spatially separated land-uses: increasing motor traffic due to reliance on the private car and increasing journey distances. People find that their journeys are taking longer, and parking is harder to find. When at home they find their environment increasingly dominated by the traffic of others, with roads increasingly dangerous and intimidating, air quality deteriorating, and traffic noise unrelenting.

Second, as communities and the world at large wake up to the problems generated by private motorised transport, measures are increasingly promoted that will reduce the freedoms and ideals of suburban life. Increasing 'trip end' restraint in higher density areas through parking controls, tolls and city centre permits, reduces opportunities for suburban dwellers to visit such areas, and thus further encourages growth of suburban destinations where such limitations can be avoided. Moreover, public transport provides for an increasingly marginal share of suburban travel, and often is not financially self-supporting.

In short, the quality of life for suburban dwellers is being eroded, while the environmental and community costs of their car-based lifestyles will put the suburban ideal under threat, either from redevelopment to achieve sustainability goals, or from fiscal and social penalties for those with car-

dependent lifestyles. What has this to do with walking and cycling? The essential ingredient of change is to reduce dependence on the car, which in turn has several favourable effects:

- availability of a choice of means of travel will provide greater independence for those who because of age or other reasons cannot drive;
- having a choice of alternative modes means that car traffic can be reduced without any overall loss of access opportunities;
- there will be less need for multiple car ownership, thus saving on household transport expenditure and helping to preserve residual demand for public transport;
- reduced traffic levels will improve local safety and environmental quality.

These changes work together in a 'virtuous circle' of improvement, but will require community planning and intervention to set the ball rolling. People acting individually cannot bring about any significant improvement either for themselves or for the community. The need for collective planning and action to limit car travel and to simultaneously provide the benefits of so doing provides a major challenge for local authorities.

In deciding what alternative modes to provide, the bicycle can be seen to have major advantages compared to the other possibilities, namely walking and public transport. These advantages include:

1. Suburban distances are too great for a high proportion of trips to be made on foot. On the other hand, many trips are not so long that they require the use of motorised vehicles. The bicycle is best at serving those distances that must commonly be travelled in the suburbs, of around 1–3 miles.
2. The bicycle upholds one of the great suburban virtues, namely independence. The bicycle, like the car, provides door to door travel without the need for timetables or information about public transport fares and services. In a study of families in Bremen (Germany) who gave up their cars for one month, it was this freedom that led the participants to choose the bicycle most often as their alternative means of travel (see Pharoah *et al*., 1995). Provided that traffic dangers can be removed, children can ride to school and other places, thus providing both them and their parents with greater independence.
3. Unlike public transport, the bicycle can provide access to suburban or isolated facilities without the need to restructure or 'densify' the land-use pattern. The suburban shopping malls, business parks and leisure centres, for example, can thus continue to function with the bicycle instead of the car. In most cases, it is impossible for such activities to be reached conveniently by public transport, even with much improved levels of service.
4. The diffusion of origins and destinations in suburban areas means that private transport will be favoured over public transport. The bicycle provides the nearest equivalent to the car in terms of flexibility of

destination, distance and time. Trip chaining is also easier, allowing multi-purposes to be served by a single 'trip chain', even where different activities are physically separated.

5. Cycle facilities in the form of special lanes or separate paths can be provided more easily than in high density or 'pre-car' areas, because there is more space available on suburban roads. Exclusive rights of way for bicycles are much easier to provide than the equivalent for bus or rail routes, because of the necessary smaller dimensions, and few restrictions in terms of required geometry.
6. Cycle-and-Ride is preferable to Park-and-Ride because of smaller space requirements. Not only is it easier to find the necessary sites next to public transport stops, but the smaller sites create less of a barrier between the stop and the surrounding neighbourhood. A problem with car Park-and-Ride sites is that even the nearest housing is pushed too far away to encourage walking; and walking through a car park is not pleasant (see Pharoah and Apel, 1995).

The bicycle cannot provide for all the trips of suburban dwellers, but the potential is likely to be at least half of all intra-suburban trips. It is important that cycling is not promoted at the expense of public transport use. Unless more cycling means less driving, there will be no environmental gain, and there will be disadvantages for those who remain dependent on public transport. Bicycle provision should therefore be planned to work in combination with public transport to provide access to the more specialised facilities and services available (at a greater distance) in town or city centres. Cycle provision should also be on space taken from the car, not from footways or other space for people on foot. Again, if more cycling simply means less walking, while car driving stays at the same level, there are no gains to be had.

The higher the proportion of trips that transfer from car to bicycle (or to walking), the greater will be the potential for higher density development without loss of environmental quality. The bicycle in this way may be seen not as an exclusive alternative to restructuring the suburbs, but an important element in making such restructuring possible and effective.

If its use can be promoted in the ways described, the bicycle can provide the means of survival for the suburban ideal, by providing important health, independence and lifestyle benefits for suburban dwellers, whilst simultaneously reducing the environmental burden that current suburban lifestyles place on the community at large.

27.6 Urban renaissance

It is in the older parts of cities in the developed world that the greatest tensions between walking and cycling exist. Here, densities of people and vehicle traffic are at their highest, streets are often narrow and indirect, or

have been reconstructed to meet the demands of motor traffic. The defining feature is scarcity of space. Provision for one mode of travel means less space (and time) for other modes. By way of illustration, it is noticeable that the largest cities (London, New York, Paris) have relatively few pedestrianised streets. The intensity of development and activities means that alternative routes for vehicular traffic are difficult to find.

Transport planning in inner city areas is thus to do with setting priorities for the different modes, and of allocating space and time accordingly. Of course, this is not always consciously done, but that does not alter the fact that a particular balance is struck between the different modes, even if only by default. Which priorities in which places? In some dense city areas, and inner London provides a good example, the pressure on space is so intense that provision for cycling produces heavy penalties for other modes. The difficulties are such that provision has tended to be based on back-street routes designed to avoid the main roads. This is unsatisfactory for many cyclists because the journey times are much greater, and there is much turning and stopping to be done compared to travelling on the main roads.

In cities with broad main thoroughfares (usually those with layouts planned in the nineteenth century, such as Berlin and Paris), there is often space within the street profile to accommodate cycle lanes as well as public transport lanes and parking. But in cities with complex networks of relatively narrow streets, as found in Britain, special provision for cyclists can be difficult to justify. Cycle lanes invariably conflict with bus lanes and, particularly, bus stops. By irritating coincidence, average bus speeds are very close to average cycling speeds, and a cyclist delaying a bus pulling into one bus stop is very likely to delay the same bus at the next stop.

In such circumstances, the provision of separate cycle facilities needs to be questioned. The main requirement for transport in inner city areas is a combination of walking and public transport. If high volumes of cycling undermine the safety, efficiency or capacity of these modes, then the wisdom of encouraging it should be questioned. In The Netherlands, much has been made of the successful reinvigoration of cycling since the 1970s. But it should be noted that Dutch cities are of medium rather than large size, and that walking as a mode of travel is much lower than in equivalent British cities. If provision of cycle facilities simply switches people from walk to cycle, what is the overall benefit? The difficult trick, of course, is to find a combination of walking, cycling and public transport that succeeds in reducing car use.

Another consideration is that the street network in many cities is not uniform. There will be sections of the network where broad streets are provided, or where there are convenient routes off the main streets. However, promotion of cycling cannot be done on the basis of isolated patches of infrastructure. It should only be done on the basis of a complete network. If a complete network of cycle lanes and paths cannot be provided, it may be better not to promote this mode. In Delft (The Netherlands), this point was carefully

considered in drawing up the cycling strategy, and the decision was made to invest in bridges and other pieces of infrastructure to 'plug gaps' in the network. This investment released the potential of the entire network (Hartman, 1997).

27.7 Upbeat in downtown

In the core of city centres, the pedestrian should be free to walk and stop and linger at will. Cyclists should not be allowed to interfere with or undermine this freedom. The density of movement in smaller towns may be low enough to enable pedestrians and cyclists to mix freely without major problems being caused, and the case of Groningen has already been mentioned. Where pedestrian densities are high, such as in core shopping and leisure streets in larger cities, mixing cycling with people on foot is generally unsatisfactory. Even wheeling a bike around causes problems and aggravation in a street with high pedestrian intensity. This is particularly so in cities where cycling is a minority activity, or where the 'culture' of riders is to speed, or to assume priority over those on foot. It is important for cyclists to be able to get to the centre, but then they should park and complete their activities on foot. Secure and convenient cycle parking facilities are needed beside the routes leading to the centre if cyclists are to be encouraged to leave their machines.

Copenhagen has pursued a programme of increasing the provision for pedestrians in the centre of the city. Access to and from the centre, and within the inner suburbs has been provided with a mix of buses and suburban trains, and the bicycle. Walking plays its part as usual for local trips. Walking is the main focus in the central shopping streets, but cycling is fairly well provided for in the side streets and parallel streets. Jan Gehl has studied the gradually increasing provision of space for people on foot in the centre of Copenhagen for over 30 years. He emphasises that the space gained from motor traffic and parking is not just for walking, but for resting and enjoying the city. He calculates that of the 96 000 pedestrian square metres in the city centre, 40 % are in streets, and 60 % are in squares (see Gehl, 1996, and Chapter 8).

27.8 Conclusions

Walking and cycling need to be planned together with motorised modes. Given that the number of trips that people make, and the time they spend making them, are more or less constant, encouraging one mode will be at the expense of another. If the aim is to create more sustainable travel patterns, then reduced car use must go alongside the planned encouragement of other modes.

Table 27.1 Priorities for different transport modes

Area	Priority
City core	Foot
Inner city areas and approaches to core (narrow streets)	Foot and public transport. Cycling integrated with vehicle traffic (safety managed through speed management)
Broad radial streets (if network)	Foot, public transport priority, plus separate cycle paths
Suburbs (lower density)	Walk and cycle paths fully segregated
Rural areas	Walk and cycle paths, separate or shared

Walking and cycling are not always compatible modes. There is little point in encouraging cycling if it leads only to less walking. Also, cyclists and pedestrians do not always happily coexist in the same space. Shared spaces tend only to work where there are low speeds or low densities. If cycle tracks or lanes are to be provided, this should be at the expense of space for cars, not people on foot.

Priorities for the encouragement of different modes should vary according to what works best in different types of area. This will depend partly on trip patterns and partly on the physical structure of the area. Table 27.1 suggests how priorities might vary. General tables of priorities (pedestrians first, then cycles, then buses, etc.) are fairly meaningless in practice. For example, to give pedestrians top priority in all circumstances would mean that drivers would have to stop to let them cross the street whenever and wherever they wanted. On many main roads this would clearly be absurd. The ordering of priorities needs to be set out in terms of a specific road classification.

Priority for different modes is about two things. First, priority on the road – which mode has the most space, which has the most time at signals, and priority through the signals? Second, there is priority in terms of planning and infrastructure provision. Which mode gets the most money, and which mode gets investment first?

Finally, now that planning for walking and cycling is becoming accepted as an important component of transport planning and urban revival, it is time to tone down the evangelical aspect that has characterised much of the research and advocacy. The arguments and the resources can be won, but only if proponents address the realities of inter-mode competition.

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28

Fundamentals of pedestrian advocacy

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28.1 Introduction

There is a growing movement of pedestrian advocacy in the United States. At the core of that movement are ordinary people demanding change in their local communities. This chapter examines the development of the pedestrian advocacy movement and the tools that pedestrian advocacy organisations are employing to bring about change. During the twentieth century, automobile travel came to dominate the transport system in the United States. Across the country, cities were constructed and reconstructed to accommodate the automobile, at the expense of human scale and meaningful places. In the course of this transformation, the rights of pedestrians and their safety, convenience and pleasure were all considerably abridged.

Pedestrians in the US were divested of substantial rights early in the century, when those on foot, who had enjoyed precedence in the public right-of-way for centuries, were made subject to traffic control. 'Safety' was the rationale for this radical curtailing of rights, as pedestrians were losing their lives to automobiles in alarming numbers. In the 1930s more pedestrians were killed by automobiles in the United States than during any decade before or since. In that period, automobile traffic speeds and volumes dramatically increased, while many of those killed were older pedestrians who had never operated a motor vehicle.

In 1964, Joseph Wood Krutch wrote 'Notoriously, Americans tend to extremes. They have been more exuberantly committed than any other people to whatever is thought of as modern – whether it be gadgets, clothes, or even social manners. And walking tended to be more completely outmoded here than anywhere else' (Krutch, 1964). As the US in the post-war years succumbed

to the vision of a modern machine age in which walking would be superfluous (or even subversive, as in Ray Bradbury's short story, *The Pedestrian*, 1964), pedestrians were relegated to the status of impediments in transport planning and engineering. Over several decades, many subdivisions and highways were constructed with no place to walk. Even more insidiously, sprawl began to dominate the developed landscape, spreading uses too far apart for walking to be efficient, even where facilities for walking were provided. Although walking trips have never been the subject of rigorous analysis and measurement in the US, all indications are that the mode share for walking has steadily decreased. Despite the erosion of pedestrian rights and the degradation of the pedestrian environment, no organised advocacy for pedestrians emerged in the United States until the last decade of the twentieth century.

28.2 The rise of grassroots pedestrian advocacy

Towards the end of the twentieth century, the untenable vision of a modern machine age began to give way, at least in some circles, to a more balanced vision of a return to communities that are healthy and liveable, where walking is a real choice. Grassroots activists for what might be called the 'liveability movement' understand that to achieve the vision of liveable cities, there must be change, and they share the belief that change occurs through organised groups dedicated to action. Pressure is needed on many fronts, to revise policies, practices and funding priorities at the federal, state and local level.

Numerous organisations have been working to provide this pressure for change, from groups that work at federal transportation policy level, like the Surface Transportation Policy Project (STPP), to groups dedicated to specific modes, like bicycle advocacy groups. Since 1990, a grassroots pedestrian advocacy movement has developed, predicated on the notion that one essential element in that transforming pressure is a demand for change at the local level, and that organised pedestrian advocacy is an effective way to generate and articulate that local demand for change.

28.2.1 Emergence of local organisations

The first pedestrian advocacy group in North America, Ottawalk, formed in Canada in 1988, in Ottawa, Ontario. It became the inspiration for the first local organisation to form in the US, WalkBoston, which began in Boston, Massachusetts, in 1990. A second local group, the Willamette Pedestrian Coalition, started independently in Portland, Oregon, in 1991. Both WalkBoston and the Willamette Pedestrian Coalition were founded by relatively small groups of citizens who, in the course of challenging local transport decisions, felt the lack of any organised voice for pedestrians and came together to fill what they saw as a need for this voice.

At about the same time, the Bicycle Federation of America, a national

organisation headquartered in Washington, DC (now known as the National Center for Bicycling and Walking), was awarded grant funding to support grassroots advocacy for both pedestrian and bicycle transport. The grant allowed the Bicycle Federation to facilitate networking between groups and provide modest support in the form of mini-grants to local grassroots advocacy organisations. Through these and other efforts, the notion of organised pedestrian advocacy began to spread. In 1993, both WALK Austin, in Austin, Texas, and Walk New York, in New York City, sprang into being. Each of these new groups modelled themselves in part after WalkBoston and the Willamette Pedestrian Coalition, whose founders provided some informal mentoring to the new organisations.

28.2.2 A national coalition

By 1995, with four established groups in different regions of the country, informal conversations began between the groups regarding the possibility of forming a national coalition that would formalise communications and help new groups get started. For at least a year, the lack of proximity and the difficulties of long-distance communication were obstacles to progress towards a formal coalition. In June, 1996, the Bicycle Federation brought together representatives of all four groups as part of a larger pedestrian summit in Boulder, Colorado. There, at the Hotel Boulderado, America Walks was born.

Inspired by the momentum, a fifth local group, Feet First, formed shortly after this in the Seattle, Washington, region. Groups that started in 1996 in Philadelphia, Pennsylvania, and Atlanta, Georgia, joined the coalition as well, bringing the total number of member groups to seven. America Walks was incorporated as a non-profit corporation in December, 1997, with the mission of fostering the development of community-based pedestrian advocacy groups, educating the public about the benefits of walking, and, when appropriate, acting as the collective voice for pedestrian advocates.

Since that time, America Walks has operated on a near volunteer basis to carry out its main mission, helping new pedestrian advocacy groups to start and be successful, and the number of member groups has grown. These member groups are diverse and autonomous organisations, all working to improve conditions for walking in their communities. At the time of writing, in 2002, America Walks included 48 groups from 18 states and the District of Columbia. To carry out the education part of its mission, America Walks maintains information on its website, answers telephone calls, and has recently begun to develop collective actions in which member groups can choose to participate. In 2002, the organisation introduced National Walk to Lunch Day on Wednesday, 1 May, and in 2003 will sponsor the first National Pedestrian Crossing Action.

Recently, America Walks has had some opportunities to act as the collective voice of pedestrian advocates. In 2001, letters and phone calls by America

Walks helped persuade the Governor of Texas to veto a bill that would have allowed automobile parking on sidewalks in that state. In 2001 and 2002, the organisation participated in a larger coalition of community-based groups, working on formulating a platform for the re-authorisation of the federal transportation legislation. Beginning in 2002, America Walks has been tracking and providing information on efforts by commercial interests to pass state and federal legislation that would allow the use of the Segway Human Transporter on sidewalks. It's concern is not to oppose the Segway itself but to limit the use on sidewalks of anything that moves significantly faster than walking speed.

28.2.3 The role of the Internet

The Internet has been an amazing boon to grassroots organising, at both national and local levels. Communication to a broad number of correspondents is possible with a minimal expenditure of resources. In less than a decade, access to e-mail and the World Wide Web has become so universal that it is possible to rely on these for the bulk of communications and information distribution.

E-mail lists, which automatically distribute e-mail messages to subscribed addresses, are a tool widely used among advocates for the dissemination of newsletters and announcements as well as for discussion. A seminal event in the pedestrian movement was the founding of PedNet, the international e-mail list for pedestrian issues, in January, 1995. PedNet provides a forum for discussion of every aspect of pedestrian travel, from philosophy to poetry to practical solutions (www.flora.org/pednet). The World Wide Web also plays an important role in the distribution of information. Advocacy organisations can maintain a presence on the Internet at a very low cost, and information and resources useful to advocates are widely available on the Web.

28.2.4 The National Congress of Pedestrian Advocates

Although the Internet has proved invaluable for the exchange of information and for networking people and organisations, electronic communication cannot substitute for the cues and energy that human beings get from each other in face-to-face meetings. Periodic gatherings of advocates appear to be needed to recharge the national movement. The first national gathering in the US dedicated specifically to pedestrian advocates was organised by America Walks in August, 1999, in Portland, Oregon. Dubbed the 'Summer Camp for Pedestrian Advocates,' the event brought together about two dozen people from member groups of America Walks. The gathering provided an opportunity to share ideas about how local groups work best, as well as about how America Walks could most effectively assist local groups, which in turn helped build momentum for the national movement.

Based on the success of this effort, America Walks launched the National Congress of Pedestrian Advocates as an annual opportunity for sharing and building momentum. The first Congress was convened in Oakland, California, in August, 2001. This tremendously empowering three day event drew more than 160 people from 21 states, the District of Columbia and Canada. Delegates enjoyed a wide range of technical workshops, organisational development sessions and plenary speakers. Those who came demonstrated the amazing variety of people who work on pedestrian issues. Thanks in part to scholarships given by the California Council of the Blind, there was a significant attendance by blind or visually impaired people.

One important task undertaken by delegates at the first National Congress of Pedestrian Advocates was the adoption of six resolutions, including a declaration of pedestrian rights. The resolutions begin to set in place some principles around which the national pedestrian advocacy movement is organised. The second National Congress of Pedestrian Advocates was held in September, 2002, in St Paul, Minnesota, as a one day adjunct to the ProBike/ProWalk 2002 conference.

28.3 The tools that pedestrian advocates use

Pedestrian advocacy is as varied as are the communities where it is practised. Because conditions vary so greatly across the country, from political milieu to climate to topography, the solutions and strategies that work in one community are not necessarily the right approach in another. Some advocacy groups promote walking, others urge changes to the built environment to make walking safer and more convenient. Advocates may sponsor neighbourhood walks, testify at hearings or demonstrate in the street. There are many ways to incite change, and creative change agents are constantly thinking up new ones. One thing seems clear: whatever tools an organisation uses, their impact is almost always greater coming from an organised group than an individual citizen. In September, 2000, America Walks published a 'Toolbox for Pedestrian Advocates', which lays out many of the successful practices and tools used by member organisations. A few of these tools are described in the sections that follow.

28.3.1 Changing plans and policies

The most important work in walking advocacy can also be the work that is the most mundane and 'pedestrian'. This is the work of changing plans and policies to make them better for pedestrians. It entails seemingly endless hours of effort, including service on advisory committees, tracking and evaluating projects and plans, providing comments and testimony, and advocating for changes to standard operating procedures such as street design standards and crosswalk marking policies. Persistence is required for success.

The most heroic example of persistence drawn from the collective experience within America Walks is the success of WalkBoston in changing the plans for the surface arterial that is being built above Boston's Central Artery Project, better known as the 'Big Dig.' Originally, the surface roadway over a buried freeway was planned to have ten lanes. It would have severed the city from the waterfront nearly as completely as the original elevated freeway did. It took six years of attending meetings, speaking out, writing letters, finding likeminded partners, persuading and cajoling, but in the end WalkBoston and their partners prevailed. When it is completed the new arterial will have two three-lane sections, separated by parkland, with frequent, marked crosswalks and signals. Boston will be all the better for walkers due to this group's dedication.

Change can be realised at many levels. In Georgia, Pedestrians Educating Drivers on Safety, Inc. (PEDS) helped to convince the DeKalb County Commission to make sidewalks mandatory at all new developments and the Georgia Department of Transportation to provide $1.8 million in federal safety funds for pedestrian-friendly improvements. In 2001, America Walks gave the annual 'Best Foot Forward' award to member group Walk San Jose, for their outstanding efforts to change plans and policies in San José, California. Their successes range from getting the city to adopt a traffic calming plan (and spend $1.5 million implementing it) to changing city policies on standard kerb radius and marking crosswalks.

Sometimes the route to change is through legislation. In California, a coalition of more than 70 grassroots organisations from around the state, including at least a dozen pedestrian advocacy groups, were able to press for passage of the Safe Routes to Schools Bill in California in 1999. That bill, which was re-authorised in 2001, set aside one-third of the state's federal safety funds to be granted to local jurisdictions to remove barriers to children walking and bicycling to school. The bill became a model for other states and federal legislation is being considered. In several states, pedestrian advocacy groups have helped pass state legislation authorising the use of cameras to catch motorists who speed or who run red lights.

28.3.2 Making news

While the bulk of an organisation's work may consist of poring over plans and policies, it is also important to have some activities that generate excitement and attention to the cause, such as pedestrian crossing actions. Such direct action can energise an organisation's membership and inspire new people to become members, as well as effect change by drawing media attention to specific important issues.

Pedestrian crossing actions were pioneered by the Willamette Pedestrian Coalition in a campaign organised in the spring of 1994 (Fig. 28.1). This consisted of mass demonstrations in which sign-wielding pedestrians quite legally crossed the street together to educate the motoring public about their

Fig. 28.1 Neighbours and advocates join a pedestrian crossing action in Portland, Oregon, USA, in 1994. Source: courtesy of the Willamette Pedestrian Coalition.

duty to yield to pedestrians in the crosswalk. The demonstrations were successful in attracting new members to the coalition and the Willamette Pedestrian Coalition got their message on to the television month after month.

Other groups around the country have followed Portland's lead, and some have developed their own innovations. In 1999, PEDS organised 'Gone With a Walk' in Atlanta, to commemorate the fiftieth anniversary of the death as a pedestrian of Margaret Mitchell, author of *Gone With the Wind*. After this first highly successful pedestrian crossing action, PEDS looked for a new issue that might get some media attention in 2000. They decided to picket a sporting goods store whose only entrance was through a parking garage. 'People shop, cars don't,' was the central theme of the protest. The demonstration was effective, as the store eventually opened a door onto the street. In 2001, PEDS teamed with the Atlanta Police Department on 'sting' operations, targeting motorists who failed to stop for pedestrians in crosswalks (Fig. 28.2). They found that having policemen on motorcycles made for good television coverage.

Many member groups in America Walks participate or take a lead role in organising community events for International Walk to School Day each fall. In addition to generating publicity, such events provide an excellent opportunity for building partnerships. In Oregon, the Willamette Pedestrian Coalition has enlisted various departments of state government as partners, along with many other organisations. Collaboration on Walk to School Day is beginning to spill over into other issues and activities.

Fig. 28.2 Police in Atlanta, Georgia, USA, team with advocates to ticket motorists who fail to yield to pedestrians, 2001. Source: courtesy of PEDS.

The media are always looking for experts, so developing a reputation for expertise, as Walk San Diego has done, is one way to get media attention. In 2001, Walk San Diego members appeared on three radio talk shows centred on pedestrian issues and neighbourhood design, had an opinion piece published in the San Diego *Union-Tribune* entitled, 'Driving Pedestrians Into Extinction,' and were the subject of articles in the *Union-Tribune* and San Diego *Home & Garden Magazine*.

28.3.3 Selling expertise

Part of Walk San Diego's reputation for expertise comes from the fact that they have gone into the business of providing technical assistance to neighbourhoods, from which they have raised a small amount of funding for their activities. Charging for expertise can be hard for an advocacy group. Often, the active members are volunteers and the organisation has a mission to provide information. Yet advocates do develop expertise in the course of their work and some groups have successfully parlayed this expertise into paying contracts that have helped sustain the organisation and pay for staff.

The two most successful examples among the America Walks member groups are PEDS and WalkBoston. Both have received grants or contracts to perform specific work. The former received funding to implement a Kids

Walk to School programme in three schools, and initiated a Neighbourhood Pace Car Programme, and WalkBoston successfully sought grants from several agencies to develop and administer Safe Routes to Schools programmes for Arlington and Boston, Massachusetts.

28.4 Expanding the movement

These are exciting times for pedestrian advocates. Interest in the movement appears to be growing and new groups are forming. There are also many opportunities for collaboration and partnerships with other organisations, both at the national and local level, especially within the emerging intersection of community design and physical activity.

One of the challenges for a growing national movement is whether the structures within which it operates are effective as the scale gets larger and larger. America Walks hopes to grow to include 100 groups by the end of 2003, and to have representation in every state by the end of 2006. At the same time, the organisation has so far been mainly a volunteer, collaborative effort. It remains to be seen whether America Walks can develop and expand to meet the needs of its growing number of member organisations and to be a resource to help them be healthy and successful.

The most successful member groups of America Walks have found ways to raise enough money to hire staff. Having even part-time staff greatly expands what an organisation can accomplish. However, many of the member groups are quite young and still in the start-up stage. Among the older groups are some that are no longer very active and others that are suffering burnout in leadership and a gradual decline in membership. To some extent, these changes are natural in the life cycle of grassroots organisations, but perhaps the larger coalition could better assist its member groups in becoming more stable if the coalition itself could muster more resources.

Within the larger liveability movement the question is sometimes asked whether there is really a need for organised advocacy just for pedestrians. In this author's opinion, pedestrian advocates bring a useful perspective to that larger movement. Thus, it makes sense to continue to expand the national network of organised pedestrian advocacy groups and for America Walks to evolve to accommodate that growth. Our work will be done when every city in the US is a liveable, human-scaled place where walking is a real choice.

28.5 References

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29

TravelSmart/Individualised Marketing in Perth, Western Australia

Bruce James, Government of Western Australia, Australia, and Werner Brög, Socialdata, Germany

29.1 Introduction

The justification for increasing the mode shares for walking, cycling and public transport are contained in the Perth Metropolitan Transport Strategy. This chapter outlines how a mobility management intervention tested by the City of South Perth is able to make a major contribution in achieving an increase in these mode shares. The transport policy setting provides the context in which extensive research has been undertaken and the effectiveness of the intervention assessed. This chapter outlines the application of a situational research technique to predict behaviour change. Information is provided on which trip purposes people chose to walk, cycle and use public transport more, and the chapter concludes with quantification of the increase in physical activity time achieved through the TravelSmart Individualised Marketing intervention.

29.2 Transport policy setting

The Metropolitan Transport Strategy (MTS) for the Perth Metropolitan Region, like many transport strategies for urban areas, advocates a change of direction from the trend towards a growing mode share for car use to a more balanced mode share. The continuation of Perth as a liveable city is the vision painted in the MTS and various targets, including the mode share targets, are prescribed as the transport sector's contribution to help achieve the vision.

The MTS has three targets relevant to travel behaviour change. They are:

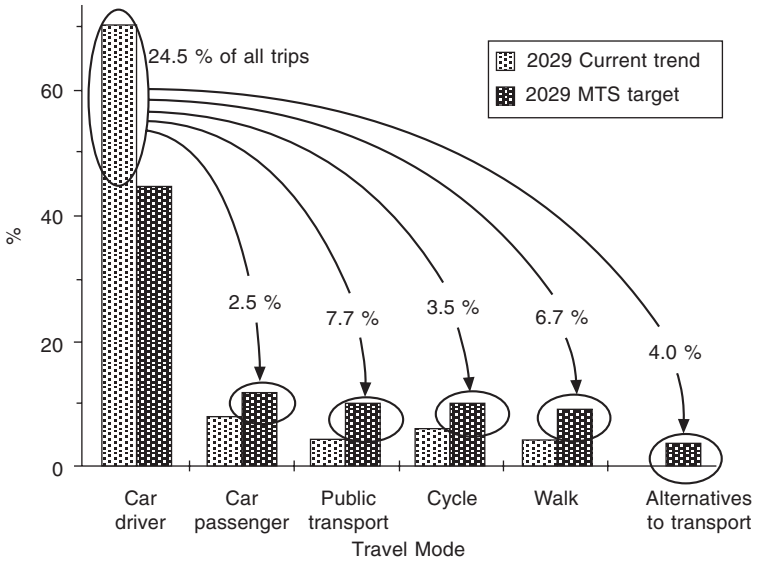

Fig. 29.1 Metropolitan Transport Strategy mode share targets.

- mode share targets, as shown in Fig. 29.1;
- increased car occupancy target, from the expected 1.13 people per car in the year 2029 to 1.25 people per car;
- reduced average trip length, from 10.7 km in 2029 to 7.2 km.

The mode share target is achieved through people changing modes. The increase in the mode share for walking and cycling as well as the reduced average trip length is achieved through people choosing to access local activities rather than those further away. This is done by people making a conscious decision to stay within their locality and/or changes to land-use patterns increasing the options for choosing local activities. Increased car occupancy can be a positive and a negative. If it leads to reducing walking, cycling and public transport trips, it is a negative outcome, while reductions in car driver trips is a positive outcome, as there will be less cars on the road.

29.3 Voluntary behaviour change approach

These targets provide the transport policy context within which voluntary behaviour change programmes can make a contribution. The targets provide the criteria by which these programmes are judged as being successful. Levels of awareness, positive attitudes and remembrance of the message, which are often used as measures of success, are not sufficient measures of success against the MTS targets.

TravelSmart® is the registered brand used for voluntary behaviour change

programmes. The emphasis is on voluntary behaviour change as opposed to involuntary change through measures like road pricing or parking restraints. Association of TravelSmart with involuntary measures by the community would diminish the goodwill value of the brand and in turn impact on the effectiveness of future voluntary behaviour change programmes.

IndiMark® is the brand for Socialdata Australia's Individualised Marketing intervention. It was developed over a number of years in Europe with the focus being on increasing the mode share for public transport or cycling. The IndiMark technique, aimed at increasing public transport patronage, has been successfully applied to over one million people in Germany. The development of IndiMark to cover walking, cycling and public transport has been very much a continuous improvement partnership between the Department for Planning and Infrastructure (DPI) and Socialdata Australia.

The aim of TravelSmart is to achieve desired mode share targets. TravelSmart achieves a reduction in the number of car trips people make by empowering them to walk, cycle and use public transport. The difference between IndiMark and other TravelSmart initiatives is the ability of IndiMark to deliver large-scale proven and sustained behaviour change. The measurement methods used with IndiMark allow robust comparison with infrastructure projects that are the traditional method used to achieve behaviour change.

29.4 Mode choice and active transport

Although the focus of this book is on walking and cycling, public transport is also included due to the extensive walking legs within each public transport trip. These legs within a trip are referred to as 'unlinked trips'. Unlinked trip data are collected to quantify the length and duration of the walking legs in public transport, car driver trips and car passenger trips. Active transport is the collective term used to cover walking and cycling, both as a trip and unlinked trip within public transport and car use.

The unlinked trip data are collected through an additional sub-sample survey of the normal travel diaries used to collect the travel data. This has only been undertaken by the City of Melville. The Melville unlinked trip data for public transport and car trips, as shown in Table 29.1, are assumed to remain constant across the other areas of Perth. This is a reasonable assumption as the City of Melville comprises a mix of traditional and cul-de-sac street patterns and Transperth, the public transport provider in the metropolitan region, has a policy that each house in the urban areas is within 400 metres of a bus stop. It is also worth noting that only walking in the public realm is counted, which means walking within buildings, such as office blocks and shopping malls, is excluded.

The unlinked trip information shows a clear difference in the amount of active transport time spent walking, cycling and on public transport trips compared to car driver and car passenger trips. As stated previously, this is

Table 29.1 Average active transport time (in minutes) as a component of trips

Main mode	City of South Perth		Perth	
	1986	1998	1986	2000
Walk	12	15	11	15
Cycle	22	19	14	18
Public transport	13	13	13	13
Car	2	2	2	2

1. Perth comprises the local authorities of South Perth, Victoria Park, Vincent, Subiaco, Cambridge, Claremont, Nedlands, Cottesloe, Fremantle, East Fremantle, Melville and a portion of Joondalup. These local authority areas contain just over 300 000 people or 23 % of the Perth Metropolitan Region population.

the prime reason why public transport should be included in behaviour change strategies, to increase walking and cycling.

29.5 Active transport trends

A major travel survey was undertaken in Perth in 1986. It is possible to show differences between the more recent TravelSmart surveys and the 1986 household travel survey for the same geographical areas. The TravelSmart surveys have been confined to a number of local authority areas within the 'Perth' region.

Between 1986 and 1998/2000 there has been an increase in the mode share for car driver trips in the Perth region and the City of South Perth. This has primarily been at the expense of walking trips. The changes are shown in Table 29.2. It is worth noting that the mobility measures have remained reasonably constant. These are shown in Table 29.3.

With an increase in car driver trips at the expense of walking, cycling and public transport, the amount of physical exercise gain from transport has changed. By combining the changes in active transport time (Table 29.1)

Table 29.2 Mode shares (%) in 1986 and 1998/2000

Mode	City of South Perth		Perth region	
	1986	1998	1986	2000
Walk	15	12	15	12
Cycle	3	2	3	3
Car driver	55	60	56	59
Car passenger	20	20	20	21
Public transport	7	6	6	5
Total	100	100	100	100

Table 29.3 Mobility measures in 1986 and 1998/2000

Mobility measure per person per day	City of South Perth		Perth region	
	1986	1998	1986	2000
Activities visited	2.0	2.0	2.0	2.0
Travel time (minutes)	61	58	60	61
Trips	3.4	3.4	3.4	3.5
Distance travelled (km)	30	27	26	27

with mode share (Table 29.2) and trips per person per day (Table 29.3), it is possible to ascertain the overall changes in time spent by the community involved in active transport. The results, as presented in Table 29.4, show an increase in active transport time in the Perth region of 8.1 % and a reduction for the city of South Perth of 6.4 %. The reason for the Perth region increase is due to the average walking and cycling trip travel time increase being greater than the reduction in the mode share of walking trips.

Table 29.4 Active transport time per person per day

	Active transport time (minutes/trip/day)	Trips (person/day)	Total (minutes)	Change
South Perth (1986)	(12 min × 15 %) + (22 min × 3 %) + (13 min × 7 %) + (2 min × (55 % + 20 %)) = 4.87 min	3.4	16.6	
South Perth (1998)	(15 min × 12 %) + (19 min × 2 %) + (13 min × 6 %) + (2 min × (60 % + 20 %)) = 4.56 min	3.4	15.5	–6.4 %
Perth region (1986)	(11 min × 15 %) + (14 min × 3 %) + (13 min × 6 %) + (2 min × (56 % + 20 %)) = 4.37 min	3.4	14.9	
Perth region (2000)	(15 min × 12 %) + (18 min × 3 %) + (13 min × 5 %) + (2 min × (59 % + 21 %)) = 4.59 min	3.5	16.1	+ 8.1 %

29.6 Interventions to influence behaviour change

Within transport planning there are three main categories covering the types of interventions available to achieve the MTS targets. The three categories are:

1. Transport services and infrastructure. Examples include public transport services, bus lanes, cycleways and footpaths. This is the prime focus of most transport sector agencies.
2. Land-use planning. The location of activities can have a major impact on achieving the MTS targets, albeit in the long-term. The prime land-use planning tool is the use of regulation through instruments, such as town planning schemes, to prevent particular land-use patterns and ensure provision of specific facilities, such as on-site car parking.
3. Travel decisions. The day to day travel decisions people make are not only influenced by transport services and infrastructure and land-use patterns but also their knowledge of the transport system. People's travel decisions can be influenced by voluntary measures, like TravelSmart Individualised Marketing, and involuntary measures, such as the price of car parking. These voluntary and involuntary measures are often referred to as 'soft policies'.

Transport services and infrastructure and land-use planning are referred to as 'hard policies' as they involve physical structures and objects. Figure 29.2 presents the hard and soft policies.

Transport planning traditionally focuses on hard policies and most transport government agencies have institutionalised the delivery of hard policies. For example, capital works programmes involving millions of dollars are designed to expand transport services and infrastructure. The situational research work undertaken by Socialdata Australia for the DPI shows enormous potential for effective voluntary soft policies, and arguably better value for money than traditional hard policies.

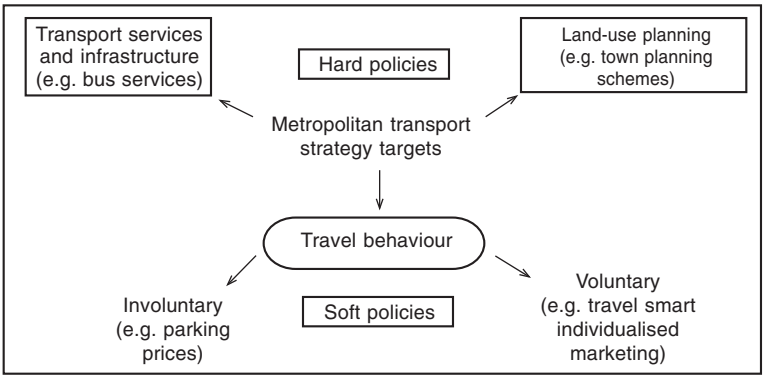

Fig. 29.2 Hard and soft policies.

29.7 Potential for behaviour change through soft policies

We all perceive the world around us in a subjective fashion. This leads to incomplete and distorted views of the world, but regardless of how wrong these subjective views may be, they determine our behaviour. Every individual is given a specific amount of personal freedom by their environment within which they can act; this is their objective situation. Each individual's personal freedom to move within their environment is affected by constraints, objective reasons and subjective views. An explanation of these three categories, with examples, is shown in Table 29.5.

Each individual experiences these constraints and objective reasons differently, thus creating individually different subjective views. Travel behaviour decisions are influenced to a large extent by individual perceptions of mobility, especially by individuals knowing they have a choice in the way they travel. These perceptions are in turn influenced by:

- land-use patterns;
- household structures and interdependencies in which people live;
- availability of alternative modes;
- previous experiences;
- habits, values and attitudes.

In many cases only subjective reasons hinder the use of these alternative modes, which can be based on lack of information. Often, people have not

Table 29.5 Reasons for not using an alternative mode to the car

Category	Explanation	Examples
Constraints	These are physical constraints and options of individuals and their households that can be socio-demographically deduced	• have to carry heavy luggage • do not have a driving licence • the car is required for the first trip but the driver has to use the car for the following trips even though they had a viable alternative
Objective reasons	These are primarily transport infrastructure and services they can or cannot access	• too far to walk • the trip by public transport would take too long or the bus service was too infrequent
Subjective views	These are social values, norms and knowledge that are pertinent to travel behaviour decisions	• do not feel like using an alternative mode • have a negative attitude about cycling • don't know when the bus leaves and the bus route

used the alternative modes for years and have no information about their current state and standard. Therefore, usage, combined with information that is adapted to individual needs, can be the key to gain a new user. The focus of soft policies is on the subjective views. These are the reasons that can be changed, whereas constraints and objective reasons are more legitimate. There is also acceptance that the car is appropriate for many trips and is supported in such cases. Dogmatic ideology that the car is no good for society is never included in any of the research or behaviour change activity.

29.8 Situational research technique

The method used to quantify potential for behaviour change is the situational research or in-depth survey technique. Socialdata has developed a situational research technique that analyses and allows transport planners to better understand individual behaviour patterns (Brög, 1982). The implementation of the in-depth research methodology requires an intensive dialogue (up to one hour) with each household with each member having previously completed a travel diary (Brög and Erl, 1980). The in-depth survey technique is an add-on product to the travel survey, undertaken as a part of the before-and-after survey for IndiMark. Its application in Perth has involved the taking of sub-samples in a range of local authorities where the travel survey has been undertaken.

With the completed travel diaries in hand, a face-to-face interview is conducted. Within a set of ranges, such as trip distance considered too far for walking, the respondents are asked about whether they could have used an alternative mode for each trip. This applies to all trips, not just car trips. Every person in the Perth region makes around one thousand trips per year. Every time someone makes a trip a mode can be chosen and most people choose and use all kinds of different modes. Therefore, to stereotype each person as simply a car driver, public transport user or cyclist is fallacious. This is an opportunity for behaviour change measures – because everybody has a trip each day where environmentally friendly modes like public transport, walking or cycling are feasible alternatives. These trips are the potentials for behaviour change (Brög and Erl, 1996). It is worth noting that if 2 car trips per week are changed, this represents an approximately 10.5 % reduction in car trips (assuming people make 19 car trips per week).

The situational approach is not limited to individual behavioural situations, such as factors influencing an individual's free choice. The approach also recognises the fact that individual (behavioural) decisions are made in accordance with a personal, subjective logic that is frequently at odds with the researcher's, planner's or politician's 'rationality'. This does not imply that the individual does not act rationally; only that their logic is also subjective. The regularities of subjective logic are naturally manifold and have not yet been exhaustively studied (Brög and Erl, 1981). For example, one of the

assumptions used in economic theory is that the mobility market is a perfect market-place in which buyers are fully informed. To rely on this assumption in 'selling' the alternative modes to buyers is a fallacy and leads to a missed market share – a situation that car manufacturers do not leave to chance.

29.9 Quantifying potential

Application of the situational research technique in Perth has allowed this potential to be quantified. All car driver and car passenger trips are categorised into the following three categories:

1. Subjective views. These are considered the subjective potential that could be changed by effective voluntary behaviour change interventions.
2. Constraints. These are assumed to be unchangeable.
3. Objective reasons. These are also assumed to be unchangeable.

In identifying this potential for behaviour change, it is accepted that current walking, cycling and public transport trips should remain as they are. For example, a person should not be encouraged to convert a walking trip to a cycling trip.

Figure 29.3 shows the quantified potential of trips into the above three categories as well as existing behaviour. This information shows that the

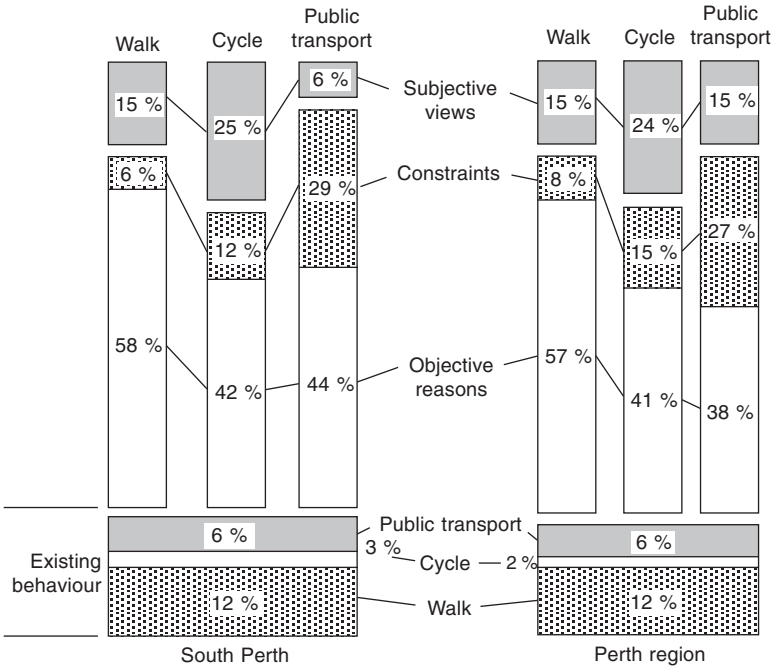

Fig. 29.3 Subjective potential for walking, cycling and public transport mode shares.

subjective potential for walking trips is double that for public transport trips, and for cycling trips nearly double that for walking trips. It needs to be remembered, though, that the potential walking trips are also potential cycling trips. The other clear observation is that the potential for public transport trips for the residents of the City of South Perth is much lower than the Perth region average. It is interesting to note that the subjective views category for potential cycle trips is 8–12 times greater than the existing cycle mode share. The theoretical maximum modes shares, without changes to hard policies and no changes to the shares of the other modes, is therefore:

- Public transport: South Perth – 12 %; Perth region – 21 %.
- Cycling: South Perth – 25 %; Perth region – 26 %.
- Walking: South Perth – 27 %; Perth region – 27 %.

29.10 Potential for change by journey purpose

Another interesting comparison is the potential for changes to modes by trip purpose. This will provide a picture of the trip purposes for which people are more likely to change their car trips. Table 29.6 provides this comparison for the Perth region only as the sample size for the City of South Perth was not large enough to allow a meaningful comparison within the area where the large scale IndiMark programme was undertaken. It is interesting to note that shopping trips exhibit virtually the highest potential across all three modes, given the propensity for transport planners to focus on the trips to work.

29.11 Why use Individualised Marketing ?

The traditional approach to change community behaviour is social marketing. Andreasen defines social marketing as 'the application of commercial marketing technologies to the analysis, planning, execution and evaluation of programs designed to influence the voluntary behaviour of target audiences in order to improve their personal welfare and that of their society' (Andreasen, 1995:7). Social marketing differs from commercial marketing in that it ultimately

Table 29.6 Subjective potential to change percentage of car trips by journey purpose

Journey purpose	Walking	Cycling	Public transport
Work	8	19	12
Education	9	25	21
Shopping	24	30	19
Leisure	12	24	15
Other	20	27	6
Average	15	24	15

benefits the targeted individual and society, not the seller; and yet is similar in that market share (mode share in the case of travel demand management) and the target audience have the primary role in the marketing process.

Individualised Marketing (IndiMark) was chosen as the marketing technique to use as it had a consistent and proven record of producing behaviour change on a large scale. There was little available evidence of traditional social marketing techniques delivering travel behaviour change. The Individualised Marketing approach has a number of advantages over the traditional social marketing approach. First, the information promoting the various modes is taken to the potential 'customer' rather than relying on the hope that the potential customer will catch it. Secondly, direct contact with dialogue allows the message to be individualised and related directly to the specific situation of the person or household. Therefore, two people with the same attributes used to identify them for traditional target marketing would make different travel decisions because of their different situations. This is important in the travel scene because, as previously stated, people make on average one thousand trips per year, for different purposes, destinations and times, with each travel decision having different circumstances.

IndiMark is a customer-friendly empowerment programme that combines informing, skilling and motivating people to change some of their car trips to walking, cycling and public transport trips. It is strongly focused on encouraging people to make the change, as opposed to social marketing, which tends to focus on raising awareness and/or repositioning perceptions.

29.12 Implementation in the City of South Perth

The completion of a 'before' or benchmark travel survey is the first action to take place. In the case of the large-scale application in the City of South Perth, the pre-pilot survey was used as the benchmark. Figure 29.4 gives an outline of how the technique works. The intervention begins by reaching all households by telephone, where it is possible to match name, telephone number and address. In the case of South Perth, that meant 15 300 out of an estimated 17 300 households. Of the 15 300 households, 94 % were reached and through a series of questions each household was segmented into one of three categories shown in Table 29.7.

A random sample of households in all three segments complete a one day travel diary on completion of the intervention and after the test tickets have expired. In future programmes it is planned to also use a panel or cohort sample selection to allow clearer identification of specific behaviour change, such as trip purpose by mode. The rewards offered were a book on the history of the local authority area, a TravelSmart mug or water bottle and a bag for shopping.

The approach adopted in South Perth was not locked into the traditional transport product thinking aligned around just public transport, car as driver

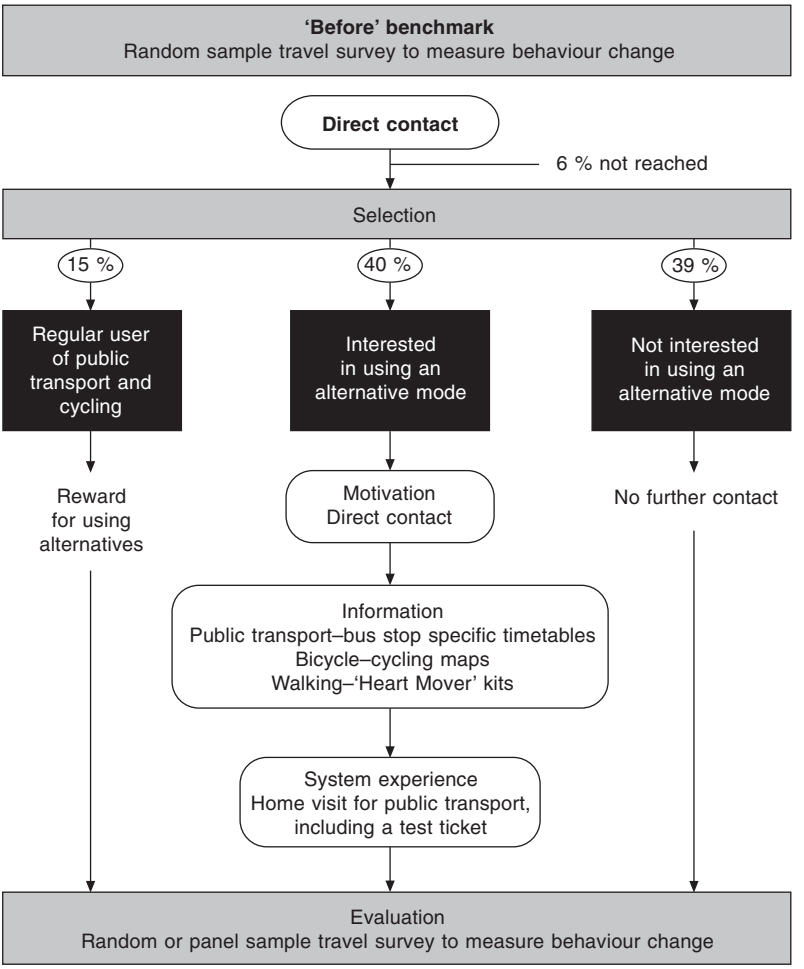

Fig. 29.4 The Individualised Marketing process.

or cycling. The requests for information showed that 56 % of the people in the interested category were interested in all three modes (walking, cycling and public transport), 33 % in two modes and only 11 % in a single mode. In support of the motivation step, information on the travel alternatives was then provided. The final step, testing the public transport system, was provided to 700 households within the 'interested' group. This entailed a visit by a driver from the public transport operator to the person's home and included a free transit pass for one month. It was not available for existing users of public transport and was used in a deliberate way to introduce new users to the system. The principle applied is that people can also change their behaviour through experience.

Table 29.7 Household segmentation

Category	Attributes	Action
Regular user	Already walk, cycle and use public transport on a regular basis (15 %)	Provide requested information and a reward for their current behaviour
Not interested	Not interested in using alternative modes to the car (39 %)	Leave alone. This minimises a negative response from elements of the community to the programme
Interested	Interested in using alternative modes to the car (40 %)	These households are offered a range of information materials. For public transport it includes a local route map and pocket timetable for the bus stop nearest their house. For cycling, a series of brochures on cycling issues (e.g., cycling and the law) and a local cycling route map were offered. For walking a 'Heart Movers' kit, developed by the Heart Foundation was, provided.

29.13 Results of Individualised Marketing

At the end of the intervention, 94 % of the people contacted said, through a self-return questionnaire, that they liked the direct and individualised contact. However, the prime success measure of the Individualised Marketing campaign is the number of car driver trips that have been converted to walking, cycling and public transport. The results, shown in Table 29.8, show a 14 % reduction in car trips, with walking gaining half of the change (4 % of the 8 % lost from the car driver trip mode share). These changes apply to the whole population as the travel behaviour of the 'not interested' group is also surveyed.

The average trip length decline reflects the increase in walking trips, while the car occupancy rate rose slightly from 1.3 to 1.4. The trips made per person per day remained constant at 3.4. These changes are consistent with

Table 29.8 Mode share changes (%) achieved by Individualised Marketing

Mode Share	Before	After Oct 2000	Relative change	After Oct 2001
Walk	12	16	+35	16
Cycle	2	3	+61	3
Car driver	60	52	–14	52
Car passenger	20	22	+5	21
Public transport	6	7	+17	7
Total	100	100		100
Average trip length (km)	7.9	7.6		7.0
Trips/person/day	3.4	3.4		3.4
Car occupancy	1.3	1.4		1.4

the MTS targets. The measure of travel behaviour in the 'after' survey allows computation of active transport time as derived in Tables 29.1 and 29.2. Table 29.9 shows the differences between the first and second 'after' surveys in 1986 and 1998. The random sampling used to assess the effectiveness of the TravelSmart intervention allows extrapolation of the results to the whole City of South Perth population; 35 000 people. On this basis, the increase in hours for each mode per day is shown in Table 29.10. The result of the second 'after' survey is a relative increase of 20 %, or an additional 1798 hours per day spent in active transport.

Table 29.9 Active transport time per person per day

	Active transport time (minutes/trip/day)	Trips (person/day)	Total (minutes)	Relative change
South Perth (1986)	(12 min × 15 %) + (22 min × 3 %) + (13 min × 7 %) + (2 min × (55 % + 20 %)) = 4.87 min	3.4	16.6	
South Perth (before 1998)	(15 min × 12 %) + (19 min × 2 %) + (13 min × 6 %) + (2 min × (60 % + 20 %)) = 4.56 min	3.4	15.5	– 6 %
South Perth (after 2000)	(14 min × 16 %) + (20 min × 3 %) + (13 min × 7 %) + (2 min × (52 % + 22 %)) = 5.23 min	3.4	17.8	1986: + 7 % 1998: + 15 %
South Perth (after 2001)	(13 min × 16 %) + (26 min × 4 %) + (13 min × 7 %) + (2 min × (52 % + 21 %)) = 5.49 min	3.4	18.7	1986: + 13 % 1998: + 20 %

Table 29.10 Changes to active transport resulting from Individualised Marketing

Mode	Before (hours/day)	Second 'after' (hours/day)	Difference (hours/day)
Walk	3593	4859	1266
Cycle	936	1506	570
Car driver	2333	2008	– 325
Car passenger	879	921	42
Public transport	1430	1675	245
Total	9171	10 969	1798

29.14 Comparison with potential

The relative changes in the modes are consistent with the potential for behaviour change. Cycling has the greatest change potential and has achieved the greatest relative change, albeit from a low base. Walking was second in observed relative change and potential while public transport was third. Another interesting aspect to consider is for what trip purposes people chose to use the alternative modes. It is worth noting that the use of cohort or panel sample is the best method to answer this question. This was not available in the case of South Perth. Nevertheless, an examination of the differences in trip purpose by mode shows interesting differences and allows a comparison between potential for behaviour change and observed behaviour change. The observed behaviour change by trip purpose is shown in Fig. 29.5. Each 'before' survey trip purpose for each mode is benchmarked to 100.

The biggest change for walking was the trip to the shops. This is also reflected in this trip purpose having the greatest potential for behaviour change. Conversely, however, work and education trips, with the lowest potential, figured strongly in the increase in walking trips. In the case of cycling trips, shopping has the greatest potential, yet the biggest change by far was for leisure. Reasons for this could include people's attitudes about the use of bicycles for leisure activities rather than as a day to day mode of

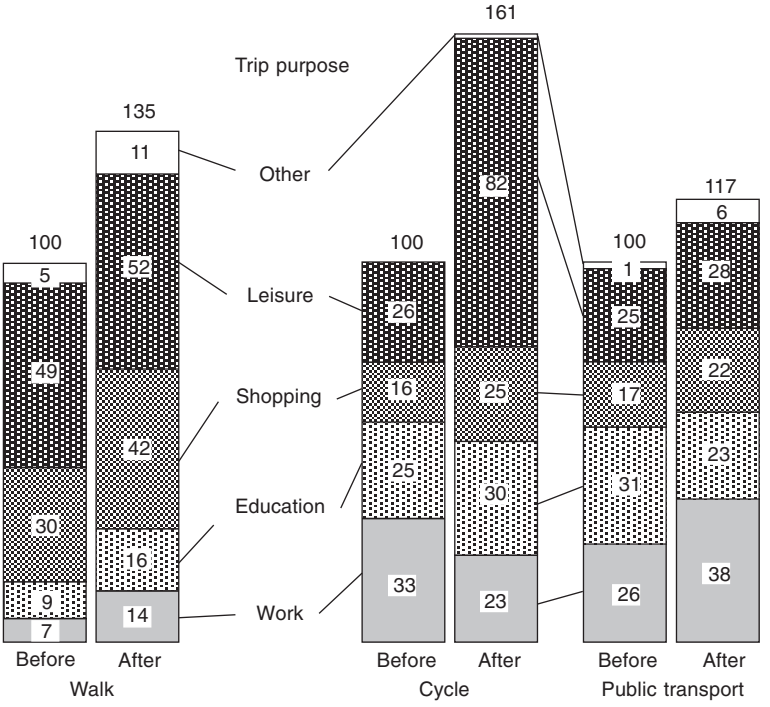

Fig. 29.5 Mode share change by trip purpose.

transport. Public transport achieved the biggest change in work trips although the greatest potential is for shopping and leisure trips. Reasons for this could be similar to cycling in that public transport is perceived to be more suited to travelling to work. The decline in education trips could in part be due to a change of mode to walking and cycling.

29.15 Comparison with traditional interventions

The two traditional approaches to achieve change in travel behaviour are social marketing using the mass media, and infrastructure, such as cycleways and additional public transport services. This section compares the TravelSmart approach against both these approaches. Traditional social marketing, involving the use of mass media, relies on the broadcasting of simple messages to entice behaviour change. The traditional social marketing approach is usually referred to as a 'campaign'. Some campaigns offer telephone numbers for people to ring to obtain more information about the advocated behaviour change. The advertising success is usually measured by the percentage of the audience who are able to recall the message, the focus being on education. Research undertaken in Perth shows the vast majority of people already have favourable attitudes to walking, cycling and public transport. The TravelSmart approach is focused on empowering behaviour change rather than education. The trick therefore is to engage as many people as possible into the dialogue (IndiMark) process.

The extent of behaviour change is usually ascertained by telephone interviews with respondents asked if they have changed their behaviour in, for example, the last two weeks. This survey technique has two major limitations. First, asking respondents to recall behaviour over the last two weeks is subject to perceptions and possible willingness by respondents to agree with the interviewer. Second, the size of the population covered by the advertising makes it difficult to attribute the cause of any behaviour change to the marketing campaign. There is limited evidence, if any, of the success of this traditional mass media approach in changing travel behaviour. The TravelSmart approach uses one day travel diaries with logic checks to verify travel behaviour, and use of control groups outside the study area to identify any other factors that may have caused behaviour change. The advocates of traditional social marketing invariably considered the Individualised Marketing approach as being too expensive. However, when benchmarked against the extent of behaviour change achieved by infrastructure, the return on investment is impressive.

Initial steps have been undertaken to include the results of the South Perth TravelSmart approach in a four stage transport model used in Perth to forecast traffic flows on the road network and patronage on the public transport system. On the assumption that the results of the South Perth project could be achieved if applied to 46 % of the Perth population, a 5.6 % reduction in

car trips and 11.5 % increase in public transport boardings is achieved for the whole of Perth. This reduction in car trips represents 1.5 million less car vehicle kilometres per day. The model also estimates that it would take just under eight months for the community to recover the A$30 million implementation cost through reduced transport costs. This includes the additional cost people would pay for public transport fares. In comparative terms, the A$30 million would buy 2.3 kilometres of 4 lanes of freeway or dual track electric passenger railway (excluding land purchase costs). It is highly unlikely either purchase could reduce car vehicle kilometres by 1.5 million, or reduce overall car travel time by 7.7 %, or increase public transport patronage by 11.5 %.

29.16 Programme expansion

Delivery to date has reached 59 000 people and funding has been provided to reach an additional 43 000 people by 2004. The local authorities that will receive the intervention are the City of Subiaco, the suburb of Marangaroo in the City of Wanneroo, half of the City of Fremantle and an area within the City of Melville. The criteria used to select these areas included an alignment of funding contributions from local government and private bus operators. Application of the in-depth research to quantify the potential for behaviour change shows Fremantle, Melville and Subiaco as having greater potential than South Perth. Current budget agreements will allow for expansion beyond these areas for a further 84 000 people, totalling 186 000 people in all.

29.17 Challenges

A number of challenges remain. The two identified so far are the need to realise the high potential for cycling as a form of transport and quantifying the benefits of reduced car trips onto the road network. The age profile for cyclists has increased substantially with children riding much less than before. Early steps are being taken to integrate the IndiMark results and situational research findings into the workings of one of the transport network models used in Perth. The findings to date are very encouraging.

29.18 Conclusion

Application of TravelSmart Individualised Marketing for the whole of the City of South Perth has proven that it is a powerful behaviour change intervention capable of making a major contribution to the achievement of

the MTS targets through a 14 % reduction in car trips. The reduction in car trips was offset by a 35 % increase in walking trips and a 61 % increase in cycling trips. The relative increase in active transport time is also substantial, with a 20 % increase from 1998 or a 13 % increase from 1986. These changes can be extrapolated across the 35 000 people living in South Perth. The second 'after' survey has shown these changes in behaviour were sustained, therefore reinforcing the value of this intervention.

The greatest change in terms of trip numbers from car trips was to walking trips. Most discussion on reducing car trips tends to focus on public transport trips. Conversely, the potential for more cycling trips is much greater than walking, yet achieving a major increase in cycling trips from a low mode share remains a challenge. The use of cycling for leisure suggests the need to reposition cycling as an everyday mode of transport. The overall conclusion is that the right soft policies are able to make a major impact on the number of cycling and walking trips. When compared to comparative returns from infrastructure projects, effective soft policies like TravelSmart Individualised Marketing are very cost effective.

29.19 References

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30

Creating supportive environments for physical activity: encouraging walking

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30.1 Introduction

Living an active life or being physically active is important to many people and walking is fundamental to active living. While walking we are most able to engage with our environments and with each other while benefiting our health. We work toward being active from birth, learning to sit up, to crawl, to walk, and then, for most people, to be active in a range of ways. Such skills contribute to survival.

We accept being active as something most people can and should be able to do, and the need to be active is acknowledged through attempts to encourage activity. At school there are regular breaks for children to be active if they wish – at recess and lunchtimes as well as in physical activity lessons. People in prisons are given exercise rights. Unconscious patients in hospital will have their bodies moved and exercised by physiotherapists and nurses. Employees talk about going for a walk during the working day, at lunchtime perhaps, especially desk-bound workers. While being active is not listed as a human right, being completely sedentary can endanger life, so perhaps, along with shelter, warmth and food, it should be.

Active living has the potential to bring health, social, ecological and economic benefits to individuals and communities. However, despite the recognition of the benefits of physical activity, for many people being sufficiently active is being phased out of daily life. In Australia, as in many other parts of the western world, local facilities related to daily activities were once largely within walking and cycling range of our homes. Our increasingly sedentary patterns of living are caused in a large part by the need to reach dispersed and distant centres of work, education, shopping and

recreation. We rely more and more on using cars and other motorised and often individual modes of transport to travel to them. Shut away in a car or being enclosed indoors for long periods contributes both to inactivity and to foregoing much of the incidental social interaction that can help create good social capital. The private car in particular has reinforced a growing emphasis on private well-being at the expense of a vibrant and interactive public realm.

Linked to these issues are other more affluent ways of living, that have brought us other fossil fuel-powered devices to replace human powered actions – washing machines, vacuum cleaners, lawn mowers, chain saws and a host of other labour-saving devices. Many of these have been developed from the latter half of the twentieth century onwards. In addition, large volumes of written material, television and computers allow more passive leisure activities. For many people, both work and recreation are more about mental activity than physical activity and earlier and earlier in our lives we are doing far less of the walking and running we aimed for in babyhood and rather more of the sitting. This trend is resulting not only in high health costs, but in economic, ecological and social costs too.

> The combination of home based sedentary pursuits – and the retreat into private life, convenient and fast access between centres of work, shopping and recreation, may have eroded the place of the public realm in daily life for most urban Australians. Active and convivial neighbourhoods may well have been largely replaced by arrays of independent and discrete households. (Atkinson, 2002)

Theoretically all the devices that save labour in terms of work (house, garden, employment) and travel, should allow more time for pleasant active living and associated social interaction that builds good social capital. Few people would recommend throwing away the washing machine and lawn mower, and eschewing the books, the Internet or television that can add to quality recreational time. But there is a very good argument for enhancing other opportunities for the majority of people to be physically active in daily life. We need to make it less necessary and less appealing to use the car, for example, and more easy and pleasant to walk or cycle in inviting neighbourhoods – to be out and about in daily life. These issues are firmly linked to the ways in which we now live our lives and the way the places where we live them are constructed to physical, structural and social factors.

It is useful to consider what is meant by physical activity. A definition often used is ‘any form of bodily movement performed by our muscle groups – going for a walk, cycling around the neighbourhood and mowing the lawn. Jogging and aerobics are more vigorous types of physical activity’ (National Heart Foundation of Australia, 2001a).

Physical activity can be deliberately undertaken or can be ‘incidental’ activity. While the distinction can be blurred, more deliberate activities usually include such things as cycling, recreational walking, swimming, gym activities and playing a sport, while incidental activity can be that gained while being

active for another purpose. Walking is an activity common to many people. It is frequently undertaken incidental to some other purpose – this might include walking to the shops, walking to and from public transport, walking up stairs instead of waiting for a lift, walking around a city, gardening, hanging out the washing and taking the dog for a walk. Of course, some people may also be deliberately active combined with another purpose, to fulfil a need for social contact with others or to achieve their own exercise requirements. Being active, especially through walking, as either an incidental or deliberate activity, may seem simple enough for an individual, but catering for it is more complex, requiring an appreciation of the many issues involved and willing collaboration between the sectors that can make a difference in enabling active living.

30.2 Active living, physical activity and health

It has long been recognised that being active is good for your health – very few people would disagree with this general statement. What is less understood by many, however, is how much activity is needed for health gains and how intense that activity should be. Many people believe that physical activity has to be strenuous to be really beneficial and achieve health gains. Messages about vigorous physical activity have been promoted in past years, particularly in the 1980s and early 1990s with activities such as jogging gaining in popularity and with slogans such as 'no pain, no gain' being quoted (see Box 30.1 for definitions of vigorous activity and other terms used in this chapter) Vigorous activity does have an important role to play in attaining levels of fitness and has probable roles in prevention of some diseases; however, over the past few decades more understanding of different levels of physical activity and the impact on health has been gained. Since the dissemination of the US Surgeon General's report on physical activity and health in 1996, the scientific evidence of the health benefits of regular, moderate intensity physical activity has been better understood, with acceptance in the health sector literature of the health benefits of moderate physical activity undertaken regularly (US Department of Health and Human Services, 1996). Walking and, in particular, brisk walking is accepted as a physical activity that brings health benefits.

Physical activity plays a role in helping prevent several diseases. Bauman *et al*. argue a clear case for the role and promotion of physical activity in Australia, saying that if the population was more physically active, health benefits would accrue in relation to cardiovascular disease prevention, diabetes prevention and control, the prevention of some cancers, injury prevention and control, and mental health. These are five of the six current national health priorities in Australia (the sixth being asthma) (Bauman *et al*., 2002).

Risk factors for cardiovascular disease include smoking, poor nutrition,

Box 30.1 Definitions

• **Physical activity**	any movement involving large skeletal muscles e.g., walking, cycling, gardening, playing sport, work-related activity etc. **Exercise** is used interchangeably with physical activity in this chapter
• **Moderate activity**	activity/exercise that is energetic, but at a level at which a conversation can be maintained, such as brisk walking
• **Vigorous activity**	activity/exercise at a higher intensity, which may, depending on fitness level, cause sweating and puffing
• **Deliberate physical activity**	planned physical activity/exercise for recreation, leisure or fitness, with a specific objective such as improving fitness, performance, health or social interaction
• **Incidental physical activity**	that physical activity/exercise gained while being active for another purpose
• **Active living**	a pattern of living that balances our need to maintain healthy physiological function, flexibility and muscle tone and our needs as social beings to develop and maintain social connectedness and civil life

high blood cholesterol, high blood pressure, diabetes, overweight and obesity and, importantly, lack of physical activity. Physical activity is also linked to the other risk factors mentioned here, playing a role in blood pressure and weight control for example. Over the last 20 years the proportion of people who are overweight or obese has increased significantly in Australia and other countries, with 20 % of the Australian population aged 25 and over being classified as obese in 1999 (Australian Institute of Health and Welfare, 2001). This is an emerging and worrying public health issue with links to both nutrition and physical activity behaviours. The issue is complex and guidelines on actual amounts of physical activity needed to assist in weight reduction have not been agreed, but it is clear and well recognised that physical activity plays an important role.

An important and well-documented health benefit of moderate regular physical activity is in the prevention of coronary heart disease, and in reducing the risk of cardiovascular and all-cause mortality. Those people who are physically active have better cardiovascular health than do those who are sedentary (US Department of Health and Human Services, 1996). Evidence suggests that the cardiovascular risk of being sedentary is similar to the risk

of smoking 20 or more cigarettes a day (Powell and Blair, 1994). Longitudinal studies have clearly identified physical activity as reducing the risk of all cause mortality (US Department of Health and Human Services, 1996). There is 'compelling evidence' of the protective role of physical activity in the reduction of coronary heart disease in particular (Berlin and Colditz, 1990).

People who are not physically active are almost twice as likely to die from coronary heart diseases. One of the National Heart Foundation of Australia's key documents *Cardiovascular Health Platform for Action* states that

> Evidence of the health benefits of moderate activity is compelling. An adult who participates in 30 minutes or more of moderate intensity physical activity (a brisk walk) on most days, has a 35–50 per cent reduced risk of dying prematurely from a heart attack. For coronary heart disease alone an increase of 10 % in physical activity levels would save 1000 lives and prevent 1112 hospital admissions for heart attack [these are theoretical estimates of per annum savings]. (National Heart Foundation of Australia, 2001b).

Being active confers health benefits while health benefits translate into economic savings. In Australia (population 20 million) the annual direct health care cost, i.e., the costs of treatments attributable to physical inactivity for each of the diseases most strongly associated with lack of activity, is estimated to be A$378 million (Stephenson *et al*., 2000), which, broken down equals:

- $161 million for coronary heart disease;
- $28 million for non-insulin-dependent diabetes mellitus;
- $16 million for colon cancer;
- $101 million for stroke;
- $16 million for breast cancer;
- up to $56 million for depressive disorders.

It is suggested that the net economic benefit from an additional 10 % of the population becoming active is A$500 million (Commonwealth of Australia, 1999), Yet recognition and promotion of the health and economic benefits of active living do not necessarily translate into action – almost half of Australians (44 %) are still not active enough to accrue the health benefits (Australian Institute of Health and Welfare, 2001). This is illustrated in Fig. 30.1.

Between 1997 and 1999 the proportion of people that were physically active to recommended levels declined. This is shown in the bar graph in Fig. 30.2. Australia is not alone in demonstrating sedentary lifestyles. It has been recognised by many health experts that the greatest public health gains are likely to result from encouragement of those who are presently sedentary to achieve moderate levels of physical activity on a regular basis. In an Australian Commonwealth Government document it was noted that '. . . the greatest health benefits to the community are likely to result from encouraging those

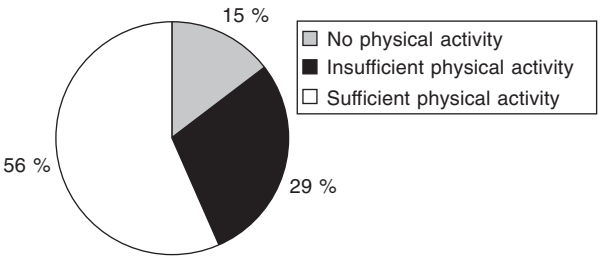

Fig. 30.1 Physical activity levels, Australia (1999). Source: AIHW (2001).

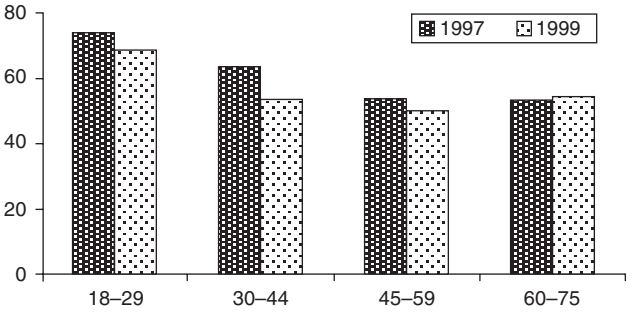

Fig. 30.2 People achieving a 'sufficient' level of physical activity, Australia (1997 and 1999). Source: Armstrong *et al.* and AIHW (2001).

who are sedentary to participate in regular moderate exercise, rather than persuading those who are already active to exercise more' (Commonwealth of Australia, 1994: 54).

In the 1990s, one response to the increasing problem of sedentary behaviour in Australia came in the form of a set of guidelines from the Commonwealth Government of Australia, who had commissioned the research and writing of the National Physical Activity Guidelines for Australians (Commonwealth Department of Health and Aged Care, 1999). These were published in 1999, after an extensive consultation process with a range of sectors. The guidelines advise people to:

- think of movement as an opportunity, not an inconvenience;
- be active every day in as many ways as possible;
- put together at least 30 minutes of moderate-intensity physical activity on most, preferably all, days;
- if possible, also enjoy some regular, vigorous exercise for extra health and fitness.

The National Heart Foundation of Australia endorses these guidelines in the Foundation's Physical Activity Policy (Bauman *et al*., 2001).

There has been increasing discussion and debate about the actual amounts of physical activity needed in relation to specific diseases and conditions.

Regardless of the actual levels of physical activity needed to prevent different diseases and conditions, to gain fitness, or to suit different age groups, people who are inactive need a shift to action. The important public health challenge is to encourage, support and make it easy for people who lead sedentary lives to move from doing nothing to doing something and from doing something to doing more – to start walking and to go further. Increasing sedentary behaviour and the implications of physical activity for such a wide range of health issues ensures that the health sector has a strong interest in addressing physical activity issues. The health sector has acknowledged that walking and active living are not health sector concerns alone; rather the health sector is one player among many.

30.3 Walking

Walking is a core physical activity and, indeed, an ideal activity for most people – it can confer health benefits, is preferred by many people as a daily activity and can be part of daily life for most people. The pace of walking can vary across a spectrum of slow to vigorous and it can be done in a variety of settings, mostly needing no special clothing or equipment. In Australia, as in many countries, and as outlined earlier, people walk for a variety of reasons. Recreational walking seems to be particularly valued and popular with many, while walking as a mode of transport or as part of a trip deserves and could have a higher profile. Walking around the neighbourhood allows people to make contact and communicate in a way that is prevented, or at least is much more difficult while in a car (especially in many modern sealed and tinted vehicles). People walk for pleasure, to go to the shops and into those shops, to 'window shop', to post a letter, to walk the dog and to see what the neighbours have been doing in the garden. People walk for transport. Walking for health and fitness may be cited as a reason to walk, especially as part of recovery from an illness such as a heart attack and probably on the recommendation of a doctor or other health practitioner. Walking is also the most likely physical activity to be done incidental to some other purpose.

The variety of reasons why people may walk give an indication of the number and range of principles and strategies needed to support walking as a first choice physical activity and the number and range of sectors involved in catering for walking. In addition, as people are the 'doers' of the walking, it follows that walkers are the primary stakeholders in initiatives to improve or develop the walking environment. Their views and involvement in catering for walking are crucial. This may seem to be an obvious statement to make but consultation of community stakeholders regarding needs is often not done or not effectively carried out.

30.4 Walking – issues and sectors

In 1996, the Commonwealth Department of Health and Aged Care funded The Supportive Environments for Physical Activity (SEPA) qualitative research project in South Australia. This project was initiated by the National Heart Foundation of Australia, in collaboration with Flinders University and the University of South Australia. The city of Marion – one of the largest local government areas of metropolitan Adelaide in the state of South Australia – volunteered its involvement. The research focused on exploration of issues in active living. A series of focus groups and interviews allowed people involved in this community to identify barriers and enablers for active living in daily life.

Three main themes emerged from people's views about what makes it easier to be active in daily life, or what encourages people to walk (or cycle) rather than using a car. Not surprisingly the obstacles to such activity were identified as:

- physical issues, including urban design factors, such as the location of shops and having destinations to walk or cycle to, street access and lighting;
- structural issues, including the impact of transport decision-making processes such as the placement of road crossings and equitable use of the road system rather than a major focus on catering for cars;
- social issues, including feeling part of the community and a sense of safety in or identification with, a particular locality, summed up as 'community spirit'.

The many sectors that are involved in addressing such issues include, but are not limited to, urban planning; local government; transport; sport and recreation; education; the media; tourism; environment; retail and business; and health.

Some of the key issues identified by people that influence their choice to walk and the sectors most closely associated with the issues, are illustrated in Fig. 30.3, and listed below:

- access to and sharing of the road system – traffic density and public transport are in the domains of both local and state governments;
- safety and design of the environment, connectivity of the street network, urban design and density of mixed use, facilities and public open space are mostly in local government, environmental groups and planning domains;
- education and awareness fall in local government, media, tourism, education and health and environmental sectors;
- personal safety, litter, clean air, graffiti and lighting are linked to local government, environmental groups and policing matters;
- social support is linked to local government, tourism, and health sectors;
- finding the time to be active is often cited as an issue, but this may be symptomatic of patterns of living less connected with local facilities and

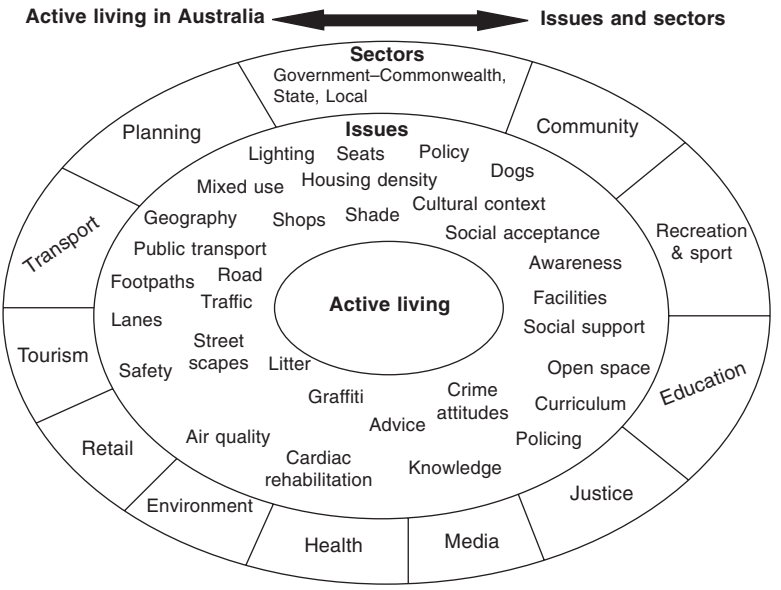

Fig. 30.3 Active living in Australia – issue and sectors. Source: C Wright.

opportunities and more related to dispersed and often distant centres of work, shopping, recreation and education.

Perhaps what is most striking when the issues are considered in this way is the number of potential sectors and partners involved and the potential effective synergies between the identified sectors and domains. It is also clear that the issues involve people who walk and that community participation is fundamental in addressing issues. To make walking a viable and pleasant choice we must address the complex and interrelated issues and determinants of activity through a range of strategies involving partnerships and cross-sector responsibilities. Addressing aspects and issues in isolation is unlikely to be successful. For example, a campaign where people are given advice about walking for health reasons will not be useful or, indeed, have much impact if the places where those people can walk are unsafe or unpleasant or boring and remain that way. Nor will it be much use to promote cycling or walking and the use of public transport if the city is designed to support car use.

A comprehensive approach is critical and in using a comprehensive approach, with collaboration between sectors to address issues, the benefits are likely to be multiple. In discussing the increase of sedentary behaviour in relation to car use, McMichael noted that 'It is not surprising that the Dutch, who have restricted their car use in favour of trams and bicycles, have both a manifest sense of urban community and Europe's flattest trendline in the rising prevalence of obesity over the past two decades' (McMichael, 2001). The complexity and the range of issues in catering for walking and the

relevance of the interface between sectors is now better recognised and promoted, for example between the health, local government and transport sectors in collaboration regarding consideration of action to address transport modes.

This has been demonstrated in 2002 in the consultation and research initiated by the Department of Transport for a Walking Strategy for metropolitan Adelaide in South Australia. In the report *Towards a Walking Strategy – Exploring Approaches to Increasing Walking in Adelaide*, five key areas were identified for action to positively affect walking. Principles underpinning these include a recognition of the need to continue and foster partnerships and collaboration with stakeholders, and monitoring and evaluating the equity of access (QED and the National Heart Foundation of Australia (SA) for Transport SA and the Government of South Australia, 2001).

The five key areas described are:

1. Management environment – a co-ordinated, collaborative approach across and within organisations to achieve increased walking through adoption of the future walking strategy.
2. Policy environment – provision and implementation of consistent and integrated policies to support walking.
3. Physical environment – design, implementation and maintenance of an environment that is conducive to walking.
4. Social and cultural environment – create and maintain social and cultural environments that are conducive to walking in daily life and foster positive attitudes to walking and walkers.
5. Learning and awareness environment – to increase awareness and knowledge about walking.

The way the built environment looks and operates and the climate that social spaces create have implications for active living and in turn for the health of individuals and whole populations.

While it is imperative that the sectors work together to enable this, a primary requirement is recognition of each other's perspective. While the ultimate vision of an active community may be very much the same to the sectors involved, being active does have different implications for the different sectors, as they will often have different objectives toward the same or very similar goals. For example, health sector objectives will be described in terms of the possible health gains made and reductions in the burden of illness. The transport sector will see achievements in terms of increasing sustainable transport options for moving people around and associated reductions in the costs of infrastructure needed for motorised transport. Planning sector objectives will seek to integrate human needs to the built and natural environment, utilising the triumvirate of social, economic and environmental factors. Tourism industry objectives will address increases in visitors to and around tourist destinations and resulting economic benefits, with retail sector objectives being similar. Environmental groups will look toward improving

air quality and 'greener' cities and public spaces. Sport and recreation will look at gains made in increasing participation in club recreational or sporting activities, while education authorities will aim to increase knowledge and the media to bring current issues and awareness of them to the attention of their audiences.

The sectors use their own language, describing in different terms what is essentially the same subject. Some of the terms may include physical activity; incidental activity; deliberate activity; active living; exercise; sustainable transport modes; walkability; active transport; recreation, being out and about; travel demand management, etc. Understanding the similarities and differences of these terms and how sectors use them becomes important when the sectors start to collaborate to achieve the aim of enabling people to be active.

Understanding the complex relationships and activities of people with and in their environments can lead to more flexible and collaborative planning processes. The inclusion of cross-sector partners in policy formulation and implementation permits each sector's objectives to influence the outcomes in strategic planning for the built environment, while its own objectives are met. Such partnerships create opportunities to address the inextricable links between health-promoting activities such as incidental physical activity conducted in daily life and the environments in which this activity occurs. Understanding the nature of other sectors and how they operate is a necessary prerequisite for building effective collaboration.

30.5 A health organisation's response

The National Heart Foundation of Australia is an independent, non-government, Australia-wide, non-profit health organisation, founded in 1959 and the third such organisation to be formed in the world. The organisation was formed in response to the realisation that heart and blood vessel disease (cardiovascular disease) was increasingly responsible for early death and disability and that, far from being inevitable, much could be done in terms of better treatment and prevention. Such behavioural risk factors as lack of physical activity, smoking and poor eating habits, and conditions such as high blood cholesterol and blood pressure, could be addressed. There are now Heart Foundations or societies in many countries, with similar missions regarding working to address cardiovascular disease, which has been recognised as a major health and economic burden throughout the world, especially in developed countries. It is estimated that coronary heart disease will become the single leading public health problem for the world by 2020, replacing transmissible diseases such as infections. Rates of cardiovascular disease are increasing dramatically in developing countries and a global epidemic of cardiovascular disease has been predicted (Husten, 1998).

Heart Foundations and Societies will play major roles in the future in helping countries grapple with this health burden and all its implications.

The National Heart Foundation of Australia's purpose is to improve the cardiovascular health of all Australians and to reduce disability and death from heart disease and stroke. In Australia, despite substantial and continuing falls in death rates from cardiovascular disease over the last few decades, it is still the biggest health problem. In 1998 cardiovascular disease accounted for 40 % of all deaths in Australia (AIHW, 2001). This is shown in Fig. 30.4. It is estimated that one Australian dies every ten minutes from a disease that is largely preventable. The Heart Foundation believes in using a comprehensive cardiovascular health strategy and that an investment in cardiovascular health is sound economics.

Promoting physical activity and being active is one of the key areas of action for the Foundation, since physical inactivity is a major risk factor for cardiovascular disease. Over the decades, since the Heart Foundation was first formed, there has been significant progress in terms of strategies to address risk factors such as physical inactivity, smoking and poor nutrition. In the 1970s and 1980s, a major approach used behavioural strategies toward changing risk behaviours, by attempting to increase knowledge and awareness via provision of information and education, including mass media campaigns. In the 1990s a focus on socio-environmental factors in addition to behavioural approaches recognised that social, economic and physical environments determine the barriers and opportunities to adopt healthy practices. In the physical activity arena this resulted in people being advised to be active and exercise in the 1970s and 1980s, while in the 1990s, in addition to information being available, the focus has been shifted to address the broad environments that impact on active living. As discussed earlier, the more recent behavioural message that has been promoted emphasises participation in moderate activity such as brisk walking, with vigorous activity as an option if possible.

While the behavioural approach places emphasis on the individual to change, the socio-environmental approach makes the community the target with better potential to affect whole populations. Most recently, the impact of socio-economic factors on cardiovascular disease has been at the forefront of debate. In this new century, the use of several strategies through a

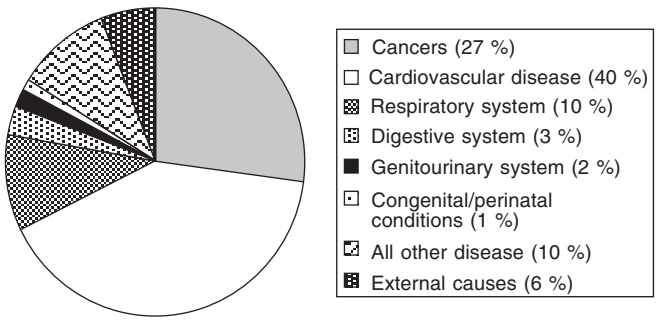

Fig. 30.4 Proportion of deaths by major disease category, Australia, 1999. Source: AIHW (2001).

multi-faceted and collaborative approach will be important for the achievement of public health benefits. Assisting the progress of such work, sometimes described as 'the new public health', the Ottawa Charter for Health Promotion (WHO, 1986) sets out principles for public health work. Among the principles there are some that are particularly relevant to enabling active living. The principles include building healthy public policy; creating supportive environments; strengthening community action, and developing personal skills. The Jakarta Declaration (WHO, 1997) extended these principles to include the following (again all relevant to active living): promoting social responsibility for health; increasing investments in health development; consolidating and expanding partnerships for health; increasing community capacity and empowering the individual; and securing an infrastructure for health promotion.

30.6 The Heart Foundation's National Physical Activity Programme

The Heart Foundation's National Physical Activity Programme aims to take on the challenge in bringing about population changes in physical activity levels by enabling and supporting people to enjoy active living. Put simply, the goal is to reach the point where it is easy and appealing for people to be active, as a norm in daily life, not as something special or extra that has to be done. Being active may include a combination of activities including walking, cycling, swimming, dancing, gardening and for some people, playing sports.

So what does it mean to people when an organisation such as the Heart Foundation advises people to be active? What do people need to be able to walk? Barriers need to be considered, and who should be involved, especially if people are being advised to take the National Physical Activity Guidelines for Australians seriously and act on them. What does being active, putting together 30 minutes of activity or more, every day if possible, mean – if people are not able or do not want to go to a gym each day, or want to be active closer to home, or just make the activity a part of the normal day? That is, if like many others, a person would simply like to walk. What does it mean to individuals and what sectors will the Heart Foundation need to work with to enable people to be active? These are the questions that have been considered and researched by the Foundation to inform the national programme.

Encouraging, promoting and supporting physical activity is an important way to help achieve the Heart Foundation's overall goal, to increase the heart health of Australians. Because of the complexities of addressing physical activity, a broad programme is needed. Many of the Heart Foundation's projects address that easy and popular transport alternative, walking. To facilitate walking, environments that are supportive in terms of physical, social and cultural contexts are needed. Advocacy at all levels of government keeps the issues to the forefront of the agenda.

The theme of cross-sector collaboration to achieve public health outcomes has been mentioned earlier. It is significant in health sector literature. Partnerships across disciplines and jurisdictions are critical to achieve mutual aims. The Heart Foundation works with all levels of government including local governments, government agencies including transport and urban planning, the tertiary education sector, and with other health agencies and the media, to increase environmental and social support for physical activity, especially walking.

30.7 Supportive Environments for Physical Activity (SEPA)

The Supportive Environments for Physical Activity (SEPA) Project is a health sector-initiated project that was a response to questions about what it means to enable people to be active – going beyond advice to environmental support for action. The research findings were discussed earlier. The SEPA Project is now a Heart Foundation key national programme that works at the public policy level and addresses better practice in planning, urban design, transport and related issues so that active living is easy.

This collaborative project assumes that the ability for people to be able to be physically active is a basic right. Being able to easily move about on foot (or cycle), i.e., take incidental physical activity or exercise, is an indicator for the environment's ability to support healthy living. To enable this, a community must be conducive to active living, including being safe (in a personal and physical sense), clean (including clean air), attractive, sociable and appealing towards people living in a healthy way. If it is, health benefits will result. The project looks at how people see the urban environment supporting exercise and active living, the enablers and barriers, and addresses action needed. Partnerships and community involvement are recognised as critical for work in this area to progress. The research findings were published in the report *Exercise in Daily Life: Supportive Environments*, which has been widely disseminated within Australia and overseas (Wright *et al*., 1996).

The city of Marion Chief Executive Officer at that time acknowledged the research findings as 'core to council business'. He considered that this and other factors were important in local government's role in the area of creating supportive environments for physical activity. These were 'taking a strategic rather than operational focus, creating open organisational structures and leadership' (MacDougall *et al*., 2002). The next phase of the project involved interpretation of the research, gaining an understanding of the responsibilities of local government and identification of principles for collaboration. A project team member was seconded by the council to work with council staff regarding the development of guidelines for implementation of the research findings within Marion. The findings were incorporated into both the city's Strategic Directions document, and statutory requirements for a redevelopment site in the form of a (Development) Plan Amendment Report**.**

In line with the tenets of 'the new public health' as described earlier, the SEPA Project seeks to promote active living through acting on at least four principles:

- build healthy public policy;
- advocate for and strengthen community action and participation;
- create supportive environments for physical activity;
- work through partnerships and collaboration.

The SEPA Project addresses structural and social environments with an overall aim of contributing to the creation and maintenance of the environments that support physical activity, in particular, 'incidental' activity. The 'moderate' activity message is relevant and appealing for many people and if the choice to be active in daily life can be facilitated there is an opportunity to affect large numbers of people – a population approach. The environment in which daily life activities take place is most often the built environment. To facilitate active living in the urban context requires an understanding of the way the environment is planned, constructed and managed. In the SEPA Project, working in partnership with other organisations and sectors to supply specialised knowledge, expertise and context is an important principle. The SEPA Project emphasises the need for the work to be integrated with community involvement, to build the community capacity needed to sustain projects. There must be recognition of the community as fundamental in the collaborative process, both by organisations and community members themselves. Project research has indicated that many of the barriers to physical activity are structural and environmental. Building healthy policy in the context of environments that support the choice to be regularly physically active necessarily covers a wide range of land-use, transport, infrastructure, attitudinal and organisational issues. To be effective and efficient, such policy must reflect multi-sectoral considerations.

The SEPA Project largely targets policy-makers. The target audience is thus diverse in nature, drawn from several disciplines including policy formulators, strategic planners and operations managers across local government; transport department employees; community health workers; local councillors; students of the built and social environments; and members of the community in general. The settings in which the project is operating include local and state government jurisdictions and the wider community.

The long-term aims of the project mean that it is difficult to situate it within traditional health promotion evaluation techniques. It will be necessary to accept the challenge to develop data sets and define a set of strategic indicators by which to measure the impact of policy decisions at a future date (by 2015). The development of such indicators must acknowledge the fact that the complex interrelationships associated with SEPA interventions generate difficulties in associating simple cause and effect connections, and analytical frameworks that recognise this complexity are needed, rather than applying rules of evidence based on single factors and easily measurable outcomes.

The difficulties of evaluating policy and environmental interventions and the need to develop relevant theory have been recognised as a challenge (Sallis and Owen, 1999).

Building on the research and the experiences and consultation with local government staff and others, 'generic' guidelines applicable to local governments generally were developed in the third phase. *Supportive environments for physical activity: Guidelines for local government* was published in September 1999 (Wright *et al*., 1999). This document is an important outcome of the SEPA project and was commended at the South Australian Royal Australian Planning Institute's 1999 'Awards for Excellence in Planning'. The Guidelines describe how a supportive environment for physical activity would look and function and propose 52 actions to achieve the objectives described.

In the current phase of this project the objectives relate to working with local governments and other sectors, e.g., transport, to build SEPA into policy documents and develop strategic indicators to track the policy impact over time in a way that is comparable. Ongoing advocacy for policy change is continuing through collaboration with local government and input in federal, state and local transport strategies and a number of other agencies in several states of Australia. At a local level, work with local governments through workshops with rural and metropolitan councils and encouraging consultation with residents, to further integration of SEPA objectives into pilot redevelopment projects, continues.

30.8 The Heart Foundation's Physical Activity Programme: other walking projects

The Heart Foundation has a number and range of companion projects to SEPA, addressing different issues and aspects in supporting walking. While SEPA addresses physical and social environments through policy and management structures, other projects provide social support and advice and awareness to provide a supportive background environment. Cross-sector collaboration is an important underlying principle. The projects include:

- The Heart Foundation *Kellogg* Local Government Awards. This national project is closely aligned with the SEPA project and recognises that local government is the tier of government that can bring about action in local communities. The Awards encourage and reward action through local government bodies to promote and support physical activity and other issues in heart health. *Kellogg* has sponsored this national project since 2000. Each year there are a number of entries that support walking through projects in policy, infrastructure, urban design and community action. The project also promotes networking within and between local governments, assisted by the Awards Annual that sums up the projects

entered at a national level and is disseminated to the almost 700 Australian local government bodies or community councils annually.

- *Just Walk It*. While SEPA addresses integrated planning, policy and environmental aspects of walking, social support is important for many people. *Just Walk It* and other community walking projects assist in providing social and culturally supportive environments for walking. *Just Walk It* started as a trial project in the state of Queensland in 1995, supported by a grant from the Queensland state government. *Just Walk It* extended across the state in 1999 and now operates in several other states. *Just Walk It* is a community-based walking project. It addresses supportive social environments and aims for the sustainability of such groups in local communities. The project is co-ordinated in local communities by staff of local community health, local government bodies and other organisations, who become co-ordinators and recruit volunteer 'walk organisers'. These people lead small groups on regular walks in their own areas. Evaluation of *Just Walk It* has demonstrated that the project encourages less active people to become active, and assists in increasing their levels of activity. The project has good retention rates. *Just Walk It* develops local capacity and promotes a supportive, safe, social environment focusing on some 'hard to reach' groups and less active people. The project is growing rapidly.
- *Heartline*. Advisory services include *Heartline*, which provides a supportive advisory environment. *Heartline* is a national telephone, mail and email service staffed by health professionals that supplies, for the cost of a local call in Australia, information on heart related issues such as physical activity, including walking.
- *General Practitioner Physical Activity Project.* In New South Wales, the Heart Foundation works with General Practitioners (GPs) through Divisions of General Practice, to encourage and enable GPs to discuss and support their patients with physical activity advice, often in relation to walking.
- *Be Active* – Heart Week 2001. National campaigns such as the *Be Active* Heart Week that was held in 2001 provide a supportive background environment and assist in raising awareness of particular issues. Other campaigns, such as World Heart Day media campaigns continue the messages. '*Walk to* . . .' days and weeks are events that assist in putting and keeping issues on the public agenda.

30.9 Conclusions

Societies that value active living must address the complex and interrelated issues and determinants of activity, with advocacy, cross-sector work, community involvement and partnerships as underlying principles. Interventions should focus on policy and a range of strategies related to the broad environments that can be supportive of physical activity. The Heart

Foundation is committed to enabling active living using these principles and working with likeminded people and organisations. Walking is fundamental to the achievement of good health and overall well-being, to ecological sustainability, for economic benefits and to the functioning of communities. Along with food, water and shelter, movement, or being able to be active, should be considered a basic human right.

30.10 Acknowledgements

The author would like to thank her colleagues who assisted in informing this chapter through their work and generous time in discussion. In particular: Rick Atkinson, Robyn Cox, Susan Dunn and Colin MacDougall. Also, members of the Heart Foundation Physical Activity staff team, including Peter Abernethy, Bernie Auricht, David Case, Tony Stubbs and Anthony Walsh; Adrian Bauman and Wendy Brown from the National Heart Foundation's National Physical Activity Committee; and Tony McMichael.

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31

Health conscious transport planning: barriers and opportunities to inter-sector collaboration

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31.1 Introduction

In many European countries health promotion has not been a stated goal of transport policy. This chapter considers whether transport planning can consciously promote health as an integral aspect of transport policy. A key to this is the role of health sector professions and whether they attempt to initiate or support health conscious transport planning, and if so, what inter-sector collaborative actions are most effective. The chapter draws on a study conducted in the late 1990s that examined collaboration between the health and transport sectors through the mechanism of the *Health for All* strategy led by the World Health Organisation (WHO). This specifically seeks to address health concerns through policies beyond as well as within the health sector. In each of three cities studied; Copenhagen (Denmark), Groningen (The Netherlands), and Sheffield (England); the research explored the work of the city *Health for All* projects in developing collaborative actions with their respective transport departments in order to achieve improvements in health. Using a comparative study approach, evidence was gathered by analysing national policies in the health and transport sectors in each country and by field work, which consisted of semi-structured interviews with key actors largely working at the city level within these sectors (Davis, 2001).

31.2 Policy background: traditional links between transport and health

31.2.1 Transport

From the 1950s up to the mid-1990s, the transport sector in each of the three countries collaborated little with health professions beyond the involvement

of environmental health officers in the monitoring of air and noise pollution and the health services with regard to traffic casualties. Indeed, transport has been described as a hidden health issue (Jones, 1994), and there is little in either the transport or health policy literature to suggest that health concerns played a significant role in influencing transport policy in either England, Denmark or The Netherlands during this period. This limited perspective on health impacts is reflected in documents such as the UK Transport White Paper, *Roads for Prosperity* (Department of Transport, 1989), the Danish White Paper on Transport, *Traffic 2005* (Ministry of Transport, 1993) and the Dutch Second Transport Structure Plan (Second Chamber of the States-General, 1990).

31.2.2 Health

Since the late 1980s there have been calls from within the public health movement in Europe for action on transport. This relates to issues such as traffic injuries and pollution and also to the environmental and social consequences of transport (Radical Community Medicine, 1989; Transport and Health Study Group, 1991). The calls were outcomes of renewed interest in public health in the 1980s, which had highlighted the need for consideration of environmental and social as well as bio-medical factors as determinants of health. This led to a perspective within public health that health work 'must attend to the policy sectors and organisational actors affecting the conditions and conduct that create health'. This has been termed 'healthy public policy' (Milio, 1981). From a public health perspective this entails addressing policies in sectors other than health. As has been noted, 'it is only if public health practitioners can influence or deploy the resources of those in other sectors that truly effective activities can be developed' (Steensberg, 1997).

The *Health for All* strategy was established by the WHO after the Declaration of Alma-Ata in 1978 and was followed by the development of 38 targets (WHO, 1985). *Health for All* provided a framework through which national and local governments could develop initiatives to address the social and environmental determinants of health as well as the bio-medical. National governments, including the Danish, Dutch and British, signed declarations of their commitment to *Health for All* in 1985. Some national governments provided initial financial support to the national networks, which developed to service the growing number of towns and cities in Europe establishing *Health for All* projects from the late 1980s. The 38 targets were designed as a framework within which the various countries in the European Region could measure progress towards the attainment of *Health for All*. The targets covered a broad range of issues and were divided into six themes. These were:

- equity;
- health promotion;
- community participation;

- multi-sector co-operation;
- primary health care;
- international co-operation.

The *Health for All* strategy reflected the concerns that policy areas beyond the health sector must play a key role in health promotion. Although transport issues were not explicitly identified in the *Health for All* targets and their summary notes (1991 edition) it is relatively easy to identify where transport issues can be located within a number of the targets beyond Target 11 (Accidents) and 21 (Air Quality). For example, transport, through the promotion of walking and cycling and less use of cars can contribute to Target 9 (Reducing Cardiovascular Disease), Target 18 (Policy on Environment and Health) and Target 24 (Human Ecology and Settlements).

In addition, in 1986 the WHO established the Healthy Cities project as a practical experiment to test out the implementation of *Health for All* at the local level. Designation of a City as a Healthy City required the establishment of a project, the appointment of a project officer, an agreement to fulfil certain commitments such as to establish mechanisms to secure community participation in health promotion, and the development of a Healthy City Plan within a set time-scale. By the mid-1990s the European Healthy Cities project was in its second phase, involving 42 cities from 23 countries. In contrast, *Health for All* projects not designated were dependent on the level of political support within their municipality in terms of resources and on going backing for any initiatives undertaken.

31.3 Concepts of health: barriers and opportunities at the policy level

31.3.1 The health sector

Many European governments have claimed their commitment to re-orientate health care services towards health promotion (Wall, 1996). Countries have, however, tended to be selective in what they choose to address in relation to the *Health for All* targets, often focusing largely on medical interventions and illness treatment services. An important reason for this is that much of the health sector from which *Health for All* originates and from which it needs support in order to be carried forward is orientated around a narrow bio-medical concept of health. As Nutbeam and Wise have commented, 'The health care services in most countries carry on with business as usual, in the midst of increasing pressure for cost containment (Nutbeam and Wise, 1996).

Unlike in Denmark and The Netherlands, health services in England are provided by a National Health Service (NHS) which is distinct from municipal government. As Hunter has noted, treatment of the sick is the central function of the NHS. 'Despite the rhetoric and good intentions stretching back decades,

the NHS is not a health service. Its whole ethos and bias is towards caring for the sick' (Hunter, 1995).

The 1992 White Paper, *The Health of the Nation* was a belated and weak response to *Health for All* (Goumans and Springett, 1997). It identified five key areas, setting goals and targets for each, and strategies for achieving them. These were:

- coronary heart disease and stroke;
- cancers;
- mental illness;
- HIV/AIDS and sexual health;
- accidents.

All of these key areas relate directly to the *Health for All* targets concerned specifically with disease and ill health (Rathwell, 1992). Little mention was made of the importance of wider determinants of health.

Similarly, in The Netherlands, adoption by the national Government of the *Health for All* targets did not lead to action to progress the majority of those focused beyond the health sector. During its development, Dutch *Health for All* policy was undermined in two respects, it is claimed. Firstly, Nota 2000, the Dutch Governmental response to *Health for All* in 1986, which sought co-ordinated interventions across the public policy fields, was downplayed in its drafting as it was perceived as a threat to the status quo of other departments. Secondly, the Dekker Report published in 1987, which advocated a free market-orientated approach to health care was accepted by the Dutch Government (de Leeuw and Polman, 1995). Its recommendations reflected a concern within most western countries in the 1980s for cost containment in the health sector. Cost containment tends to involve reducing the number of, and focusing on, core activities, so this is an obstacle to *Health for All* policy orientated beyond the health sector (Dekker and Saan, 1990; Baum, 1990).

In Denmark, by way of contrast, there had been less emphasis on the role of the free market, and *Health for All* policy had not been so marginalised. Denmark's welfare policy is seen as an integral element of society and concepts such as security and promoting good living conditions are highly valued (Swedish National Board of Health, 1993). During the late 1980s and early 1990s, the Danish Ministry of Health was supportive of health promotion and *Health for All*. It prepared its own health promotion programme in 1989, the first of its kind in Denmark, in response to the WHO *Health for All* strategy (City of Copenhagen, 1994).

31.3.2 The transport sector

Equally, concepts of health among transport professionals influence levels of engagement with health issues in transport planning and policy. This has already been referred to in terms of traditional links at the national level between transport and health such as air and noise pollution and traffic

casualties. It is recognised that the term health can be problematic because of this association with ill health (Baum, 1995; Goldstein, 1997). This problem of interpretation is reflected in the WHO's amendment in 1991 of Target 2 of the *Health for All* targets from 'Developing health potential' to 'Health and quality of life' in order to reflect the importance of quality of life as well as health. The transport planning literature in all three countries contains notably more discussions about transport and quality of life than transport and health (maintenance and promotion). Quality of life may, therefore, provide a more useful means through which transport professionals can address health promotion issues.

Quality of life in English, Danish and Dutch transport literature has been associated with concerns for the protection of the physical and social environment. In Denmark and in The Netherlands, in particular, considerable concern and policy focus towards protecting such environments manifested themselves in environment-led national transport policies from the mid-1970s. In England, concerns for quality of life became a notable feature within transport planning from the early 1990s (see, for example, Buchan, 1992).

31.4 Case studies

31.4.1 Groningen

Groningen is the sixth largest city in The Netherlands, with a population of 170 000. It is in the north of the country in an area with few large towns or cities nearby. The municipality has six departments, including Health Services (GGD), and the Department for Town Planning, Traffic, Transport and Economic Affairs. In transport terms, the city had been recognised both within and beyond The Netherlands for its traffic restraint policies, a central feature of which was a traffic circulation plan introduced in 1978 that restricted private motor traffic access across the city centre while leaving this open to other modes. The City Council had an overall goal of economic development and improving quality of life (Groningen City Council, 1992). Groningen is a compact city enabling many journeys to be walked or cycled.

A *Health for All* project was established in the GGD in 1992 with a part-time co-ordinator. The project tried to initiate discussions with the transport department but this had not succeeded by mid-1995. One strategy had been to try to identify health-orientated information about each department's work with which to open discussions. The lack of success was partly due to lack of political support for *Health for All* among the City Council and specifically an absence of such support among politicians responsible for transport. 'We want to work together with departments in the city but sometimes it is not possible for practical reasons and sometimes because politicians have missions and ideas other than the health ones' was the view of the *Health for All* co-ordinator in October 1995 (Davis, 2001). The interviewee, who had overseen

national policy work on *Health for All* for over a decade, argued that one reason for the lack of politician-led interest in collaboration with the *Health for All* project was that politicians tended to conceptualise health as ill-health, so that health promotion and preventive measures became marginalised.

At officer level within Groningen's transport planning department there was little knowledge of the *Health for All* project. Collaborations beyond the department but within the Council were largely made with the Environment Department. 'There is contact with people from the environmental health department . . . the people who will bring in the environmental aspects in the different policies. Especially air quality, and also with noise. That's the main health aspects of transportation' (Interview with Transport Planner, October, 1995 (Davis, 2001)).

Yet, despite this limited interpretation of health, quality of life was one of the two overall goals of the City Council and when asked about quality of life the transport planner connected quality of life with transport in broad terms. Transport had negative effects in terms of a general degradation of the physical environment, and specifically through air pollution, but also positive effects in that transport could enable access to social networks. The transport planner also saw quality of life as meaning that people have freedom from dependence on others. In this respect too, the transportation system is seen to be very important. This he related to issues of social inclusion and exclusion, noting that besides a Physical Structure Plan, there was also a Social Structure Plan, which placed particular emphasis on quality of life (Groningen City Council, 1992). He stated that people needed to be able to maintain social networks irrespective of whether they had an income. Quality of life encompassed having enough resources to ensure that individuals were not excluded. This includes the ability to travel to gain access to services, facilities and people.

31.4.2 Copenhagen

Copenhagen, the capital city of Denmark, lies within the region of Greater Copenhagen and on the eastern edge of Denmark's most easterly island. The city has a history of implementing traffic restraint policies since the 1960s and it has been policy for over a decade to reduce the overall level of motor traffic in the city (City of Copenhagen, 1991). Its Roads Department had already overseen a decline in motorised traffic in the city from the 1980s and a significant reduction in traffic accidents.

In order to achieve the overall goal of *Health for All*, the Copenhagen City Council recognised that health promotion and disease prevention had to have a significantly more prominent role than previously in the work of the municipal authority. For this reason it was decided by the municipal government that the WHO Healthy Cities project provided an appropriate vehicle for the development of health promotion in Copenhagen with a distinct programme of projects adopted to achieve this. Designation as a Healthy City was confirmed

in June 1988 and the office was located within the Health Services Department of the City Council.

The Healthy Cities project developed two initiatives that were to have some influence on transport planning. The first was a city-wide Health Profile where more than 12 000 responses were received to a questionnaire that asked about how people perceived their own health. The Profile results suggested that the public was concerned that its health and quality of life were being undermined by, among other things, 'too much traffic'. For example, in the district of Inner Nørrebro, over 50 % of respondents said that they wanted the local authorities to take action to reduce the problems caused by the traffic. This was the most frequent single proposal. Types of initiatives proposed were those that would reduce the danger, noise, and air pollution from traffic (Healthy City Project, 1992).

The Healthy City Project then used the results from the Health Profile to highlight the public desire for action from the Council on traffic issues. The Healthy City Project co-ordinator felt that the project was able to provide a valuable perspective because health was not usually associated with transport planning:

> A lot of people urged us to do something about traffic because this is really a big issue . . . many people feel that there are a lot of decision-makers in the field of traffic already so we were just an extra. So we were surrounded by decision-makers who had many views on this aspect. But we started of course from a different angle, which was the health angle. (Interview with Healthy City co-ordinator, July 1995 (Davis, 2001)).

The co-ordinator believed that the Health Profile was also important in influencing the transport planners, not least because the politicians were influenced by it. This was despite the fact that the Profile was based on perceptions about quality of life and not ill-health as traditionally conceptualised by transport planning professionals as measurements of pollution and the counting of accidents.

> Of course we discussed the figures in the Health Profile. How should we interpret it? Because when we look at the illness side we know that it is very difficult to see how much illness traffic creates. Anyway, we felt that the signal was very very clear to the politicians, even those who say that this is not health in the sense of illness, it's health in the sense of quality of life as much. (Interview with Healthy City co-ordinator, July 1995 (Davis, 2001))

For the transport planners, residents' concerns provided the material for political discussions about what actions might be taken. The politicians' willingness to acknowledge public concerns for health, as identified through the Health Profile, meant that the Roads Department could attempt to accommodate such concerns even though they were not quantified. This

action could be attempted irrespective of the degree of scientific uncertainty about the health impacts since it was viewed as a matter politicians could lead on. As a senior transport planner noted, 'there is agreement in the political aspects on that, in that we don't like to have more car traffic in the city. Most of the politicians even want to reduce the number of cars. And that is from the feeling that it is unhealthy to have so many cars and so [much] pollution and all the consequences that follow' (Interview with Transport Planner, July 1995 (Davis, 2001)).

The second initiative involving transport of the Healthy City Project was the development of a Healthy City Plan. All WHO Healthy City projects are required to develop a Healthy City Plan although how they undertake the preparation of the Plan is for them and their respective municipal authorities to decide. According to the WHO, in Copenhagen the process by which the Plan was prepared illustrates the *Health for All* principle of inter-sector collaboration (WHO, 1994). The Roads Department made a significant contribution to the Plan during its drafting between 1992 and 1993. The Healthy City co-ordinator noted that because of the political interest in traffic issues, proposals for traffic had to be included in the Plan.

The Healthy City Plan was published in January 1994. The traffic chapter, which was informed by the 1991 Health Profile, set out new transport policy objectives as part of the Roads Department's contribution to the Plan. This included specific targets to promote cycling by extending bicycle routes by 20 kilometres in 4 years, improving public transport infrastructure, and undertaking further traffic management to route motor traffic away from sensitive areas. The Healthy City co-ordinator thought that the Roads Department's contribution to the Plan was substantive. He suggested that this was because of the relatively good traffic situation in Copenhagen: the decline in motor traffic since the 1970s, and a significant reduction in traffic accidents over the same period. Reducing traffic accidents and ensuring the smooth flow of traffic are often key objectives for road and traffic departments. The relatively good traffic situation in Copenhagen, he thought, with year on year declines in traffic casualties, gave the Roads Department a certain degree of confidence that it could address issues beyond its traditional areas of concern and make them receptive to new ideas. The Health Profile provided the Roads Department with an opportunity for a new approach to help maintain the favourable balance between cycling, walking, public transport and car traffic.

31.4.3 Sheffield

Sheffield is the fourth largest city in England with a population of around 500 000, located in the south of Yorkshire. During the 1970s and 1980s Sheffield experienced massive economic decline, losing a total of 60 000 jobs between 1978 and 1988, resulting in an unemployment rate of 13 % by 1995 (Sheffield Health, 1995). For such reasons, from the late 1980s, much

emphasis was placed by Sheffield City Council, business interest groups, and the city's two universities, on the regeneration of the local economy. Sheffield had operated a successful cheap fares policy on public transport between 1975 and 1986 when Government legislation (bus deregulation) brought this to an end. The cheap fares policy was indicative of concerns for equity within Sheffield City Council. Transport policy, which was particularly focused on regaining public transport patronage 'lost' after 1986, was, however, secondary to regeneration of the city centre by enabling access by all modes.

Healthy Sheffield, the local *Health for All* project, was established with three staff, based within the Environmental Health Department. The Department is responsible for, among other things, air pollution monitoring, and this determined that the main interest in transport from the Healthy Sheffield project was that of vehicle emissions. From a transport planning perspective, officers within the Transportation Planning Unit noted that their interest in health had emerged through their concerns for environmental issues. Healthy Sheffield had had some influence on their perspectives about health work although it had not instigated it. Rather, Healthy Sheffield was seen as a grouping that might be able to help the Transportation Planning Unit carry forward its own plans. In particular, the Transportation Planners were interested in getting help to develop health messages relating to transport in order to reduce car use, such as via facts about air pollution.

> I think we would say that we have arrived at our transport policies, through our concerns for health, for the environment, just from our own professional point of view. And then found willing collaborators to develop it. Our first approach to environmental health was to say that there is a massive problem in changing people's attitudes, can you give us any help in establishing the facts about air pollution?. (Interview with Transportation Planner, February 1996 (Davis, 2001))

Although an early Healthy Sheffield public consultation had identified transport issues in a number of different contexts, the Healthy Sheffield Board decided to focus on other issues. It was not until mid-1996 that some collaboration had been initiated between the project and the Transportation Planning Unit. As a result, in November 1996 Healthy Sheffield and Rotherham *Health for All* issued a public consultation document *Improving Health in Sheffield and Rotherham – the Transport Challenge*. However, a draft of the document was finalised only after significant disagreements arose, principally between the Chamber of Trade and Commerce and the other organisations. The former had described a draft of the report as 'idealistic' and so would not endorse it, being particularly critical of plans for traffic restraint in Sheffield city centre. The exercise highlighted the fact that different groups had widely differing views about what transport and health were about (McGrogan and Greig, 1997). Moreover, there was no evidence of change in transport policy but rather affirmation of the value of particular health arguments, strongly focused around pollution, in support of existing transport policies.

31.5 Conclusions

At the city level, inter-sector collaboration initiated by *Health for All* projects had some limited influence on transport departments. At best, health issues were taken up by transport departments as an additional justification for further actions in pursuit of stated transport policy goals. This was the case in both Copenhagen and Sheffield. While health issues provided justification for action there was no evidence to show that health issues changed the general emphasis of local transport planning policy.

The findings from the study also provide support for previous claims that health in itself does not have intrinsic value for policy-makers at the city level. Indeed, the word 'health' can carry with it connotations of hospitals, medical services and the treatment of ill health. Consequently, this was a barrier to progressing *Health for All* targets relating to transport beyond those defined by a medical model of health. Therefore, it is important for health sector initiatives on transport and health to ascertain what the key transport policy drivers at the local level are and work through these so that health concerns inform transport policy. Health then needs to be translated into values related to transport policies to avoid being perceived as predominantly the responsibility of health service departments.

In this respect, in the two cities where there was least evidence of effective collaboration on transport and health there may have been untapped opportunities. In Groningen, where the *Health for All* project failed to gain political support within the transport planning department, the fact that quality of life was an objective of the Council might have provided an opportunity for collaboration if health objectives could have been aligned more with quality of life. As noted previously, quality of life is contained within Target 2 (Health and quality of life) of the 38 *Health for All* targets. Similarly in Sheffield, equity issues, which featured so highly within the Council's perspective, might have been better used as a lever by the Healthy Sheffield project for earlier and more effective action on transport. Equity in health is Target 1 of the 38 *Health for All* targets.

The main policy drivers in transport planning varied in each city although in Groningen and Copenhagen these can be defined as largely environment-led with a strong focus on traffic restraint and support for alternative modes to the car. In Sheffield the pressure for economic regeneration was powerful and so this led to the view that traffic restraint measures should not be foremost in decision-making. Where transport policies were environmentally-led and there was political support for *Health for All* work (including resources), both at the national and local level, health concerns could provide support for further development of health enhancing transport policies rather than initiatives which only sought to ameliorate the more widely recognised negative impacts of transport on health. These prerequisites were only found to be present in the Danish case study where both health and transport departments at national and the local level were respectively supportive of health promotion

and environment led transport planning. By contrast, where support for *Health for All* is weak and transport policy not environment-led it is unlikely that *Health for All* can provide support for health conscious transport planning.

Moreover, the pre-conditions for inter-sector collaboration on health and transport occurred only where an official WHO Healthy City had been established, in Copenhagen. This suggests that political support is critical. In addition, in Copenhagen the transport planning professionals were more open to *Health for All* initiatives as the transport sector had been successful in reducing traffic casualties while supporting modes of transport other than the car. Of particular note, the *Health for All* collaboration was fruitful in the city where the Healthy City Project was able to translate health into values such as quality of life concerns, which had resonance with the transport planners and local politicians.

Finally, environmentally-led transport policies at the city level in The Netherlands and Denmark delivered significant health benefits as a result of the relatively favourable levels of walking and cycling and low levels of car use. This confirms the importance of traffic restraint not only as an effective traffic management measure, creating a more favourable environment for alternatives to the car but also the importance of traffic restraint as a health promotion tool irrespective of the influence of programmes such as *Health for All*.

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32

Green modes and US transport policy: TEA-21

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32.1 Introduction

The 1990s were a decade of remarkable progress for the green modes in the United States:

- annual spending of federal transportation funds on bicycling and walking rose from a meagre $6 million to $8 million per year in the late 1980s to almost $340 million in 2001;[1]
- the number of pedestrians and bicyclists killed in traffic crashes fell from almost 7500 in 1990 to 5500 in 2000;[2]
- the number of people reporting to the US Census Bureau that they bicycled to work rose from 450 000 in 1990 to more than 490 000 in 2000[3] and the sales of new bicycles (of all sizes) rose from 15 million units in 1991 to 19.6 million in 2001;
- transportation agencies carried out more research, undertook more planning studies, and hired more bicycle and pedestrian staff and consultants than ever before.

Much of the credit for these positive developments can be traced back to the 1991 Inter-modal Surface Transportation Efficiency Act (ISTEA) and its successor, the Transportation Equity Act for the twenty-first century (TEA-21) passed by Congress in June 1998.

However, the reality is that bicycling and walking are still marginal modes of transport in all but a few US communities and that all the progress of the 1990s has succeeded only in 'making things a little less awful' for bicyclists and pedestrians. Annual vehicle miles travelled in the United States grew by 29 % between 1990 and 2000, more than 42 000 people are still killed in

traffic crashes each year, and the percentage of people getting to work by foot and bicycle has declined to around 3 %[4]. The person in the street would not likely say that conditions for bicycling and walking had improved in the past decade. The story of the green modes in the United States is a little schizophrenic. On the one hand, great progress has been made and projects for the non-motorised modes that were unthinkable 15 years ago are now an everyday reality. On the other hand, nothing fundamental has changed in the way agencies plan for and implement transportation projects: the car is still king.

32.2 Background to US transport policy

Every time a US motorist fills their car with gasoline, he or she pays 18.5 cents of tax on every gallon to the federal government. All but a few cents of the tax are paid directly into a 'Highway Trust Fund' which is administered by the US Department of Transportation. Most of the money – approximately $30 billion annually – is then distributed to state governments according to formulae based on lane mileage, population and vehicle miles travelled, and is divided into a variety of spending programmes or categories based on national priorities. The whole process is governed – or authorised – by legislation passed by Congress every five to six years.

From the mid-1950s to 1990, the federal highway programme focused on building the 70 000 km interstate system that connects every major US city and state with limited access highways. Additional priorities included improving other major highways, upgrading bridges, maintaining farm-to-market roads, and building urban freeways and beltways (circumferential motorways). Little attention was paid to any other mode than the motor vehicle, although an increasing percentage of funds have gone to support urban transit systems since the early 1980s. The result is a transport system that is heavily dependent on private motor vehicles and trucks.

In 1990, when the US Congress began considering the next round of authorising legislation for the national highway programme the interstate system was largely complete. Attention was focused instead on what would succeed the interstate system and how the federal government should direct billions of dollars of investment each year. Suggestions ranged from scrapping the whole programme and turning the money over directly to the states, to redirecting the money towards maintenance of the existing system, and even to promoting a new system in which alternatives to the single-occupant vehicle could flourish.

32.3 The Inter-modal Surface Transportation Efficiency Act (ISTEA) – a breakthrough for bicycling and walking

The resulting legislation, hammered out by Congress in 1991, was the Intermodal Surface Transportation Efficiency Act, known as ISTEA ('ice tea'). A new vision of an intermodal transportation system was spelled out in a declaration of policy:

- It is the policy of the United States to develop a national inter-modal surface transportation system that is economically efficient and environmentally sound, provides the foundation for the nation to compete in the global economy, and will move people and goods in an energy-efficient manner.
- The national inter-modal surface transportation system shall consist of all forms of transportation in a unified, interconnected manner, including transportation systems of the future, to reduce energy consumption and air pollution while promoting economic development and supporting the nation's pre-eminent position in international commerce.[5]

The new law, coupled with a similar change in emphasis within the US Department of Transportation (as evidenced by the 1990 policy statement *Moving America*[6] and the 1994 National Bicycling and Walking Study[7]), heralded a period of great promise for the green modes. After decades of official neglect, the 'forgotten modes' were suddenly back on the agenda of state and local transportation agencies. The simple mention of bicycling and walking throughout the ISTEA legislation helped legitimise the two modes and make them an acceptable activity for transportation agencies to include in their regular activities.

32.3.1 Eligibility for funding

Before ISTEA, federal transportation funds were allocated to states in a rigid set of spending categories – the interstate system, the primary route system, farm-to-market roads, urban roads – overseen by the Federal Highway Administration (FHWA), which is part of the US Department of Transportation. Transit funding was handled with its own trust fund, administered by a separate agency, the Urban Mass Transit Administration. Bicycling and walking did not fit well in either area and consequently fell through the cracks. During the 1970s and 1980s more than 30 of the 50 state Departments of Transportation failed to spend even a single dollar on improving conditions for bicycling and walking. There was virtually no flexibility as to how the funds were spent.

The ISTEA broke down many of these practical barriers and gave states much greater freedom to fund their own priorities. Bicycling and walking became eligible activities in all the major funding categories – removing the excuse that 'we're not allowed to spend the money on bicycling and walking

projects'. Indeed, there is even greater flexibility in some programmes to spend the money on bicycling and walking projects: the Surface Transportation programme, for example, is primarily a construction programme, but can specifically be used for non-construction activities related to bicycling and walking.

32.3.2 Specific opportunities for bicycle/pedestrian funding

While the new law did not set aside any funds exclusively for non-motorised transportation investments, there were several funds that were clearly intended to create specific opportunities for increased funding. The Transportation Enhancement programme was established with ten per cent of states' Surface Transportation programme funds being allocated to projects that went beyond the narrow definition of a highway project and enhanced the travelling experience for all road users. Ten categories of enhancement activity were identified, two relating specifically to bicycling, walking and trail projects. Bicycle and pedestrian advocates have had considerable success in securing funding from this category. Now, every state is spending money on bicycling and walking and collectively they have spent half the available funds in this programme on bicycling and walking projects.

The Congestion Mitigation and Air Quality (CMAQ) Improvement programme was also created from scratch by ISTEA. The CMAQ programme was designed to focus investment in urban areas with poor air quality and fund projects that would reduce pollution and congestion. Bicycling and walking projects have been able to compete quite well for these funds in many urban areas, although less than five per cent of overall funds go to bicycling and walking projects. The cities of Chicago and Philadelphia, for example, have invested millions of dollars of their CMAQ funds in bicycle parking and bicycle lane networks.

32.3.3 Inclusion in the planning process

Prior to the passage of ISTEA, state Departments of Transportation were under no obligation to have a long-range transportation plan to guide their expenditure of hundreds of millions of dollars. Metropolitan areas have long had a requirement to develop such a plan but had not been given the power or financial control to implement them. The ISTEA changed that and required states to undertake a continuous, comprehensive transportation planning process which took into account a wide range of factors including energy policy, land-use, recreational travel, safety, connectivity, and inter-modalism. The plan was required to have a 20 year horizon and to incorporate similar plans drawn up by metropolitan planning organisations (MPOs) in the state. From this long-range plan, states and MPOs were required to adopt an annual or biannual work plan know as a Transportation Improvement Programme (TIP).

Bicycling and walking issues were one of the planning factors required by

ISTEA to be considered by states and MPOs. The FHWA and the Federal Transit Administration issued guidance on what the bicycle and pedestrian elements of these plans should contain and a training course was developed to teach planners how to implement this advice. A 1995 review of the bicycle and pedestrian plans developed under ISTEA found that while few agencies followed the suggested structure, the overwhelming majority of agencies did at least address bicycle and pedestrian issues – many for the very first time.[8]

32.3.4 Establishment of bicycle/pedestrian co-ordinator positions

One of the less heralded sections of ISTEA created a new requirement for state departments of transportation to have at least a part-time person designated as the state bicycle and pedestrian co-ordinator. The position was designed to provide at least one point of entry to the bicycling public to their state Department of Transport (DOT) and to ensure that there was at least one person within each agency watching out for bicycle and pedestrian issues and opportunities. For most state DOTs this was their first real commitment to bicycling and walking issues and even though the positions were often not full-time – most of the co-ordinators were given the title along with other existing or new responsibilities – they did indeed provide a focal point for activities within the agency.

32.3.5 Impact of ISTEA

The ISTEA expired in 1997, to be replaced by TEA-21. After 6 years in place, the level of investment in bicycling and walking had shot up from less than $10 million per year to more than $250 million per year. Dozens of detailed bicycle and pedestrian plans had been adopted along with hundreds of plans that mentioned bicycling and walking for the first time. In communities where the bicycle and/or pedestrian community was well organised, ISTEA enabled significant progress to be made; funding was available, projects were eligible, plans had to include the green modes, and there was a place at the table for bicycle and pedestrian transportation interests.

32.4 Transportation Equity Act for the twenty-first century (TEA-21) – continued progress for bicycling and walking

In early discussions of the re-authorisation of ISTEA, traditional highway interest groups were keen to roll back many of the provisions of ISTEA that they felt took ‘their money’ away from ‘real’ highway projects. The transportation enhancement programme was high on the list of ‘luxuries’ that were attacked, especially as Congress struggled to control huge budget deficits. As it turned out, by 1997–98 when Congress wrote the Transportation Equity Act for the twenty-first century, the economy was stronger, deficits

were declining, and transportation funding was successfully protected from 'diversion' to deficit reduction or other programms. Indeed, TEA-21 was authorised at a level of $217 billion over 6 years, almost 40 % more funding than ISTEA.[9] The basic structure of ISTEA was, therefore, left pretty much intact. All the major funding categories continued under the new law, including those that had funded the majority of bicycle and pedestrian projects and programmes. The details of the planning process were amended, but once again the basic structure remained in place: bicycling and walking still had their place at the table.

In addition to the fine-tuning of many of the programmes, there were perhaps four major developments in TEA-21 to move the bicycling and walking issue further forward.

32.4.1 Accommodating bicyclists and pedestrians in all transportation projects

The non-motorised community argued strongly in the re-authorisation debate that the US Congress should require all transportation projects funded with federal money to accommodate bicyclists and pedestrians. They were concerned that despite increased funding for bicycle and pedestrian projects, most transportation investment in roads and transit was failing to include any space or facilities to improve conditions for pedestrians and bicyclists (see Figs 32.1 and 32.2). In a compromise agreed between the US Department of Transport (USDOT), the US Congress and the bicycle community, USDOT was asked to 'develop guidance on the various approaches to accommodating bicycle and pedestrian travel' in co-operation with various professional bodies and user groups. The resulting USDOT policy statement on integrating bicycling and walking into transportation infrastructure, which was issued on 28 February 2000, incorporates three key principles:

1. a policy statement that bicycle and walking facilities will be incorporated into all transportation projects unless exceptional circumstances exist;
2. an approach to achieving this policy that has already worked in state and local agencies;
3. a series of action items that a public agency, professional association, or advocacy group can take to achieve the overriding goal of improving conditions for bicycling and walking.[10]

The policy document was based on the existing policies in Florida and Oregon. In both states, legislation requires that bicyclists and pedestrians be included in all transportation projects unless to do so would be contrary to public safety, the cost of establishing facilities would be excessively disproportionate (defined in the USDOT policy as exceeding 20 % of the cost of the overall project), or where there is a demonstrable absence of need. The public safety exception was replaced in the USDOT document by the phrase 'unless they are prohibited by law from using the roadway'.

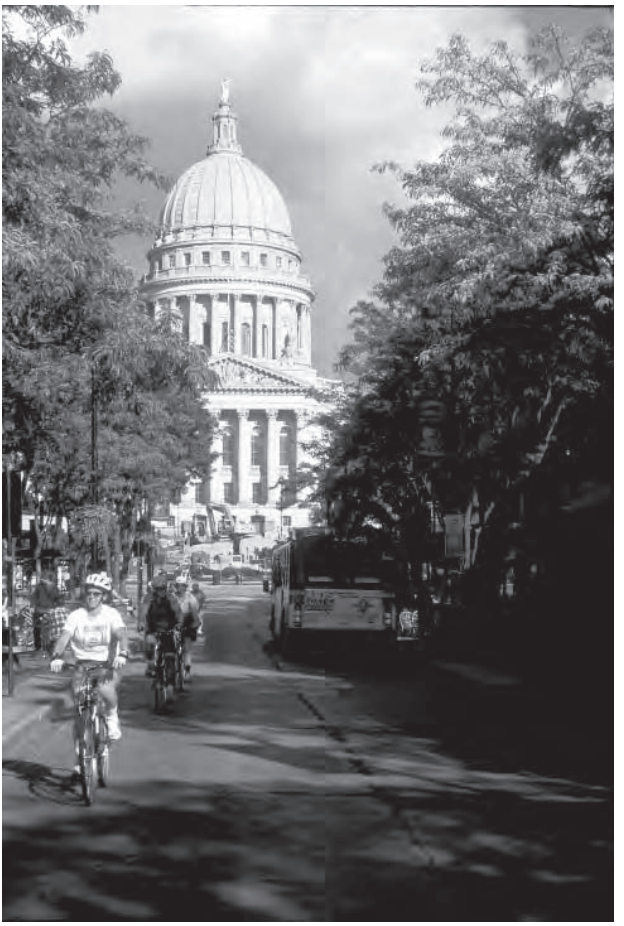

Fig. 32.1 Integrating cycling into the transport infrastructure: Madison, Wisconsin, USA.

The Federal Highway Administration does not develop and set design standards for roadways. They insist only that highways that comprise the National Highway System meet roadway design guidelines developed by the American Association of State Highway and Transportation Officials. Thus the immediate impact of the new bicycle and pedestrian design guidance was necessarily limited: it does not have the force of law or regulation, but provides strongly worded advice as to how state and local agencies should proceed. Several states, including California, Kentucky and Tennessee have subsequently adopted the guidance language.

32.4.2 Improved access to safety funding sources

The transportation enhancement programme was a tremendous boost to funding for bicycle and pedestrian projects under ISTEA. However, bicycle and

Fig. 32.2 Facilities for cyclists: cycle lanes in Chicago, USA.

pedestrian safety groups also wanted access to a funding programme of equivalent size to the enhancement programme (ten per cent of the Surface Transportation programme) known as the Hazard Elimination programme or the 'safety set-aside'. This programme targets highway construction funds on treating high crash locations with cost-effective solutions. While the funds had technically been available to spend on bicycle and pedestrian safety improvements, only a handful of projects were ever funded by states during the life of ISTEA or before. One issue was that bicycle and pedestrian crashes do not occur in large enough clusters for 'high crash locations' to rise to the top of the pile of funding requests.

The TEA-21 specifically identified bicycle and pedestrian safety countermeasures, trail safety improvements and traffic calming projects as being eligible activities under the hazard elimination programme. Data collection and analysis was made eligible. Still no states jumped at the chance to fund

non-motorised projects as part of this programme, even though bicyclists and pedestrians comprise 13 % of fatal traffic crash victims.[2]

A unique coalition of non-motorised, traffic safety, and school-related organisations (teachers, parents, unions) was, however, successful in persuading the California legislature to require that Caltrans, the California Department of Transportation, set aside one-third of their hazard elimination programme funds – $20 million a year – for safe routes to schools projects. A competitive grant programme was established and requests totalling more than $120 million came in during the first round of funding. The legislature subsequently voted to continue the programme after an initial two years of funding was complete. Advocates in Texas recently (2002) achieved similar success and are helping to implement a $3 million annual programme with the Texas Department of Transportation.

32.4.3 New funding sources

The TEA-21 did create a number of new, smaller funding programmes that are well-suited to funding improvements for bicycling and walking. These include:

- Transit Enhancements; 1 % of transit funding in urban areas with more than 200 000 population is set aside for transit enhancement projects including improving access to transit for bicyclists and pedestrians;
- Transportation, Community and System Preservation (TCSP) pilot programme; $25 million per year was made available, on a competitive basis, to projects exploring ways to link transportation, land-use, economic development, and other community issues;
- High Priority projects; almost $200 million of funds were earmarked by Members of Congress for individual bicycle or pedestrian projects.

None of these programmes has become a significant source of funding for the green modes, but each adds to the arsenal of available funding sources. Everything that a community might want to do to improve conditions for bicycling and walking is now eligible for one or more federal funding programmes (see Box 32.1).

32.4.4 Pedestrian and Bicycle Information Centre (PBIC)

The TEA-21 also set aside $500 000 per annum to support a clearing house of information on bicycle and pedestrian issues, to be run by a not-for-profit organisation with experience dealing with bicycling and walking programmes. The University of North Carolina's Highway Safety Research Centre and the Association of Pedestrian and Bicycle Professionals won the grant to establish and manage the centre, which can be visited at www.bicyclinginfo.org and/or www.walkinginfo.org. The PBIC has established a comprehensive web-based knowledge centre and has provided technical assistance to communities in a variety of ways:

Box 32.1

TEA-21 funding sources for bicycle and pedestrian projects

Bicycle and pedestrian projects are broadly eligible for funding from almost all the major federal-aid highway, transit, safety, and other programmes. Bicycle projects must be 'principally for transportation, rather than recreation purposes' and must be designed and located pursuant to the transportation plans required of states and Metropolitan Planning Organisations (MPOs).

Below are listed the TEA-21 funding sources for bicycle and pedestrian projects. Numbers in parentheses are the authorised spending levels over the six years of the legislation.

Federal-aid highway programme

- **National Highway System** funds may be used to construct bicycle transportation facilities and pedestrian walkways on land adjacent to any highway on the 155 000-mile National Highway System, which includes the 45 000-mile Interstate Highway system ($28.5 billion).
- **Surface Transportation Programme (STP)** funds may be used for either the construction of bicycle transportation facilities and pedestrian walkways, or non-construction projects (such as maps, brochures, and public service announcements) related to safe bicycle use and walking ($33.3 billion).
- Ten per cent of each state's annual STP funds are set aside for **Transportation Enhancement Activities (TEAs)**. The law provides a specific list of activities that are eligible TEAs and this includes 'provision of facilities for pedestrians and bicycles, provision of safety and educational activities for pedestrians and bicyclists,' and the 'preservation of abandoned railway corridors (including the conversion and use thereof for pedestrian and bicycle trials).'
- A further ten per cent of each state's STP funds is set aside for the **Hazard Elimination and Railway-Highway Crossing programmes**, which address bicycle and pedestrian safety issues. Each state is required to implement a Hazard Elimination programme to identify and correct locations that may constitute a danger to motorists, bicyclists, and pedestrians. Funds may be used for activities including a survey of hazardous locations and for projects on any publicly owned bicycle or pedestrian pathway or trail, or any safety-related

traffic calming measure. Improvements to railway/highway crossings 'shall take into account bicycle safety.'

- **Congestion Mitigation and Air Quality Improvement programme** funds may be used for either the construction of bicycle transportation facilities and pedestrian walkways, or non-construction projects (such as maps, brochures and public service announcements) related to safe bicycle use ($8.1 billion).
- **Recreational Trails** programme funds may be used for all kinds of trail projects. Of the funds apportioned to a state, 30 % must be used for motorised trail uses, 30 % for non-motorised trail uses, and 40 % for diverse trail uses (any combination) ($270 million).
- **High Priority projects and Designated Transportation Enhancement activities** identified by TEA-21 include numerous bicycle, pedestrian, trail, and traffic calming projects in communities throughout the country ($9.3 billion).

Federal Transit programme

- Title 49 USC (as amended by TEA-21) allows the **Urbanised Area Formula grants, Capital Investment grants and loans,** and **Formula Programme for Other than Urbanised Area** transit funds to be used for improving bicycle and pedestrian access to transit facilities and vehicles. Eligible activities include investments in 'pedestrian and bicycle access to a mass transportation facility' that establishes or enhances co-ordination between mass transportation and other transportation ($18 billion).
- TEA-21 also created a **Transit Enhancement Activity** programme with a one per cent set aside of Urbanised Area Formula grant funds designated for, among other things, pedestrian access and walkways, and 'bicycle access, including bicycle storage facilities and installing equipment for transporting bicycles on mass transportation vehicles'.

Highway Safety programmes

- Pedestrian and bicyclist safety remain priority areas for **State and Community Highway Safety grants**, funded by the Section 402 formula grant programme. A state is eligible for these grants by submitting a Performance Plan (establishing goals and performance measures for improving highway safety) and a Highway Safety Plan (describing activities to achieve those goals) ($932 million).

- providing fast access to federal and other research reports on bicycling and walking;
- supporting awareness-raising programmes such as the (international) Walk to School initiative;
- evaluating innovative bicycle and pedestrian treatments;
- creating a digital library of more than 2000 bicycling and walking images;
- providing direct technical assistance to advocates and agency staff;
- incubating a programme of 50 'walkability audits' in six metropolitan areas across the country;
- creating a Bikeability Checklist to assess the bicycle-friendliness of a community;
- developing online 'expert systems' to quickly link practitioners to effective countermeasures.

32.5 TEA-21 – obstacles to progress

After more than ten years of living with ISTEA and TEA-21, one can say with certainty that a great deal has happened to benefit bicycling and walking that would not have happened without them. The amount of funding spent on the green modes has increased by an order of magnitude or two. In communities across the country it is now quite common to read of multi-million dollar bike/pedestrian bridges being opened to span highways, waterways, or railroad tracks. Cities and states routinely invest millions in bike lane networks and lengthy trail projects. The city of Chicago will install its 8000th bike parking rack in 2002, all paid for with federal funds. The city of Portland, Oregon, opened the $35 million Eastbank Esplanade in 2001, a 2 mile long, downtown, riverfront pathway that floats in the Willamette River for part of its length, and crosses the river twice on major bridges.

However, after ten years, not only have ISTEA and TEA-21 failed to fundamentally change the direction of US transportation investment, many would argue that the green modes – including transit, telecommuting, ridesharing and other transportation demand management techniques – are actually worse off as a result of growing traffic volumes, increasing sprawl development, rising tension and incivility on the roads, and more hostile roadway design.

32.5.1 Less than one per cent of transportation funds go to the green modes

Almost $2 billion of combined ISTEA and TEA-21 funds have been spent on bicycle and pedestrian projects over the past ten years.[1] However, this is less than one per cent of the estimated $245 billion of federal transportation funding that has been spent during that same period. As mentioned earlier, bicycling and walking comprise approximately 3 % of journeys to work and

more than 6 % of all trips, and they comprise 13 % of traffic fatalities. Further, federal funding accounts for only one-fifth of overall transportation spending by government agencies in the United States – all units of government combined spent slightly more than $120 billion in 2000. Most of the federal funds spent at the state and local level have to be matched with up to 20 % of state or local funds, but beyond this state and local governments generally rely on federal funds for the majority of their bicycle and pedestrian improvements.

32.5.2 99 % of transportation funds go to other 'improvements'

If the remaining 99 % of ISTEA and TEA-21 funds had been spent on projects that integrated bicycling and walking into their planning, design, management, and operation, then it would not matter that so little of the funds were allocated to stand alone bicycle and pedestrian projects. However, this is not the case. In 1997, for example, all units of government combined spent $48.7 billion on highway capital outlays – and the federal government supplied more than 40 % of those funds. Of the $48.7 billion, 43 % was spent on system expansion (i.e., new roads, added lanes) and 47 % on system preservation (defined as reconstruction, rehabilitation, resurfacing etc., but not routine maintenance).[4]

This kind of system expansion and 'preservation' is usually described in terms of highway 'improvements' or 'upgrades' and yet this is rarely the case for the green modes. Widening a two-lane road to a five- or six-lane road, even with the addition of striped bike lanes and sidewalks, is frequently not an improvement for people wanting to bicycle or walk along the road, or for those trying to get across the new or expanded highway. Even safety improvements are frequently targeted only at motorists.

32.5.3 Bicycle and pedestrian projects are funded from too few programmes

Another failing of the ISTEA and TEA-21 promise is that bicycle and pedestrian projects are funded out of a small number of programmes that are still considered by many agencies to be non-mainstream activities. Approximately 75 % of ISTEA and TEA-21 funds spent on bicycling and walking come from the Transportation Enhancement programme, much of the remainder comes from the CMAQ programme, and the Recreational Trails programme. Almost none of the funds in the large National Highway System, Surface Transportation, Bridge, Hazard Elimination and Transit funding programmes are allocated to bicycle and pedestrian projects. Even the planning, research, safety education and other smaller funding programmes usually overlook bicycling and walking. This suggests that the green modes have yet to be fully integrated into the thinking of transportation agencies.

32.5.4 State DOTs remain in control of priorities

Although ISTEA and TEA-21 both attempted to promote greater co-operation among government agencies and a more inclusive public involvement process, the reality is that after ten years the powerful state Departments of Transportation remain firmly in control of the transportation planning process and funding decisions. By virtue of their size, influence and resources they also exert a powerful influence over planning, project selection, and roadway design standards at the local level. There are two particular reasons why this is not good for the green modes.

First, most bicycling and walking takes place in urban and suburban areas, at a very local level, over short distances. The safety, comfort and convenience of the two modes are determined by small-scale, localised factors – missing sidewalks; potholes; an inability to cross a major street, river, or railroad track; a lack of bike parking; signals that do not work – with which an agency addressing state-wide transportation issues cannot really deal adequately. The same is true of the metropolitan planning agencies that fund programmes and set priorities within urban areas. They are dealing with regional transportation issues and travel corridors that extend for miles, not spot improvements for pedestrians or bike parking racks on street corners. The ISTEA and TEA-21 funding programmes typically fund projects and not programmes – so fixing system-wide problems of bicycle or wheelchair access, or improving the safety of school travel city-wide, is much harder to fund than rebuilding a couple of miles of urban arterial street that serves 25 000 vehicles a day.

Second, the traditional focus of state DOTs has been, and remains, on travel outside the urban core. Vast sums of state DOT money have been poured into building ever-larger highways in the ever-expanding suburban and ex-urban communities surrounding US cities in a desperate attempt to keep up with the traffic growth emanating from failed or non-existent land-use policies. Most state DOT owned roads are rural or suburban and are not the roads on which the majority of bicycling and walking will ever take place. Indeed, because of the design standards used to construct most of those roads, bicycling and walking are effectively discouraged or prevented on most of them.

There are state DOTs that routinely accommodate bicyclists and pedestrians in their projects. Florida and Oregon have long been the standard-bearers in paving wide shoulders, striping bike lanes, providing sidewalks; New Jersey and Pennsylvania are slightly ahead of the curve now. The state DOT bicycle and pedestrian co-ordinators have certainly improved the attention that is given to bicycling and walking in their agencies. Yet the fact remains that most of what most state DOTs do with their TEA-21 funds makes life less safe, less pleasant, and less convenient for bicycling and walking.

32.6 Critical lessons from ISTEA and TEA-21

From this review and analysis of ISTEA and TEA-21, three critical lessons can be identified.

32.6.1 Funding is not the issue

For decades prior to the passage of ISTEA, efforts to improve conditions for bicycling and walking frequently foundered on the 'we don't have the money for that' or the 'we can't fund those projects with this money' excuse. The ISTEA and TEA-21 took away that excuse. Funds are available for virtually anything and everything that an agency might want to do to improve the lot of the green modes. The TEA-21 funds can be used for bike lanes, trails, sidewalks, accessible signals, bike-to-work campaigns, education programmes, safety literature, bike racks on buses, training programmes for engineers and planners, traffic calming, research, plans, bike parking, urban landscaping, and so on.

As we have learned, a sizeable amount of money has gone to those things. However, not only is the amount dwarfed by all that has been spent for car-related projects, but not all of the bicycle and pedestrian projects have been implemented well or in a timely fashion. Planners and engineers who are unfamiliar with the latest design guidelines have built inappropriate or poor facilities for the green modes. Agencies unfamiliar with managing bicycle and pedestrian projects have forced unnecessary reviews, impact statements, and other bureaucratic steps on implementing agencies, dragging out completion dates sometimes for years.

The Transportation Enhancement programme is a good case in point. State DOTs have, on average, spent only about 70 % of the available or authorised funding on these activities (compared to close to 100 % for the highway construction and reconstruction programmes). They complain that local project managers cannot handle the necessary paperwork, or have been unable to front the money for projects (federal transportation projects are reimbursable programmes: implementing agencies are reimbursed for work they have completed and not given the money up front to go and do the work). State and local agencies are either unaware of, or choose to ignore, the accepted guidelines on trail width and build 2m or 2.5m paths for two-way bicycle and pedestrian traffic. States require even the simplest bike parking installation to go through an environmental review worthy of a major highway project. Congress responded to these issues early on in ISTEA and provided states the flexibility to speed up project delivery in a variety of ways. Only a handful of the 50 states took advantage of those options.

Even though money is available, therefore, it is still necessary to have well-trained, knowledgeable professionals managing and implementing projects for the green modes. The US has generations of planners, engineers and other transportation professionals who have had no schooling or other formal training in accommodating bicyclists and pedestrians. In addition, policy-

makers above the technicians must encourage, promote and facilitate the use of available funds on the green modes.

32.6.2 Bicycle and pedestrian programme staff and advocates make a huge difference

The ISTEA and TEA-21 have worked well for the green modes in those communities where bicyclists and/or pedestrians are organised as a constituency and where state or local government has bicycle and pedestrian professionals on staff. Campaigners in California and Texas were responsible for securing safety funds for safe routes to schools initiatives; local advocates in Philadelphia and Chicago lobbied successfully for CMAQ funding for bike rack and bike lane programmes; and advocacy groups from Maine to Florida, Texas and Hawaii have worked with their state transportation agencies to train future generations of bicyclists.

The simple act of requiring each state DOT to have just one person with responsibility for bicycling and walking – often in an agency numbering several thousand employees – has been remarkably effective in most states in promoting a minimum level of attention to the green modes. Some states have gone much further and established non-motorised programmes with several staff and sizeable budgets.

32.6.3 Walking will eclipse bicycling

While much of the non-motorised language in ISTEA refers to both bicyclists and pedestrians, the real impetus for change came from the bicycle community. In 1990, there were no organised pedestrian advocacy groups. As the decade progressed, not only did walking advocacy groups begin to form (starting in Boston, Portland and Atlanta) but also many bicycle advocates and professionals began to realise the importance of walking and the extent to which the mode had been ignored. Walking is also easier to justify; the numbers are bigger and 'everyone walks'.

Two additional developments seem certain to ensure that walking will become a more powerful inspiration in the future for changing communities and shifting transportation priorities. First, the Americans with Disabilities Act (ADA) is a federal civil rights law that demands universal accessibility for people of all abilities to the transportation system (and all other aspects of life). Transportation agencies are slowly realising that providing sidewalks and crosswalks that are accessible is no longer an optional nicety but a legal requirement. Technical information on the design of sidewalks, crosswalks and trails for access is more readily available and will likely be adopted as a federal standard or regulation in 2003 or 2004.

Second, the public health community is becoming increasingly involved in the transportation planning and policy debate. As obesity, diabetes and other illnesses caused by a lack of physical activity reach epidemic proportions, so the realisation grows that routine daily exercise such as walking has

effectively been designed out of most people's lives because of the communities in which they live. Restoring the ability or opportunity to walk in one's community is going to be the cornerstone of a public health initiative comparable in ambition to that of discouraging smoking. While bicycling will also feature in this campaign, walking will undoubtedly dominate.

32.7 Conclusions

In 2002, after a decade of progress and opportunity, bicycling and walking are still marginal modes of transportation in all but a few cities in the United States. The green modes have yet to be fully embraced by transportation professionals and policy-makers, and are still perceived as 'special interest' activities that are not real or realistic transportation modes. There is a fundamental lack of belief that Americans will give up their cars and turn to bicycling and walking and/or transit, even though all the benefits of such a switch are well known and acknowledged.

The green modes have hit a glass ceiling. Under ISTEA and TEA-21 the two modes have been allowed to sit at the table and even eat a few morsels of food – but not at the expense of others feasting at that same table. We have made as much progress as we can without upsetting the established order. A new emphasis on linking transportation to public health, and making transportation responsible for meeting public health targets, could cause such an upset.

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33

Bicycle transport in the US: recent trends and policies

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33.1 Introduction

During the last quarter of the twentieth century, cycling increased significantly in a number of northern European countries. In Germany, bicycling's share of urban trips rose by half between 1972 and 1995, from 8 % to 12 % (Pucher, 1997). Similarly, cycling's share of urban trips in the late 1990s stood at 30 % in the Netherlands, 20 % in Denmark, and 10 % in Switzerland (Pucher, 1997). These modal shares are at least ten times higher than cycling's share of urban travel in the United States, which reached only 0.9 % in 1995 and appears stuck at around 1 % in 2002, despite a decade of efforts to improve conditions for bicycling.

Since passage of the federal Inter-modal Surface Transportation Efficiency Act (ISTEA) in 1991 and its successor, the 1998 Transportation Equity Act for the twenty-first century (TEA-21), funding of bicycling programmes in the US has increased dramatically. New bike paths have proliferated and most states and many cities now have programmes to facilitate bicycling, including bicycle co-ordinators in state departments of transportation (See Fig. 33.1).

Nevertheless, the remains all-powerful in American transport and culture. Notwithstanding frequent official expressions of support for bicycling, little has been done to induce motorists to respect cyclists' rights or to otherwise subvert driving as the dominant paradigm. The lack of a societal commitment to protect cyclists' rights of way and otherwise legitimise cycling is a severe impediment to increasing cycling in the US (Komanoff, 1997).

In this chapter progress in cycling in the United States over the past two decades is reviewed. Because public policies at the local level influence

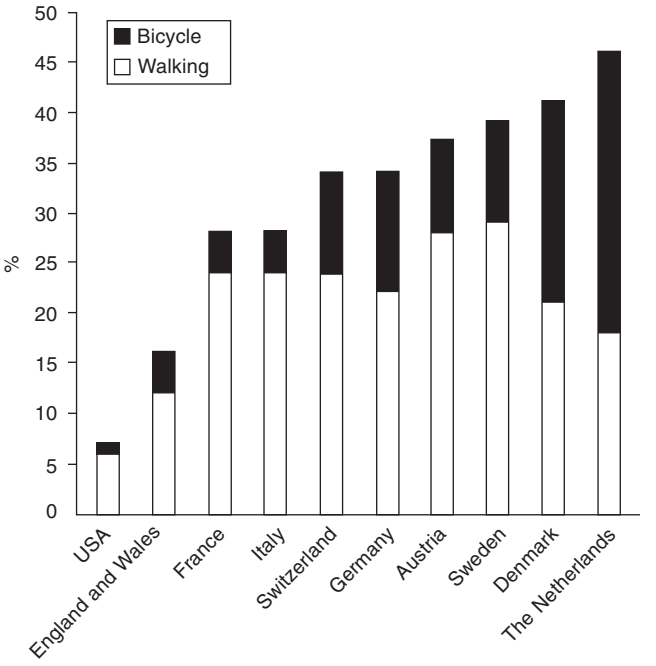

Fig. 33.1 Modal shares of walking and bicycling in urbanised areas of North America and Europe. Source: Pucher and Dijkstra (2000).

cycling, case studies are offered of three American cities: New York, Seattle, and Davis. Finally, the effectiveness of alternative policies to promote cycling is considered and an assessment is made of whether the US is poised for the kind of bicycling renaissance that is flowering in northern Europe.

33.2 Aggregate trends in bicycling

The most authoritative source of information on travel behaviour in the United States is the Nationwide Personal Transportation Survey (NPTS), which the US Department of Transportation has conducted periodically since 1969, and which has included bicycling since 1977. Over the 18 year period covered in Table 33.1, total bicycle trips approximately doubled and the percentage of trips by bike rose by half, from 0.6 % to 0.9 %. The NPTS data shown in Table 33.2 indicate that only nine per cent of bike trips in the US are work trips, while well over half are social or recreational. Even including trips for shopping, school and personal business, utilitarian trips account for less than half of American cycling. The percentages are reversed in the most cycling-oriented European countries. For example, in The Netherlands, 60–65 % of all bike trips are for utilitarian purposes (Welleman, 1997).

Table 33.1 Annual US bicycle trips and bicycle modal share, 1977–95

	1977	1983	1990	1995
Bicycle trips (millions)	1272	1792	1750	3141
Adjusted bicycle trips (millions)	1476	2078	2030	3141
Bicycle modal share, %	0.6	0.8	0.7	0.9
Auto modal share, %	83.9	85.0	87.1	89.3
Transit modal share, %	2.4	2.2	2.0	1.8
Walking modal share, %	9.3	8.5	7.2	5.5

Note: The 1995 data are not directly comparable to earlier years, due to changes to improve reporting of trips (e.g., use of travel diaries). 'Adjusted bicycle trips' increases the earlier figures by 16% to reduce the difference (Pickrell and Schimek, 1998). Note also that the NPTS excludes students living on campus, thus understating bike travel for all years. 2000 survey data were not available.
Source: US Department of Transportation (1994), Pickrell and Schimek (1998), tabulations by the authors from US Department of Transportation (1997).

Table 33.2 Bicycling by trip purpose, US, 1995

Trip purpose	% of all bicycle trips
Commuting to work	9.0
Shopping	12.7
Personal business	12.5
Social or recreational	57.0
School	8.8
All trips	100.0

Source: authors' calculations based on US Department of Transportation (1997).

Whereas the full spectrum of society cycles in Europe (Tolley, 1997), most cycling in America is by children and young men. Cycling's modal share is highest among ages 5–15, at 3.3 %, but falls for each successive age group and is just 0.2 % for those 65 and over. For all ages, cycling's modal split is 1.3 % for men but only 0.5 % for women.

Cycling in the US is also inversely correlated with income. Its modal share is 3 times higher among households earning less than $15 000 than for households earning more than $80 000. The poor are less likely to own a car and low-income households are also concentrated in central cities, where trips tend to be shorter and thus easier to cycle. While high-income households may choose to cycle for fun or exercise, most can afford the automotive alternative.

33.3 Government provision of bicycle facilities

Prior to 1990, US states or municipalities spent little money specifically to improve bicycling conditions (Clarke, 1997). The few exceptions were programmes in cities with large and vocal cycling constituencies, mainly

university towns. This changed dramatically with the passage of ISTEA in 1991. Over the 6 year life of ISTEA (1992–97), $972 million of federal funds were programmed for bicycle projects, an annual spending rate some 80 times greater than the $41 million in federal funds for pedestrian and bicycling projects combined in the 20 years previously Most (86 %) of the bicycling expenditures under ISTEA were for off-highway paths and trails, most of which are in rural areas and are used primarily for recreational cycling rather than for utilitarian trips like commuting, shopping, or school. Only 13 % of the ISTEA bicycle funds went for on-road bicycle facilities, and just 1 % for bike parking or connections to public transit (Rails-to-Trails Conservancy, 1998).

The federal transportation legislation of 1998, TEA-21, extends and strengthens most of the bicycling provisions of ISTEA. Nevertheless, in the United States it is still not standard practice for highway designers to accommodate bicyclists' needs, even in new or rebuilt roadway facilities (Schimek, 1996). The TEA-21 only vaguely requires that bicycle facilities 'shall be considered, where appropriate, in conjunction with all new construction and reconstruction of transportation facilities.' Similarly, while TEA-21 requires development of highway design standards with regard to cycling, it does not mandate their use.

33.4 Case studies

It is largely at the municipal level that bicycling moves forward in the United States, whether through implementation of national planning or funding mandates, or through vigorous activism by local officials and advocates, or both. Three American cities are selected in this chapter for detailed analysis. New York and Seattle are major cities in which cycling appears to have increased over the past decade, whereas Davis is a small, bicycling-oriented city in California.

High-density environments tend to attract utilitarian cycling because more destinations are within easy cycling distance. Conversely, heavy traffic often discourages less experienced cyclists. College students have a much higher rate of cycling than the general population, due to factors such as low incomes, limited campus parking, preponderance of short trips, and the appeal of cycling's casualness and sportiness. Indeed, one statistical analysis of US cycling levels found the percentage of college students to be by far the most important explanatory variable (Baltes, 1996). The high cycling rate in Davis conforms to this finding.

33.4.1 New York City

New York (population: eight million) could be America's leading cycling city. The terrain is relatively flat, the streets are well lit and destinations are

packed closely together within easy cycling distance. The low cost and casualness of cycling suit the city's many artists and freelancers, and an extensive transit system lets New Yorkers eschew automobiles for the 'green modes' – bike, walking and public transport. Indeed, traffic congestion and limited parking make driving in New York costly and difficult, providing incentives to use alternative modes.

Yet anyone venturing onto New York's streets on two wheels confronts a legion of obstacles. Road surfaces are torn and treacherous, bike paths on bridges connecting Manhattan to the other boroughs are substandard and periodically closed, and many office buildings refuse entry to commuter bikes. Worst of all, traffic is heavy and cyclists must constantly battle for a place on the road. Around 20 cyclists are killed in traffic each year, and hundreds more are seriously injured (Komanoff and Smith, 2000).

With an estimated 100 000 bike travellers on a typical day (Transportation Alternatives, 1998), the city's regular cycling populace outstrips that of any other American city, but is still just two per cent of adult residents. Several thousand of the daily cyclists are hired riders – bike messengers conveying business parcels or cyclists delivering take-away meals. Their trips and those of bicycle commuters are concentrated in Manhattan. Surveys taken at the beginning of the 1990s measured per-avenue mid-Manhattan cycling volumes of 125–200 per hour, accounting for an average of 8.6 % of vehicles (Transportation Alternatives, 1993).

Yet even this impressive mode share does not fully reflect the interest in cycle commuting. In a 1990 survey, half of 700 office workers living within 10 miles of their job said they would bike to work if provided with safe lanes, secure parking and washing facilities (Transportation Alternatives, 1993). Even allowing for exaggeration or selection bias, the survey is indicative of pent-up desire for utilitarian cycling in New York City.

The key to a bicycle-friendly New York would be a network of on-street bike lanes offering respite from cars. But the entrenched policy of maximising street space for automobiles has made appropriating vehicle lanes for bicycles politically daunting. Currently, only 128 km of streets – scarcely more than 1 % of the city's 10 000 km street network – have bicycle lanes, although off-street paths constitute an additional 192 km (Transportation Alternatives 2002).

Still, the street network provides a modicum of room for cycling. Kerbside lanes on most Manhattan avenues are extra wide and some side streets function as one wide lane. Although pervasive double-parking constantly forces cyclists to change lanes, moving vehicles often yield to cyclists, particularly faster riders. Elements of an eventual 40 km waterfront bikeway encircling Manhattan are in place, including a very popular Hudson River bike path. A city bike racks programme has installed several thousand bicycle parking spaces on sidewalks, although in many areas cyclists still must lock to parking meters, construction scaffolding and other street furniture.

However, cyclists remain politically marginal and cycling progress is

piecemeal at best. When cycling fatalities unexpectedly doubled several years ago, officials reflexively blamed cyclists for the upsurge in deaths, even though a case-by-case analysis by cycling advocates indicated that motorists were usually at fault (Komanoff and Smith, 2000). In 2002 a new local law made it illegal for adult cyclists to ride on the sidewalk, regardless of speed or circumstance. The vision of bicycles humanising and liberating New York remains the utopian dream of embattled cycle advocates. Even in America's least car-dependent city, the dominance of pro-auto policies consigns cycling to the fringe.

33.4.2 Seattle

Notwithstanding its damp climate and hilly terrain, *Bicycling* magazine has twice rated Seattle 'best bicycling city', and cycling appears to be more widespread there than in any other major American city. Surveys show that 16 % of Seattle's 560 000 residents cycle at least 2 days a week and another 20 % ride at least occasionally, with an overall commuting modal share of 2.3 % (City of Seattle, 1998).

City government actively encourages cycling. Seattle's Urban Trails System includes 45 km of bike paths, 24 km of on-street bike lanes and 145 km of signed bike routes with wide kerb lanes or shoulders, and an additional 68 km of paths, lanes and routes was recently under development (Lagerwey, personal communication, 1998). Through proactive programmes such as resurfacing, pothole patching, kerb lane widening, drain grate replacement, better signage, lane striping, bike-activated traffic signals and free bike-route maps, Seattle is working to make all roads accommodating to bikes (City of Seattle, 1998). The Spot Improvement programme circulates postcard forms to cyclists to pinpoint road and path maintenance needs.

Another Seattle innovation, police bicycle patrols, started with a handful of officers in 1987 and now includes dozens of bike police and has been adopted by several thousand US towns and cities. Seattle also abounds in bike racks and bike–bus connections. From 1993 to 1997, the city installed 1622 bike racks downtown and in neighbourhood business districts. All city buses have two-bike external mounts, and bicycle–bus trips exceed 300 000 annually.

Since 1977, Seattle bicycling projects and funding priorities have been reviewed by a Bicycle Advisory Board representing local cycling advocacy groups rooted in the region's outdoor-adventure culture. The Cascade Bicycle Club and the Bicycle Alliance of Washington publicise cycling and generate community support through mass events such as Bike to Work Day. Both groups also lobby for cycle-friendly transport policies.

Naturally, Seattle's wet weather and hilly topography deter some residents. On rainy days utilitarian cycling falls by 45 %, and recreational cycling by 80 % (Washington State Transportation Commission, 1995). Nevertheless, Seattle remains a model among major US cities for policies to encourage bicycling.

33.4.3 Davis, California

Davis, a small city a dozen miles west of Sacramento, is America's most bicycle-oriented municipality. As a university town with nearly ideal year-round cycling weather, Davis is well disposed to be bicycle-friendly. Both the city of 52 000 and the University of California campus, with 20 000 students, are unique for their high levels of bicycling, the quality and completeness of their cycling infrastructure and the extent to which cycling is now ingrained in their identity.

Bicycle facilities include thousands of parking racks serving virtually all stores, government offices and other public places; 56 km of off-street bike paths; another 56 km of wide on-street bike lanes on 80 % of arterials and collector streets; and 11 grade-separated bike bridges and tunnels crossing expressways and other major roads. Many Davis neighbourhoods are built around a network of superbly maintained greenways that provide recreation and transportation alike and foster children's independent mobility (Bicycle Federation of America, 1995).

More than 20 % of all trips in Davis are by bike and many of these are with or by children. The city dispensed with school buses years ago, so young people reach school by bike or on foot. Bike buggies or trailers hauling children and groceries are as common a sight in Davis as are ordinary bikes in some cities.

The centrally situated University of California campus is even more bicycle-oriented, with half of all trips made by bicycle and most of the remainder on foot. The core area was closed to private car traffic in the mid-1960s and all campus roads have wide, clearly marked bike lanes. Every building sports clusters of bike racks, totalling 15 000 campus-wide. Roundabouts allow intersecting streams of cyclists to cross safely. Indicative of the care given to cycling infrastructure, different radii were field-tested in the 1970s to determine the optimal geometry prior to construction (Takemoto-Weerts, personal communication, 1996).

Davis city and campus resemble the best cycling cities and towns of northern Europe, not just in high cycling percentages but in attitude and custom. Cyclists observe traffic laws and drivers keep out of bike lanes and defer to bike riders' right-of-way. Both the city and campus police enforce traffic laws applying to cyclists and offer optional traffic safety lectures in lieu of payment of traffic fines.

In Davis, bike riders are neither eccentrics nor enthusiasts, they are ordinary people riding bicycles. The campus and surrounding city prove that even in the car-dependent USA, a genuine cycling infrastructure can attract and sustain high levels of use.

33.5 Factors inhibiting cycling in the US

We have established that cycling has increased in the US over the past two decades, both in the aggregate and for four case study cities. Yet, despite the

increases, the share of total trips by bike in the US still stands at only about one per cent, far lower than in most European countries. Why is bicycling still a 'fringe mode' (Gordon and Richardson, 1998) in the United States? Below are summarised eight key factors.

33.5.1 Public attitude and cultural differences

Culture, custom and habit are important. While the other factors listed below help explain which forms of travel become widespread and thus considered 'normal', countries with unbroken traditions of utilitarian cycling have an easier time maintaining that tradition. Where cycling is viewed as normal, people consider doing it when it is convenient and they have access to the necessary equipment and knowledge. Similarly, motorists exhibit more respect toward cyclists, partly because they are more likely to cycle themselves or know others who do. In general, where there are few bicyclists, cycling is considered abnormal and this climate tends to be self-perpetuating.

33.5.2 Public image

There is no single image of bicycling in America, but a multiplicity of perceptions dependent upon the type of cycling and the context in which it is viewed. Recreational cycling has a youthful, vigorous image since it is associated with sport and fitness; some car adverts even feature recreational cyclists. Bicycling as a whole also has a positive environmental image, thanks to zero air pollution, negligible noise and minimal energy usage. On the other hand, cyclists suffer from a renegade image associated with disobedience of traffic laws, and a pervasive sense of cyclists as an alien presence on roads intended for cars. Indeed, the various images of cycling are so heavily determined in relation to automobiles that utilitarian cyclists are variously seen as too poor to own a car, 'anti-auto,' eccentric, or deviant. The perceptions of cycling as lying outside the mainstream of American life discourage bicycle use.

33.5.3 City size and density

Small, compact cities are probably more amenable to cycling since more destinations are accessible within a short bike ride, motor traffic volumes are lower and there are fewer obstacles such as expressways and bridges. Indeed, with the exceptions of Amsterdam and Copenhagen, no very large city (one million inhabitants or greater) in either Europe or America has bike use exceeding ten per cent of trips. Europe has many more small, dense cities where biking is convenient for reaching destinations.

33.5.4 Cost of car use and public transport

Travel cost, speed and convenience have a crucial impact on modal choice. In the US, low fuel taxes, few road tolls, and ubiquitous free parking make

auto use almost irresistible, even for short trips that could be walked or cycled. Not only are road tolls, taxes and fees far higher in Europe, but the extensive availability of transit makes car ownership less essential, thus reducing car ownership and increasing the tendency to use bicycles for utilitarian trips.

33.5.5 Income

Car ownership is highly correlated with rising incomes. This helps explain why university students are more likely to cycle and suggests that the bike share of travel should decrease over time as countries get richer and an ever-larger share of the population can afford cars. This generalisation does not always hold, however. Denmark, The Netherlands and Germany, among the wealthiest countries in the world, have high bike modal shares.

33.5.6 Climate

Cycling levels are obviously affected by climate. Two case study cities with relatively high levels of cycling (Davis and Seattle) enjoy mild winters and, in the former case, little rain. The extreme heat and humidity of summers in the southern United States clearly discourage cycling there. Yet the effect of climate on cycling may be exaggerated. Despite frequent rain and drizzle, northern Europe has far higher cycling levels than dry and sunny southern Europe.

33.5.7 Danger

Around 800 cyclists are killed and 500 000 injured annually in the United States (NHTSA, 1998). A bike ride in the United States is over ten times more likely to result in death than a cycling trip in Germany or The Netherlands (see Fig. 33.2). Not surprisingly, the prospect of accident and injury is a major obstacle to bicycling in the US.

Moreover, the elevated risk of cycling is compounded by cultural attitudes that attribute cycling accidents to the supposedly intrinsic perils of bicycles, unlike motorist casualties, which are rarely associated with the idea that driving is dangerous (Komanoff, 1997). From there it is a short step to blaming cyclists for their own peril, an attitude that permeates the reactions of everyone from police and courts to the cyclist's own family and friends and contributes to cyclists' marginal status.

Although most US cycling crashes do not involve motor vehicles (Rivara *et al.*, 1996; Tinsworth *et al.*, 1993), collisions with cars or trucks account for well over 90 % of cycling fatalities, and 95 % among children (Youth Bicycle Education Network, 1998). For this reason, bicycle safety campaigns in the US have focused on bicycle helmet use, especially among children. In contrast, bicycle safety in Europe is promoted more holistically, as part of a policy to

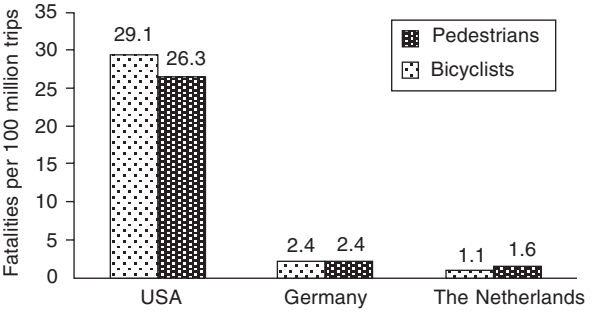

Fig. 33.2 Fatality rates per 100 million trips by pedestrians and bicyclists, 1995. Source: Pucher and Dijkstra (2000).

encourage widespread cycling and universal road safety. As enumerated by Pucher and Dijkstra (2000), Germany and The Netherlands promote cycling *and* safety through provision of elaborate and well-maintained cycling infrastructure, traffic-calming of residential neighbourhoods, streets design-oriented to cycling and walking rather than motor traffic, restrictions on automobile use, extensive traffic education, and strict adherence to traffic regulations.

These policies are mutually reinforcing. First, they encourage broad participation in cycling which strengthens support for maintaining and expanding the policies. With cycling so widespread, drivers are more inclined to relate empathically to cyclists rather than dismiss them as aberrations. The more that cyclists become a feature of the road environment, the harder it is for drivers to ignore them. These 'feedback loops' help keep cycling levels high in northern Europe, but they hint at the difficulty of 'jump-starting' cycling from its low participation rates in the US – a matter taken up below.

33.5.8 Cycling infrastructure

Unquestionably, separate bike lanes and paths for cyclists, together with parking facilities and transit links, make cycling more attractive to non-cyclists. Such facilities may be more of a response to increased cycling rather than its cause. Nevertheless, every European city with high cycling levels has an extensive route system, including separate bike paths and lanes as well as general street use in traffic-calmed neighbourhoods.

33.6 Steps to increase cycling in the US

Below are seven proposals to make cycling more widespread in the United States.

33.6.1 Increase cost of auto use

Probably the most effective way to increase bicycling in the USA would be to discourage auto use by increasing its marginal cost, particularly for short trips that are both underpriced for driving and most amenable to cycling. Insofar as it has proven near-impossible to raise fuel taxes, a promising approach may be to restructure road taxes and auto insurance to shift lump-sum charges into marginal use fees, thus providing positive incentives to shorten trips and make greater use of non-auto modes (Litman *et al*., 1998).

33.6.2 Clarify cyclists' legal rights

To a great extent, cyclists in the United States operate outside the prevailing system of traffic governance. Motorists and even police often are not fully cognisant of cyclists' right to use ordinary roads, and there is scant appreciation of the vulnerability cyclists feel when autos impinge too closely. However difficult it may be, establishing motorists' accountability for their actions toward cyclists is crucial to improving bicycling safety and encouraging cycling. A key first step, recently urged by the Toronto regional coroner, after a major study of cycling casualties, would be to grant cyclists precedence over motor vehicles where both are vying for the same road space and neither clearly has right of way over the other (Lucas, 1998). With their preferential right of way established in law, cyclists might improve their adherence to traffic laws, leading in turn to greater consideration from motorists in a reinforcing process of mutual respect.

33.6.3 Expand bicycle facilities

Separate bike paths and lanes are not a panacea for making cycling easier and safer. Nevertheless, rail trails and mixed-use greenway paths have increased recreational bicycling, and strategically located cut-through paths (as in Davis) can reduce trip times and thus encourage utilitarian cycling as well. Separate paths and lanes are especially important for those unable or unwilling to do battle with cars for space on streets, particularly those whose mental or physical conditions limit their capacity to negotiate heavy traffic safely. Without them, cycling is likely to remain the province of those who are trained, fit and daring enough to navigate busy traffic on city streets.

33.6.4 Make all roads accessible to bikes

More than other countries, the United States must rely heavily on the general road network for bicycling. While some American cities have bike lanes and paths that link up to some extent, none has a complete route network approaching that in virtually every Dutch, Danish and German city and throughout the countryside, with official route designations, signage and maps. A fundamental strategy to make America more accessible to bikes

must be to improve roads through wider kerbside lanes and shoulders, pothole patching, clear lane striping, and bike-activated traffic signals, while deterring motorist behaviour that infringes upon cyclists' legal right-of-way. Seattle's and Davis' efforts to improve the road infrastructure are good models, but no US jurisdiction has taken the further step of inculcating motorist responsibility for cyclist safety.

33.6.5 Hold special promotions

Bike-to-work weeks and employer-based promotions appear to be helpful in inducing Americans to try – and then continue – cycling for transportation. Similarly, large-scale rides ranging from recreational and charity events to monthly 'Critical Mass' rides in San Francisco and other cities help build cyclist confidence and generate mutual support and enthusiasm for cycling. In some cases such rides have also focused public attention on the needs of cyclists and helped engender cycle-friendly public policies.

33.6.6 Link cycling to well-being

Numerous studies have documented the health benefits of regular exercise, and physical inactivity has come to be seen as a major cause of premature death in industrial societies, even rivalling the effects of tobacco. Ironically, cycling, a potentially ideal, low-cost way of getting that activity, has been linked in the American mind to risk-taking and danger, in part by health-based helmet promotions that implicitly link cycling to danger. The British Medical Association's finding that cardiovascular-related gains to longevity from cycling far outweigh collision risks, though widely reported in Europe, is little known in the USA (BMA, 1992). Holistic and proactive efforts by the health community and efforts such as the State of California's to integrate routine physical activity into daily life by making physical environments more accessible to cyclists (Seeley, 1998) could boost cycling by casting it as a healthy choice.

33.6.7 Broaden and intensify political action

Political action is essential to bring about changes in public policy to encourage cycling (Wachs, 1998). In many parts of the United States, cyclists are already well-organised and have learned to wield political clout to win funding for cycling facilities. Nevertheless, cycling groups will have to continue to exert pressure to maintain and improve the cycling infrastructure against the threat of prohibitions (e.g., from bridge sidepaths) or banishment to substandard facilities. Cyclists will also need to open up another front: inducing police and courts to enforce the rights of bicyclists to use public roads and to curb driving privileges of motorists who violate those rights.

33.7 Prospects for bicycling in the US

With the right set of public policies, bicycling in the United States could increase dramatically. As noted by both Wachs (1998) and Gordon and Richardson (1998), to date there has not been sufficient political support to pass and implement those policies. So far, only the easiest no-conflict measures have been implemented; most new US bike paths and lanes do not directly compete with auto use. By contrast, many European cities have implemented policies that sharply restrict auto use in favour of walking and bicycling, especially in city centres (Pucher, 1997; Pucher and Dijkstra, 2000)

German, Dutch and Danish cities give cyclists priority on certain streets and intersections and routinely employ 'advanced' green lights and traffic-calmed streets. Some one-way streets have been made two-way for bicyclists and cyclists are exempted from many turn restrictions on cars. Some European cities have re-allocated car parking space to bike lanes or bike parking, not just to enable cycling but to discourage auto use. Enacting such measures has taken concerted political pressure, even in cities where 20 % of the populace cycles regularly.

Such auto-restrictive initiatives do not yet appear politically feasible in America. Too many Americans drive cars (and believe they would be hurt by such measures), and those who presently bicycle (and feel they would benefit enough to fight for such measures) are too few.

It is possible to imagine a deus ex machina giving a strong boost to cycling in America – perhaps an oil shock, or a cultural or style change toward bikes and away from cars, or ascendancy of a charismatic politician closely identified with cycling. Unfortunately, the 11 September 2001 attacks on New York and Washington seem only to have reinforced Americans' insistence on unfettered usage of automobiles and petroleum.

The likely scenario is a slow, painstaking progress: modest extensions and improvements in separate bicycle facilities, even more modest improvements in roadway design, and isolated instances of effective enforcement of cyclist rights to use public roads. Those measures may produce significant growth in bicycling in those cities that implement them. Overall, they will not produce a bicycling boom, unless the visible success of cycling enhancements in one or two major cities attracts imitators elsewhere.

33.8 Acknowledgements

An earlier, longer version of this chapter, co-authored with Paul Schimek, appeared in *Transportation Research* Part A 33 (1999) 625–54.

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34

Planning for recreational cycling in the UK

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34.1 Introduction

Throughout most of the twentieth century, recreational cycling has been an important component of rural tourism in the United Kingdom. This is true of many European countries. Therefore, it is not surprising that cycling, alongside walking and the railways, is depicted in a rich destination iconography dating from the early decades. However, as with utilitarian cycling in the UK, casual leisure and cycle touring declined in the 1970s as traffic growth accelerated and transport and tourism policy gave preference to access by car. This is in contrast to many other north European countries where it continued to be developed. As a result, despite a revival of interest in the 1980s and again in the mid-1990s in the UK the overall level of cycling for recreational purposes is lower than many north European destinations.

Thus, in 1996, when the central government launched a National Cycling Strategy with an aim of bringing about a 'cultural change for cycling' there was a potential impetus to encourage recreational cycling too (Department of Transport, 1996: 2). However, despite leisure and recreation taking a more central position in post-modern society, the opportunity to enhance recreational opportunities was not pivotal to this strategy (Lumsdon, 1997). Recreational cycling was assigned to an appendix of the main document of the National Cycling Strategy (NCS). It was explained as follows:

> . . . [it] has great potential for growth, it can be a stimulus to tourism, it is a high-quality way to enjoy the countryside and a good way to introduce people to cycling for everyday transport needs. To encourage leisure cycling there need to be small-scale improvements, especially near where people live, followed by better signposting, marketing and

> information. Flagship leisure routes, using quiet roads or disused railway paths, can increase the profile and boost leisure cycling in town and countryside (Department of Transport, 1996: 13).

A note of interest is that the statement refers not only to 'flagship leisure routes' for cycle tourism, usually associated with short breaks and longer distance cycle touring, but also the concept of recreational cycling near to home. In either context a recreational journey is defined as a discretionary trip where the journey purpose is associated with relaxation and enjoyment of the outdoors and involves the development of physical and mental skills.

However, there has also been a distinct lack of interest in recent decades within the tourism sector with regard to recreational cycling. The position is changing as, in recent years, several tourism boards have commissioned major studies of cycle tourism and are repositioning cycling as a major activity alongside walking at the destination. Despite this resurgence of interest, the relative importance of non-motorised transport as part of the tourism or recreational experience has been, for the most part, underestimated in many tourism studies. Whilst there has been a focus on greenways and trails in the North American literature, the extent to which walking and cycling form an integral part of the recreational and tourism experience in other contexts, such as visiting historic quarters, local countryside parks or shopping areas has been less well explored (Page, 1999). Furthermore, there has been a lack of data on 'near to home' walking and cycling recreational trips and what could be described as locally based tourism. A locally focused tourism economy is one which places emphasis on the importance of near markets including residents from the area and the VFR (visiting friends and relatives) market segment.

This chapter explores the concept of 'near to home' cycle recreation within the overall context of sustainable tourism development. It focuses on a major sustainable development project, the National Cycle Network (NCN), which was developed during the 1990s. The scheme was progressed by Sustrans, the sustainable transport charity, which was given a capital grant of over £43 million (€71.7 million) from the Millennium Commission in 1995. The purpose of the grant was to progress a network of routes throughout the UK that would encourage cycling and walking. The NCN was developed in conjunction with several hundred partners including landowners, such as Forest Enterprise and British Waterways, local governments and a range of non-governmental organisations such as The National Trust, and individual supporters. Therefore, during the period between 1995 and 2000, the £43 million grant stimulated an additional financial commitment amounting to a total expenditure of £211 million (€352 million) from this wide range of stakeholders. The first 8000 kilometres of the NCN was launched in the year 2000 with a commitment to maintain and upgrade sections wherever resources were available. A second stage of development aims to double the size of the network by 2005 and work continues on this at present.

The NCN comprises an amalgam of traffic free paths and quiet or traffic

calmed roads which usually have a very low vehicle traffic count per day. Approximately one-third of the NCN is traffic-free and this includes railway paths, seaside promenades, riverside and canal towpath routes. These tend to be the most popular sections in that they overcome the major barrier to casual cycling, the fear of traffic. The other two-thirds of the network use minor roads. The network is designed on a basis of a common framework of standards in terms of crossings, surfaces, signing and other features. It is managed and maintained by a range of organisations and there are over 1300 volunteer rangers who also assist Sustrans in this process.

34.2 Policy framework

In 1998 the Government published the Parliamentary White Paper *A New Deal for Transport, Better for Everyone* (DETR, 1998) which endorsed both the National Cycling Strategy and the National Cycle Network. Furthermore, in 1999, the Government published a policy paper on tourism entitled *Tomorrow's Tourism* (DCMS, 1999). This offered encouragement to local government to encourage sustainable tourism development. More specifically, it reinforced the concept of encouraging non-motorised transport not only to the destination but also while at a destination. This was considered to be an integral dimension of recreational and tourism development (DETR, 2001). It is within this broad framework that the development of the NCN has taken place. The prime aim of the network is to encourage everyday non-motorised trips for all purposes. Thus, it is important to note that the NCN was conceived as a transport facility and is designed as such.

Given the importance of policy initiatives which seek to encourage short cycle trips from home, not involving other modes of transport, the network has been designed specifically to penetrate central urban zones as well as providing access between towns and countryside. This core element of design means that the NCN has been used to stimulate the development of more finely meshed networks in urban areas which provide safe routes to schools, hospitals and transport terminals. However, the NCN also links towns throughout the UK and in this context many routes pass through areas of high scenic quality or near to visitor attractions which are appealing to those seeking recreation or cycle touring. In some cases, such as the C2C route across the northern Pennines, the NCN has become a visitor attraction in its own right, in a similar manner to a national walking trail. Nevertheless, the NCN is, for the most part, a multi-purpose sustainable transport network.

34.3 The studies

In 1998 Sustrans introduced a route monitoring exercise spanning the network. Since then a survey has been undertaken on an annual basis, the research

methods having been refined since 1999. The aim of the NCN Route Usage Programme is to measure the extent to which the network provides the benefits anticipated in the early years of design, namely to reduce traffic, enhance safety of travel and encourage improvement to health as well as to stimulate local economies. This chapter presents some of the findings from the NCN 2001 survey and a complementary survey of recreational users on the Celtic and Taff trails in Wales undertaken in the same year.

The Sustrans monitoring exercise involves a sample of route users covering four different days. These include weekdays and weekends during the school term time and during the vacation period in late summer and early autumn. The network was observed at 22 sites and on each day a 12 hour period survey was conducted from 0700 hours on the chosen four days. Surveyors recorded all users and were instructed to approach every next walker or cyclist in order to conduct a face-to-face interview. In 2001, over 30 504 users were counted during the four days of surveying and over 3400 interviews were completed and processed using an SPSS computer analysis package. The network survey showed an overall increase in trips of three per cent on the NCN from the previous year, a figure which stands in contrast to the national travel statistics, which recorded a two per cent decrease in the number of cycle trips on highways.

The survey elicited a number of more specific findings regarding the use of the network with regard to walking and cycling trips. For example, the gender balance of users is uneven with a breakdown of 63 % males and 37 % females. There is a wide age spread but over 50 % of users are over 45 years of age reflecting a skewed distribution. In this connection it is important to note that 20 % of users are retired. The split between functional and recreational trips is also asymmetrical. Recreation accounts for 70 % of all trips whilst functional trips account for the remaining 30 %. This aggregate percentage masks a wide variation across survey sites. The average distance travelled per cycle trip was 19 km in comparison to walking at 4 km. Inexperienced cyclists accounted for approximately 25 % of all users regardless of type of trip. The implication is that the NCN attracts cyclists who would otherwise not cycle on highways although this assumption has yet to be proven. In this respect, it could be inferred that the NCN is a training zone where cyclists gain experience prior to making other trips.

Recreational trips were recorded at all survey sites on the NCN but those sections which exhibit tourism appeal are likely to attract higher levels of recreational use. For example, one survey site was located on the Tarka Trail in Devon, a major holiday destination area in the south west of England. The trail now forms part of the Devon Coast to Coast cycle route, which has experienced a 50 % increase in use during the past 3 years. At this site, 97 % of trips were recorded for recreational purposes and a high proportion commenced their trip from holiday homes. The survey also highlighted a number of differences in comparison to utility trips, for example, that recreational trips are longer in terms of distance and duration: 75 % of

recreational trips on the Tarka Trail were greater than 3 hours duration. Furthermore, group sizes were slightly higher suggesting that recreational cycling is essentially a social activity, a finding verified by earlier cycle tourism studies (Sustrans, 2002).

Thus, it is clear that the NCN attracts leisure journeys but the balance between functional and leisure recreational trips varies considerably according to location. There is also some evidence to support the argument that recreational trips are different to functional trips, certainly at locations where day visits and longer stay holidays are important. At this stage, however, it would be misleading to make further generalisations. However, it is important to attempt to verify the findings of these initial surveys and thus a more focused study on recreational cycling was undertaken. The next sections review the key findings from the recreational study undertaken in 2001 (Sustrans, 2001).

A detailed study of recreational users was carried out on the Celtic and Taff Trails in Wales. The Celtic Trail is a major flagship route in South Wales, spanning 220 miles from the border town of Chepstow to St David's in Pembrokeshire. The Celtic Trail is crossed by the Taff Trail, a route developed in 1987 between Cardiff and Brecon and adopted as part of the NCN in 1996. This now forms part of a longer route from North to South Wales known as Lôn Las Cymru. The survey method used was similar to the overall network survey in that counts were made and cyclists intercepted at 12 survey stations on the trails. These surveys were conducted on four days in August and September, 2001. In order to record more detailed information about visitor spending, respondents were asked to complete a travel diary about their cycle trip on the route.

In total, 855 respondents completed survey forms on the route; this represented 1710 cyclists. The gender split was 64 % male and 36 % female. There was a wide spread in terms of age group but the largest group of users, some 38 %, were between 30 and 50 years of age. The mean group size was 1.9 but the fact that 45 % were solo riders indicates that the distribution is skewed. In terms of journey purpose, 92 % were cycling for recreational purposes. Only 1.5 % of the users were touring; in contrast nearly 70 % were on short recreational trips from home. The residual, some 20 %, were on a day ride. When asked whether or not they had used another mode of transport, over 72 % indicated that they had cycled from home and only 20 % had accessed the route by car or other vehicle. A small number used the train, a bus or ferry.

The mean duration of cycling for recreational purposes was 2.8 hours and 56 % indicated that they had cycled for 2–3 hours. This is slightly lower than that recorded at the Tarka Trail site. It is a reflection of the importance of local recreational trips on the Celtic Trail in contrast to the high proportion of cycle tourism trips from holiday accommodation recorded in Devon. In terms of experience, 9 % were new to cycling and 17 % indicated that they were occasional cyclists. Thus, 26 % of cyclists were either new to cycling or cycled on a casual basis, a similar result to the survey of the network. Over

46 % of users were experienced, regular cyclists which suggests that the Celtic Trail enjoys a significant percentage of loyal and repeat visitors. These figures, once again, are reflective of the results of the wider monitoring programme of the NCN.

To ascertain more detail regarding visitor spending, respondents were asked to complete a travel diary in order to provide notes regarding locations where they stopped, and the time and amount of spending at each location. Of the 169 diaries completed, (20 % response rate), 151 were day visits and the remaining 18 were from cycle tourists on the route. The average spend per cyclist per day on the route was £3.33 (approximately €5.50) while the figure was much higher for cycle tourists using overnight accommodation. The day visitation figure is slightly higher than the average figure noted in the UK Day Visitors survey for trips to woodland, for example, where an average of £2.80 (approximately €5) per person is recorded. The sum is lower than might be expected given that many of the solo trips involved no expenditure at all. This reflects the close proximity to home of many of these very short recreational trips. This reduces the mean spending figure, say, in comparison to cycle trips made by holidaymakers which involve travel by groups and are of a longer duration per day. The mean average income of the groups recorded by diarists was £33 279 (€55 465). Given that the mean group size was two, the level of income per person is lower than the national average.

34.4 Implications

There are a number of general points that both studies highlight. An analysis of the descriptive statistics suggests that the Celtic and Taff Trails have succeeded in attracting a wide range of users from the communities through which they pass. In fact, in recent years there has been a promotional campaign to encourage use by residents who live on or near to the route and this has stimulated interest locally in the route. There remains an imbalance in gender in that far fewer women use the routes. This might be explained by perceived security issues. There is a far higher percentage of women who are new or occasional cyclists using the network, in contrast to men, so the pattern could well be changing. Other indicators suggest that the Celtic Trail and other sections of the NCN enjoy a wide user profile. The Celtic Trail study, for example, indicates a higher proportion of lower income households are accessing the route.

In terms of sustainable tourism development there are two fundamental points which analysis of the survey findings help to elicit. One of the most important findings is that access to the route involves, for the most part, one mode of transport, i.e., cycling only. This is an important finding given that it has been argued that the development of cycle routes, such as the Celtic Trail, actually encourages additional car trips rather than offering the potential

for car trip reduction. Evidence from the network monitoring exercise and the Celtic Trail study does not support this view. In reality, the NCN attracts mainly 'near to home' tourism and only 20 % of trips involve access by car. This is significant in terms of planning for sustainable development. When cycle routes were developed in the 1970s and 1980s they were designed in a similar manner to rural visitor attractions, i.e., they were located in isolated areas and invariably accompanied by the addition of car parking facilities. It was highly likely that they would attract large numbers of users by car; there were few alternatives and journey distances from centres of population were longer. The walking and cycling trails in the Peak District National Park provide an appropriate example and even now attract mainly car-borne visitors (Lumsdon and Smith, 1997). However, the NCN network has been developed in order to encourage use from densely populated urban zones to nearby places of recreation and along old railway corridors; the pattern of use has changed.

A comparison with rural scenic destinations or visitor attractions is worthy of further attention to illustrate the bold contrast between visits to the countryside in general and visits by way of the NCN. In the case of national parks, for example, trips to the countryside by car account for over 80 % of all journeys. In addition, a similar pattern of visitation is often recorded by rural visitor attractions. With the NCN, the reverse appears to apply. The majority of users, over 80 %, arrive by cycle. More importantly, many of the journeys on the NCN are motivated by a desire to enjoy the countryside, to relax and to get fit. This is likely to affect modal choice; the use of the cycle actually enhances the recreational or tourism experience and gives a feeling of good health. Whilst the purpose of this chapter is to explore recreation, there is also a complementary case to be made for development of the NCN on the grounds of health. Over 30 % of respondents indicated that they had a car available at the time of the cycle trip but chose to leave it at home. At some locations in the south of England the figure was far higher. The NCN is therefore currently encouraging modal switch for recreational (and incidentally for functional) trips.

There is another important implication in relation to sustainable development. Recreational cycling and locally based tourism is primarily about quality of life for residents and visitors. The retention of residents as locally based visitors not only has an intangible benefit as the travel cost is reduced but it also has a benefit in terms of improving the economy of informal recreation. Work undertaken by Cope, Downward and Lumsdon (2001) on the North Sea Cycle Route offers a statistical analysis of trips made on this long distance route in the north east of England. The authors found that there was a significant relationship between group size, duration of cycling during the day and level of spending in the rural economy. It can be inferred from this study that visitor spending is only in part a product of a number of cyclists. It is also about group composition, the nature of the itinerary and opportunities to stop while on route. Thus, local residents cycling with, for example, visiting

friends and relatives (VFR) or with neighbours, are more important to the local economy than previously anticipated.

The implication for recreational planners is that enhancements to routes should not only involve infrastructure such as improved surfaces and crossings, but also embrace the encouragement of traders to stimulate investment in new facilities. There is also a case for marketing campaigns which target families and groups of friends to go cycling together and to specify itineraries which encourage stopping off at places and an extended duration of trips. As identified in previous cycle tourism studies, the level of spending is likely to be clustered, for example, around villages and towns *en route* and in particular at meal times. Thus, routes need to be designed or modified to encourage the social dimensions of trip-making in a recreational corridor which is essentially linear.

34.5 Conclusions

Two fundamental dimensions of sustainable tourism development have been explored through the interpretation of findings from two key surveys on the NCN. These are the ability of the NCN to encourage tourism without a car, and the potential improvement of quality of life through this form of 'near to home' recreation. There are a number of research implications to be drawn from these studies. Firstly, the Sustrans monitoring programme is now well established to provide continuous data regarding different users on the network. It provides a tool of analysis to evaluate the potential of the NCN as a non-motorised transport facility. In due course, it will be possible to use the trend data, collected across sites, to develop a forecasting model.

Secondly, at the same time it offers an opportunity to assess another dimension of current society: transport as a recreational or tourism experience. Given the relative importance of recreational trips on many sections of the NCN, it is important to develop a more detailed research programme to investigate the various patterns of behaviour of the different user segments. It is also important to reflect on the multifarious benefits which widening access to the route provides in terms of quality of life. In the past, most European studies have focused on cycle tourists, given their relatively higher level of spending. Now, it is perhaps as important to concentrate on 'near to home' tourism for while the spend per capita is currently less for these recreationalists, the health and quality of life benefits to society could well be more significant than previously anticipated. Moreover the development of the local tourism market could well be more important than previously discussed.

The next stage of the research will need to quantify these benefits more accurately. Recreation, in due course, could be identified as one of the key triggers in progressing a cultural change toward cycling. That, in turn, would

be a step forward in signalling the importance of non-motorised transport in the development of sustainable tourism at the destination.

34.6 Acknowledgement

The author acknowledges the assistance of Dr Andy Cope from Sustrans in the preparation of this chapter.

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35

The politics of changing to green modes

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35.1 Introduction

'Walking isn't transport. Transport is something you get *in*!' So said a transport department official at a seminar organised by Transport 2000 in London in the early 1990s. A lot has changed since then, and the indignant official might think twice before making the same comment ten years on. In the last decade the UK has experienced a shift in political, public and media attitudes to green transport modes and policies, first in favour of green modes and then, following a so-called 'motorists' backlash', quite sharply away from them. For a short time motoring groups, environmentalists and politicians seemed to agree that we could not continue the way we were. But almost as soon as the consensus formed, it fell apart. Despite this, UK transport policies are greener in 2002 than they were in 1992. Much of the credit for this goes to local councils, which are now more active in encouraging walking, cycling and use of public transport, and to environmental groups and other advocates of green modes, who set out a cogent case for change. But it is also a lucky consequence of the institutional inertia of government departments, which, once set on a progressive course by their political masters, proved harder to turn around than might have been expected. This chapter describes the role played by green advocacy groups, the media, politicians and others in catalysing or resisting change, and the nature of the political battle of ideas and actions which took place between 1992 and 2002. The political context in which change took place is distinctively British, but there are wider lessons for the future of green advocacy in the UK and other countries.

35.2 Consensus for change

Since the early 1990s, transport policy in Britain has shifted away from an emphasis on the car as the most important means of passenger transport and towards acceptance that public transport, cycling and walking can and should play a more major role. Arguably this was 'catching up' with practice in other European countries, particularly The Netherlands, Germany, Switzerland and Scandinavia, but despite the existence of these successful examples the shift was politically contentious and hard-fought. In the late 1980s and early 1990s, British transport policy was dominated by a belief that motorised traffic growth was an inevitable consequence of economic growth and that it should and could be catered for by increasing road capacity. This led to the publication by the Conservative Government of what it proudly proclaimed to be 'the biggest road building programme since the Romans' (Department of Transport, 1989). Over the same period, government support for public transport was low and walking and cycling were not seen to be legitimate areas for public policy: cycling because it was seen as marginal and insignificant and walking because it was 'just something that people did'. As another civil servant put it: 'Why should we have a policy for walking? We don't have one for breathing!'

The shift away from a car-focused transport policy was prompted by several factors. First was the growing opposition to road schemes, both from local communities, which used conventional campaign tactics of media stunts, public meetings, leafleting and demonstrating, and from protestors taking non-violent direct action. A nationwide network of community anti-road campaigns, ALARM UK, played a central role in inspiring and supporting hundreds of groups and individuals to oppose damaging road schemes. The wide spectrum of people involved in the anti-roads movement made their action difficult for politicians to ignore, as one protest after another caught the imagination of the broadsheet and broadcast media. Second, the case for car-based transport policies was challenged by transport academics and professionals, who pointed out that even the most ambitious road-building programme could not accommodate forecasted traffic growth and that new road construction itself generated traffic. Academics, transport professionals, business and environmental groups all agreed the Government's transport policy was faulty, and that a strategy to combat growing traffic was needed. Third, the Treasury was increasingly nervous at the escalating cost of the trunk roads programme. By the mid-1990s, ministers could see that their transport policy cost too much, would not work and people did not like it.

In response to growing pressure for change, the government launched a 'great transport debate' about how transport policy might reconcile the competing priorities of the economy, the environment and individual freedom. Environmental groups began to have access to senior ministers, who began to treat organisations such as the green pressure group Transport 2000 as legitimate players with an important point of view, even if not one they

necessarily accepted. The great transport debate led to the publication of a green paper which for the first time accepted the need to address forecast levels of road traffic (Department of Transport 1996). It identified consensus for reducing the environmental impacts of transport, making better use of existing capacity and enhancing the role of public transport. There was growing official acceptance that walking and cycling were legitimate arenas for policy-making. In a new spirit of openness the Government set up a partnership of cycling groups, local authorities, business groups and others to develop the National Cycling Strategy and started drawing up a national strategy for walking.

The opposition Labour party contributed to the new mood with an environment policy document (Labour Party Policy Commission on the Environment, 1994) and a transport paper 'Consensus for change' (Labour Party, 1996). These documents prepared the ground for the incoming Labour Government in 1997 to review the trunk roads programme and publish a White Paper on transport. The optimism of the White Paper is illustrated by the following extract. It suggests alternatives to the car will be improved; that this will be effective in enticing people out of their cars; and that it is possible to reduce the rate of traffic growth and in some areas to reduce it absolutely:

> . . . the time for action is long overdue. People want more choice, more alternatives to using their cars and more reliable journeys when they do drive. They want a better public transport system that doesn't let them down. They want better protection for the environment and they want less pollution because they are worried about their health.
>
> We shall also need to reduce the rate of road traffic growth. Where its environmental damage is worst, we want to see an absolute reduction in road traffic and a shift to other modes made possible by the improvements and wider choice our policies will bring about. (DETR, 1998)

35.3 The motoring backlash

Conflict over the environmental impact of the Conservative Government's roads programme opened up political space for change, forcing ministers to reassess the direction of transport policy, but conflict from another direction soon threw implementation of the new vision off course. Less than a year after the launch of the transport White Paper, road hauliers staged a series of demonstrations, including lorry 'go slows' through central London and around the M25 motorway, in protest at increases in fuel duty and road tax for the heaviest lorries. The duty increases were a continuation of the annual fuel duty escalator first introduced by the Conservatives and continued by Labour. Although responsible for the introduction of the fuel duty escalator, the

Conservatives were quick to jump on the hauliers' wagon, describing fuel duty rises in the Budget as 'a spiteful attack' on motorists, hauliers and remote communities (*The Times*, 1999).

The 'go slows' were organised not by the established road haulage interest groups but by a breakaway group of hauliers. Their argument, that British jobs were being lost as a result of undercutting by foreigners and high taxes, was picked up by the right-wing tabloid press and, unnerved by hostile coverage, the Government quickly caved in and abandoned the fuel duty escalator.

The hauliers' protest marked the beginning of the backlash against the Labour Government's transport policy. The media, especially the tabloids, decided that the Government was anti-motorist. Months later, the tabloids pounced on an incident on the M4 motorway, where the Prime Minister's car was held up in a traffic tailback reportedly caused by a new bus lane (*Evening Standard*, 1999). Further incidents followed, until by the end of 1999 the negative coverage had taken its toll and ministers' focus switched from delivering the vision mapped out in the White Paper to management of a hostile media.

Despite the abandonment of the fuel duty escalator, further fuel protests took place in 2000. The first of these, 'Dump the Pump', was started by an ad hoc group of individual motorists, but again amplified by high profile coverage in the tabloid press. Motorists were asked to boycott petrol stations for one day. Some petrol stations reported loss of trade but most motorists simply filled up the next day. The second protest, in September 2000, was catalysed by the success of French protestors, who had recently forced fuel tax cuts through a ports blockade. Spurred by the French activists' victory, a group of small farmers and hauliers blockaded Stanlow oil refinery in Cheshire. Over the space of a few days the protest spread, with other refineries and distribution depots blocked, tanker drivers refusing to cross picket lines, fuel running short and lorry blockades on motorways. Again, the protest leaders were an ad hoc group. Many were farmers, angry about a wide range of issues, from the Government's handling of BSE to the low prices paid by supermarkets for their goods, as well as the price of fuel. Their action led to a further cut in the price of diesel and petrol, announced by the Chancellor two months later.

The backlash against the Government was compounded by the travelling public's exasperation at poor performance on the railways, following a series of fatal train crashes. The crash at Hatfield, the result of a cracked rail, led to train speed restrictions over much of the network for many months while track safety checks were carried out. These problems were arguably largely a consequence of the privatisation and restructuring of British Rail by the previous Conservative Government, but the media blamed successive Labour transport ministers for failing to 'sort the railways out'.

Although fuel prices were the central focus of the backlash against government transport policies, the resulting retreat took place across a range

of issues, including traffic reduction, road building and speed policy. The transport White Paper had referred to the need to reduce the rate of road traffic growth. In some places, it argued, an absolute reduction in road traffic was necessary. But within 18 months, ministers seemed to have decided that this objective was politically unachievable. They appeared to have judged that traffic could only be cut by a substantial increase in the cost of motoring, which would provoke adverse media reaction and more accusations that the Government was anti-motorist. This was publicly rationalised by arguing that government policy should tackle the adverse impacts of traffic, rather than traffic volumes themselves: '. . . we should focus our targets on the outcomes we want to achieve, rather than crude national traffic volume figures . . . The key issue is not the national volume of road traffic but outcomes such as congestion and pollution' (DETR, 2000).

In shifting from an objective of traffic reduction to one of cutting congestion and pollution, the Government downplayed the other impacts of traffic: noise, danger, severance, and loss of independent mobility for children and older people. By focusing on congestion, ministers were able to rationalise a renewed emphasis on road building, since congestion might be reduced by widening roads at 'pinch-points'. This fitted well with ministers' desire, probably encouraged by Prime Minister Tony Blair, to be seen to be responding to a motorist and business agenda. The practical outcome of the new interest in road building was a promise in the ten-year transport plan, published in 2000, to widen 360 miles of existing trunk road and motorway, and to build 30 trunk road bypasses, 70 local road bypasses and 130 further local road improvements. ministers claimed their modelling showed they could cut congestion on inter-urban trunk roads by 5 % below current levels by 2010, although it soon became clear this would be imperceptible to motorists, saving less than 60 seconds on a 60 mile journey (Goodwin, 2001) and that the method used by the Government to measure congestion bore little relationship to the way congestion was actually experienced.

Ministers' pro-road shift undoubtedly encouraged local authorities, government regional offices and consultants who were pre-disposed towards relieving congestion by road-building, rather than demand management. In December 2000, ministers rejected just 1 out of 77 local authority road schemes submitted for funding. Several of the approved schemes damaged environmentally sensitive sites and were opposed by local campaigns. Approved schemes included the Weymouth relief road which cut through Dorset Downs, an area of outstanding natural beauty and a site of special scientific interest; the Carlisle Northern Development Route which damaged the internationally designated River Eden; and three schemes near Salisbury, forming part of what local campaigners termed a 'strategic route by stealth' damaging the River Avon special area for conservation. Environmental groups, particularly the Council for the Protection of Rural England (CPRE) and Transport 2000, highlighted the damage likely to be caused by these schemes and it seems likely that ministers and officials concluded that they had gone too far, since

the following year the proportion of local road schemes accepted for funding was slightly lower. Nevertheless, the rehabilitation of road building as an effective solution to transport problems continued, with a series of government-funded multi-mode studies recommending road building solutions.

Speed enforcement and limits also became a hotly contested policy area. Transport ministers and their officials wanted to reduce speeds, because the road safety benefits were so clear. Green groups wanted lower speeds both to save lives and enable vulnerable groups, such as children and older people, to travel independently; and because high speed traffic intimidates and discourages walking and cycling. However, motoring groups saw lower speed limits or even enforcement of existing ones as unwarranted erosion of their rights and parts of government outside the Department for Transport, Local Government and the Regions (DTLR) were sensitive to this. Claims in the media that a review of speed policy would lead to a lower 50 mph limit on some rural roads were immediately and vigorously rejected, not by transport ministers, but by the Prime Minister's press secretary. A year later, plans to extend the use of speed cameras were nearly ambushed by a politically nervous Home Secretary and a vigorous tabloid press campaign against 'sneaky' hidden cameras. The speed camera roll-out survived, but ministers announced that all cameras would in future be painted bright yellow to warn motorists of their presence. More worryingly, they decided speed cameras could only be installed where there was recent evidence of death and serious injury, effectively ruling out cameras where communities wanted them but nobody had yet been killed.

Fear of being branded 'anti-motorist' by the media was a major factor in the Government's policy retreat, but so was fear of alienating powerful business lobbies. This started to take effect even before publication of the transport White Paper, when retailer Tesco successfully lobbied 10 Downing Street to ensure that plans for a levy on car parking at out-of-town superstores were dropped. The levy would have encouraged development of less car-based forms of retailing, including home delivery and location of stores close to public transport. A desire to be seen to be pro-business may also have contributed to ministers' decision to increase the maximum lorry weight from 41 tonnes to 44 tonnes, despite an explicit promise to the contrary in their 1997 election manifesto.

35.4 Surviving green policies

Although the motoring lobby caused significant policy retreat, it did not have everything its own way. Where green groups exerted extreme counter pressure they could persuade ministers to make decisions reflecting the strategy set out in the transport White Paper. Several environmentally damaging road schemes were turned down or delayed following vigorous local and national campaigns, a notable example being the Hastings bypass, which would have

cut through three sites of special scientific interest and an area of outstanding natural beauty.

A sustained campaign for lower speeds, involving the Slower Speeds Initiative, Transport 2000, Roadpeace and other groups helped counter lobbying against speed enforcement by motoring groups and was probably a factor in the Government's decision to extend the use of speed cameras. Government plans to publish a national walking strategy, which had been shelved because of feared press ridicule of a 'Ministry of Silly Walks', were revived, partly as a result of lobbying by the pedestrians' organisation, Living Streets, but mostly because of a fierce attack by the Parliamentary Transport Select Committee on the Government's lack of policy on walking (ETRA, 2001).

Other progressive policies escaped being labelled 'anti-car'. Key among these was the move to statutory five year local transport plans. These, together with increased funding for local transport, enabled local authorities to develop more cycle networks, bus priority, traffic calming, pedestrian areas, home zones and other initiatives to enhance non-car travel. Although some local authorities encountered local reaction against such measures, in some cases co-ordinated by retailers who feared the impact on trade, towns including Nottingham, Birmingham, Oxford, Edinburgh, York, Cambridge, and Bristol (and many others) made good use of increased local transport funding to improve provision for green modes. Government-funded travel plan advice posts in local authorities led to steady growth in the number of employers implementing staff travel plans and safe routes to schools. The Transport Act 2000 gave local councils powers to bring in road pricing and a levy on workplace parking and although take-up of these new powers has remained slow the London Mayor has introduced a £5 charge to drive into central London, and other cities are developing plans. Funding for bus services in rural areas was increased and 'challenge' funding led to innovative demand-responsive services which offer a template for the rural bus network in future.

35.5 Shifting public attitudes

Public concern about transport grew steadily through the 1990s. In 1996, public transport was mentioned as an issue of concern by only 6 % of people; by July 2000 (before the fuel protests, but after a year of transport being controversially in the news), transport was ranked fourth at 15 % (Commission for Integrated Transport, 2001). In 2002 it ranked joint third, at 31 %, alongside health and just behind economy and employment at 32 % (CfIT, 2002). The proportion of people agreeing that the amount of traffic on the roads is one of the most serious problems for Britain also rose steadily, from 58 % in 1993 to 63 % (1995); 69 % (1997); and 73 % (1999). This concern is coupled with pessimism that the problems caused by traffic will be tackled in the near future. Almost eight in ten people believe congestion will get worse and

seven in ten believe emissions causing climate change will worsen (CfIT, 2002).

When the new Labour Government came into office and promised radical change on transport, public opinion surveys suggested more motorists were open to the possibility of using improved public transport as an alternative to their cars. In 1997, 45 % of motorists agreed with the statement 'I would use my car less if public transport were better'. But this was a high point: by 2000 the proportion of motorists agreeing with that statement had fallen back to the level of the early 1990s, at 36 % (RAC, 2002). From being hopeful of the possibility of change, the centre of gravity of public opinion had shifted to disillusionment and, perhaps, cynicism.

It is impossible to know how much this disillusionment is the result of actual experience (train delays, worsening congestion) and how much it is a consequence of high profile negative media coverage. It seems likely that both played a part. The motoring backlash effectively closed down politicians' room for manoeuvre and made it harder to implement new policies with an element of restraint – effectively, made it harder to solve the very problems of congestion and traffic growth that are of concern to people.

35.6 Analysis: lessons for the future

35.6.1 Conflict is a catalyst for change

The influences which led first to the greening of British transport policy with the publication of the 1998 White Paper and then to a shift back towards 'pro-car' policies, are interesting to compare. Key players in the first stage were anti-road campaign groups, both those involved in direct action and more conventional community-based campaigns. The 'David and Goliath' struggle between ordinary people and road builders, security guards and faceless officials caught the imagination of the media. Other green advocates and groups played an important role in developing the case for change and identifying policy solutions, but without this conflict and the resulting media interest, change would have taken longer or possibly not happened at all.

The main players pushing policy back to a pro-car position were the mirror image of the grassroots anti-roads movement: ad hoc groupings of hauliers and motorists prepared to take direct action. They, too, used conflict to attract media interest and pressurise politicians, and were able to achieve short-term policy reversal on specific issues. For reasons discussed later, it seems that this is likely to be temporary: the motoring lobby's campaigns may have catalysed policy reversal but, without a coherent solution to the problem of traffic growth, they are unlikely to have secured a permanent policy shift.

35.6.2 Improved communication from the environmental movement

The green movement must find better ways to explain the consequences of pro-car policies and to appeal to people's self-interest. Green campaigners are motivated by a desire to create a better environment and quality of life for the community as a whole. Green arguments are also closely tied up with concerns about the future: unless we do something now, our children will suffer worse traffic, poorer quality of life, and more severe environmental impacts. In contrast, the motoring lobby's message to government is one of short-term self-interest: 'don't do anything that makes it more difficult or expensive for me to drive my car or lorry tomorrow'. Pro-car campaigners are concerned with individual benefit rather than the public good. They have little interest in future consequences or any policy prescription for how these might be addressed, and are more concerned about *now*.

These differences between pro-car and green arguments pose a challenge for advocates of green modes. First, how do we explain the consequences of pro-car policies? On casual examination, 'pro-car' might seem quite a good thing. But pro-car policies are inextricably pro-traffic and pro-more road deaths, anti-safe neighbourhoods and anti-tranquil countryside. Pro-car policies are also ineffective: more road building does not reduce congestion (except in the very short-term), and higher speeds create bunching and traffic jams so drivers do not arrive sooner. Through the period of the motoring backlash, pro-car groups enjoyed success in portraying the consequences of the policies they advocated as more freedom and better quality of life: that is, the opposite of what they will actually be. On the whole, green groups failed to explain that this is not simply an argument about alternative policy prescriptions, one painful and the other painless but both producing satisfactory outcomes. The growth in traffic will affect us all, in our cars, on our bikes or on buses, and as motorists, parents and residents.

Second, green advocates must avoid promoting policies which to the casual observer look unpleasant or hair-shirtish, and instead promote policies which are self-evidently beneficial. To the uninitiated, road closures are not self-evidently a good thing, but cities with better spaces for people are. A motorist who is also a mother might not support lower speed limits but will want her children to be safe when they go out, so might back a lower limit if it is part of a safe streets initiative. Opinion polls show net support for congestion charging so long as it is linked to better public transport. Even higher fuel duty might be attractive if directly linked to lower public transport fares.

35.6.3 Need for quick wins

People want to see tangible changes quickly, even if not everything can be solved overnight. The new Labour Government was slow to deliver tangible improvements on the ground. It spent the first year in office developing strategy and, despite opinion poll evidence showing people were most concerned about local transport problems (poor or non-existent bus services; busy roads

in need of traffic calming), was slow to deliver small-scale improvements in these areas. Politicians and transport experts (especially transport economists) concentrated too heavily on big schemes such as new roads, major rail projects, or congestion charging. But these solutions, if such they are, will take many years to reach fruition and once complete will only affect a small proportion of people in a few areas.

Green groups argued in the early years of the Labour administration that it should instead concentrate on some 'quick wins': small-scale measures which could be delivered within two or three years at most and which would benefit people everywhere. Examples might be funding for cycle lanes, a major expansion of bus services, minor rail improvements to improve reliability and frequency for local services, a national public transport discount card for frequent travellers, 20 mph zones wherever local communities wished for them, home zones, and safe routes to schools for every child. As well as demonstrating that the Government had started improving transport choices, large numbers of such schemes might reduce travel demand by car by an estimated 6–18 % (DTLR, 2002; James, 2002), equivalent to reducing traffic to levels a decade earlier.

As the public became more cynical about the ability of politicians to deliver transport improvements, they also became less tolerant of restraints on car use. Opinion polls show a growing proportion of people effectively saying 'You promised us better trains and buses and you haven't delivered; things *aren't* going to get better so leave us alone in our cars.' Interestingly, the Government did not seek to pin the blame for poor services on local providers: the language used in education and health policy of league tables and 'failing' schools or hospitals was not applied to transport. There was no league table of failing, or high performing, bus services. Perhaps if there had been, the public would have been persuaded that ministers were determined to improve things on the ground.

35.6.4 Explaining the environmental case

The Government needs to better explain the environmental case for its policies. When it came under fire for supposed anti-motorist policies, it frequently failed to explain the reasons for them. The most notable example of this was during the fuel crisis, when ministers justified fuel duty on the grounds that it paid for better health care and education, but failed to explain that lower duty would result in higher traffic volumes and increased climate change impacts, and that it was part of a package of actions to reduce pollution, save road deaths, and stop us having to tarmac over the countryside to cater for growing traffic. People may sometimes be persuaded that higher taxes are a good thing, but only if governments make a powerful and persuasive appeal to wider common interest. By not invoking the environmental arguments for higher fuel taxes, ministers made it difficult for green groups to enter the debate: news editors saw the 'story' as being about conflict between small

road hauliers about to go to the wall and unsympathetic government, and nothing ministers said suggested environmental concerns should be part of the story. The Government did not fully recognise the advantage it might have drawn from working more closely with green groups to explain the environmental case for policies. Ministers (including the Prime Minister) were happy to invoke benefits to business to explain their decisions, but were uneasy with alliances with the environmental movement.

35.6.5 Green groups' strategies towards the tabloid press

The tabloid press is a major player in the motoring lobby, and green groups must respond to this. The tabloid media played a powerful role in shifting the terms of the transport debate. Editors might argue that their role was simply to reflect public concerns, but on certain issues they had a strong agenda of their own and were hugely powerful but unaccountable lobbyists. One freelance journalist was told by a tabloid newspaper that his commissioned article (about speed policy) was well written and highly persuasive, but could not be printed because it was not the editorial line. Ministers were highly sensitive to tabloid criticism, particularly on the issues of fuel tax, speed policy and road user charging, and hostile front page tabloid stories repeatedly prompted knee-jerk government denials which locked ministers into a pro-traffic, anti-environment, anti-safe neighbourhoods, course of action.

Green advocates found it difficult to counter the tabloids' anti-environment agenda. The consequences of traffic growth rarely interested tabloid journalists. This is partly because it is difficult to be specific: for example we know that climate change will have severe negative impacts, but we can only occasionally identify individual 'victims' for a media story. Impacts of new road construction on landscapes and rural tranquillity were only newsworthy if the area affected was particularly 'precious' (that is, a designated site, preferably of European importance).

However, social concerns such as the impact of traffic growth on the health, safety and well-being of ourselves and our children, and on quality of life and the quality of public spaces, did generate positive media coverage and public support. Throughout the period of the motoring backlash, groups including Transport 2000, the Children's Play Council, Roadpeace, Sustrans, Living Streets and others generated extensive media coverage of the devastating consequences of road crashes for those involved and their families, and the benefits of Home Zones (residential streets where pedestrians and cyclists have effective priority and cars travel at under 10 mph) and safe routes to schools. This positive coverage was effective in persuading ministers to devote resources to such projects.

However, tabloid newspapers saw no irony in campaigning for less speed enforcement on the front page while reporting horrific road crashes on the inside pages the same day. Similarly, the tabloids rarely made a link between the cost of fuel, traffic levels, and flood and storm evidence of climate

change, even during autumn 2000 when both stories were simultaneously filling their pages. So although green groups could win occasional positive coverage in the tabloid press, it was overwhelmed by pro-motoring stories. Green groups have still to develop an effective strategy to tackle this problem.

35.7 Reasons for optimism

Despite the motoring backlash against sustainable transport policies, there are grounds for hope that society will eventually accept the necessity of taming the car. First, as traffic grows people tend to become more supportive of measures to restrain car use. Thus, public support for measures such as congestion charging is higher in London where traffic impacts are most severe. As traffic conditions worsen elsewhere, it is likely that public support for measures to cut traffic will grow stronger and louder. Second, towns and cities that have acted to reduce car use, such as York, find that public and business support for traffic restrictions grows over time as the benefits of a high quality street environment become clear. Traders who are initially hostile to road closures become staunch advocates of these measures once they see the positive impact on retail turnover. In the medium-term public attitudes are therefore likely to shift in favour of green policies.

Although delivery of measures to make cycling, walking and public transport attractive is still far too slow, schemes introduced in the last five years are starting to have a positive effect. Green transport plans are now widespread amongst public bodies and interest in them is growing in the private sector. Successful plans cut car use by nearly one-fifth (Department for Transport, 2002). Bus service improvements are attracting more passengers: for example, in London, new bus lanes, more bus services and lower fares led to six per cent more passengers over just twelve months (Transport for London, 2002). Towns which encourage cycling are starting to see results: Edinburgh estimates that journeys to work by bike have increased by 50 % since 1991 (City of Edinburgh Council, 2001). However, the scale of implementation of these small-scale or 'soft' measures is patchy: some local authorities have made great progress and others have done very little. Green groups have an important role in lobbying at local level for delivery of soft measures to be scaled up.

Although most progress has been made in urban areas, there are tentative signs of better alternatives to the car in the countryside. Opinion polls show transport (including lack of public transport and speeding) is of even greater concern to people in rural areas than in towns (CfIT, 2002). Demand-responsive transport, shared taxi services, speed cameras and other innovations in Lincolnshire, Wiltshire, Devon and elsewhere may offer a way forward. Better transport in the countryside is a vital political prerequisite to increases in the cost of motoring.

There is also growing understanding of, and support for, green policies amongst transport professionals in government and local authorities. Although

politicians were all too quickly thrown off course by the motoring backlash, government departments change more slowly. In the past this institutional inertia was a source of frustration for green campaigners, but now it means there is continued commitment to, for example, demand management policies in local transport plans, or promotion of cycling. The merging of the Department of Transport and the Department of the Environment in 1997 catalysed a huge change in the culture of transport officials, and this seems to have survived the subsequent split of environment from transport in 2001.

Finally, political support for the values that underpin green transport policies is growing. The Labour Government has not found 'the environment' a compelling framework to articulate its values. However, in 2001 Prime Minister Tony Blair gave a speech about local quality of life, or 'liveability' (see Chapter 21), which for the first time acknowledged the importance to people of high quality public spaces, reduced danger from traffic, and a clean, well-managed, safe and secure street environment. It is possible that local quality of life will offer a more compelling justification for politicians to act to cut traffic than did the environment.

35.8 Conclusions

Political support and action in favour of green modes has gone up and down since the early 1990s. The policy prescription initially advocated by green groups has become a mainstream one, the logic of which is widely accepted by transport professionals, academics and even politicians, and no other intellectually coherent policy package has emerged. In a sense, the green movement in the UK has demonstrated that it 'has the answers'.

However, having logic on one's side does not guarantee success. Green advocates, whether in pressure groups, local authorities, the media or politics, still need to build stronger public support for policy packages to cut traffic. This will remain difficult while government is weak on delivery: if people can see that, despite promises, their bus service or the safety of their roads is not getting better, it is understandable that they will become sceptical and less receptive to reducing their own car use.

There are two priorities for advocates of green modes in the UK in the future. The first is to lobby, cajole and campaign for scaled-up delivery of 'quick win' solutions that improve the attractiveness of alternatives to the car. These are likely to be more effective at reducing car use than the big flagship projects so beloved of politicians. The second priority is to reinstate traffic reduction as a core policy aim. Only if ministers show leadership in directing local councils, public transport operators and other agencies to act to reduce traffic in the areas where most people live are we likely to see a decisive shift away from the car and towards greater use of green modes.

35.9 Acknowledgement

The analysis in this chapter is based on discussions during the period in question with Jonathan Bray, Denise Carlo, Roger Harrabin, Stephen Joseph, Emma Must, Ben Plowden, John Stewart and colleagues at Transport 2000 and in the transport activists' roundtable.

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Part III

Practice

36

Segregation or integration of cycling in the road system: the Dutch approach

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36.1 Introduction

The Dutch design manual for bicycle-friendly infrastructure *Sign up for the bike* (CROW, 1993) provides the tools for designers for a proper design of infrastructure to meet the needs of cyclists. One important decision to be made is whether cyclists and motorists will be using the same carriageway or whether they will get their own space on the road. In this chapter we elucidate the approach in the Dutch manual.

Any road design should be based on a balance between the function, the form and the actual (or expected) use of the infrastructure. In other words, the design should allow and accommodate the envisaged traffic flows and the expected manoeuvres (and discourage undesirable driving behaviour at the same time). In relation to the matter of segregation or integration of cycle traffic the question is: for which situation is which solution most appropriate?

As an introduction we start with a list of conceivable forms of integrated and segregated road profiles (asterisks note the most common types of physical segregation in The Netherlands). In the discussion on integration and segregation we can distinguish between:

- No segregation but integration of different modes:
  - in two directions;
  - one way streets;
  - one way streets allowing cyclists in the opposite direction;
  - with or without (speed and/or intensity) restrictions for motor traffic.
- Visual segregation (road paint):
  - bicycle lanes (which have a bicycle logo on the pavement in order to give them a legal status);

  - virtual bicycle lanes (lanes which have no bicycle logo and no legal status, but which do suggest that cyclists will use this lane).
- Physical segregation:
  - bicycle routes following their own line;
  - bicycle tracks alongside roads for motor traffic
    (a) unilateral in two directions;*
    (b) unilateral in one direction;
    (c) two-sided, both in one direction;*
    (d) two-sided, both in two directions.

A physical segregation can be achieved in various ways, e.g., by a verge between the carriageway and the bicycle track; by creating merely a difference in level between carriageway and bicycle track; or by putting a fence in between. If sufficient room is available, a verge of a certain width is preferred in order to create a safety margin between cyclists and motorists. This chapter will not go into details concerning the design of the different solutions and their variants, but will instead concentrate on giving the arguments and the criteria for the choice between integration, visual segregation and physical segregation.

36.2 Principal arguments for and against segregation and integration

36.2.1 What is the problem?

Discussions about segregation and integration have their starting point in the incompatibility of (fast) motor traffic and non-motorised traffic (i.e., bicycles and pedestrians). This incompatibility has to do with the vulnerability of cyclists in confrontations with motor traffic. Thus, large flows of speeding motor vehicles are a threat to cyclists' safety. As safety in a given situation is inversely proportional to the number of encounters, the speed and the complexity of the traffic situation, this incompatibility is obvious. However, other aspects of cycling quality are also affected by large numbers of fast driving motorists. Freedom of movement (making the manoeuvres you want to make) is decreased. The presence of much traffic requires constant alertness on the part of the cyclist and is therefore a source of stress. Also, heavily used roads are not usually the most attractive to use (due to smell, noise etc). There are two approaches to overcome this incompatibility: integration and segregation. Both approaches have their own merits and drawbacks.

36.2.2 Integration

The approach of integration aims to solve the problem by adapting the drivers' behaviour to the circumstances. As insecurity is caused by the number and the speed of motor vehicles, the solution is a reduction in the number of cars

on the road, and an adjustment of their speed. Integration underlines the equality of all road users as all have the same freedom of movement. Moreover, no extra space is needed for traffic purposes.

On the other hand, parking manoeuvres of cars can be aggravating and dangerous for cyclists too. In narrow streets the cyclist can have the feeling that he/she is a living speed reducer (which might feel uncomfortable), and can be threatened by cars cutting in during overtaking manoeuvres. More generally, integration is asking for a certain attentiveness which is increasingly required as intensities and speeds get higher. Therefore, the approach of integration is hardly applicable on sections or in areas where it is not possible to limit the number of motor vehicles or to reduce their speed effectively. This has also to do with the function of the road. Some through roads are meant for large volumes of traffic or for use by heavy lorries. Physical speed reducers lose their impact on ordinary cars when they are dimensioned for heavy lorries. On bus routes these speed reducers are not wanted.

36.2.3 Segregation

The approach of segregation tries to solve the problem by giving the incompatible modes their own territory. This is a good solution on road sections where there is enough room for the different categories (segregated facilities usually take more space than integrated facilities). At intersections the segregation can be realised by fly-overs (spatial segregation) or by traffic lights (segregation in time). At road sections with segregated facilities cyclists are better protected, overtaking manoeuvres of motorists are easier, cyclists are less affected by congestion, and cycling becomes more comfortable as the need for alertness is decreased.

On the other hand, cyclists' freedom of movement might be diminished, motorists will speed more while their level of attention for cyclists will decrease. As often there is no (real) segregation of crossing flows at intersections, the construction of bicycle tracks may lead to a decrease in accidents along the road sections concerned, but to an increase in accidents at intersections.

36.2.4 Balance of interests

With the segregation approach the equality of modes is replaced by a balance of interests. Usually, only a limited quantity of space is available, which has to be divided among the different categories of road users. It is obvious that a category which is looked upon as less important, will have to give in, especially when the available space is not enough to meet all demands. The choice of sub-standard solutions for cyclists is most likely to be made. On the other hand, when space is available, segregation leads to large-scale solutions and it enlarges the barrier effect of roads.

In principle, the approaches of integration and segregation can be complementary to each other:

- Segregation of modes (by means of tracks, fly-overs and tunnels) should be applied where reduction of numbers and speed of fast driving cars is not possible or desirable.
- Reduction of speed (by physical measures) is necessary where different modes have to share the same infrastructure (where segregation is undesirable or impossible).
- Measures to simplify manoeuvres are helpful in situations where modes inevitably meet each other, in order to make it easier to deal with the situation and to reduce the severity of conflicts and collisions. This again implies speed reduction at these sites.

In principle it is not difficult to agree with this complementary opproach. However, when segregation is realised, the free movement of cyclists is often restricted. The interests of cyclists appear not to pull enough weight in the balance of interests. Too often segregation looks like aiming for the free flow of motorised traffic. Cyclists are banished to the side of the road, and in some countries even to the pavement. At intersections it is even worse. The facilities created are often of a very poor quality. That is the reason why cyclists' organisations in some European countries oppose obligatory use of segregated bicycle facilities. As long as planners do not give enough weight to the interests of cyclists to achieve a bicycle-friendly balance of interests, keen cyclists will have a preference for the integrated approach. The greater their skills to survive, the greater this preference. Basically this preference has more to do with the insufficient quality of the actual design (which often does not comply with quality requirements on aspects like comfort and directness) than with the principle of segregation. One should not reject the principle because of bad execution. A bad design will always be a bad design.

Yet it is only fair to say that bicycle activists are sometimes biased in their preference for integration in all cases. They judge the situation on the basis of their own bicycle skills and confidence. From several investigations it appears that 'ordinary' (less self-confident) cyclists have an outspoken preference for segregated facilities. A well-designed bicycle track offers them the opportunity of unhindered and comfortable cycling. Parents will be more prepared to allow their children to cycle when they can use segregated facilities because they are perceived as being safer. Moreover, bicycle tracks can contribute to the coherency and recognisability of a bicycle route network and to continuity of design at through bicycle routes. If the design of segregated facilities has sufficient quality, many objections against segregation will disappear. Alignment and width of segregated facilities are important aspects in this respect.

36.3 Criteria for incompatibility

36.3.1 Critical speeds and intensities

The speed and intensity of motor traffic are the main factors for deciding if, and to what extent, different modes have to be segregated. Both intensity and

speed influence the number of overtaking manoeuvres, while the speed of motor traffic is a main factor in the danger of these manoeuvres.

The intensity of bicycle traffic is in principle not decisive when debating whether segregation is desirable or not. The danger on the road is not caused by cyclists, but by cars. If it is not safe for many cyclists, it will not be safe for a small number of cyclists either. The number of cyclists, however, does have an influence on the urgency and the cost effectiveness of the construction of a segregated facility. The more cyclists there are using the facility, the more cost-effective the investment will be. Of course the number of cyclists will have an influence on the design as well. Widths will have an obvious relation to flow. Apart from the intensity and speed of motor traffic on the road section concerned situational factors are also jointly of importance, such as the parking situation, the distance between intersections, etc.

Strangely enough there is only limited research available into the safety of cyclists on different road profiles, with different combinations of car speed and intensity, yet there is a need for criteria to be laid down. The following criteria have come about on the basis of practical experience and common sense. Results of research, however, of the Dutch Institute for Road Safety (Slop, 1993) are in line with these criteria (or at least do not give any indication that these criteria are wrong).

Figure 36.1 shows what kind of integration or segregation is necessary at what combinations of intensity and speed of motor traffic. Note that the speed is indicated as the actual speed, not to be exceeded by more than 15 %

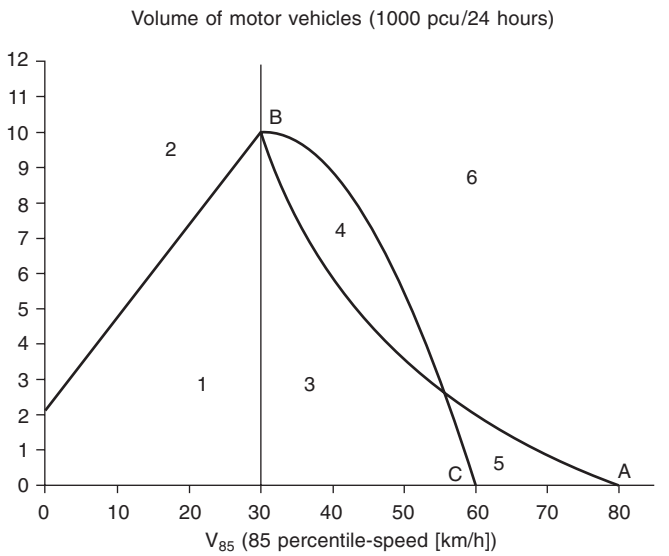

Fig. 36.1 Recommended degree of separation between cyclists and motorists at various combinations of intensity and speed. Source: CROW (1993).

of the drivers (V_{85}). The actual speed may differ to the legal speed limit. The figure shows the following areas:

- Area 1: V_{85} < 30 km/h. All modes can be mixed. The only reason to consider bicycle tracks or bicycle lanes is for the sake of continuity of design on connecting bicycle routes.
- Area 2: this situation is merely theoretical.
- Area 3: in general a profile without segregation is acceptable, but, depending on circumstances, bicycle tracks or bicycle lanes can be desirable (see below).
- Area 4: some form of separation is needed, but visual separation (bicycle lanes) can be acceptable as well.
- Area 5: bicycle tracks are desirable, but as densities are low, a mixed profile is acceptable. However, bicycle lanes are not advised.
- Area 6: speed and/or density of traffic flow make it an absolute necessity to segregate bicycles and motor traffic. Separate bicycle tracks are the only option.

36.3.2 Explanation of the shape of Fig. 36.1 and the used values

At speeds below 30 km/h, overtaking manoeuvres cause little danger. Disadvantages of segregation (less manoeuvrability) will cancel the advantages (protection) easily. The areas above the curve between A and B represent combinations of intensity and speed where some kind of segregation is necessary (this could be either visual segregation, i.e., a bicycle lane, or a physical segregation, i.e., a bicycle track). The curve represents the following conditions:

- If 15 % of all motor traffic has a speed of 80 km/h or more (85 % of motor traffic having a speed of up to 80 km/h), segregation becomes absolutely necessary, even if intensities are low. The differences in speed make it impossible for motorists to react adequately to the presence of cyclists on the road.
- The combination of an intensity of 10 000 or more private car equivalents of which 15 % have a speed of 30 km/h or more also makes it necessary to segregate motor traffic and bicycle traffic.

It can be assumed that intensity and speed equally contribute to the insecurity of cyclists. Segregation therefore becomes necessary if the product of intensity and speed is above a certain constant value. The curve which indicates when segregation becomes necessary has the mathematical shape of a hyperbola.

The curve between A and C shows the speed–volume combinations above which bicycle lanes are not a good solution and physical segregation is necessary. This is because the risk of a severe accident on a road section with bicycle lanes increases rapidly at higher speeds. Cyclists who, for whatever reason, leave the bicycle lane, are not expected on the carriageway by motorists. Therefore they will not react in time to avoid an accident. On roads with

integrated modes car drivers will anticipate the actions of cyclist better. The conditions of this area are:

- When 15 % of motorists are at speeds of 60 km/h or above, bicycle lanes are advised against.
- When 15 % of motorists are at speeds of 30 km/h or more in combination with an intensity of 10 000 private car equivalents, bicycle lanes are advised against as well. The chance that the bicycle lane will be abused is too great, and it becomes too difficult for cyclists to leave the bicycle lanes because of the number of cars.

The shape of the curve is based on the assumption that for visual segregation the relationship between speed and safety is much stronger than the relationship between intensity and safety.

36.3.3 Other factors influencing choice

In so far as the figure is not conclusive about the desirable degree of segregation, in every case one can use the following (mainly situational) considerations:

- Where there is not much parking space, bicycle lanes are advised against. These lanes will be abused as parking space.
- A bicycle track or lane can contribute to the coherency and recognisability of a bicycle route. If a road section is an important link in the bicycle network, this could be an argument in favour of a segregated facility.
- When there are many (large) intersections, bicycle tracks will lose their value. The comfort of untroubled cycling will be affected negatively by the necessity of being careful at intersections (when only minor streets are entering the road, this is less of a problem).
- In the case of one way streets where cycling is permitted in the opposite direction, segregation (i.e., contra flow lanes or tracks) is more desirable than in other situations.
- When trams also use the road, physical segregation is desirable.

36.4 How to deal with the criteria

If the criteria indicate that in a given situation an integrated solution is not appropriate, it does not necessarily imply that the construction of a bicycle track is required. The other possibility is to take away the source of the incompatibility by changing the composition of the traffic flow. From the criteria one can learn which characteristics of the traffic flow or the situation can be changed for the safety of cyclists:

- the speed of the motor traffic can be decreased (by physical measures);
- the intensity of the traffic flow can be diminished (by changing the circulation system);

- the parking situation can be altered;
- the intersections can be changed.

Whether the characteristics of the traffic composition are altered or segregated bicycle facilities are constructed depends on several factors:

- the function of the relevant road section for both the motorists and cyclists;
- the spatial possibilities;
- the scenic or urban characteristics of the road;
- other restrictive circumstances, like the presence of public transport and the necessary accessibility for emergency services, etc.;
- the coherence and continuity of the bicycle route network.

These considerations imply that on a connecting bicycle route the preferred choice would be segregation, for continuity, so the bicycle route is easily recognisable. On the other hand, on sections which are meant to open up the area, the preferred method would be integration. This would make all destinations alongside the section accessible. The figure shows the *acceptable* options at different combinations of speed and intensities. 'Acceptable' does not imply that the outcome is always an ideal solution. Whenever integrated solutions are chosen, the quality for cyclists will be further improved by reducing the speed and flow of the motor traffic.

36.5 Intersections

In the discussion about segregation and integration, intersections play an important role. As stated earlier, segregated bicycle tracks lose much of their effectiveness (i.e., allowing for safe and unhindered cycling) when at intersections cyclists and motorists still have many conflicting manoeuvres. As one of the main points of segregation is to avoid encounters with motorists, the design of intersections should also be aimed at this goal.

Real segregation of modes at intersections can be realised by the use of fly-overs or underpasses, and by segregation in time, i.e., by the use of traffic lights. Both of these methods have serious drawbacks. Segregation in time by traffic lights will cause delay; in the green light phases the cyclists will have to compete with motorists. If cyclists have their own phase in the cycle of lights, waiting times will increase for all road users. This will make cyclists (and other road users) prone to running the red light more often. Fly-overs on the other hand are often a too large-scale solution. Their application forces cyclists to make detours often over steep terrain, and practical circumstances often limit their usability.

In The Netherlands there is an established practice of a less comprehensive form of segregation at intersections: bicycle tracks or bicycle lanes are continued across the intersection, thus providing the cyclists with their own space in the

intersection area. However, cyclists still have to cross the stream of traffic at street level. Whether this partial segregation or designation is recommended depends not only on intensities and speeds on the crossing, but also on:

- the course of the bicycle connection(s) at the intersection;
- the presence of bicycle tracks and bicycle lanes on the feeder roads;
- the dominant manoeuvres at or near the intersection.

There are a number of advantages of using these types of segregated facilities at intersections. They can:

- give cyclists their own space at the intersection, which allows them to overtake waiting cars and to pass by the intersection unhindered by other traffic;
- provide a protected position where cyclists can estimate the possibilities for crossing;
- underline the continuity of the facilities at feeder roads;
- allow priority to cyclists in the adjustment of traffic lights;
- underline the presence of cyclists at the intersection and indicate where encounters can be expected.

However, there are also serious drawbacks. Segregated facilities can:

- lead to large-scale solutions;
- make the situation more complex and thus create only pseudo safety;
- sometimes force cyclists to split up a left turn manoeuvre into two separate crossing manoeuvres, which lengthens the riding curve, and might cause some delay as well.

Therefore, only in cases of high intensities of motorised traffic do the advantages counterbalance enough of the drawbacks of segregated bicycle facilities on intersections. The use of the roundabout as a solution should be mentioned here as well. The principle of a roundabout is to simplify manoeuvres at intersections in order to make it easier to deal with the situation. For the safety of cyclists, low speeds at roundabouts are essential. The new styles of roundabout applied in The Netherlands have a geometry (narrow curves, only one lane) which is aimed at reducing speed. In this circumstance integration on an intersection is more often possible than otherwise would be the case. Roundabouts with separated bicycle tracks are also constructed.

36.6 Conclusion

Sign up for the bike, the Dutch design manual for a cycle-friendly infrastructure gives clear guidelines as to in which situations cyclists should get their own segregated infrastructure, and when integration is a more appropriate solution. In this chapter we have discussed the principle rather than the elaboration of the principle. It is only fair to say that these guidelines are most convincing

in respect of road sections, because we know which form is appropriate for the envisaged function of the road section and the expected use of it. For intersections, however, this is less clear. Though we certainly have some knowledge about the design of intersections, this knowledge is not all-embracing. A more fundamental approach to the design of intersections from the perspective of the cyclist is still needed.

36.7 Acknowledgements

This chapter was originally written for the Velo-city conference in Nottingham (1993). A slightly updated version was published in *The Greening of Urban Transport*, 2nd edition, edited by Rodney Tolley (1997). This 3rd version has again some revisions.

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37

Conserving walkable environments in Japan

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37.1 Introduction

Japanese towns were traditionally 'walkable'. Streets were narrow and virtually pedestrianised, because they were not built for access by motor vehicles. Some old Japanese neighbourhoods still provide such conditions, though they lack functional efficiency in the motor age. This chapter aims to illustrate and examine how to conserve such walkable environments in Japan using the example of Kyojima, where the people and the local government have struggled to improve their quality of life for almost half a century.

Kyojima is a neighbourhood situated in the eastern inner city of Tokyo, approximately seven kilometres north east of the Imperial Palace. After the great earthquake of 1923 it was rapidly urbanised without any planning, and had a population density of eight hundred people per hectare in the 1950s. There still remains a traditional community, a lively shopping street, many wooden tenement houses and tangled narrow alleys. People enjoy the intimate and walkable environment, but at the same time, are concerned by the risk of earthquakes and fire. Though it is necessary to deal with these risks, it is hoped not to do it by redevelopment but by the renovation of the existing neighbourhood, without destroying the walkable environment.

In 1971, the Tokyo Metropolitan Government produced a draft urban renewal plan that proposed to demolish all the old houses in Kyojima and replace them with high-rise blocks in large open spaces (Tokyo Metropolitan Government, Bureau of Housing, 1971). Fortunately, influenced by the new wave of town planning, it abandoned that plan in 1974 and began to look for an alternative. In the 1980s, a partnership developed between the local people and the Government in which they began to outline an improvement process

aiming to conserve the humane and walkable environment of Kyojima. New streets of moderate width have been laid out, tiny pocket parks were put in street corners, and low-rise community housing projects constructed. However, many difficulties still remain. In the following sections, the history and characteristics of Kyojima will be explained, and the efforts to conserve its walkable environment discussed. It tells a typical story of an old inner city neighbourhood that was once rejected by modern planning but has survived the national bulldozer.

37.2 Profile of Kyojima

Tokyo was built in the early seventeenth century as the capital of the Tokugawa shogunate government. The city spread over the heights to the west, and over the alluvial low land in the east. The castle of Tokugawa sat on the tip of the former, now occupied by the Imperial Palace, and dominated the town on the latter. Kyojima is a neighbourhood located in the lower land beyond the Sumida River, which was the eastern boundary of the town in its early days. It was once the countryside outside the original Tokyo and even in the late nineteenth century there remained a vast spread of paddy fields and marsh. At the beginning of the twentieth century, two railway stations were opened on the northern side of Kyojima and a number of factories built, but the majority of the area was still occupied with paddies and marshes.

The earthquake of 1923 took approximately 90 000 lives, most of which were lost not by the earthquake itself but by the fire that followed. It was not until after this disaster that urbanisation really began in Kyojima. Many wooden tenement houses were constructed to accommodate people from the ruined town. Rapid growth caused the neighbouring irrigation stream to turn into a sewer and the marsh into a rubbish heap. The construction of service roads followed with the four-lane Meiji-dori Street on the eastern edge of the area in the late 1920s and the two-lane Takara-dori and Oshiage-dori on the northern edge in the 1930s. However, the main urban area had virtually no modern streets, just a maze-like network of narrow alleys.

Bombing by the American Air Force in 1945 devastated most of Tokyo. After the Second World War, Kyojima, one of a few areas saved from the war damage, began once again to grow rapidly. People moved into the surviving tenement houses that were one- or two-storeyed wooden buildings, situated closely together along narrow alleys. More than 20 000 people lived within 25 hectares in the 1950s. There are still many crowded low-rise wooden houses. Though narrow alleys are often less than two metres wide, and rather gloomy, unhealthy and a high fire risk, they produce a car free, sociable and walkable environment. Local people often go out without locking their doors. They use the alleyways to meet and chat with their neighbours and embellish the alleys with flowerpots. Children also play outdoors without the danger

from cars (Fig. 37.1). Alleys in Kyojima provide people with an intimate outdoor living space.

Kyojima is now famous for its convivial shopping street, Tachibana Ginza Street. It is a narrow street approximately 5 metres wide with more than 100 shops (Fig. 37.2). The decline of the inner city shopping street is a major urban problem in Japan. Though Tachibana Ginza is fighting a hard battle with big shopping centres, it still draws customers from its own and neighbouring areas. Most of its shops open onto the street and create a lively atmosphere.

Fig. 37.1 Children playing in an alley, Kyojima.

Fig. 37.2 Tachibana Ginza Street, Kyojima.

37.3 Early urban renewal schemes of Kyojima

An official report in the 1960s said that the lower town of Tokyo would lose 55 % of its citizens if there was another earthquake as severe as that seen in 1923. In 1965, the central Government proposed to build 16 Disaster Prevention Bases east of the Sumida River. A typical base consisted of a vast open space of more than 25 hectares surrounded by double or triple walls of high-rise housing blocks. In 1971, the metropolitan Government published a draft urban renewal plan for Kyojima (Tokyo Metropolitan Government, Bureau of Housing, 1971). It proposed two alternatives: one with blocks of 15 storey buildings and the other with blocks of 5–11 storey buildings in a park-like open space. Both of them, following a functionalistic housing model, suggested demolishing all the houses in the area and building new high-rise blocks of flats in open spaces.

Crowded wooden houses were a great fire risk, but they did create a sociable, car free and walkable environment. Jan Gehl, a Danish urban designer who has studied the relationship between public life and public spaces for many years, criticised this functionalistic planning approach for removing the sociable aspects of the community from new housing areas (Gehl, 1987). Throughout the history of human habitation, he said, streets and squares have formed focal points and gathering places, but with the advent of functionalism, they were replaced by no man's lands with roads and endless grass lawns. People in Kyojima love their environment, both now and then. They hoped to make their neighbourhood safer, but wished to do it without destroying the character of the area, and were opposed to urban renewal.

A research report in 1974 marked a turning point in the history of planning in Kyojima (Tokyo Metropolitan Government, Bureau of Planning and Co-ordination, 1974). It advocated community planning that took account of the proper context of the area and proposed the following three improvements:

- to protect alleys from traffic;
- to keep evacuation routes open;
- to rebuild dilapidated houses.

It pointed out five features to be conserved:

- dwelling houses combined with other uses;
- flexibility to extend and/or remodel houses;
- semi-private space under eaves and transparent façade;
- maze-like alleys;
- physical continuity.

Though the report drew no detailed plan, it suggested four guidelines:

- to conserve the low-rise character of the area;
- not to adopt an unnecessary large-scale solution;
- to create rich outdoor space combined with wide open corridors and terraces;

- not to adhere to a parallel arrangement of blocks.

The metropolitan Government carried out housing project research and prepared a structure plan in 1978 (Tokyo Metropolitan Government, Bureau of Housing, 1978). The plan divided the area into five types: those to be demolished; renovated; rehabilitated; restored; and conserved. The Government still retained a desire to clear some areas but took an opinion poll to incorporate citizens' views into the plan.

37.4 Efforts of community planning in Kyojima

Community planning in Kyojima was established in the 1980s. A planning assembly was held in 1980 with the board of the neighbourhood association, the metropolitan Government, the local government of Sumida City and planners. It was reorganised as the Community Development Conference in 1981. The conference began to prepare a district development plan, held public hearings and then published a general policy of community development in 1982.

The policy proposed to build up a step-by-step improvement process to conserve the human and walkable environment (Tokyo Metropolitan Government, and Sumida City, 1982). It advocated respecting the existing network of streets and alleys and widening or opening a few service roads, which are essential to the development of the community. It analysed the condition of houses, classified the area into five zones, and also proposed to replace seriously dilapidated houses with moderate size community housing, but not with high-rise blocks, with the aim of improving the quality of life.

The policy showed four desirable features for the future Kyojima:

- a humane living environment in accordance with the context of the area;
- a proper mixture of dwellings, shops and factories;
- a safe neighbourhood with specific earthquake precautions;
- a lively neighbourhood for 10 000 people.

It also proposed principles for local service roads, houses and community facilities. The principle for local service roads was that:

- a few service roads, essential to community development, were to be opened and some existing roads widened;
- service roads 6–8 metres wide were to be laid out at intervals of about 100 metres;
- the existing network of walkable streets and alleys was to be preserved.

The principle for houses stated that:

- seriously deteriorated houses were to be redeveloped to improve the quality of life;
- houses were to be made fire-proof;

- small plots were to be assembled to build moderate size housing;
- the residential area was to be divided into three zones according to the conditions of the houses (to be conserved, improved or redeveloped).

The principle for community facilities set out:

- the area surrounded by the main service roads was to be treated as one community;
- a community centre, containing a meeting room and a nursery, was to be built as a central facility of the community;
- moderate size playgrounds were to be laid out at proper intervals.

The metropolitan Government planned to redevelop deteriorated houses and build community housing in accordance with the general policy. It was the first plan in Tokyo that incorporated rehabilitation and citizen participation as the key concept. However, participation did not go well. Some residents opposed the plan in 1982 and the chairman of the conference resigned from his post. The plan became deadlocked. Throughout the 1980s, the community housing project was only able to construct 29 units in two blocks.

In 1990, Sumida City took over responsibility for the community development project from the metropolitan Government. It founded a local community development centre, a task force branch of the town planning department, to develop close communication with people in the area. The centre encouraged self-financed rebuilding and joint replacement. It adopted a new strategy to reduce the size of community housing to about ten units and locate such small housing blocks mainly along new local service roads. The project began to run smoothly. Central government subsidies were effectively introduced into the joint replacement project, and community housing comprising 137 units in 16 blocks was built before the end of the 1990s. Construction also began on new service roads, slowly but steadily.

37.5 How do we conserve walkable environments?

The basic concept of general planning policy was still a functionalistic one of towers and open spaces. The local government and planners modified it in several ways according to the character of the area. They incorporated citizen participation into the implementation process, replaced clearance-type renewal with small in-fill projects and prepared varied programmes in place of the single model (Sumida City, Department of Community Development, 1996). However, problems appeared as the project went on. The community development effort has built up into an incremental improvement process, little by little, since 1970, but at the same time it could not sufficiently conserve the character of the area. The population of Kyojima has gradually decreased, almost halving in this period (Table 37.1). The proportion of children under 15 has reduced by half and the population of people over 65

Table 37.1 Total population and population density of Kyojima

	1970	1975	1980	1985	1990	1995	2000
Population	13 508	11 574	10 127	8951	8159	7277	7126
Persons/ha	529	453	397	351	319	285	279

has doubled. People want to recover the moderate population of about 10 000 and regain an equal balance of generations.

Kyojima is a unique neighbourhood with a walkable and livable environment, but its walkability and livability have been gradually weakened. How do we conserve the character of Kyojima? What type of housing should we establish for the future neighbourhood? What kind of public space should we propose for a rich public and private life? What strategy do we devise for the local shopping street? And how do we maintain and evolve community development? Though we still have no definite answers, some valuable ideas have come from 30 years of experience.

There have been approximately 150 community housing units built. Though they are three- or four-storey blocks of flats and not on a large scale, elderly people who have been moved into the apartments feel isolated. People used to live more comfortably in their poorly equipped tenement houses. Those houses were one or two storeys high and had their living rooms downstairs which usually looked out on the alleys. This low-rise environment encouraged the elderly to go out into the neighbourhood and to renew their social relationships as well as to gain exercise. Openness or transparency, another character of wooden tenement houses, brought about frequent communication. People, at home in their living rooms, used to chat with friends passing along the alley through their open windows. Residents were also able to check on elderly neighbours from the alley. Unfortunately new apartments do not provide such an opportunity. In Kyojima, the future of housing may not be a block of flats but it should preserve close contact with the social network of the area. Two key ideas, low-rise and openness, must be essentially important. A prototype is being sought that interweaves alleys with houses.

It is the maze-like network of narrow streets and alleys that gives Kyojima its life and townscape. It is a corridor, a garden, a service yard and even an outdoor living room for its residents. It is a space for pedestrians and cyclists, with few cars. People can walk peacefully, enjoy gardening with their many tiny flowerpots, put up their colourful washing on clothes poles, and stand chatting with their neighbours. Children also walk and run about, play house and tag, and do exercise such as cycling. It is a relatively safe place. Jane Jacobs argued in the 1960s that there must be eyes upon the street, eyes belonging to those we might call the natural proprietors of the street, to maintain the safety and security of the street (Jacobs, 1961). Of course, there are many eyes on the streets and alleys in Kyojima. However, new eight

metre wide streets lined with new houses hardly seem to fit into the traditional public life in this neighbourhood. Such houses have less openness and lack connection with the street because they are set back for front-yard parking. It may be necessary to build a few moderately wide streets to avert disaster, as the earthquake of 1995 in Kobe has demonstrated, but new widened streets should be for people rather than cars. A possible model is an old street, eight metres wide, which runs meanderingly through the area. It has little through-traffic because of a bottleneck at one end, and has become a kind of pedestrian-orientated street, where pedestrians, cyclists and some cars co-exist without trouble. People have used it as an important part of their summer festival for many years. It is hoped that new streets can be integrated into the local fabric in this way and that the walkable and liveable quality of the alleys may be conserved.

Kyojima is one of a few neighbourhoods that retain a lively local shopping street. There are about one hundred shops – greengrocers, butchers, bakeries, delicatessens, fish and tempura shops and so on – along a narrow street approximately 350 metres long. Most of them are small shops with frontages of several metres, which open up onto the street. It is this narrowness of the street and shop frontages that provides shoppers with a convenient and favourable environment. Tachibana Ginza Street is jammed with people and cyclists every weekday evening. However, it is suffering a gradual decline because of the ageing and migrating population. The Government has proposed constructing a new building near a railway station just outside of the area to contain local shops and to modernise their businesses. However, such a solution is wrong and destructive. It is certainly the narrowness, openness and walkability that give special character and vibrant life to the neighbourhood as well as to the shopping street. It should be revitalised, not by building a big box, but by conserving and reinforcing these qualities.

The Community Development Conference has fostered a positive partnership with the local government since the 1980s and built up a step-by-step improvement process to conserve the walkable quality of the neighbourhood. Inevitably the key members of the conference are growing older and it has become necessary to gradually renew its members. The conference recognises that it is crucially important to involve the younger generations in its activities, and now tries to provide children with frequent opportunities to learn about the area. The local primary school willingly co-operates with the conference and adopts the community learning programme in its curriculum. A team from Chiba University, led by the author, works together with them to have community planning workshops for children – for example, a town trail for pupils to discover community resources (Chiba University, Department of Urban Environment Systems, 2001). Though it may seem a slow and leisurely process, the next generation is growing up there and should positively embrace the community development effort. It will take time to achieve this goal, but it seems clear that in Kyojima community planning is steadily building up the development process to conserve and rehabilitate the walkable environment.

It is also raising children who can enjoy and support the human-oriented neighbourhood.

37.6 Conclusion

Kyojima is an inner city neighbourhood with a humane walkable environment. The urban renewal policy in the 1960s and 1970s neglected this quality and proposed the functionalistic model of towers and open spaces. However, the community development effort in the 1980s and 1990s has modified the policy and respected the traditional character of the area. Many traditional neighbourhoods remain in Japanese towns and they are still to be redeveloped using the modern planning model in spite of its repeated failures. It is necessary to develop an alternative way to conserve their positive qualities as well as to remedy their defects. The experience in Kyojima has provided some useful guidelines for other traditional neighbourhoods in Japan to help conserve their walkable qualities.

Firstly, low-rise and openness of houses is essential for such a neighbourhood to retain a walkable and liveable environment. Modern planning has single-mindedly proposed high-rise blocks in inner city areas, often leaving old people and children isolated, both physically and socially. We should develop a prototype of low-rise and high-density housing for an inner city neighbourhood, which could provide barrier-free access to the community.

Secondly, it is important for streets and alleys in a neighbourhood to be moderately narrow and have a mixture of various activities. A wide street with traffic lanes and pavements often invites heavy through-traffic that would oppress the young and the elderly alike. We should give priority to a network of moderately narrow streets with no separate pavements in an inner city neighbourhood, which could facilitate casual meeting and communication.

Thirdly, it is the narrowness of an inner city local shopping street that gives it its special character and vibrant life. Such a shopping street is similar to a community centre where people, especially the elderly, come together and socialise. It is fatally destructive to move old small shops into new big buildings in order to modernise them. We need to understand that small shops opening onto a narrow street are essential elements of a walkable neighbourhood and not just a local shopping street.

Finally, it is usually more difficult for a community to continue its improvement effort rather than to launch it. Most successful organisations often age with their key members. It is necessary to gradually renew a community organisation through educating and involving the younger residents in the project. In Japan, in the course of our 30 year collaboration with residents and some local governments we have slowly recognised that walkability is one of the essential qualities of a liveable neighbourhood. Though many problems remain to be settled, we will surely continue to go ahead step-by-step towards our goal.

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38

The Cycle Balance: benchmarking local cycling conditions

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38.1 Introduction

The Netherlands is a country that is well known for its cycling. Over 80 % of the population own at least one bicycle. Owing to there being no mountains to speak of and a moderate climate, and the fact that the Dutch live in close proximity to one another, people use their bicycles from early age to old age, all year round and for all purposes. In fact cycling is a normal day to day mode of transport for most Dutch people: about 34 % of all trips less than 7.5 kilometres are made by bicycle, while the car provides for 38 %, walking 23 % and public transport only 3 % (Ministry of Transport, Public Works and Water Management, 2001).

The Dutch Cyclists' Union (Fietsersbond) asserts the interests of cyclists in The Netherlands and is dedicated to achieve more and better conditions for cycling. It strives to make the bicycle more competitive with other modes of transport over short distances, in terms of time, as well as in terms of safety and comfort. For this an infrastructure should be provided that gives cyclists the most direct, attractive, comfortable and safe route possible within a coherent cycling network.

As a result of high bicycle use, the Dutch Government, private organisations and companies invest a lot of time and money in support of cycling. There are, for example, over 20 000 km of bicycle lane and bicycle path along Dutch roads and the capacity of bicycle parking facilities at railway stations alone is almost 300 000. Strangely enough, the effectiveness and efficiency of all these efforts have never been assessed. In order to fill this void the Fietsersbond developed the Cycle Balance (Fietsbalans). This benchmarking project is funded by the Ministry of Transport, Public Works and Water

Management. Impartial assessment of local cycling conditions is used as strategy to improve local cycling policies. This chapter will discuss the background, contents, results and effects of this project.

38.2 History, objectives and characteristics

The idea for the Cycle Balance originates from the need that was felt by the Minister of Transport and the Fietsersbond to maintain the attention given to cycling that was generated by the *Bicycle Master Plan* (Ministry of Transport, Public Works and Water Management, 1991) during the first half of the 1990s and make results manifest on the streets. At the same time the minister recognised the need for a strong interest group for cyclists to enhance their position in local policy and practice. Thus arose the idea of a benchmarking project on local cycling conditions: the Cycle Balance, executed by a specially formed team at the Fietsersbond central office and funded by the Ministry of Transport, Public Works and Water Management. The project that started in the summer of 1999 has two main objectives:

- The primary objective of the project is to stimulate local authorities to adopt a (still) better cycling policy using benchmarking techniques. The aim of benchmarking is to learn from others by comparing the performance of one town to that of others and look for best practices.
- The secondary objective of the project is to enhance the position and strength of the local Fietsersbond branches. As most decisions that influence cycling conditions are made on a local level, it is important that the Fietsersbond local branches are recognised by local councils and civil servants as knowledgeable and influential partners that represent the interests of cyclists. Therefore the Cycle Balance is used to establish a co-operative environment in which discussion is based on facts rather than emotions.

The perspective within the project is that of the cyclist. This guides both the collection and the assessment of data. That is why *Sign up for the bike* (CROW, 1993) is used as the primary basis for the choice of assessment criteria, the collection of data and the units of measurement and standards. This design manual for cycle-friendly infrastructure proves that taking the characteristics of both the bicycle and the cyclist seriously is the basic condition for good cycling policy.

The initiative for benchmarking as a method to better one's performance is usually taken by the company or organisation itself. In the Cycle Balance the benchmarking initiative is taken by an outsider. Consequentially the internal incentive to generate and implement the results is absent. The Fietsersbond has to convince local authorities that participating in the project is in their interest. They have to be 'seduced' to implement improvements. That is why the Cycle Balance is designed as a project on which the local

branches of the Fietsersbond, the Fietsersbond central office and the councils of the participating towns work together to generate reliable information that is meaningful in the decision-making process.

The Fietsersbond local branches are very much involved in the project, both in data collection and in communicating and discussing the results. This means that the Cycle Balance profits from the local knowledge and involvement of hundreds of volunteers in the towns that participate in the project. By 2002 the project had been executed in 115 towns, and included all Dutch towns with over 100 000 inhabitants and covered almost 50 % of all Dutch cyclists (see Fig. 38.1).

38.3 The four surveys of the Cycle Balance

The Cycle Balance assesses 10 different dimensions of the local conditions for cyclists (see Table 38.1). These dimensions provide a good mixture of policy results, policy effects and policy processes. The original idea when designing the project was to use existing data as often as possible. These data had to be relevant, comparable, reliable and generate information on a local

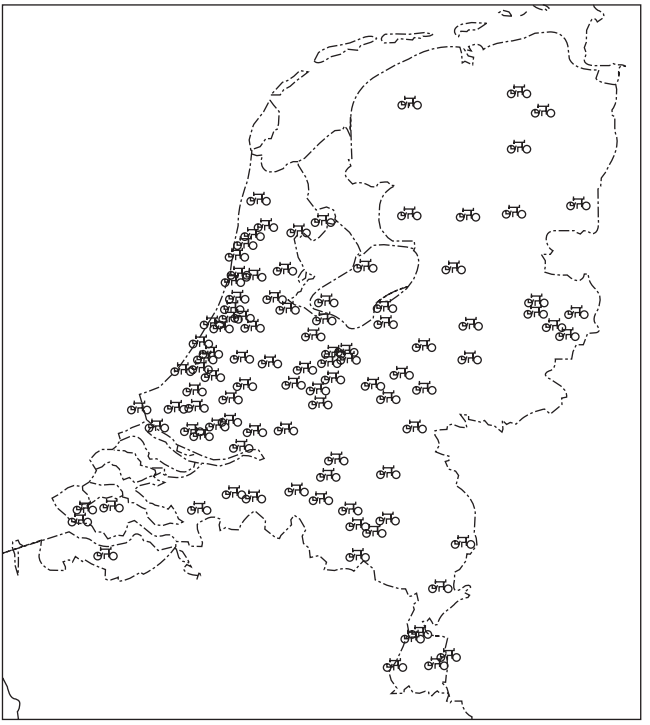

Fig. 38.1 Distribution of the participating towns throughout The Netherlands.

Table 38.1 The ten dimensions of assessment in the cycle balance

1.	Directness
2.	Comfort (obstruction)
3.	Comfort (road surface)
4.	Attractiveness
5.	Competitiveness compared to the car
6.	Bicycle use
7.	Road safety of cyclists
8.	Urban density
9.	Cyclists' satisfaction
10.	Cycling policy on paper

level. Very few existing databases met these conditions. More than anticipated, the team had to collect the relevant data themselves. The research part of the project consisted of four surveys.

A questionnaire for the municipality, filled out by the towns' civil servants, is used to assess the local authorities' cycling policy on paper. Although policy papers in themselves do not improve cycling conditions, a good cycling policy is vital for long-term comprehensive decision-making and practice. A good cycling policy focuses on the cyclist and therefore meets with certain quality requirements. The following themes are addressed: policy papers and plans, the bicycle network, bicycle parking, budgets and the council as employer.

A questionnaire on cyclists' satisfaction is used to assess if the cycling conditions meet with the requirements of the day to day cyclists. After all, the cyclists are the customers! Stimulating bicycle use is more likely to be successful if it meets their needs, desires and requirements. The questionnaire consists of simple questions on bicycle parking, cycling comfort, road safety for cyclists, social safety, the handling of bicycle theft and the municipality's cycling ambitions.

On some dimensions of local cycling conditions, data are available in national databases of organisations like Statistics Netherlands (CBS) and the Institute for Road Safety Research (SWOV). Using these data, the dimensions bicycles use, road safety for cyclists and urban density are assessed.

The Quick Scan Indicator for Cycling Infrastructure is used to assess the quality of the local cycling infrastructure. This is the most innovative and appealing of the four surveys. The Fietsersbond developed this method in alliance with several specialised engineering companies. With a specially designed measuring bike, 12–16 routes criss-crossing through the city are investigated. This measuring bike, as shown in Fig. 38.2, registers on a laptop computer the time, distance, speed, sound and vibrations (and thus indirectly also stops, waiting time etc.) experienced. At the same time a video camera records the road profile, type of road surface, manoeuvres and obstacles. These data are linked by a special computer program so that for example 'the average vibration disturbance of cycle tracks with asphalt paving'

Fig. 38.2 The measuring bike of the Fietsersbond.

and 'the average waiting time at intersections with traffic lights' can be determined. Using these data the dimensions of directness, comfort (obstruction), comfort (road surface) and attractiveness are assessed.

Special attention has been given to the choice of routes because the assessment results in the various towns have to be comparable. According to a fixed method of random sampling 12–16 routes are selected in and around the town centre. These routes go from a randomly chosen house to a destination that attracts many cyclists and subsequently to another house etc., thus giving a representative picture of how cyclists move around in the town. While the measuring bike rides the 30–40 kilometres of selected routes, at the same time a car drives the same routes as the bicycle to determine the competitiveness of the bicycle, both in time and in cost.

38.4 The assessment of participating towns

For each of the participating towns a comprehensive report is made on the results of the assessment, giving an adequate, objective and comprehensive picture of local cycling conditions. It contains a reliable assessment of the local cycling conditions on the ten dimensions shown in Table 38.1. The results are compared with:

- existing and developed standards;
- average scores of all 115 towns and towns of roughly the same size;
- the best scoring towns.

This way the participating towns gain clear understanding of the strong and weak aspects of their cycling policy and are able to compare their efforts and results with those of other (comparable) towns. They can reliably determine which aspects most urgently need improvement. Table 38.2 shows the assessed dimensions and sub-dimensions, the indicators that are used for the assessment, the standards and intervals that are used and the average assessment results.

Table 38.2 shows that small towns score well on attractiveness and directness. The chosen indicator to assess attractiveness is noise pollution. Noise is relatively easy to measure and not many cyclists find noisy surroundings attractive. In fact the results showed a correlation between the scores on attractiveness and cyclists' satisfaction. The explanation for the good score of small towns is fairly obvious: noise is predominantly produced by motorised traffic of which there is less in small towns, whereas in large towns cyclists are often on bicycle paths or lanes next to busy motorised traffic. The fact that small towns do well on directness is due to good average speed and very little delay. Cyclists in large towns suffer more than twice as much delay as those in small towns. The sheer number of traffic lights is the culprit causing over 80 % of the delay in large towns.

While cyclists in small towns enjoy attractive and direct routes, large towns excel in the competitiveness of the bicycle compared to the car. Basically, you are a thief of your own time and money not to use the bicycle for short trips in large towns. On average in large towns the bicycle is five per cent quicker than the car. The costs of car parking are substantial, averaging 40 eurocents per hour for every trip, some 5 times higher than in small towns.

The reports on the assessment results of each individual town discuss in great detail the relevance of each (sub) dimension, which data were collected, how standards were determined and the assessment method. The main part of the report consists of a presentation of the assessment results and the conclusions that can be drawn on the basis of these results. Finally, recommendations are given on how to improve the towns' performance on each (sub) dimension.

To illustrate the results of the assessment, a brief account is given of the results, conclusions and recommendations based on the central graph of Veenendaal as presented in Fig. 38.3. The figure shows clearly the strong points of Veenendaal. It is a very compact town with many destinations within cycling distance. Bicycle use is high and cyclists are satisfied with the quality of cycling conditions offered to them. The road surface is of extremely high quality, mainly because of the use of asphalt on bicycle paths with smooth joints on intersections and good maintenance. Finally, the policy on paper meets with the standards set in *Sign up for the bike*. The cycling policy is complemented by free guarded bicycle parking in the town centre and at the railway station.

Table 38.2 General overview of the Cycle Balance assessment results

Assessed (sub)dimension	Standard	Interval	Overall Average	Average large towns*	Average medium size towns**	Average small towns***
Directness						
Detour factor (ratio)	1.25	0.1	mediocre	mediocre	very good	mediocre
Delay (sec/km)	16.5	10	good	mediocre	good	very good
Actual cycling speed (km/h)	15.5	1	mediocre	mediocre	mediocre	good
Overall judgement directness			mediocre	mediocre	mediocre	mediocre
Comfort (obstruction)						
Chance of stopping (N/km)	0.75	0.5	mediocre	bad	mediocre	good
Slow cycling and walking (% of time)	7.5	5	mediocre	mediocre	mediocre	mediocre
Traffic-obstruction (v-Fv)	1.75	1.5	mediocre	mediocre	mediocre	mediocre
Infrastructural impediment (v-Fi)	0.75	0.5	mediocre	mediocre	mediocre	bad
No right of way (N/km)	2.5	1	mediocre	mediocre	mediocre	bad
Turning off(N/km)	2	0.5	mediocre	mediocre	mediocre	bad
Overall judgement comfort (obstruction)			mediocre	bad	mediocre	mediocre
Comfort (road surface)						
Hindrance caused by vibrations (v-Ft)	100	40	mediocre	mediocre	mediocre	bad
Attractiveness						
Noise pollution (v-Fg)	130	40	mediocre	bad	mediocre	good
Competitiveness						
Journey time ratio (ratio)	1	0.1	good	good	mediocre	mediocre
Journey bikes faster (% of journeys)	70	20	mediocre	mediocre	bad	mediocre
Costs per journey (cents)	100	30	bad	good	bad	very bad
Overall judgement competitiveness			mediocre	good	mediocre	bad
Bicycle use						
Share in trips to 7.5 km (%)	43	4	mediocre	mediocre	bad	mediocre

Table 38.2 *(Cont'd)*

Assessed (sub)dimension	Standard	Interval	Overall Average	Average large towns*	Average medium size towns**	Average small towns***
Road safety of cyclists						
Victims per 100 million cycle km (N)	14	4	mediocre	mediocre	bad	mediocre
Urban density						
Adresses per square kilometre (N)			mediocre	good	good	mediocre
Cyclists' satisfaction						
Bicycle parking (% dissatisfied)	17.5	15	mediocre	mediocre	mediocre	bad
Comfort (% dissatisfied)	17.5	15	mediocre	mediocre	mediocre	mediocre
Road safety for cyclists (% dissatisfied)	17.5	15	mediocre	mediocre	mediocre	mediocre
Social safety (% dissatisfied)	17.5	15	good	good	good	good
Approach to bicycle theft (% dissatisfied)	17.5	15	very bad	very bad	very bad	very bad
Municipality's cycling ambitions (% dissatisfied)	17.5	15	good	good	good	good
Report mark	7.25	0.5	mediocre	mediocre	mediocre	mediocre
Overall judgement cyclists' satisfaction			mediocre	mediocre	mediocre	mediocre
Cycling policy on paper						
Policy papers and plans (N)	16	4	mediocre	mediocre	mediocre	bad
Bicycle network (N)	13.5	4	mediocre	mediocre	mediocre	mediocre
Bicycle parking (N)	14	3	bad	mediocre	mediocre	bad
Budgets (N)	4	1	bad	mediocre	bad	bad
Council as employer (N)	5	1	mediocre	mediocre	good	mediocre
Overall judgement cycling policy on paper			mediocre	mediocre	mediocre	bad

* Large towns = more than 100 000 inhabitants
** Medium size towns = 50 000–100 000 inhabitants
*** Small towns = 20 000–50 000 inhabitants

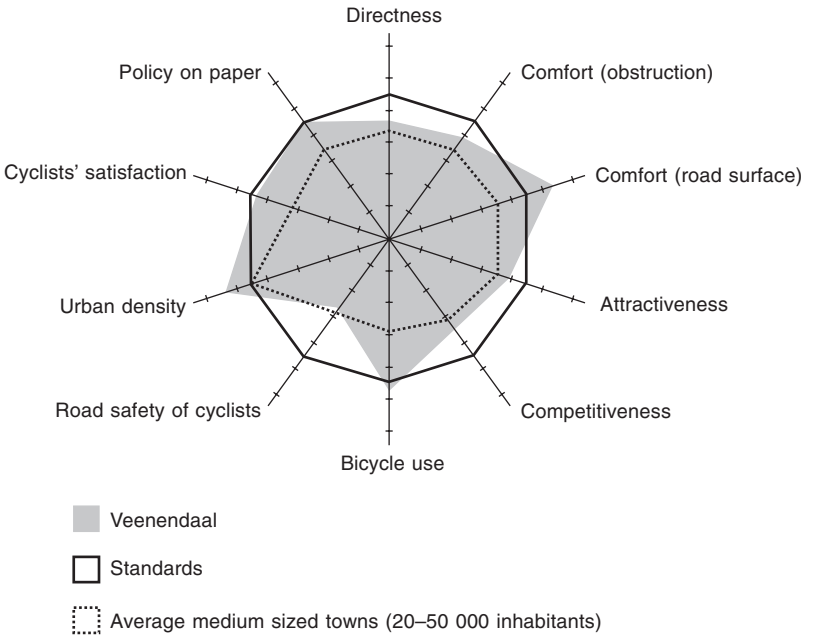

Fig. 38.3 The Cycle Balance score of Veenendaal.

However, Veenendaal also has its weaker points and these show very clearly in the figure as well. Most striking is the relatively high risk of cyclists getting involved in a serious accident. It is likely that intersections with busy 50 km/h roads are the main cause of the problem. The solution should be to reduce car speeds at these intersections, and building roundabouts has proved to be a successful strategy to achieve this. The relatively low score on directness is caused by a high detour factor, probably caused by the limited passages under or over the railway tracks. A good analysis of the problem, using a matrix of origins and destinations (the O/D matrix), should be made to see if easy solutions can be found in the way of short cuts for bicycles. The obstructions caused by road design and fellow road users make cycling sometimes uncomfortable. Obstruction by cars on roads where cars and bicycles are mixed and the fact that cyclists have to make many turns to reach their destination also explain the relatively low average speed. A traffic policy which bans motorised through traffic from residential roads is the way to enhance cycling conditions within this aspect. Finally, the competitiveness of the bicycle compared to the car could be better. In half of the trips that were part of the assessment the car was quicker than the bicycle. Most importantly, the parking costs for the car are too low to act as an incentive for people to take the bicycle on short trips instead of the car. Giving cyclists more direct routes, preventing cars from going through the town centre and raising parking costs for cars at important destinations like

the town centre, the railway station and office areas is the effective strategy for the bicycle to compete better.

38.5 Good cycling policy works

The surveys in the 115 towns produced unique databases on the cycling conditions in The Netherlands. Never before have so many data on cycling been collected in such a systematic way. Apart from the reports on each individual town, analyses have been made on a general level. The most important result of these analyses is that a strong correlation can be found between the actual bicycle use and the scores on the nine other dimensions of the local cycling conditions that are assessed in the Cycle Balance. Figure 38.4 shows that in towns with a high score on the Cycle Balance, bicycle use is 30 % higher than in low scoring towns. This means that the assessment in the Cycle Balance is relevant. More importantly it shows that a well executed coherent cycling policy pays off in terms of more cyclists and more cycling.

However, although the correlation between score on the Cycle Balance and bicycle use is strong, it only explains 20 % of the difference in bicycle use in the assessed towns. Because of that we looked for other factors that play a part in the differences in bicycle use between towns. First of all we looked at the influence of the use of public transport for short trips. Although the share of public transport for short trips is at most 11 % (in Amsterdam and Rotterdam), 75 % of these trips are at the expense of bicycle trips. If the use of public transport is incorporated in the model, it explains over 40 % of the variance between towns. Competitiveness of the bicycle compared to the car then becomes the strongest explanatory factor; three times more than the

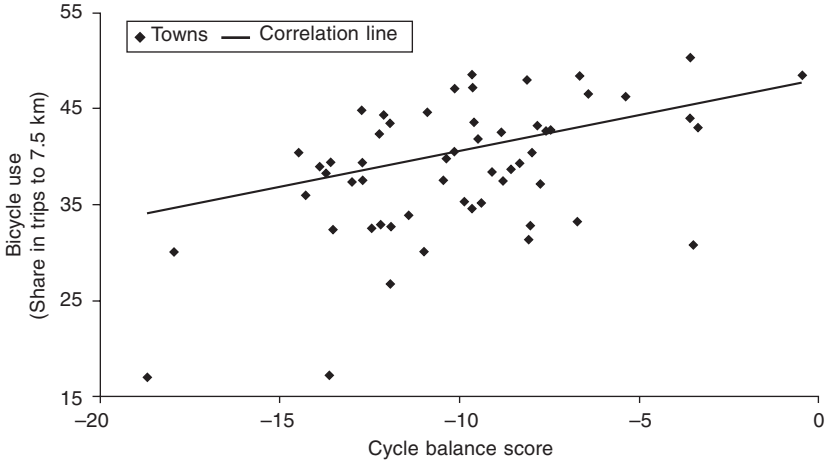

Fig. 38.4 Correlation between bicycle use and score on the Cycle Balance.

other dimensions in the Cycle Balance. Characteristics of the population were also examined. Unsurprisingly, age is an important factor: older people cycle less and teenagers cycle more. The strongest correlation, however, was found with the percentage of protestants in a town. Although cycling is not religious, Calvinists are known for strong principles and sober lifestyles. These characteristics not only influence the choice of mode of transportation, but also influence the local political decision-making on transport and traffic in favour of the cyclist as it leads to higher bicycle use and a better score on the Cycle Balance.

After incorporating these significant characteristics in the model, the theoretical potential growth of bicycle use in The Netherlands is at least 12 %, if cycling conditions in all towns would meet with the set standards. Good cycling conditions lead to more cycling and towns with many cyclists have a better cycling policy, which in turn leads to better cycling conditions. This is a self-enhancing process. Small towns can make easy progress by enhancing the competitiveness of the bicycle compared to the car. Large towns have to make efforts to make cycling more enjoyable: better flow, less disturbance by motorised traffic and less noise.

38.6 Local debate and effects

For every assessed town a comprehensive report is written. The assessment results should provoke a debate on the necessity and actions to improve cycling conditions and policy. In order to be effective, this debate should take place in the public arena: the city council and the local media. The strategy of the Dutch Cyclists Union is to have the report put on the agenda of the council committee for transport and traffic, accompanied by a list of priorities for actions and activities the council should decide on to improve cycling conditions. The local and regional media are informed through a press release and invited to a presentation to the council. This has proven a successful strategy. In most towns council committees have given the Fietsersbond the floor for 20–30 minutes. During the presentation the councillors are confronted with a prediction as to the potential growth of bicycle use if the right actions are taken. This often leads to a lively debate on what actions should be given priority within the limitations of the budget. However, in many cases the committee and the alderman for traffic and transport agree that a (new) comprehensive local cycling policy plan should be developed and budget reservations should be made to execute these actions.

The success of the Cycle Balance is mainly due to the enormous efforts of the volunteers of the local branches of the Fietsersbond. Over 300 volunteers worked thousands of hours on preparing, executing and computing the surveys. An evaluation shows that these volunteers are very content with the project and they feel it will definitely help them in their lobby for better cycling conditions in their towns. Local and regional publicity in combination with

the contact with local civil servants and politicians have given them an (even) better position and status as a local interest group. Their image has become more professional and that gives their opinions more importance in the decision-making process.

The visible improvements on the streets as a result of the Cycle Balance are still scarce in 2003 but a lot has been set in motion and many participating towns have indicated that cycling is getting more priority in terms of time and money so that many visible and measurable improvements can be expected in the near future. The Fietsersbond, the local branches and the team at the national headquarters will keep a close watch on the local developments to make sure cyclists benefit in terms of more safety, more comfort, better flow, etc.

38.7 Publicity and the 'Cycle-city' elections

Media attention has been recognised as an essential aspect of the project from the beginning and has been incorporated in the design of the project. Influencing public opinion in all stages of the project is conditional to its status and thereby its effectiveness. The quick scan measurements have successfully been used to generate local, regional and even national publicity. The extensive media coverage is mainly due to the high tech measuring bicycle's appeal to the camera, but the presentations of the assessment results and subsequent discussions in council committee meetings also get good coverage in local and regional newspapers.

To make the project even more exciting, a competition element was introduced. In November 2000, based on the analysis of all collected data, five towns of different sizes were nominated for the 'Cycle-city 2000' title. An independent jury declared the town of Veenendaal the winner. The jury praised Veenendaal for its overall coherent policy and for the high quality of the infrastructure and other facilities for cyclists. The fact that Veenendaal was not known for its excellence clinched it for Veenendaal. In December 2002 a jury chose the town of Groningen as Cycle-city 2002 (Fietsstad 2002, see Fig. 38.5) from six nominated towns. The main consideration of the jury was that the excellent competitiveness of the bicycle did not only lead to a very high modal share for the bicycle (47 %) but also to a low modal share for the car (23 %) in inner city transport. The publicity and interest these Cycle-city elections have generated has been used to communicate the good practices that can be found in the nominated towns. The main focus of communication has been on traffic and transport professionals, civil servants and local politicians of other towns so they can learn from these excellent achievements.

The special focus on publicity in the project has paid off. The project is a household name for everyone involved in bicycle planning. It is known to the relevant target groups: civil servants, aldermen, council members and other

Fig. 38.5 The Cycle city 2002 prize is an official road sign for entering a built-up area.

professionals. Participating towns are eager to get the final results and new towns still show interest in participating. Several of these have already indicated that they want to use the results to revise their cycling policy. The bicycle in general and the Cyclists Union in particular have also benefited from all the media attention.

38.8 The future

In 2003 new towns will be assessed using the Cycle Balance method. However, large numbers of new participating towns are not to be expected. Several of the assessed towns have already shown interest in the return of the Cycle Balance to see if their cycling policy results in actual improvements that can be measured in the streets. This will, however, not be worthwhile before 2005. This means that the emphasis will shift to other aspects of the benchmark.

Two best practice studies will be conducted. The first one will be on bicycle-friendly Traffic-light Regulation Installations (TRIs). Traffic-lights are responsible for 85 % of the total delay in larger towns and a big irritation for most cyclists because they always seem to come last. Good examples of TRIs that increase the chance of proceeding and minimise waiting time will be promoted to local authorities and the suppliers of TRIs. The second best practice study will be on road surface for cyclists, i.e., paving. Cyclists especially appreciate a good road surface because bicycles hardly have any suspension. Bicycle tracks, however, are often flag-paved and many important bicycle routes on roads for mixed traffic have clay pavers. These are often of poor quality. The study will show the effect of different quality paving for different materials but also for different modes of construction and maintenance. Again, good examples will be promoted to local authorities and construction companies.

The Cycle Balance assesses the cycling conditions on a general (network) level. Both local branches of the Fietsersbond and various highways authorities have shown interest is using the measuring bike for the assessment of a

specific bicycle route. This means slightly adjusting the existing method so that assessment of individual road sections and intersections can be made. The assessment will identify actual problems and give advisable solutions. For the presentation of the results a Geographic Information System (GIS) package will be used.

Finally, there has been international interest in the use of the Cycle Balance method, in particular the measuring bike, mainly from Germany and Belgium. The Fietsersbond will seriously look for ways to make this possible. Problems with regard to organising the process, language and funding have to be solved.

38.9 References

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39

Implementing local cycling policies in Great Britain

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39.1 Introduction

It is becoming increasingly common for local authorities in Great Britain to include policies for pedestrians and cyclists in their transport planning documents and in more and more cases, such policies are brought together in fully formed modal strategy documents. The growing policy attention given to these modes is partly due to the fact that British local authorities were encouraged to include policies for pedestrians and cyclists in their five year local transport plans (LTPs; England and Wales) or local transport strategies (LTSs; Scotland), which they have been required to prepare since 2000. A second reason is the actual recognition that the two modes can contribute to solving local transport problems, especially if they are properly integrated with public transport.

However, putting policies on paper is not the same as implementing them successfully. Bratzel, in a study on environmentally-orientated local transport policies in Germany, Switzerland and The Netherlands noted that, 'the analysis of transport-related political activities in municipalities largely breaks new conceptual ground. Although there are numerous findings about political administrative systems in local authorities, local transport policy has hardly ever been the focus' (Bratzel, 1999: 11). Though there are notable exceptions in a German context such as Gertz (1998) and Flämig *et al*. (2001), this is not only true for German studies but also for the Anglo-American context, where there are very few studies of transport related implementation processes. One exception is work carried out in the USA by Sabatier and Mazmanian (1989) on the statutory regulations for the reduction of motor vehicle emissions and another is a study of the construction of cycle routes in Portsmouth, England (Quenault and Head, 1977). However, the first study relates to

statutory duties in a federal system and the second is concerned with measuring the actual outputs of a policy, not the processes which produced them. Neither example is likely to help practitioners in local authorities in their efforts to implement non-statutory walking and cycling strategies.

This chapter is based on a study of British local authorities, which combined findings from the literature, a questionnaire survey and a series of interviews with local practitioners into a conceptual model of walking and cycling policy implementation (Fig. 39.1). The model shows the factors found to play a part in the implementation process and their relationship to each other. The terms 'local policy formation' and 'national policy context' in Fig. 39.1 are self-explanatory. The remaining terms are defined as follows:

- external factors have a bearing on implementation but cannot necessarily be influenced by the actors in the process (e.g., topography, climate, urban structure, demographics);
- inter-organisational processes are all interactions between the local authority and other bodies or organisations (e.g., local interest groups, employers, schools or other authorities);

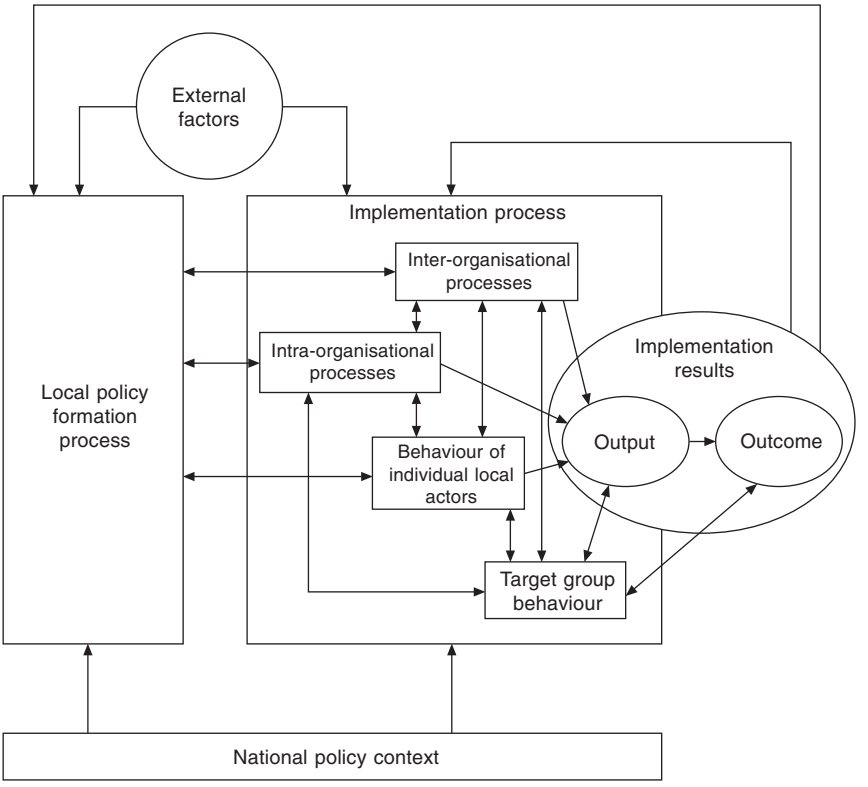

Fig. 39.1 Conceptual model of walking and cycling policy implementation determinants. Source: adapted from Winter (1990).

- intra-organisational processes are all interactions between individuals, groups, departments or even policy areas within a local authority;
- behaviour of individual local actors includes all characteristics, attitudes and behaviours of actors such as officers, managers or councillors (this determinant overlaps slightly with the previous one but the differences are sufficiently important to treat them separately);
- target group behaviour covers characteristics, attitudes and behaviour of members of the general public outside an organisational context;
- output describes all walking and cycling measures implemented by the authority;
- outcome describes the effects of such measures on modal share, accident rates, the perception of modes and other indicators.

Discussion of the opportunities, problems and solutions (below) associated with this model is intended to help both those involved in implementation at national and local levels and those studying these processes in structuring their work and learning from the experiences of others. Although the study looked at local authorities with very different characteristics – such as size, political organisation or land-use patterns – the breadth of cases examined should cover a wide enough range of implementation scenarios to relate to the experiences of most local actors and authorities in some way.

39.2 Factors determining implementation success – and how to influence them

39.2.1 External factors

Opportunities

A flat terrain and low rainfall level are generally considered more likely to encourage people to walk and cycle. Also, local authorities attractive to tourists are more likely to develop good walking and cycling facilities. This is primarily because noise, congestion and pollution from car traffic are seen to be deterrents to the tourist trade and local policy-makers as well as those benefiting economically from this trade consider the reduction of car traffic a high priority. Sufficient existing road space to accommodate new walking and cycling facilities without causing major inconvenience to motorised traffic was identified as an asset and sometimes as a condition for getting such measures planned and implemented. Compact and accessible town or local area centres are also considered conducive to walking and cycling since many trips there are within the range of pedestrians or cyclists.

Problems

The major problem associated with such external factors is that they are – or could appear to be – outside the control of local actors implementing walking and cycling policies. Problematic conditions include a hilly topography, ‘bad’

weather, lack of space for new facilities due to the nature of the urban fabric or rural areas with low density development, which result in people having to cover distances unsuitable by walking and cycling. High levels of car ownership and a general perception of the car as the most desirable mode of transport were also reported to influence implementation success.

Solutions
Statistics show that in some European countries, which feature high rainfall, a cold climate or a hilly topography (e.g., Denmark, The Netherlands, Sweden, Switzerland) the modal share of cycling reaches up to 15 % (DoT, 1996). This suggests that, in themselves, such conditions are not sufficient to deter people from cycling. The study also showed that these factors were not perceived as barriers in every authority. Thus, it seems that explaining a lack of walking and cycling policy or measures with these external factors either arises from an incorrect perception of the real problems facing these modes – or the desire to find an excuse for inaction. Consequently, local actors keen to see walking and cycling policy developed and implemented can cite examples both from other British authorities with similar conditions and other European countries to counteract arguments about 'bad weather' or 'too many hills'.

A lack of space for facilities is harder to deal with but, again, the situation should be carefully examined to ascertain whether space is in fact the real problem. Because there is generally an existing network for pedestrians, a lack of space *for cyclists* was cited as a barrier to providing dedicated facilities. However, road space reallocation is an acknowledged tool for improving conditions for both modes and it is often a matter of political will rather than physical space which determines the provision of new facilities. It has also been shown that careful combination of cyclists with public transport (e.g., in bus lanes; Davies *et al.*, 1998) and even pedestrians (Trevelyan and Morgan, 1993) can successfully be used in situations where other solutions are not feasible or where small gaps in an existing or planned network need to be bridged.

In areas with low population densities it will be difficult to ensure that the majority of people will be within walking or cycling distance of jobs, shops and other facilities. However, authorities should consider both short- and long-term approaches such as the integration of the modes with public transport (e.g., cycle lockers at stations, safe routes to stations) and issues of land-use planning. It is recognised, though, that some of these approaches are outside the direct influence of local actors.

39.2.2 The national policy context

Opportunities
The study clearly demonstrated that the national policy framework influenced both local policy-making and implementation processes. The strongest sources of influence were the UK Transport White Papers, the National Cycling

Strategy and the requirements associated with the preparation of Local Transport Plans and Strategies (LTP/Ss). All of these have served to increase the awareness of walking and cycling as important modes and have raised their political credibility. The documents have also created a framework to which local actors can refer when policies or measures for walking and cycling meet doubt or opposition. The National Cycling Strategy's original target of doubling cycle use in Britain was shown to have had a particular impact in this context as it gave local authorities a concrete goal to aim for in their own policies.

The regulations in England and Wales, which tie resource allocations to specific measures included in the LTPs, have meant that funding for specific walking and cycling projects has increased. This has overcome some problems of a shortage of local resources having been allocated to these modes. National planning guidance documents (DoE and DoT, 1994; DETR, 2001; The Scottish Office Development Department, 1999 a, b) were also shown to have influenced the local approach to transport planning and some local actors have used these documents to back up their arguments for specific schemes.

Problems

The main problems identified were a lack of national targets for walking and the comparative weakness of the guidance document *Encouraging Walking* (Department of Environment, Transport and the Regions, 2000), which in the continuing absence of a UK National Walking Strategy is considered the nearest equivalent to the National Cycling Strategy. An additional – and potentially very serious – problem identified was the fact that in Scotland funding allocations based on LTSs were not tied to individual schemes and since authorities were generally receiving less money than they bid for, this meant walking and cycling still had to compete for funds internally.

Another problem which emerged was the fact that some authorities still have no policies for walking and cycling included in their LTP/Ss. The encouragement given for such policies at the national level thus appears to be ineffective in ensuring that walking and cycling are catered for through adequate local policy provision throughout Great Britain. Furthermore, those responsible for approving draft LTPs and LTSs at the national level evidently do not ensure that the documents fulfil the requirements relating to the two modes.

Lastly, the study found that local actors were not always aware of national guidance documents and design manuals, though these were considered to be very helpful by those who did use them. However, gaps in this guidance material were also identified and it was felt that it was the national Government's responsibility to fill these.

Solutions

The study identified the following measures which the UK national Government should consider, if it seriously wishes to see better provisions made for pedestrians and cyclists and an associated rise in modal share:

- a national strategy for walking, incorporating national modal targets;
- ensuring that national policy documents are based on relevant theories and experience and that they complement each other (the virtual omission of walking and cycling from the Government's strategy for buses (DETR, 1999) is an example of bad practice);
- Westminster, the Scottish Executive and the Welsh National Assembly should ensure that all local authorities adopt well-developed walking and cycling strategies as part of their LTP or LTS;
- firming up requirements – and guidance – for the local assessment of base levels of key output and outcome indicators and their monitoring; evaluating this information centrally to be able to provide a more detailed national picture;
- providing more detailed design guidance on specific pedestrian and cycling issues and measures (such as different types of pedestrian crossings or cost–benefit comparisons of different specifications for cycle paths); ensuring targeted distribution of these to all local actors.

An improved national framework would help to underline the importance of walking and cycling and would be useful in helping local authorities and actors to politically justify actions and expenditures.

One approach local actors can take is ensuring that they have the relevant guidance material available to them, both as reference material for their own use and as a source of supporting arguments for new schemes and proposals. This, though, can be a time consuming task and it will be difficult to perform for officers, who merely cover walking and cycling as part of a wider job load.

39.2.3 The local policy formation process

Opportunities

The most obvious opportunities are provided by the LTPs and LTSs. Getting sound policy provisions for pedestrians and cyclists embedded in these plans is an important step towards successful implementation. The study showed that once policy had been expressed in writing, it could provide a useful basis when arguing the case for implementation as well as for reminding local politicians and other actors of existing commitments.

Problems

A lack of walking and cycling policy or inadequate policies are very obvious obstacles which can seriously affect many other determinants of the implementation process. Moreover, conflicts during the policy formation process can also lead to weak implementation structures being put in place – a lack of committed staff time would be one example. If the policies are formed without adequate internal consultation, it is possible that important connections with other policy areas (such as education or planning) are

missed or that vital stakeholders will lack a sense of involvement and ownership. Equally, it was found that neglecting consultation with outside bodies and the general public during policy formation could lead to conflict during implementation.

Solutions
Local authorities should ensure that they formulate well founded, detailed policies for pedestrians and cyclists. Various mechanisms for enhancing this process exist. Authorities which have not previously included these modes in their transport policies can look at the provisions made in the LTP or LTS of councils more active in this respect. Evidently, it is very helpful if the authority has a modal champion, ideally a committed officer, who is willing and able to do the necessary research.

It is also important that an interactive implementation process is specified at the policy-making stage to ensure actors are aware of the important policy links (such as health and transport), the groups which should be consulted (such as local or national user groups), and the organisations which should be involved (such as health authorities, local employers and public transport operators). Furthermore, policies must specify targets for policy outputs (such as the number of new cycle parking facilities, pedestrian crossings or Safe Routes to School schemes) as well as policy outcomes (e.g., modal share for different types of trips; levels of use of new or existing facilities; accident reduction). Only if indicators are chosen, targets specified, base levels measured and then monitored (with both the latter actions also anchored in policy) will authorities be able to assess if their policies are being implemented as planned and have the desired effect. This review and feedback process is vital if policies and their implementation are intended to be more than symbolic acts. It should also be remembered, though, that any targets – whilst challenging – should be tailored to local conditions rather than simply adopted from elsewhere.

39.2.4 Inter-organisational processes

Opportunities
A major opportunity for enhancing the implementation of walking and cycling policies is the existence of active local user groups (though few authorities reported such groups for walking). These groups – traditionally considered adversaries of local authorities – can in fact help by providing local expertise and also by lending public support for new policies and schemes. Their active lobbying was reported to be a good way of demonstrating public demand and thus gaining political support for walking and cycling measures. Thus, where they exist, efforts should be made to involve user groups in both policy formation and implementation through formal consultation (see also Section 39.2.7) but also through less formal methods, such as attendance of local group meetings by officers.

Some authorities also reported local schools and parent groups keen on developing Safe(r) Routes to School. Again, fostering good links with such groups and providing 'hard' measures in exchange for schools offering cycle training or parents organising walking buses, for example, was seen as a good way of maximising support as well as policy outputs.

Working with developers can also result in enhanced provisions for pedestrians and cyclists, which are often cheap compared to the overall cost of a new scheme, are supported by current planning guidance and regulations and can be included in the requirements for planning consent. A good opportunity for gathering and exchanging information and practical experience across different authorities is provided by a variety of schemes and groups such as cycling officers' groups, integrated transport groups and the Cyclists' Touring Club benchmarking project (which includes study visits to locations and authorities of interest; see also www.ctc.org.uk). All officers with experience of such groups were highly enthusiastic about their benefits.

Lastly, many authorities had found the organisation Sustrans a useful partner in implementing projects beneficial to pedestrians and cyclists. The matching funding provided by Sustrans enhanced the authorities' return for their own investments. Sustrans could also contribute expertise and experience, links to the National Cycle Network (which could help to generate political support) and sometimes also assisted in difficult purchase negotiations with land owners. Several local actors reported that their authorities had actively lobbied for the Sustrans National Cycle Network routes to pass through their area. In some cases, such routes were then used as justification for providing physical links with existing facilities.

Problems

The influence of local lobby groups can of course also create obstacles if the groups express opposition to walking or cycling schemes. Such opposition caused serious problems in several instances. Another potential problem in some British authorities is conflicting priorities between different administrative tiers such as County Councils and District Councils or London Boroughs and *Transport for London* for example. Another problem is the fact that a considerable number of authorities do not actively involve organisations such as local schools, employers, health authorities or public transport operators in the implementation process.

Solutions

A potential solution to local opposition is consultation, and local authorities have employed a variety of techniques including targeted contact with both statutory consultees and other potential stakeholder groups. However, it was not always possible to reach mutually acceptable compromises through the consultation process. Politicians were sometimes reluctant to decide against the wishes of a particularly vociferous group even though such groups often only represented a minority opinion while the measures in question would

actually provide a net benefit to the community. If the proposed measures can be shown to have an overall long-term benefit the solution would be for local politicians to be prepared to take decisions, which might attract some adverse publicity in the beginning. There are many examples in Britain where even initial detractors of a scheme became supporters after it had been implemented and its benefits had begun to manifest themselves – such as increased economic turnover in newly pedestrianised streets (Hass-Klau *et al*., 1992). In such cases, it is very important to make good use of potential allies outside the authority who might be able to fight parts of the public battle without the real – or perceived – limitations imposed by political accountability.

Another potential way of increasing organisational support and involvement is via local events dedicated to walking and cycling (such as participation in the annual European Car Free Day). Such events which should emphasise the fun and health aspects of the modes can create positive publicity and help to demonstrate public demand – to both the council and outside organisations.

39.2.5 Intra-organisational processes

Opportunities

Communication within the organisation is an important factor in local policy implementation. Good formal and informal communication links between individuals, groups and departments should thus be fostered and made use of wherever possible. The study also showed that personal face-to-face communication either in meetings or between individuals was often the most effective way of clarifying queries, conveying the importance of walking and cycling or pre-empting conflicts. Written reports on the other hand were seen to be useful as a medium for presenting detailed arguments, particularly if they could be backed up by good practice examples, statistics and other relevant background information.

Senior officer and political support for the modes, and measures geared to cater for them, also constituted a significant positive force in the implementation process and should be seen as a considerable asset, where it exists. Topical connections with other policy areas, such as health or land-use planning were identified as further opportunities – particularly in the light of guidance and legislation increasingly stressing the need for making these links and giving planning authorities the right to demand certain measures during the planning process.

Problems

Problems include the spatial separation of key actors (e.g., officers, groups or departments located in different buildings); a lack of interest, awareness and support – particularly at senior officer level – and a general lack of strategic priority being given to walking and cycling, with a resulting shortage in resources (particularly staff time and money). Lack of resources was in

fact identified as one of the most significant impediments to successful policy implementation.

Solutions

One forum for establishing and fostering interpersonal communication is dedicated groups which bring together people working on related issues or common projects. Wherever appropriate, such groups should span different departments and can also be used for internal consultation during the policy formation process. Many local actors contributing to this study felt that the extra time needed for attending such meetings was more than offset by the benefits derived from participating.

Some authorities run internal seminars in which officers provide information on important issues and the latest developments in their area of work. Such seminars can be aimed at both local politicians (who often have to take decisions in many different policy areas) and other officers, to whom the issues are relevant but who might not have time to collate and digest all the relevant information individually.

Several local actors stressed the benefit of making the effort to talk to colleagues and councillors in person. They found such informal communication helpful in gaining allies for new schemes. It helped to raise awareness of walking and cycling issues among colleagues and also to identify and overcome possible objections to new schemes before proposals were officially discussed in political committees. Since the formation and development of such personal contacts requires both initiative and good interpersonal skills, authorities should ensure that the relevant posts are filled with people who possess these characteristics.

Several authorities stressed that it was important to remain vigilant about potential sources of extra funding (including Sustrans, European funding, land-fill tax, dedicated national funding and regional development agencies). In this context, it was stressed several times that authorities that employed an officer specifically with the task of tracking and tapping the various EU and national funding opportunities found this to be an extremely useful investment and one that increased resources and therefore implementation activity.

Many officers tried to maximise the effects of council spending by adding walking and cycling elements to any new scheme on an ad hoc basis, thereby sometimes creating sufficient momentum for isolated provisions to be strategically connected. However, it was considered to be preferable if sufficient dedicated funding for walking and cycling measures meant policies could be implemented according to local priorities.

39.2.6 Behaviour of individual local actors

Opportunities

The existence of dedicated posts for both or either of the two modes represents a major opportunity in itself. Such posts almost automatically create an

internal champion and are generally held by individuals motivated to achieve positive results for the mode in question. Often, these officers also contribute personal experience of the mode and might have existing contacts in the relevant interest groups. All of these factors make the implementation process more successful, especially if these individuals also have the chance to participate in policy formulation.

Problems
Along with a lack of money, lack of time was the problem most commonly identified by local actors working on walking or cycling. A lack of the appropriate skills and experience due to the prolonged neglect of the two modes came second. Some authorities had experienced problems filling new posts with qualified personnel and several officers identified a lack of awareness among colleagues or an unwillingness to change existing working cultures as potential barriers.

Solutions
Successful implementation of adequate walking and cycling policies is very unlikely if a local authority does not employ an officer whose work time is largely, if not fully, dedicated to either of the two modes. Local authorities should furthermore foster the professional development of walking and cycling officers, for example, by enabling them to take part in cross-authority officer groups and relevant conferences or seminars. The experience thus gained is invaluable and in the long run generally makes the investment worth while. The lack of professional skills can also be (and increasingly is) addressed by training and education organisations, thus ensuring that future transport engineers are better able to design and build good quality pedestrian and cycling facilities and are also more aware of the need to do so.

39.2.7 Target group behaviour

Opportunities
The main opportunity associated with non-organised target group behaviour is a high existing level of walking and cycling. A local authority's perception of existing demand for new and improved facilities and a good take up rate of new facilities is likely to provide a more favourable climate for future policy formation and implementation.

Problems
A variety of problems were associated with behaviour and attitudes in the target group. Public protest against proposed or newly constructed schemes was one of the main potential detractors alongside an apparent or actual unwillingness to switch modes. People expressing opposition to new schemes were mostly concerned about negative impacts on parking and road space and these concerns reflect an underlying transport culture, which generally

considers the car to be a superior and more desirable mode of travel, which should be given priority. Safety fears associated with traffic volumes and speed were identified as another reason that prevented people from walking and cycling more.

Solutions
One of the most important measures preventing potential adverse public reception to new proposals and schemes is far-reaching consultation, which involves people early in the process. Local actors reported on a variety of approaches which they considered to have been successful in different circumstances: door to door leafleting; the formation of cycling forums which involved stakeholders from both outside and inside the authority; public exhibitions and the organisation of public conferences dealing with strategic policy development. Consultation is not only useful to inform the public about new proposals and seek their views, but also to explain the reasoning behind the policies and schemes directly, without having to rely on filters such as the media. However, it must be remembered that any consultation process should be carried out with a true desire for dialogue, coupled with the knowledge that the loudest detractors will not necessarily be representing the most widely held views.

A proactive and creative use of the media (e.g., through giving detailed briefings, creating attractive photo opportunities and selling the council's success stories) and the organisation of public events associated with walking and cycling can also positively influence public opinion. It is, furthermore, important to ensure that any new schemes implemented are attractive, functional and well constructed.

Councils can also consider running public awareness campaigns, which are aimed at getting people to reconsider their transport options and address the cultural imbalance between walking and cycling on the one hand and the private car on the other. Such campaigns often do not show immediate results and can also be relatively costly. Considering this absence of direct returns they are more likely to succeed if they can tie into similar activities at the national level.

39.2.8 Implementation results – outputs and outcomes

Implementation outputs are a direct result of the issues and processes discussed above but the following additional points need to be considered. Firstly, it is important to ensure that facilities provided for pedestrians and cyclists are well designed and, wherever possible, continuous. Isolated sections of cycle path throughout an authority, for example, are less likely to attract new users than one continuous path serving a major route. Nevertheless it is better to provide discontinuous facilities of potentially lesser quality, if the alternative would be to provide no facilities at all. Such outputs, which are often constructed on an opportunistic basis, can generate public demand for further improvements

and can help to justify additional efforts. They can also serve as a visual reminder that walking and cycling are welcome activities, which should be catered for.

Secondly, although the main purpose of implementation outputs is to make walking and cycling more attractive and hence more frequently chosen modes of travel, it seems that measuring these outcomes – to then feed back into policy formation and implementation – is not seen as a high priority. The study found that a great proportion of local authorities did not have base line figures for walking and cycling (such as modal share for different types of trips or at different locations) and that many were not monitoring the relevant indicators. This is in stark contrast to the requirements for monitoring, which are associated with LTPs and LTSs. In fact, many more authorities have adopted targets than will actually be able to assess whether they are meeting them. The exception is accident rates, which are monitored almost universally.

Clearly, broader systematic monitoring must become an integral part of policy implementation. Policy-making and implementation are cyclical rather than linear processes and these cycles can only be properly completed through informed reviews of the relevant indicators.

39.3 Conclusions

This chapter has presented the results of the only major study focusing on the implementation of walking and cycling policies in Britain. It has proposed strategies and approaches which local actors, local authorities, other local stakeholders and the national Government can adopt in their efforts to improve the provisions for pedestrians and cyclists. It is not intended to suggest that affordable and convenient solutions exist for every problem experienced by local authorities or their employees nor that the approaches discussed are all vital ingredients of successful implementation. Implementation is a complex process and problems can occur at all levels of activity and communication. This also means, however, that everyone involved in the process has some means at their disposal of influencing implementation and no individual, group or organisation is entirely dependent in its actions on any other.

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40

Barring the way: gated communities and walking

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Crawford pointed to the crenellated wall. 'Look at it, Charles . . . it's a medieval city. This is Goldfinger's defensible space raised to an almost planetary intensity – security guards, tele-surveillance, no entrance except through the main gates, the whole complex closed to outsiders. It's a grim thought, but you're looking at the future'. (Ballard, 1996)

40.1 Introduction

Cities across both the developed and the developing worlds are undergoing seemingly constant social, economic and physical transformation. De-industrialisation and shifts in the mode of production in the West have led to dramatic changes in fortunes for formerly prosperous urban regions and, as traditional elements of the city have begun to disappear, new ones have materialised. Alongside big box retailing and mega-malls, one of the most visible new components has been the rise of suburban 'gated communities' – privatised and walled-off housing enclaves that provide barriers to entry and increased security for their residents. Gated communities, observable in a variety of sizes and styles, are becoming highly visible in many British, French, American (North, South and Central), African, Asian and Australasian cities – and are considered to be a global phenomenon. Given that over eight million people were already thought to be living in such communities in the United States by 1997 (Blakely and Snyder, 1997: 85) Ballard's statements in the above quote are plainly not ridiculous.

Despite growing research into gated communities there has been little attention given to what influence they are having on urban life and, in particular,

on the behaviour of those who live within them. An ongoing research project at the University of Queensland has been seeking to establish the impact of the gating of suburban estates on the travel behaviour of residents. While previous research by the author (Burke and Sebaly, 2001) has detailed more technical findings, the concern for the purposes of this chapter was to summarise research findings as they relate to pedestrians as a whole and to identify, in part, how they may be ameliorated by proactive urban management, even in jurisdictions where gated communities are deemed acceptable urban developments.

The chapter is organised as follows. First, the term 'gated community' is defined and the particular type on which the research focused is identified. Research findings for pedestrians are discussed as they relate to behaviours inside the walls, then to impacts on external behaviours. Finally, the way in which urban planning generally fails to identify or address these impacts is discussed and suggestions are made as to possible planning and design actions that can limit the impact of such estates.

Through this research the gates and walls have been found to have a series of negative impacts on pedestrian behaviour. Whilst there is also a very limited number of positive impacts, if urban managers are serious about environmental and social sustainability then the rights to develop gated communities must be questioned.

40.2 What constitutes a 'gated community'?

Blakely and Snyder define gated communities as:

> . . . residential areas with restricted access in which normally public spaces are privatised. They are security developments with designated perimeters, usually walls or fences, and controlled entrances that are intended to prevent penetration by non-residents. They include new developments and older areas retrofitted with gates and fences, and they are found from the inner cities to the exurbs and from the richest neighbourhoods to the poorest. (Blakely and Synder, 1999:2)

The salient features of gated communities are simply these. First, they are residential estates, rarely featuring much in the way of either commercial or retail functions. Second, they are clearly separated from the surrounding community by a barrier to human movement, usually in the form of a wall or fence, though moats are not unheard of. The entry and exit of residents and visitors alike, whether on foot or by vehicle, is only made possible through security-controlled access points, usually a gatehouse, with numerous electronic and surveillance devices to ensure those without invitation are not allowed to enter. Third, they are private entities, with private streets, private parks and private facilities. Management of these assets is usually undertaken either directly by the developer or, more commonly, through a homeowners' or

community association, which retains many restrictive legal controls over resident actions. As will be shown, it is the barriers to human movement and the privatised nature of gated community streets that lead to a number of impacts on pedestrian behaviour.

While there are a number of forms, research at the University of Queensland has focused on the most commonly understood type of gated community, the type defined as Secure Suburban Estates. The term 'suburban' is used to signify that the majority of these developments are to be found in either in-fill or green field developments in the middle or outer suburbs of major cities. Characterised by a housing form that is predominantly one of low-rise villas or townhouses, the housing stock is generally developed using common building materials, designs and layouts under an architectural master plan. Lifestyle features are absent, other than perhaps in the form of a small communal pool or gymnasium, and Secure Suburban Estates tend to be smaller in the number of constituent dwellings than the more resort-styled gated communities (see Fig. 40.1).

In the Australian context, where gated communities are becoming increasingly prominent, Secure Suburban Estates are often located alongside one another. A good example of this arrangement is the Daw Road precinct in the Brisbane suburb of Runcorn. Here, a total of seven Secure Suburban Estates with names such as 'Premworth Court', 'Stewart Glen' and 'Crystal Gardens' – most with around 50 dwellings inside their gates – either share boundaries or are across the road from one another. As with the majority of such estates in Queensland, each is surrounded by approximately two-metre

Fig. 40.1 Robertson Heights, a Secure Suburban Estate in Brisbane, Australia.

high walls with electronically controlled vehicle and pedestrian gates. Mailboxes are located outside of the gates at the primary entrance and most estates include an in-ground swimming pool and barbecue, all in one small communal area. The estates, except for Crystal Gardens, all have a resident manager who, amongst other things, is rental agent, groundskeeper, informal security patrol, complaints desk and prominent neighbour of the residents. The majority of the apartments are rented, with very few of the dwellings being owner-occupied.

40.3 Researching the impact of gated communities

To determine whether the gates and walls alter travel behaviour a series of matched-pair studies were employed at locations in Brisbane to compare the behaviours of residents in gated and non-gated communities in the same locality. The use of adjacent neighbouring developments of similar income status and, where possible, demographic profile, ensured that the travel behaviour impacts of the gates and walls alone could be isolated. More than 20 Secure Suburban Estates were surveyed as part of the study, collectively representing just under 1000 households.

The study used three differing research approaches. First, travel diary surveys were employed to ascertain broad resident trip-making behaviour, including the modes used, trip distances, trip times and other key variables. Second, attitudinal surveys were prepared to determine the underlying attitudes and preferences of individuals to a series of transport-related issues. Third, environment–behaviour surveys, incorporating direct observations, pedestrian intercept surveys and other techniques were used to record localised travel behaviour. The findings were then correlated to identify impacts and, where possible, to provide some indication as to why they occur. Many of the findings relate to issues of pedestrian movement and static behaviour.

40.4 Pedestrian behaviour inside Secure Suburban Estates

Across a series of criteria, the internal streets and communal spaces in Secure Suburban Estates in Brisbane were found by pre-trained researchers to be more pedestrian-friendly than comparable suburban environments. Various design elements altered the free movement of both pedestrians and vehicles, and the study identified specific impacts on street vitality.

40.4.1 Limitations on vehicular traffic

While segregated footpaths are generally not provided, roadways in the Brisbane estates are often not simply given over to bitumen, but are treated with

concrete surfaced and patterned to resemble brick paving. Streets are extremely confined with carriageway widths of around four metres or less providing minimal opportunities for vehicles to pass. In larger estates, one-way directional systems with loop road layouts tend to be favoured to control vehicular movement. Speed-limiting signage and speed-limiting devices such as speed humps are regularly employed to reduce traffic speed further and the overall impact is to slow vehicular speeds to 10–30 km/h in most estates – although higher speeds were observed at a number of locations. Given the small number of dwellings and the barriers to through-traffic, the estates feature few vehicle movements even in peak periods.

These alterations to the physical environment had a positive impact on resident perceptions of vehicular traffic as a threat to their person. Residents surveyed across all the gated communities in the study routinely reported that they felt they belonged on the streets 'as a right' and they differed greatly from their counterparts in non-gated neighbouring estates when surveyed on their attitudes towards whether there is dangerous traffic in their estate. Less than 10 % of residents in the gated estates reported that there was dangerous traffic within their estate, as compared to over 50 % of residents in the non-gated areas surveyed.

40.4.2 Street vitality

Surprisingly, there did not appear to be advantage taken of the opportunities created by the lack of vehicular threat and the improved amenity of the street. While it was hypothesised that gated communities would have a more vital street presence – due to pedestrians using the streets and communal areas for static activities (neighbours talking, children playing in the street, etc.) – our research found instead that the neighbouring, more traditional post-war suburban housing estates tended to have more vital street environments.

To quantify the differences, a crude Street Vitality Index (SVI) was calculated from observations taken at key locations across a sub-sample of selected matched-pairs of gated and non-gated estates in Brisbane. The SVI may be determined by combining the number of dynamic pedestrian movements within or through a delimited space with the number and duration of static pedestrian behaviour (sitting, stopping to chat, etc.) observed within the space. This can be done for a given hour (usually a morning or afternoon 'peak' hour) using the formula:

$$\mathrm{SVI} = \frac{2P + S}{t}$$

where: P represents the total number of pedestrian movements; S represents person-minutes engaged in static pedestrian behaviour; and t represents time measured as hours of observation. The validity of any such index is admittedly limited but it is useful here in comparing the usage of streets within these differing but adjoining environments.

The observations were generally made in the early to late afternoon/evening, with morning and weekend observations for a couple of the matched-pairs undertaken in addition. These observations unanimously returned similar results. An example of the observed pattern is that determined through afternoon observations in and around two typical Secure Suburban Estates – 'Kuranda' and 'Kuranda Close' – in the Brisbane suburb of Eight Mile Plains, discussed more fully in Burke and Sebaly (2001). There was a reasonable level of activity within the walls of the gated estates, with the SVI generally increasing with estate size and the location, layout and equipping of communal areas within the walls. However, the SVI recorded for non-gated matched pairs was always found to be significantly higher.

The reasons appear to be twofold. Firstly, in Brisbane suburbs such as Eight Mile Plains and Runcorn, over one-third of recorded SVI values were attributable to the presence of children at play. There were often no children playing on the streets of the gated estates. This is not unusual because children are literally *prohibited* from playing on the privatised streets of many gated communities in Australia. Specific provisions prohibiting children from occupying the street for the purposes of play may be inserted into the body corporate or homeowner association regulations governing the estate – either at inception or later in the life of the development. It is presumed that these restrictions are implemented due to the potential for either property damage or public liability, should an accident occur. Therefore, while the treatment of a streetscape inside an estate may approach good practice pedestrian design, the freedom of a key portion of society to use these streets is removed.

Secondly, a significant share of the SVI recorded in non-gated estates was the result of through movement by recreational walkers. The barriers to entry at the gated communities prevent such individuals from outside the estate considering a recreational route that incorporate those streets. Throughout the observations researchers noted that a range of other outsiders also found it difficult to penetrate the gates – ice cream salesmen, charity collectors and household census officials were all observed being at least temporarily, sometimes firmly, denied entry.

40.4.3 The influence of estate size

Our observations have shown there to be a positive relationship between the size of gated communities and the vitality of their internal streets. That is, for an increase in the number of dwellings inside the gates, there is a general increase in SVI recorded. Further, in the majority of smaller Secure Suburban Estates managers report that the use of internal facilities, such as the ubiquitous in-ground pool, is inconsistent. In larger communities there are more sizeable populations that appear to support such facilities. The small areas of most gated communities and the lack of viable destinations mean there are insufficient internal trip distances to encourage recreational walking trips solely within the walls and very few have generally been recorded. Only in the largest

Brisbane Secure Suburban Estates with sizeable loop street arrangements is there sufficient potential trip distance to encourage residents to undertake promenade walking trips and, as recorded at one estate, recreational jogging trips, solely within the walls.

Nevertheless, there are a number of unfortunate negative impacts of larger gated communities. At 'The Manor' estate in western Sydney residents were observed in earlier research by the author making return journeys to and from their mailboxes by motor vehicle, rather than on foot. Such behaviour was encouraged by the location of the mailboxes at the main gate, more than three hundred metres from some of the dwellings. However, the most serious impact on pedestrians of larger gated communities relates to the permeability effects they have in the broader urban area.

40.5 Pedestrian behaviour beyond the walls

The impact of gated communities on pedestrian travel in the broader suburban area in which they are situated was also of concern to the researchers. It was found that the Secure Suburban Estates of Brisbane have a number of impacts including decreases in permeability and connectivity for neighbours and detrimental effects on streetscape amenity through the erection of gates and walls.

40.5.1 Connectivity

The research found that the impact of the walls and gates on connectivity was not necessarily felt by the residents of the gated communities themselves, but was instead foisted onto their immediate neighbours. As noted by Burke and Sebaly (2001: 71–2), travel survey data at the Kuranda and Kuranda Close estates in Eight Mile Plains noted some especially interesting findings. Trips to the nearby Eight Mile Plains Shopping Centre, made by the residents of Kuranda and Kuranda Close, were reported, by and large, as being undertaken on foot. But trips to the same destination from houses immediately on the other side of the estate's walls, in the non-gated Arcadia Street, were reported as being made to the same shopping centre by private car. These differences, also observed in other Brisbane suburbs, can be explained by how gated communities alter connectivity. Pedestrian connectivity may be explained using the Pedestrian Route Directness (PRD) ratio developed by Hess (Hess, 1997), calculated by the formula:

$$\text{PRD} = \frac{\text{Route distance}}{\text{Geodetic distance (straight-line distance)}}$$

The most direct routes to the Eight Mile Plains Shopping Centre from six sample locations within the study area are displayed in Fig. 40.2. The

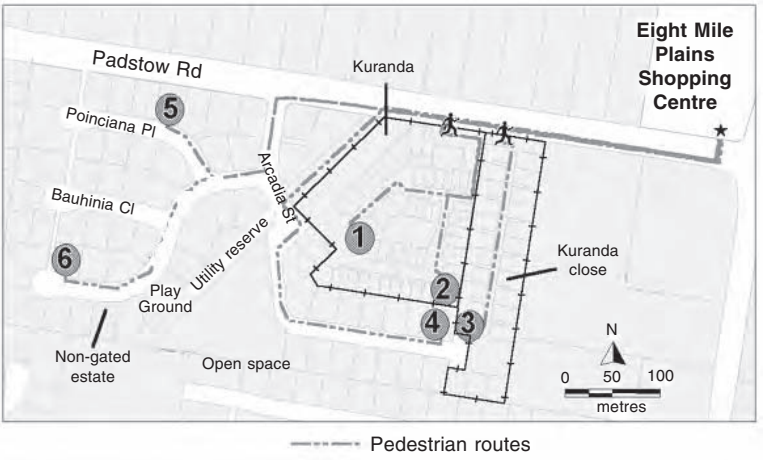

Fig. 40.2 Pedestrian routes to Eight Mile Plains Shopping Centre.

PRD ratio values for indicative local shopping journeys are shown in Table 40.1.

The difference between the connectivity of, for example, locations 2 and 3 on the one hand, and location 4 on the other, is understandable as the external barriers of the gated communities could be traversed by their residents at the pedestrian gates located on Padstow Road. However, for those living outside the gates in Arcadia Street (location 4), a trip to the neighbourhood shopping centre must instead deviate via the power line easement to the east of the Kuranda Estate. The safer night-time route would record an even higher PRD ratio, diverting all the way along Arcadia Street. The walls block any attempt to move directly towards the shopping centre, increasing the overall trip distance by at least 250 metres. Meanwhile, the locations not immediately blocked by the gated communities (5 and 6) have a low PRD ratio value in line with the more connected streetscapes available in this neighbourhood. Overall, these differences in connectivity most likely account for the mode choices being made by residents for journeys to the local shopping centre.

Table 40.1 Pedestrian Route Directness (PRD) values for trip origins

Estate category	Location	Route distance (m)	Geodetic distance (m)	PRD
Gated	(1) Kuranda	486	328	1.48
	(2) Kuranda	461	267	1.73
	(3) Kuranda Close	391	264	1.48
Non-gated	(4) Arcadia St	677	299	2.26
	(5) Poinciana Pl	567	479	1.18
	(6) Jacaranda Pl	698	574	1.22

While the population affected by the barriers in this particular example is small, the larger gated communities in Brisbane and elsewhere have the capacity to reduce the pedestrian connectivity of neighbourhoods containing populations in the hundreds, and in some cases thousands. To overcome this, urban planners have required narrow paths to be inserted between the walls of adjoining estates – leading to the construction of dangerous, unsupervised and generally unused laneways.

40.5.2 Deficient streetscapes

For a small number of Secure Suburban Estates in Australia, entry is via local feeder streets or culs-de-sac and the majority of their perimeter fencing backs against the rear of adjoining residential properties. In such cases the only effect of the development on the external street environment is likely to be the presence of the gate on the local street. On occasions gates and other entrance features are treated to disguise their function and to be less threatening to the passer-by. However, by far the majority of such estates are located with at least one sizeable property boundary on a local street or main road. In these cases, the long sections of two metre high, stucco on brick, no-go barriers have been shown to have a number of impacts.

Interviewing both the residents of gated and non-gated estates in Brisbane, the author found that regardless of which group the interviewee belonged to, pedestrians in locations just outside the walls feel less safe at night, and many spoke directly of the lack of surveillance from the surrounding development as being part of their reduced comfort levels. Further, the plastering of notices from security firms on walls, a less common practice in Australia than the United States, though still apparent, further reduces pedestrian perceptions about their right to inhabit the space in front of the walls for legitimate purposes.

40.6 The failure of planning to consider these impacts

Urban planners have failed to keep step with the emergence of this new developmental product and have not succeeded in addressing the impacts they present. Concurrent research at the University of Queensland by Claire Wilkinson (2001) focused on these issues. Her research found that firstly, gated communities are rarely defined as a specific entity in planning ordinances. The omission of a separate definition often leads to a lack of consideration of the full impacts of such developments when in reality it would appear appropriate for them to be considered as a separate development category. Secondly, as identified through case studies in the south east Queensland region, local government regularly fails to consider impacts of gated communities such as:

- the aesthetic impacts of perimeter fencing;
- the contribution to the street environment that entrances make;
- vehicle manoeuvring if access to estates is denied;
- cumulative effects of adjoining gated estates;
- connectivity issues that result from gated enclosure;
- social implications for nearby un-gated areas.

Wilkinson also found that within south east Queensland gates were repeatedly retrofitted early in the life of developments. When local government stipulated that entry gates could not be fitted as part of an overall plan of development for an estate, the developers often left them off and constructed as per their approval. However, following construction, the body corporate (homeowners' association) often took subsequent action to ensure that gates were installed. Alternatively, developers have used formalised negotiation processes under planning legislation to persuade local authorities that gates and walls were appropriate. In either of these situations, the impacts of gated communities – many that directly relate to pedestrian amenity – may be all too easily overlooked.

40.7 What can be done?

It must be questioned whether gated communities have any place in a city that is serious about social and environmental sustainability. Contemporary urban planning and design should focus on increasing the potential of walking and cycling to provide for daily transportation needs, rather than reducing further the probability of such trip-making. Fragmented, impermeable street layouts that create a less vital street environment across an urban area and with the capacity to reduce walking potential should not be considered acceptable. Controls prohibiting gated communities are readily available to both local and regional governments through planning ordinances and/or legislation and there is a range of innovative, economic and sustainable New Urbanist and transit-oriented alternatives for estate design on hand. Safeguarding of the public street as a public thoroughfare for use by all persons, especially the young, should also be recognised as a superior standard to privatised and barricaded streets that may be used only as a homeowner's association decrees. Brisbane City Council, the largest local government by population in Australia, has proactively sought to limit the privatisation and gating of streets in master planned estates within its jurisdiction, ending the city's previous acceptance of gated communities.

Yet there are many localities around the world where political realities mean these estates are, at least in the short-term, considered acceptable forms of development. In these circumstances there are a number of planning and design responses – actions that may be taken – should urban planners and others wish to mitigate the impacts of gated communities as they relate to pedestrian trip-making:

- As suggested by Wilkinson (2001), gated communities should be separately defined in urban planning ordinances, given their differences with other suburban developments. Such definitions assist in conceptualising both the development and its likely impacts.
- Large gated communities should not be encouraged. (One Chinese city has recently been advised by Australian consultants to reduce its current generous planning provisions to restrict the size of gated areas to less than two hectares, on the basis of improving permeability.)
- The co-location of gated communities should not be supported, especially where the cumulative effect of multiple fences obstructs pedestrian desire lines.
- Great care should be given to ensure that pedestrian accessibility is retained for residents of gated communities by taking all feasible opportunities to insert additional pedestrian gates around an estate.
- Perimeter walls should be designed to maximise 'eyes on the street'. Impenetrable barriers do not have to be opaque and many gated communities successfully meet street amenity requirements by using semi-transparent fencing materials. Walls and gates should not decrease the performance of adjoining spaces in meeting the requirements of crime prevention through environmental design (CPTED) standards.
- The right to occupy the street for legitimate purposes should not be removed in these privatised entities. The rights of children to play in the street is something that should be retained at all times – especially when the design of that street makes it extremely supportive of such a function.

Should gated communities continue to spread in number and geographic coverage, these simple steps may be meaningful responses to improve pedestrian amenity in the twenty-first century.

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41

Promoting walking in the US: overcoming the 'stickiness' problem

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41.1 Introduction

A growing effort is being made in the United States to increase routine walking among the population. However, it is not necessarily the pillars of the transportation community – mainstream planners and engineers – who are at the centre of this effort. Certainly there has been an active community of transportation and planning officials who have seen the value of alternative transportation to reduce traffic congestion and the associated pollution and social degradation, as modern American communities have evolved largely for the automobile. In an increasing group of notable communities there have been sustained efforts to create more 'walkable' settings. However, they have focused primarily on trying to change transportation systems, with only the rare transportation demand management programme or similar effort targeted specifically at promoting routine walking.

Who has been specifically promoting walking in the US? Since the 1980s the public health community has made a focused effort to increase walking as a fitness activity. Recent data indicating insufficient physical activity levels and dramatic increases in obesity and chronic disease risk across the population have been fuelling ever greater concern in the health world. To put it simply, Americans are fatter and less active than ever, and the prospects are frightening. Should baby boomers reach old age in this inactive state, many fear that the cost of their care could bankrupt the major public healthcare funds in America. Unfortunately, public health efforts to increase leisure time physical activity in general, and walking specifically, have shown little success at the population level. There appears to be a 'stickiness' problem. Health promotions are able to get a targeted group to be more active during

an intervention period, but then the improvement does not stick. People drift naturally back to their more sedentary ways once the intervention is removed.

Of late, walking promoters have taken a more holistic approach. They have recognised that not just individual, but environmental and even policy level factors influence the population's likelihood of walking regularly. As a result, health professionals are realising that they cannot promote walking alone. In many cases, it is an eclectic group of public health, environmental, safety, and liveable community advocates that joins a handful of enlightened transport, public works, and planning officials, working to promote more routine walking.

This chapter summarises the experiences and arguments that bring these groups together, and examines three of the most promising approaches to promote walking now being seen in the US. It reviews the circumstances in the US that are likely to have driven activity rates downward. This is important because altering those circumstances is probably central to getting people walking again. It then describes the 'stickiness' problem – the fact that behaviour-only activity promotions work in the short-term, but do not seem to stick permanently. Finally, it describes a proposed solution, the application of a social-ecology approach to increasing walking, and it outlines some promising programmes.

41.2 The setting: autocentric development

Many walking advocates in the US feel that development patterns and transportation infrastructure in the US have fuelled a heavy dependence on the automobile for transportation, while decreasing the amount of walking done for transportation. Data from the US Department of Transportation's National Personal Transportation Survey (US DoT, 1995) illustrate the change. From 1977 to 1995 driving trips increased from about 85 % to nearly 90 % of total trips, while walking dropped from about 10 % to 5 % of trips. Effectively, there was a shift of about 5 % of the trips from walking to driving (Figs 41.1 and 41.2). What is making people walk less?

Many feel it is the growth of suburban living in the US that undermines routine walking. Researchers have described environmental factors that appear to influence routine walking. For example, it is believed that shorter blocks and continuous sidewalk networks (Vernez-Moudon *et al*., 1997), higher densities and mix of land-uses (Craig *et al*., 2002; Handy *et al*., 2002) and streetscapes designed with pedestrian safety as a central goal (Pucher and Dijkstra, 2000) will all increase the amount of walking for transportation. It is notable that there appears to have been a dramatic shift in the US to the creation of less walkable environments through the twentieth century. In fact, a recent study specifically correlated the age of a community's development to the percentage of those who walked regularly (Berrigan and Troiano, 2002). It found significantly more of the population walks at least a mile, 20

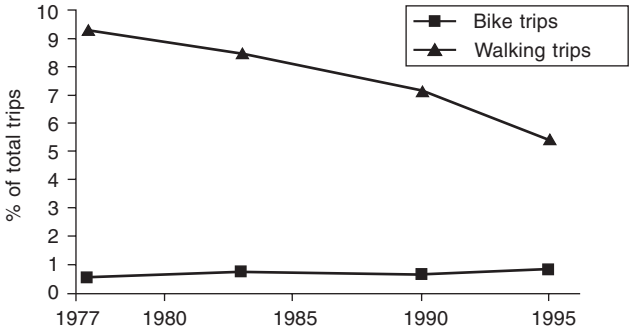

Fig. 41.1 Decrease in walking trips, 1977–95. Source: US DOT (1999).

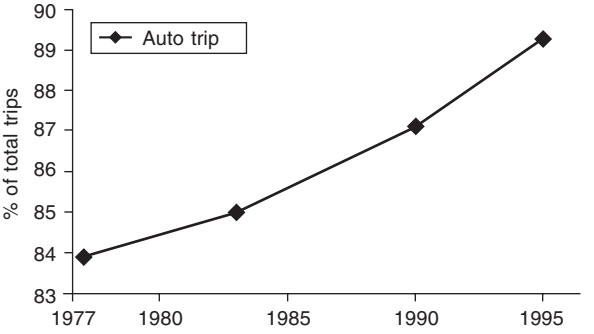

Fig. 41.2 Increase in automobile trips, 1977–95. Source: US DOT (1999).

or more times a month, in communities built before 1973 than in those built after.

In *Bowling Alone* author Robert Putnam calls the gross effect the 'suburbanisation of America', and (Putnam, 2000) charts a dramatic change from 1950 to 1996 (Fig. 41.3). While the urban population remained fairly static at almost one-third of the total in the US, those in non-metropolitan areas – smaller towns and rural settings – dropped from roughly 45 % to only 20 % of the country. Meanwhile, suburban dwellers grew from about one-quarter to nearly half of the US population. This shift has been driven by many things, but those listed below are likely to have been crucial factors (Weingroff, 2000):

- Growth of the middle class following the Second World War. This was a group desirous of their own personal piece of the American Dream – home ownership.
- The creation of an interstate highway system, begun in 1956. This enhanced the mobility of the middle class and allowed people to work in cities while buying less expensive homes outside the urban core.
- Tax policies, as incentives to home buying. These allow mortgage interest payments to be income tax write-offs.

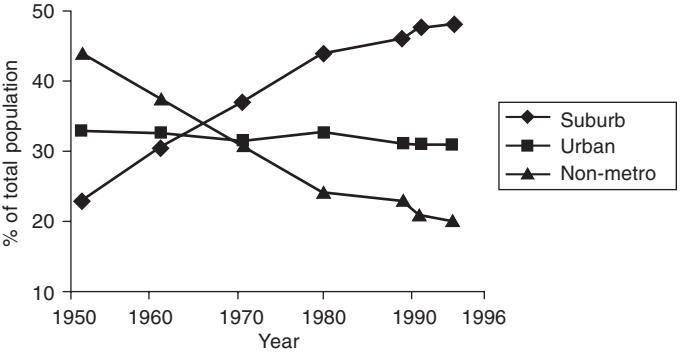

Fig. 41.3 The suburbanisation of America: US population shift from non-metropolitan to suburban areas, 1950–96. Source: Putnam (2000).

- Historic zoning laws. The widespread land-use principle of segregating land into single-use zones helped drive up automobile use.

The last factor, single-use zoning, is a hold-over from the period when it was preferred that homes, schools, and retail areas be kept distant from the more polluting factories where people worked. Even as environmental controls and the flight of manufacturing from the US obviated the need for such separation, however, zoning codes retained this 'single-use' approach.

It is important to bear in mind that such suburbanisation may decrease walking in two ways. First, modern American suburbs are typically structured so that most trips are more easily taken by automobile, and absent or insufficient transit systems, due to lower population densities, exacerbate the problem. With stores clustered in commercial areas and segregated from residential developments, schools, office parks, and industrial areas, it is no surprise that practically every trip from a suburban household is by car.

Second, as middle- and high-income families leave the urban core, they take with them resources and economic power. This can eventually leave the urban core blighted, and although the street networks and densities may be appropriate for walking, a lack of economic activity and safety may reduce its likelihood. Thus, both the new suburb and the older city centre offer a degraded walking environment (Kunstler, 1996).

41.3 The problem: the 'stickiness' dilemma

The issue with reduced routine walking is not merely academic. Public health advocates in the US have taken to displaying a series of maps of the United States beginning in the late 1980s, in which the obesity rate in each state is color coded (CDC, 2002). Light coloured states have lower obesity rates, with the colour gradually darkening to bright red as the rate of obesity in a state rises to over 20 % of the state's population. In the1980s all of the states

were light coloured, but with each succeeding year more and more begin to darken. In fact, the series looks like the spread of a highly contagious virus beginning in the so-called stroke belt – a cluster of south eastern states with the highest cardiovascular disease rates – and eventually consuming the entire nation in red. Figure 41.4 shows the change less dramatically, but with a monotonic rise that is rare among natural phenomena. It displays the percentage of the US population with a body mass index (weight in kilograms, divided by height in metres squared: kg/m^2) above 30, the level considered obese by the medical community.

It is understood that two things increase obesity in the US – an increase in the consumption of calorie dense food and a decrease in physical activity (and thus daily caloric expenditure). In an attempt to affect the latter of these factors, the US Surgeon General's office published its *Report on Physical Activity and Health* in 1996. The goal was to exhaustively research the literature and determine the minimum amount of physical activity that people could do to avoid an undue risk of chronic disease and an early demise. The report concludes that Americans should accumulate at least 30 minutes of physical activity most days of the week to reduce the risk of cardiovascular disease (the number one killer of men and women in the US), obesity, diabetes, osteoporosis, clinical depression, and some forms of cancer. It went on to point out that the activity could be broken into as little as ten minute doses and still offer the same benefit. That suggests that walking for transportation – for example, a ten minute walk to the bus in the morning, a similar length stroll for errands at lunch, and a walk back from the bus in the evening – would suffice (US Department of Health and Human Services, 1996).

Unfortunately, only about 25 % of the US population gets the recommended dose of physical activity, and in 1998 27 % were estimated to be essentially sedentary. Despite the health community's focus on promoting exercise, and specifically encouraging a simple daily 30 minute walk, the fraction of

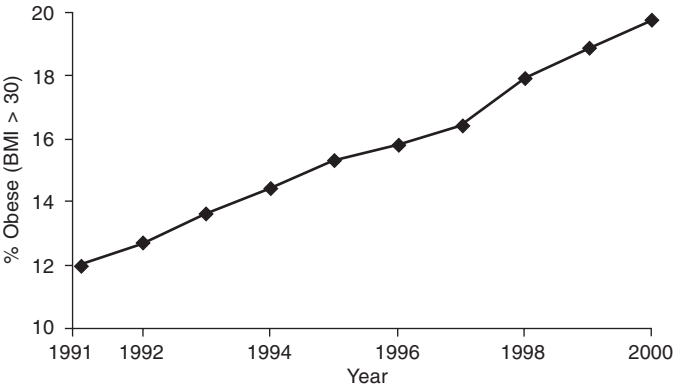

Fig. 41.4 The obesity epidemic in the United States; those with a body mass index over 30, as a percentage of the population. Source: Mokdad *et al.* (1999).

Americans meeting that goal has remained stuck at roughly one-quarter for over a decade (Centers for Disease Control, 2001).

In an attempt to get more people more physically active most efforts have focused on increasing walking. Data from the Sporting Goods Manufacturers Association (SGMA) and similar surveys show walking to be the nation's favourite fitness activity. The SGMA estimates that over 36 million Americans walked for fitness at least once in 2001, and 16.8 million averaged two or more days per week of exercise walking (SGMA, 2002). Logic suggests walking is ideal for exercise promotion. No elaborate equipment or formal instruction is required, it is possible in a wide variety of settings, and viable for people of many abilities. Furthermore, many people find a walk quite relaxing and enjoyable.

It was initially conceived that activity levels were remaining static because many activity promotions were focused on formal exercise. A typical intervention study, for example, encouraged people to get 40 minutes of daily walking, and even provided free treadmills for a portion of the study cohort. It compared those who were instructed to walk 40 minutes all at once, those who were urged to take four ten minute walks, and those who were given a treadmill for their four ten minute walks. Figure 41.5 shows that during the six month intervention period, participants did significantly increase their total minutes of walking per week. However, once participants were no longer contacted by instructors, offered group support, and provided regular exercise incentives, activity levels dropped. This is true even for the group with free treadmills (Jakicic *et al.*, 1999).

Some researchers theorised that a focus on formal exercise was the fatal flaw and they shifted their walking interventions to a 'lifestyle' approach. One cohort in such a study would be given traditional exercise prescriptions, instructions, incentives, and health club memberships, while another would be trained in ways to incorporate more walking into their daily lives (Dunn

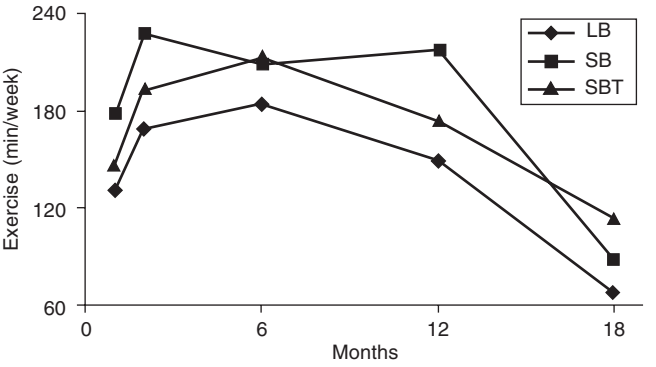

Fig. 41.5 The effectiveness of multiple short exercise bouts (SB), one longer bout (LB), and use of home treadmills (SBT) in promoting daily walking. Source: Jakicic *et al.* (1999).

Table 41.1 Typical skills developed in lifestyle walking promotions

Skill developed	Specific example
Utilising social support	Planning a walk with a work colleague
Scheduling active time into the day	Walking to transit, planning errands on foot
Setting goals and appropriate rewards	Five less car trips this week earns a trip to the movies
Measurement and recording of activity	Using a pedometer and exercise logbook
Substitution of active for inactive time	Walking to a friend's home rather than calling on the telephone
Mapping opportunities for active travel	Finding a store within walking distance of home

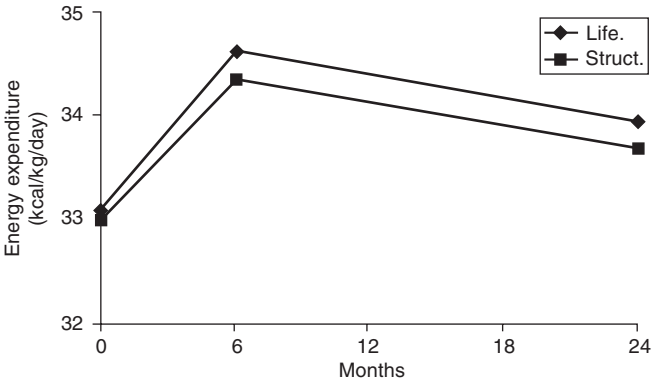

Fig. 41.6 Comparison of a lifestyle oriented (Life.) versus a formally structured (Struct.) exercise programme. Source: Dunn *et al.* (1999).

et al., 1999). Table 41.1 lists skills that would be developed in this 'lifestyle' group. Sadly, although the lifestyle groups increased walking during the intensive intervention, activity levels again appear to drop after the intervention period (Fig. 41.6). This trend is seen in numerous comparable studies, such as work site wellness interventions and community-based walking promotions (Sallis and Owen, 1999). It suggests a simple reality – individually targeted behaviour modification alone is not enough to get people to walk more, consistently. It appears likely that outside factors, such as the autocentric development described above, have a strong influence on walking habits.

41.4 The solution: a social ecology approach

In part as an answer to the limited success of individually targeted walking promotions, the social ecology model of behaviour change has come into

favour among physical activity promoters. A simple version of this model suggests that there are at least five levels of influence on personal behaviour (Table 41.2), ranging from individual factors to public policy (Sallis and Owen, 1999). Many traditional walking promotions only operated on the first one or two levels. For example, a work site well-being programme that gave out t-shirts and water bottles to those who walked at least four days a week during lunch hour – a perfectly typical intervention – really operates only at the individual level. Creating departmental teams which compete for the most miles or days walked, a common strategy, extends the effort to the interpersonal level. As expected, such an approach typically provides short-term results but no stickiness.

To utilise the other levels of intervention of the social ecology model requires cleverness and probably an effort beyond the realm of the typical wellness co-ordinator or public health educator. For example, considering the work site walking programme, providing reduced-price transit passes to those who will walk or cycle to the transit station might be an appropriate institutional level intervention. Creating a locker room or showers for those who actively commute to work would also operate at the institutional level. At the community level, improving the sidewalks or crosswalks near the office park, assuring that snow is cleared in winter, or creating a connection to a nearby multi-use trail would help frequent walkers. A policy level intervention might include increased fuel taxes, tolls, or parking surcharges near to work sites to discourage driving.

These examples show that to take a socio-ecological approach means thinking about the broader factors that influence behaviour beyond personal will or ability. It requires altering those factors so that the initial effects of a behaviour change effort – for example, a 12 week walking programme – are more likely to stick. It clearly requires collaboration between health promoters – well-versed in behaviour change strategies – and the business, engineering, planning, public works, safety, and other public officials who can influence factors beyond the individual level.

It is worth noting that this model has shown great relevance in the battle to reduce smoking in the United States (Brownson *et al*., 1995). Although the Surgeon General's first report on the ill effects of smoking tobacco was

Table 41.2 The social ecology model of behaviour change

Level of intervention	Typical examples
Individual	Personal readiness, self-efficacy, belief, baseline fitness
Interpersonal (group)	Family, friends, classmates or workmates
Institutional	Schools, work sites, health providers, private businesses
Community	Transportation networks, local culture, public institutions
Public policy	Transport, land-use, fees and taxes, mass media, law enforcement

Source: Sallis and Owen (1999).

published in 1964, and was widely understood by the population by the 1970s and 1980s, it took much more than that knowledge to change smoking behaviour. It is likely that the broader array of environmental and policy level interventions all contributed to an eventual reduction in tobacco consumption in the US. These include the Surgeon General's warning on cigarette packs, heavy taxation of tobacco products, a broadcast advertising ban, public place smoking bans, enforcement of the ban on the sale of tobacco to minors, and even successful litigation against tobacco companies. These represent actions taken at the group, institutional, environmental, and policy as well as individual levels. The trick is now for physical activity promoters to come up with comparable interventions in support of routine daily walking.

41.5 Next steps: collaborative walking promotions

With the framework of the social ecology model of intervention, it becomes easy to imagine how more comprehensive walking promotions are now taking shape in the United States. Below are three of the activities occurring in the US in support of more routine walking by the population. The first emphasises environmental change. The second begins with an individual programme and tries to add environmental elements. The third is the most comprehensive and promising walking promotion underway in the US. Note that in each case, the potential participating partners span health, transportation, planning, safety, business, education, environmental and other realms.

41.5.1 Walkability checklists

There are many consumer-targeted checklists available that allow individuals to take a walk and look for barriers to routine walking. Many are based on a simple five question checklist designed by a walking promotion coalition in the US, the Partnership for a Walkable America (US DOT, 1997). It is designed so that a parent and child can take a typical walk together (for example, to school or a friend's house), and answer the questions with no formal training, but simply by observing their experience.

The idea of distributing checklists is to collect them from many different walkers in an area (for example, all of the children who walk to a particular school or employees in a certain plant). The results can then be tabulated and particular barriers can be prioritised. With the help of partners in the transportation field, problem areas can be ranked according to two factors:

1. The cost of possible improvements (e.g., installing a traffic signal);
2. The number of users who might benefit (e.g., the children who could cross at that intersection while walking to school).

A first focus could then be on the lower cost, higher impact projects.

Typical checklist questions are often similar to the following, exploring the primary elements of a walkable setting:

- Did you have room to walk?
- Could you cross streets?
- Was traffic a problem?
- Did you feel safe? Was it pleasant?
- Did you find destinations within walking distance?

Health and recreation officials can distribute checklists at fitness walking events, during walk to school or work site walking programmes, or through community, parks, and recreation events. They can then join with transportation, public works, and elected officials to prioritise and pursue solutions.

41.5.2 Comprehensive pedometer programmes

Pedometers – sometimes called step counters – are pager-sized devices worn on the hip which measure the number of steps taken by the wearer. Though more elaborate models estimate miles or kilometres walked and calories burned, the simpler step-counting devices have come into favour among activity promoters in the US. They are being utilised in walking promotions at health and weight loss clinics, work sites, schools, and community programmes (Tudor-Locke and Myers, 2001).

An important aspect of pedometer walking promotions is that they allow all participants to succeed irrelevant of their total daily steps, as long as they are improving. A simple approach is to provide users with a pedometer and simple log sheet, and instruct them to simply measure their typical daily step totals in the first week. After determining daily averages with no conscious effort to increase steps, in the second week participants simply try to boost average daily steps by 20 %. They can continue boosting steps by 10–20 % a week until they reach or exceed the recommended 'healthy' minimum of 10 000 steps per day (Tudor-Locke and Myers, 2001).

Inevitably, people who are consciously trying to increase their number of daily steps begin to recognise the need for improved walking environments. This is the opportunity to extend the programme beyond individual behaviour change. For example, the following are logical supporting activities to a pedometer-based walking promotion in a work site or school:

- open and clean up stairwells. Make them light, clean, safe, and well-ventilated;
- build, repair, maintain and clear sidewalks;
- provide maps of walking routes and nearby destinations (stores, banks, transit stops);
- distribute neighbourhood walkability checklists and prioritise improvements;
- institute mass-transit programmes. Provide free bus or train passes with each pedometer;

- launch car-pool programme. Match up employees or students who live near one another;
- stop subsidising driving – do not provide free parking;
- make showers and lockers available to walkers;
- build a trail on or near company grounds, or adopt and maintain a nearby trail.

For more information on online pedometer programmes see www.walkinginfo.org/hf/index.htm and http://www.pbs.org/americaswalking/health/health20percentboost.html.

41.5.3 Safe Routes to School

This has become a generic term for a wide range of activities, many of which span the spectrum of the social-ecology approach to promoting walking. The fundamental element is the idea of encouraging children and often accompanying adults to walk to school regularly. Many communities utilise International Walk a Child to School Day to kick off their walking programmes, but in most cases the goal is to build a sustained programme rather than just a one day event. Table 41.3 summarises how walk to school programmes can operate on all levels of the social ecology model. In fact, there appears to be a fairly natural progression of walk to school programmes from one day events to permanent improvements for walking (PBIC, 2002). Below are some of the steps in such a progression.

1. Participate in International Walk to School Day. Typically in early October, this is an opportunity for children, parents, school, safety and elected officials to walk to school together and recognise the health, safety, and environmental benefits of daily walking, as well as the fun (for current information, www.walktoschool.org).
2. Designate preferred routes to school. Education, safety and transportation officials can survey the areas around schools and recommend those routes that would be safest for children to walk regularly, not just during a walk to school 'event'.

Table 41.3 A sample of the socio-ecological elements of a comprehensive Safe Routes to School programme

Intervention level	Safe Routes to School Implementation
Individual	Health, weight loss, fitness information; pedestrian safety training
Interpersonal (group)	Class-by-class competitions (which has most walkers, steps, etc.)
Institutional	Hold Walk to School Day festivities, create walking school buses
Community	Distribute, collect walkability checklists, prioritise problem areas
Public policy	State legislation earmarking $ for improving pedestrian school routes

3. Launch sustaining activities. Some schools continue with specific walking events, such as Walking Wednesdays or they utilise pedometers or logbooks to encourage children to keep walking and increasing their daily steps. There can be classroom or neighbourhood competitions in step totals or participation percentages.
4. Make it part of the curriculum. Maths classes can calculate miles and calories burned, health and science classes can study the health benefits of walking, geography classes can map walking routes, and literature classes can write walking poems and essays.
5. Teach safe walking. Pedestrian safety programmes are often incorporated into classrooms or physical education curricula to prepare children for walking regularly.
6. Teach safe driving. Campaigns to remind drivers that school is in session and providing safe driving courses are two approaches. A newer tactic is getting adults to pledge to be pace cars and to use bumper stickers proclaiming the fact that they will be driving at or below the speed limit, especially in neighbourhoods and school zones.
7. Initiate walking school buses (CDC, 2000). The idea is to have groups of children accompanied by adults on the walk to school. These can be informal – a group of neighbourhood parents and children who simply regularly walk together – or more formal, with a designated route and departure times and a rotating schedule of parent 'drivers.' Some even pull a wagon for children's book bags. A new twist is encouraging retirees to be walk leaders, as older Americans are at elevated risk of sedentary lifestyles.
8. Distribute walkability checklists. As described above, these can help a community set priorities in removing barriers to walking and creating safer routes to school.
9. Build better walking environments. Sidewalks, trails, improved lighting, better crosswalks and signals all can be requested once the walking environment is assessed for a child's safe passage. This is a good reason for children to participate in filling out the walkability checklists.
10. Designate funding for safer routes to school. In 2000, the state of California passed landmark Safe Routes to School legislation which earmarked a portion of the transportation budget's safety dollars specifically for walking and cycling routes to school. Other states have now followed suit, and such legislation is even being considered at the federal level. Such permanent funding could have a tremendous impact on creating more walkable settings across the United States.

41.6 Conclusion

The three examples of walking promotion given illustrate the evolving direction for walking in the United States. The use of walkability checklists comes

largely from the transportation perspective. Yet it increases awareness of the built environment for all users, and even non-professionals can find checklists an effective tool in creating the public will and desire to create better walking settings. Pedometers are a typical health community approach. They provide quantifiable outcomes and lend themselves to distribution through a specific intervention, such as a work site wellness programme, and they focus initially on personal behaviour change. However, in both of these cases the approach can be extended to cross disciplinary lines, extending from transportation to health and vice versa.

Walk to school initiatives can and do effectively utilise both of those tools, and have the potential to be a truly socio-ecological approach to promoting walking. They operate at all levels, and most importantly they provide an impetus for more walkable settings that is hard to argue against. After all, who is willing to say we do not want our children to be safer, healthier and happier? It is now incumbent upon all of us to work to find other approaches to promote walking which operate at many levels, which will receive similarly widespread support and which will overcome the 'stickiness' problem.

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42

Promoting walking in the UK: bottling walking and making it sell

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42.1 Introduction

Anyone who has climbed a mountain, completed a National Trail or even just spent a day out hiking will relate to the feeling of contented exhaustion that comes after a good walk. The satisfaction, however, is gradual and is most commonly experienced via a series of stages – firstly, in preparation, often there is a period of unwinding and off loading as we search to escape from the fog of everyday life; then there is a period of exploration and discovery as the detail of the surrounding environment is revealed and the time found, as if from nowhere, to indulge and enjoy it. For many there then follows seamlessly a stage of inspiration – a renewed strength and a clarity that allows us to reflect and deal with some of the original clutter which otherwise absorbs us. Such journeys happen to people at different paces, in different places, but wherever and whenever the experience, as the path inevitably returns us, more often than not, we feel somehow happier, healthier and generally more content.

If these feelings could be bottled and bought there would be a long queue for them and that is exactly what the traditional path manager, tourism officer and leisure guide writer have for centuries attempted to do by personalising and describing the walking experience. In a way it can be assumed they have done a pretty good job, as nearly half of us enjoy leisure walking, and walking for pleasure continues to score consistently as the UK's most popular leisure activity.[1]

More recently, engineers, health experts and planners have also tried to bottle and sell walking as, among other things, 'the perfect exercise',[2] the answer to more liveable cities, and a significant part of the solution to less congested roads. This form of social marketing is only in its infancy but it

needs to catch up quickly if the trends for more sedentary lifestyles and increased use of the private motorcar are to be stopped and potentially reversed. A walk down the high street is less of an inspirational journey to most than a walk in the country but the experienced bottlers have adopted, however subconsciously, some key principles for the successful marketing of walking. This chapter attempts to identify the principles of relevance whatever the discipline from which the selling is approached, and provide some guidance to those keen to get more people walking wherever their journey may begin and whatever its purpose.

42.2 Background

In the book *The Magic of Walking* by Aaron Sussman and Ruth Goode,[3] walking is referred to as being 'as natural as breathing – the exercise that doesn't need a gym, the prescription without medicine, the weight control without diet, the cosmetic that isn't sold in a chemist, the tranquillizer without a pill, the therapy without a psychoanalyst, the fountain of youth without a legend and the vacation that doesn't cost a penny'. Some 35 years since that book was written there is a growing realisation amongst professionals across government at a national and local level that, by encouraging walking, a myriad of topical epidemics can be addressed including:

- reducing cardiovascular heart disease – the nation's number one cause of death;
- increasing domestic tourism and regional economic benefit;
- reducing the number of premature deaths caused by obesity brought on by a lack of physical activity;
- easing traffic congestion and air pollution in our cities;
- uniting socially excluded communities;
- providing a sense of place and identity in urban and rural regeneration schemes;
- improving opportunities for farm diversification and becoming a focus for revising access legislation.

The question on many a politician's lips, at least in private, is increasingly 'how can we get more people walking?' The usual response to such a question would be to start building – measures such as reallocating road space, reducing traffic speed, improving the quality of the street scene and developing signage to the network of paths. These are not wrong and will all often help, but they assume a certain level of knowledge about walkers that would pay to be checked in advance of any works to ensure the 'improvements' being implemented have maximum benefit. Some might call this marketing, as ultimately we are attempting to satisfy the needs of the walkers but this in turn assumes that we know who the walkers are, what their needs are and how they can be satisfied.

42.3 Knowing walkers

The first principle, therefore, for getting people to walk more is to adopt a marketing approach which centres people at the heart of policies and plans. Walkers are not a homogenous group (as often assumed) so it is important to understand who is currently walking, their habits, behaviour, likes, dislikes, perceptions and attitudes.

There are an increasing amount of published data that provide a useful base line of statistics from which local assumptions can be tested. For example, 43 % of adults in the UK are known to regularly go for a walk of at least 2 miles,[4] and 80 % of journeys under a mile are walked. More than half of all journeys to school, one-third of shopping journeys, and one-quarter of all social trips are walked and it is accepted that the average walk journey lasts approximately 15 minutes/km.[5] Published studies into the attitudes of walkers, however, are more limited in the UK although some preliminary research by the Transport Research Laboratory in 2000[6] suggested people walked because of the exercise, the opportunity it provided to relax and enjoy themselves, for social reasons and to enjoy the view, and fresh air – all of which scored higher than the fact that it was a way of getting from a to b.

Walking, therefore, can be regarded as a subconscious activity, used as a way to enjoy other things, rather than something done for the sake of it in the majority of cases. Research by the Ramblers Association supports this: 40 % of the public they surveyed in 1999 did not consider themselves 'walkers' and an even higher 65 % did not want to be known as a 'rambler'.[7] The word 'pedestrian', often used to describe functional walking (in contrast to leisure walking), has even more negative connotations to the extent that the Pedestrians Association (so named since the 1930s), having completed some brand research of their own in 2001, decided to change their name to 'Living Streets'. This is useful to know, although the data should be treated with caution, as there may well be pockets or segments of society where these words are the exact triggers to encourage them to walk more. The Ramblers Association, for example, has a membership of 130 000 and is working hard to evolve its brand to appeal to younger markets.

It does suggest, however, that pictures of footprints, shoes and feet, and the publication of walking leaflets, maps and even walking strategies may not necessarily be the way forward. No better example of this can be found than at central government level where the publication of the *National Walking Strategy* in the UK has been delayed because no politician is willing to stand up and put his or her name to the document for fear of being laughed at or referred to John Cleese's 1979 sketch on the Ministry of Silly Walks. Unfortunately, and it is assumed that even Monty Python could not of thought of this (Michael Palin is now President of Transport 2000 in the UK), things have got to a stage where we do need a Ministry of Walking, for government to set a strategy in place to remind people to put one leg in front of the other. Yet clearly unless a minister is willing to stand up with John Cleese and

agree that it is time to replace the word 'silly' with 'serious', it may well be better called something other than a Walking Strategy and the valuable content and policies which have been drafted to fit with accepted, existing transport and health statements, may actually be better adopted elsewhere.

National Trails such as the Pennine Way, Thames Path and South West Coast Path in England and Wales have learned this too. User surveys[8] have revealed 95 % of walkers only visit for a day on a relatively short walk and yet for years the only guide book information and marketing has been in the specialist press, aimed at the other 5 % – the 'striders' rather than the 'strollers', out to walk the whole length and marketed to in the specialist press. Promotion for trails is now being 're-bottled' to target the strollers too which means not just promoting the walking of trails as a destination activity in its own right but as an integral part of a wider visitor experience.

The leisure walking market is sometimes broken into three groups – the 'amblers, ramblers and scramblers'. It is estimated by EMAP Publications whose titles include *Country Walking* and *Trail*, that 'amblers' represent approximately 25 % of the market, 'ramblers' 70 % and 'scramblers' 5 %.[9] Recent calls in London for a 'fast lane' along Oxford Street – the capital's most walked footway – suggest that the utilitarian or functional walking market may be split in a similar way. Although useful, this needs further classification (as does the leisure market), if it is to be of relevance when it comes to selling the final bottled product.

The British Tourist Authority (BTA), which studied data from the UK Day Visits Survey and Inbound Travel Survey and developed a walking campaign in 2000 in response, illustrates this point further. The research[10] recognised that 28 % of visitors from overseas choose to go for a walk whilst in the country and for a significant number the ability to walk on the network of rights of way was a reason to visit Britain in the first place. A web site was created and print produced, supported by several of the regional tourist boards which also developed their own walking area guides and organised walking festivals. Analysis of the campaign found that its impact was being limited, however, by its focus and subsequently in 2002 the BTA launched a more inclusive promotion of 'Outdoor Britain' in an umbrella campaign which allowed visitors to plan their walk around other activities too. It is expected that the regional boards and local authorities will take the lead from this change and follow suit in forthcoming seasons.

The Marketing Director of Coca Cola once said that there are two ways to market something – 'figure out what is desirable and make that what you deliver or figure out what you can deliver and make that desirable'. Both approaches are possible but one will cost a lot more and probably take a lot longer than the other. Having identified who is walking and who is not, if the objective is to get more people walking it is usually far cheaper and quicker to identify first those interested in walking (the contemplator markets) rather than trying to appeal to those who are less interested. The TravelSmart Approach, described by James and Bröge in Chapter 29 has adopted this

principle and identified the contemplator markets from research into who drives and why in the city of Perth. Over the last few years it has managed to achieve a 16 % shift from private cars to walking and cycling by one-to-one marketing with the contemplator markets.

The Health Education Authority (HEA) in the UK ran a similar campaign during 2000.[11] The HEA research identified young professional women between the ages of 18 and 24 as not doing enough exercise to benefit their health and, more importantly, a market that was interested in doing more if only the barriers of not having enough time and not wishing to be seen in a swimming costume or leotard could be overcome. The HEA developed a campaign poster titled 'I like to do it in the morning' with a picture of a rather contented looking woman with beautiful legs stepping out to work in sensible shoes. The posters were supported by a partnership campaign on *Kelloggs* Bran Flakes (breakfast is the time when most people were found to make the decision as to how to get to work) and adverts were secured in a number of women's lifestyle magazines. Promotional shoe bags for a second pair of shoes were given away to help promote the scheme and it was considered an effective way of getting more people to walk.

42.4 Knowing the competition

Having identified that the majority of people do walk, albeit for different reasons, the second principle for successful walking marketing is to be positive and learn from the successes of competitive brands to help deliver the message effectively. Walking is often described as an 'alternative' form of transport and an unnecessary activity. As it stops being a necessity for those with access to alternatives, it becomes a luxury so that marketing is only likely to be effective if the messages focus on the opportunity for spontaneous indulgence and the added social interaction that it affords in contrast to the car.

Alternatively, walking needs to be marketed as a necessity again and the health message – the fact that walking may save our lives – is likely to be the strongest way of doing this quickly. People's awareness of the state of their health is generally increasing along with an understanding that there is a need to keep physically active. A major survey in 1992[12] found that 80 % of the population thought they already did enough exercise to maintain or benefit their health, when in reality around 30 % actually did. It was estimated at the time that if just 10 % of these people became moderately active there would be an annual health care saving of £445m. Governments in the UK, the US, Australia and New Zealand have agreed that adults should be encouraged to take 30 minutes of moderate intensity physical activity on most days of the week and this message is being steadily promoted to create a sense of concern in the inactive that will, it is hoped, spark some involvement in physical activity. It is likely that walking – as a cheap, practical and low impact

activity – could be 'sold' relatively easily to these sedentary segments as their levels of concern push them into contemplator markets.

The British Heart Foundation/Countryside Agency Health Walk project[13] is an example of a scheme aiming to turn such anxiety into action as part of a five year project targeting physically inactive communities across England and is being received very positively by a host of different groups. Interestingly, the Health Walks Scheme is being funded by a car company, which suggests reciprocal benefits accrue from campaign managers sharing markets and messages. Cars are often portrayed by walking marketers as the walker's 'enemy' which has probably limited people's interest in supporting walking initiatives for fear of being seen as anti-car. Westminster City Council took this view in 2001 during the planning of the World Squares Project in Trafalgar Square. The closure of the road in front of the National Gallery was seen as an inconvenience to resident motorists rather than a positive thing for the millions of residents and visitors enjoying the area on foot in the centre of London every day.

Kia Cars, who sponsor the Walking the Way to Health Project, has taken the positive step of encouraging its buyers to use their cars responsibly and not for short trips. Other manufacturers are adopting similar stances, keen not to lose out on the increasingly environmentally-aware car buying market who do not want to feel guilty about owning a car and in a highly competitive market may well feel closer to a brand that was more caring, considerate and aware than perhaps other car manufacturers. More potential partnerships can be expected in this market in the future. Cars generally, however, are promoted with significant budgets, as something that will make the driver richer, sexier, more successful and happier. Rarely is there any mention that it will also get you from a to b, and these emotional messages are as relevant to people promoting walking, if it can be assumed that the aspirational goals of our shared market are the same.

Similarly, the negatives of driving can be taken advantage of – some of the strengths of walking are that it is reliable, predictable, cheap and totally flexible, with no congestion, parking, petrol costs or pollution. These messages are best expressed subtly and positively so people do not feel they cannot own a car *and* walk. Whatever policy is eventually pursued it has to accept that the car is a part of our life which must coexist with walking rather than compete with it and the challenge is making it culturally acceptable, if not desirable. Car Free Days and Walk to School Days, which endeavour to encourage people to leave the car at home and walk more, provide an interesting annual insight into life without the car. It is unlikely, however, that these alone are enough of an insight into the quality Utopia of life without cars. However, during 2001 there was a rather shocking insight into a life without walking in the UK when Foot and Mouth Disease effectively closed large areas of the country. Although the UK Day Visits Survey[14] suggests walking has only 20 % of the share of activities enjoyed on an average day out, when walking was prohibited people did not go to the country at all and the

dependence on walking was suddenly fully realised as rural communities really started to suffer. Martin Bell, Chief Executive of South West Tourism, was quoted afterwards as saying the South West Coast Path was as important an artery as the Main A30 road to the economy of the region.[15]

It is interesting to contemplate such a parallel event restricting our ability to walk from a to b during everyday life – would we stop going to work, to school and to the shops too? Such an immediate breakdown would surely grab the attention of ministers, but if the effect was gradual, would it be noticed so much? Sadly, post-Foot and Mouth there is no obvious new political investment in walking and no measured increase in walking either, despite greater appreciation of its value. Getting more people walking therefore will not come from a big bang event but from long-term campaigns that establish an acceptable place for everyday walking in our culture.

42.5 Knowing the product

Once the values and perceptions of walkers are understood it is important to audit the quality of the walking environment and evaluate the gap in the product that needs closing in order to meet the demand. This is the third principle – to adopt a process which clearly identifies the message that is needed and to consider the most effective way of targeting it to the walker. The latest walking audit methodology, proposed by Living Streets for Transport for London, suggests measuring the physical, practical and emotional aspects of the surrounding environment in order to gain a representative model of the walking environment. This is the first time, as far as the author is aware, that emotions and feelings have been brought into an audit model – which at last involves walkers themselves in the audit system – providing a valuable holistic framework to help with identifying a list of investment priorities.

The evaluation can result in a list of physical improvements to the infrastructure (such as seating if it is understood that the barrier to a particular market is not having enough resting places between home and the shops, for example) but a programme of 'soft policies' should be considered too (such as setting up a home delivery service to deal with the lack of seating issue, or promoting a message that the shops are nearer than people think if in fact their perception of distance is greater than the reality). This approach requires engineers and planners to learn new skills (or feel confident enough to employ extra help from those who can provide it) and to think creatively about the solutions alongside the traditional disciplines. Marketing messages may well not only be a cheaper option but a more practical one if the walker is involved in the development of the product, which is ultimately the way to ensure more people walk.

42.6 Conclusions

Walking is an everyday activity but it receives low priority for investment and little political interest because the image of walking is not one with which people wish to be associated. The benefits of walking, however, and its potential, if encouraged, to improve our personal health, local community and national environment are clear and agreed. The way forward is in the hands of marketers to repackage walking in more acceptable bottles or to change the label totally, perhaps adapting it to different markets. The key is to adopt a people-centred process which identifies all that is needed to be known about the current attitudes and behaviour of existing and potential walkers; that considers the strengths of the competition luring people away from walking and builds on them; assesses how far the current walking environment satisfies the demand for the desired market; and then creates a robust, improvement plan which integrates targeted messages with physical improvements in order to develop the product with people and for people.

As walking strategies begin to be implemented locally it is inevitable that investment will take place in marketing walking. If the right approach is adopted, and the experience of those who have successfully been bottling walking for years incorporated, ultimately more people will walk and be as happy doing it in the high street as they are currently on the mountain.

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43

Non-motorised Transportation Demand Management

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43.1 Introduction

Transportation Demand Management (TDM, also called Mobility Management) is a general term for strategies that result in more efficient use of transport resources. There are many potential TDM strategies with a variety of travel impacts, including changes in trip frequency, mode, destination, route or time (VTPI, 2002). Some TDM strategies increase transport system diversity, improving the travel options available. Others provide incentives to reduce vehicle travel. Some reduce the need for physical travel through mobility substitutes or more efficient land-use. Transportation Demand Management is an increasingly common response to transport problems. In fact, many transport problems are virtually unsolvable without TDM.

Transportation Demand Management does not eliminate automobile travel, as cars are the most efficient option for certain types of trip, but it tends to significantly reduce the amount of automobile travel that occurs, particularly under urban peak conditions. Most individual TDM strategies have modest impacts and benefits, affecting just a small proportion of total vehicle travel. As a result, they are seldom considered the most effective solution to a transport problem. However, TDM strategies have cumulative and synergetic impacts (total effects greater than the sum of their individual impacts), so it is important to evaluate a TDM programme as a package. For example, just improving cycling facilities may reduce five per cent of motor vehicle travel in an area. Just implementing parking management and parking pricing programmes may reduce five per cent of vehicle travel. If implemented together, the 2 strategies may produce a 15 % reduction, because together they provide both positive and negative incentives for motorists to use alternative

modes. A comprehensive TDM programme can often reduce automobile use by 20–40 % over what would otherwise occur in an area. Table 43.1 shows examples of TDM strategies.

Transportation Demand Management involves prioritising travel based on the value and cost of each trip. It gives higher value trips and lower cost modes priority over lower value, higher cost trips. For example, transit vehicles, service vehicles (such as postal vehicles and garbage trucks) and commercial vehicles usually have relatively high value, and so should receive priority over private vehicles. Transit, ridesharing, bicycling and walking generally cost society less per trip than single occupant automobile travel (in terms of road space, parking costs, risks imposed on other road users and pollution emissions), and so should receive priority. This contrasts with conventional transport planning practices, which often devote more public resources (such as road and parking space) per automobile trip than to other modes, particularly non-motorised travel.

43.2 Transportation Demand Management benefits

Transportation Demand Management can provide multiple benefits to society, including congestion reduction, road and parking facility cost savings, consumer savings, improved consumer choice, increased road safety, environmental quality, community liveability, efficient land-use and equity. Transportation Demand Management can greatly expand the range of solutions considered for addressing transportation problems and allows solutions to be tailored to a particular situation. It can often be implemented quickly and target a particular location, time period or user group. When all factors are considered, TDM is often the most cost-effective solution to transportation problems.

Transportation Demand Management reflects sustainability principles of integration and resource efficiency. It helps achieve specific sustainability objectives, including resource conservation, equity, environmental protection, efficient land-use, and public involvement. As a result, TDM is a critical component of sustainable transportation programmes. Several current trends support the increased implementation of TDM. Traffic and parking congestion are increasing in most urban areas, and so are the economic costs of building more roads and parking facilities. Many residents now recognise the value of preserving green space and cultural resources, and enhancing community liveability and so are increasingly concerned about the economic, social and environmental costs of additional motor vehicle traffic. As a result, transportation planners and community stakeholders are increasingly willing to consider TDM solutions to transportation problems.

Table 43.1 Examples of TDM strategies

Improve transportation options	Incentives to reduce driving	Parking and land-use management	Policy reforms and programmes
Alternative work schedules	Walking and cycling encouragement	Bicycle parking	Access management
Bicycle improvements	Commuter financial incentives	Car-free districts	Campus transport management
Bike/transit integration	Congestion pricing	Clustered land-use	Car-free planning
Carsharing	Distance-based pricing	Location efficient development	Commute trip reduction programme
Flexitime	Fuel taxes	New urbanism	Comprehensive market reforms
Guaranteed ride home	HOV (high occupant vehicle) priority	Parking management	Context sensitive design
Park & ride	Parking pricing	Shared parking	Freight transport management
Pedestrian improvements	Pay-as-you-drive vehicle insurance	Smart growth	Institutional reforms
Ridesharing	Road pricing	Smart growth policy reforms	Least cost planning
Shuttle services	Speed reductions	Transit oriented development (TOD)	Regulatory reform
Taxi service improvements	Vehicle use restrictions	Road space reallocation	School transport management
Telework			Special event management
Traffic calming			TDM marketing
Transit improvements			Tourist transport management
Universal design			Transportation management associations

Transportation Demand Management includes more than three dozen strategies that improve transport options, encourage use of efficient modes and create more accessible land-use.

43.3 Non-motorised transportation in TDM

Non-motorised Transportation (also known as Active Transportation and Human Powered Transportation) includes walking, cycling, wheelchairs, handcarts, push scooters and animal carts. Non-motorised transportation is an important component of TDM, yet some studies conclude that walking and cycling improvements can do little to address transportation problems because they only consider current commute trips that can shift directly to non-motorised modes, with no changes in destinations or land-use (Comsis Corporation, 1993). However, non-motorised travel plays a much larger role in mobility management than this indicates.

Non-motorised improvements can be substituted directly for automobile trips, particularly for non-commute trips such as shopping, travelling to school, travelling to recreation and social activities, and other local errands. According to some estimates, five to ten per cent of automobile trips can reasonably be shifted to non-motorised transport in a typical urban area (Mackett, 2000). A relatively short non-motorised trip can often be substituted for a longer motorised trip. For example, a shopper might choose between walking to a small local store, and driving a longer distance to a supermarket. Non-motorised travel is also critical for transit and rideshare transport. Transit riders often walk or cycle to their transit stop, and they usually walk to their destination. Once at work, transit and rideshare commuters often walk to other destinations, such as to a nearby restaurant for lunch, or shops to run errands. For this reason, transit and rideshare commuting tend to be higher at worksites with good pedestrian access to commercial services. One of the most effective ways to encourage transit and ridesharing travel is to improve non-motorised travel conditions at origins and destinations, for example, by creating more walkable commercial centres, improving cycling facilities in residential areas, and providing bicycle parking at transit stations. Similarly, one of the most effective ways to encourage higher density, infill development and to discourage sprawl is to improve walking and cycling conditions in urban areas.

Consumers tend to significantly increase their personal mobility when they purchase an automobile, due to the increased convenience of travel, and because they want to get their money's worth from their large investment. For example, the US National Personal Transportation Survey (USDOT, 1990) indicates that people who own an automobile travel about three times as many miles each year as non-motorists.

Communities that improve non-motorised travel conditions often experience significant increases in non-motorised travel and related reductions in vehicle travel. Residents in pedestrian- and bicycle-friendly communities walk, bicycle and use public transport far more than residents of automobile-oriented communities, typically reducing per capita automobile travel by 20–40 %, and even more if implemented with other TDM strategies (see Fig. 43.1) (VTPI, 2002).

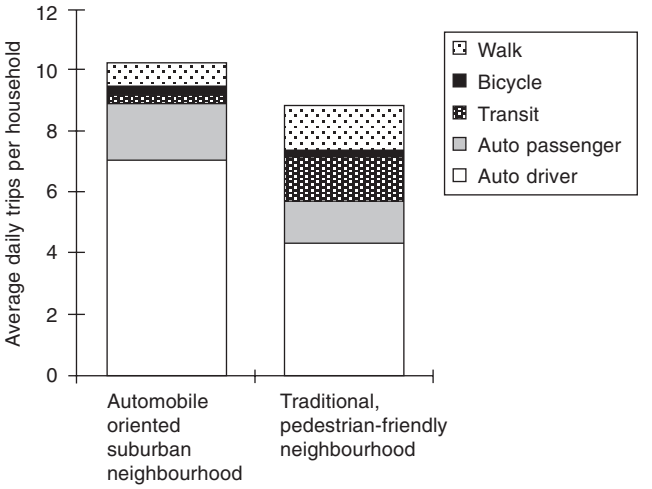

Fig. 43.1 Average daily trips per household by neighbourhood type. Source: Friedman, Gordon and Peers (1995).

43.4 Transportation Demand Management planning and implementation

Transportation Demand Management implementation faces a variety of institutional and practical barriers. Conventional transportation planning and funding practices tend to favour motor vehicle transport improvements over mobility management solutions to transportation problems. Conventional planning tends to evaluate transportation system quality on mobility (the movement of people and goods) rather than access (the ability to reach desired goods, services and activities). As a result, it tends to assume that any increase in vehicle travel volumes and speeds is beneficial, and any reduction in mobility or shift to slower modes is harmful to consumers. Mobility-based planning tends to favour automobile-oriented transport policies and land-use patterns. For example, it justifies roadway and parking capacity expansion, even if this reduces pedestrian mobility and leads to automobile-dependent, sprawling development patterns. Accessibility-based planning gives greater consideration to TDM solutions and land-use factors such as density, clustering and mix.

Current transport planning and evaluation practices tend to undervalue non-motorised travel, because they often ignore or undercount shorter trips, non-work trips, off-peak trips, non-motorised links of motorised trips, travel by children and recreational travel. If a traveller takes ten minutes to walk to a bus stop, rides on the bus for five minutes, and takes another five minute walk to their destination, this walk–transit–walk trip is usually considered simply a transit trip for analysis, even if the non-motorised links take more

time than the motorised link. Similarly, a walking trip from a parking space to a destination is often ignored. As a result, there are more non-motorised trips than recognised in conventional transport models.

Conventional planning tends to ignore the fact that many people actually prefer to walk or bicycle rather than drive for some trips, and so shifts from the automobile to non-motorised modes that result from positive incentives (such as improved non-motorised facilities and financial rewards for non-drivers) reflect user benefits, in additional to external cost reductions. To their credit, many transportation professionals give non-motorised transportation more consideration than is justified by the their evaluation travel survey data. They realise that non-motorised travel has many critical functions in an efficient and balanced transportation system, some of which are difficult to measure. However, this occurs in spite of, rather than supported by, conventional planning practices. There is much that can be done to improve transportation planning and modelling to better evaluate non-motorised transportation. Several evaluation tools have been developed to predict demand for non-motorised travel, evaluate walking and cycling conditions and predict the effects of pedestrian and cycling improvements. For more information the reader is directed to the 'Non-motorised Transport Evaluation' chapter of the *Online TDM Encyclopedia* (VTPI, 2002).

Transportation planning must become more comprehensive for TDM in general, and non-motorised transportation in particular, to achieve its full potential. Table 43.2 compares conventional and comprehensive transportation planning. It indicates the various ways in which conventional planning tends to favour automobile-oriented improvements over mobility management strategies, particularly those that involve non-motorised modes.

43.5 Methods to improve and encourage non-motorised transportation

There are many ways to improve and encourage non-motorised transport (ADONIS, 1999; VTPI, 2002).

43.5.1 Plan for non-motorised transport

Non-motorised improvements should begin with a pedestrian and bicycle plan to identify problems and prioritise projects (DRD, 2000; Litman *et al*., 2001). Best practices:

- build for everyone. Streets have multiple uses that must be balanced;
- integrate non-motorised planning into all transport and land-use planning activities;
- educate all transportation professionals in non-motorised transportation planning principles;

Table 43.2 Comparing conventional and comprehensive planning

Factor	Description	Conventional	Comprehensive
Selection of options	The range of solutions that are considered, including capacity expansion and TDM programmes	Often ignores TDM options	Includes TDM options
Investment practices	How funding is allocated, and the flexibility with which it can be used for the best overall option	Favours large investments	Applies least-cost planning
Underpricing	Degree to which vehicle use is underpriced, resulting in excessive travel demand	Ignored	Considered
Modelling practices	Whether transport modelling uses current best practices to predict travel and economic impacts	Limited analysis capability	More comprehensive
Measuring transportation	Methods and perspectives used to measure travel (vehicle traffic, mobility or accessibility	Measures vehicle traffic	Measures accessibility
Unco-ordinated decisions	Whether transport and land-use decisions are co-ordinated to support strategic regional objectives	Not considered a problem	Considered a problem
Generated traffic	Whether planning takes into account the full impacts of generated traffic and induced travel	Ignores many components	Includes all components
Consumer impacts	Techniques used to evaluate the consumer impacts of changes in the transport system	Travel time changes	Consumer surplus analysis
Vehicle costs	Whether all vehicle costs and savings are considered, including long-term costs	Only short-term operating costs	All affected vehicle costs
Parking costs	Whether all parking costs are considered, including costs borne by motorists, businesses and governments	Only if paid by motorist	Includes
Construction impacts	Whether increased congestion delays during construction periods are considered in evaluation	Ignores	Includes
Non-motorised travel impacts	Accessibility, convenience, safety, comfort and cost of walking and cycling	Ignores	Includes

Table 43.2 *(Cont'd)*

Factor	Description	Conventional	Comprehensive
Transportation diversity	Changes in the quantity and quality of travel options (particularly those used by non-drivers)	Limited analysis	Comprehensive analysis
Environmental impacts	Impacts on air, noise and water pollution; green space preservation and community liveability	Limited analysis	Comprehensive analysis
Impacts on land-use	The degree to which each option supports or contradicts strategic land-use objectives	Limited analysis	Comprehensive analysis
Equity impacts	The degree to which each option supports or contradicts community equity objectives	Limited analysis	Comprehensive analysis
Safety and health impacts	How safety and health risks are measured	Per vehicle-mile crash risks	Per-capita health risks

Source: VTPI (2002).

- fund non-motorised planning and facility investments at a rate that reflects its importance in the transportation system (i.e., 10–30 % of total transportation budgets);
- include non-motorised travel in transportation surveys and models, and perform user surveys to identify problems and barriers to non-motorised travel;
- ensure that all roads are suitable for walking and cycling unless these modes are specifically prohibited and suitable alternatives are available;
- create many linkages. Develop a well-connected street network that offers multiple routes and modes to destinations. Add special walking and cycling linkages where possible (for example, mid-block walkways and paths that connect dead end streets);
- use current planning guides and design standards (avoid outdated guides and standards);
- establish and enforce rules for the use of non-motorised facilities to avoid conflicts, such as which types of users are allowed to use sidewalks and paths, and maximum allowable speeds under various conditions;
- build green streets that include trees and boulevards.

43.5.2 Improved sidewalks, crosswalks, paths and bike lanes

Many areas have inadequate sidewalks, crosswalks and paths and opportunities for pedestrian and cycling facilities and connections are overlooked. Many roads are not designed or maintained to accommodate cycling and other slower modes, putting cyclists and car users at risk, or forcing them onto pathways where they conflict with pedestrians. Best practices:

- create pathways for non-motorised travel that are safe and convenient, even for people with disabilities, children and people using handcarts;
- use traffic calming and other traffic control measures to make street environments safer and more pleasant for cycling;
- create facilities based on Universal Design principles, which means that they can accommodate people with disabilities and other special needs;
- design sidewalks that are comfortable, and streets that are easy to cross;
- establish high standards of maintenance and cleanliness on non-motorised facilities;
- build narrow streets and compact intersections. This makes it easier for pedestrians to cross.

43.5.3 Develop walkable communities

Various community development principles, called New Urbanism, Neotraditional Design or Transit Oriented Development, can help create more attractive, accessible, walkable communities. Best practices:

- each community should have a discernible centre with public facilities

and activities. This is often a plaza or park, with a school or community hall, and a transit station or stop. Most dwellings are within a five minute walk (half a kilometre) of the centre;
- encourage diversity. Combine mixed uses and mixed incomes within a community. Create the maximum number of activities within walking distance of each neighbourhood;
- design streets for walking and cycling, with sidewalks on both sides, bike lanes where needed, good crossings, traffic calming features used to control motor vehicle traffic speeds, and other features to encourage non-motorised travel;
- try to achieve residential densities averaging six to seven units per acre or greater, with higher density toward the community centre, and lower density further away;
- develop a variety of dwelling types in each neighbourhood, including houses, row houses and apartments, so all types of households can find places to live;
- provide a mix of shops and public services in each neighbourhood to meet common household needs, such as convenience stores, a post office, a bank machine and a gym;
- there should be an elementary school, parks, trails and playgrounds within half a kilometre of every dwelling;
- create multiple access routes connecting adjacent neighbourhoods. These access points may be highlighted with a gateway or signs;
- make urban thoroughfares relatively narrow and shaded by rows of trees that slow traffic and create an appropriate environment for pedestrian and bicyclist;
- build public spaces. Recognise that streets are the primary component of the public realm, where people can interact and build a community;
- build with proper size and scale. Scale for people, rather than motor vehicles.

43.5.4 Introduce traffic calming, speed reducing and vehicle restricting measures

Traffic calming refers to various design features and strategies intended to reduce vehicle traffic speeds and volumes on a particular road. Traffic calming projects can range from minor modifications of an individual street to comprehensive redesign of a road network. Traffic calming changes the emphasis of street design to give greater weight to pedestrians, cyclists and residents. Best practices:

- involve experts familiar with the latest traffic calming resources and design standards;
- planners should consider a variety of traffic calming devices, rather than relying on a single type, such as speed humps or rumble strips;

- develop traffic calming projects that support multiple objectives as well as controlling traffic speeds, including enhanced street aesthetics, and improved walking and cycling conditions;
- do not use stop signs as traffic calming devices;
- traffic calming planning should include adequate public involvement;
- devices that are new to an area should be implemented on a trial basis with adequate signing. For example, the first traffic circles in an area should have signs showing the path vehicles should follow. After a few years such signs will be unnecessary and can be removed.

43.5.5 Introduce bicycle storage and transit accommodation

Bicycle parking, storage and changing facilities are important ways to provide convenience and security for cyclists at destinations and there are many types of bicycle racks and lockers available. Inadequate facilities and fear of theft are major deterrents to bicycle transportation. It is particularly important to provide adequate bicycle storage at transit stops, and to accommodate bicycles on transit vehicles (buses, trains, ferries, and air transport). Transit is most effective for moderate- and long-distance trips on busy corridors, while cycling is effective for shorter trips with multiple stops. Combining transit and cycling can provide a high level of mobility comparable to automobile travel. Best practices:

- provide suitable bicycle parking where cyclists stop. Locate bicycle parking where it is convenient to use, secure, visible, protected from weather, and has adequate clearance;
- bicycle storage facilities should be well-designed, provide cover from the weather and be located where they are not in the way of traffic. They should securely support a bicycle's frame, rather than just a wheel;
- provide well-protected, long-term bicycle parking for commuters and residents and any other place that cyclists will leave a bicycle for several hours. If possible, also provide showers and clothes lockers for bicycle commuters;
- do not locate bicycle racks where they are in the way of pedestrian traffic;
- bike storage and racks should be well publicised, and include instructions for cyclists on how to use facilities;
- cyclists should be involved in planning bicycle storage and selecting hardware;
- allow cyclists to carry bicycles on public transit vehicles. Transit buses and taxis should have bicycle racks whenever possible.

43.5.6 Address security concerns

Personal security refers to freedom from risk of assault, theft and vandalism. Such risks can discourage walking, cycling and transit travel. These problems

can be addressed through various programmes and design strategies that increase security, including Neighbourhood Watch and community policing programmes, special police patrols (including police on foot and bicycles), pedestrian escorts, and monitoring of pedestrian, bicycle and transit facilities. Best practices:

- make security planning an integral component of transportation demand management planning;
- involve community members in crime prevention programme planning and implementation;
- use urban design features to maximise visibility in pedestrian, cycling and transit areas;
- revive downtowns as public gathering places, and create mixed-use centres with both commercial and residential development, so people are in these places at night;
- use traffic calming and pedestrian improvements to create more attractive streets;
- incorporate common space in new developments and existing neighbourhoods, including pocket parks, community gardens, community centres and neighbourhood schools;
- in dense, multi-family housing, provide semi-private courtyards shared by no more than 20–30 people;
- encourage a strong sense of community by supporting programmes, activities and design features that create opportunities for residents to interact and work together;
- create incentives and regulations that encourage owners to clean up, maintain and renovate rundown and vacant properties.

43.6 Case studies

Below are some examples of successful non-motorised transportation programmes intended to help achieve TDM objectives.

43.6.1 National Bike to Work Month (www.bikeleague.org)

The League of American Bicyclists has declared May to be National Bike Month since 1956. The league also promotes Bike to Work Week and Bike to Work Day. They invite communities, corporations, clubs and individuals to join in sponsoring bicycling activities during the month of May in order to increase awareness and acceptance of bicycling. The league produces a *National Bike Month Event Organizer's Kit*, to help individuals and organisations that promote these events.

43.6.2 Bike To Work Week campaign (www.biketoworkvictoria.bc.ca)

A Bike to Work Week campaign is held annually by a non-profit organisation in Victoria, British Columbia. It includes:

- a bicycle commuting contest with more than 200 teams at different worksites competing in various classes to see which can achieve the most bicycle commuters. All participants are eligible for prizes and drawings;
- a friendly contest between drivers and cyclists determines who gets a cup of hot coffee first at a downtown coffee shop without violating traffic rules;
- free bicycle skills training workshops for employees who want to learn more about bicycle commuting;
- an elementary school literary competition between bikes and cars. Cycling and driving parents leave the school at a specified time, travel to the downtown public library, check out a book and return to the school while following all the rules of the road. Students that estimate the closest time differences between the two modes are eligible to win bike prizes.

43.6.3 Employer-funded commuter bikes

The Nabisco bakery in Buena Park, CA, gives new bicycles to employees who commute to work three out of five days for a six month period. Those who commute on their own bikes are given $300, the cost of a moderately priced new bike. The scheme has meant that 10% of the plant's 480 workers now commute regularly by bicycle, helping Nabisco satisfy the Los Angeles area's anti-pollution rules. 'These commuters have become biking enthusiasts', reports Nabisco transportation co-ordinator Byron Kemp. 'For them, biking is now an important social activity, and they regularly participate in fun rides on weekends' (TA, 1998).

43.6.4 Los Angeles Metropolitan Transportation Authority

The Los Angeles Metropolitan Transportation Authority (MTA) is installing front-mounted bike racks on its buses. Each rack holds two bicycles, and features an easy-to-use spring-action latch that allows the mounting and dismounting of a bicycle in about 30 seconds. Within 4 years the entire 2200 MTA bus fleet should be bicycle compatible and newer buses will come equipped from the factory with the bike racks. The MTA is working with the LA County Bicycle Advisory Group, the LA Bicycle Advisory Committee and several other bike organisations to determine the most appropriate bus routes to select, 'Studies indicate that the most likely users of our buses with racks will be cyclists who are a mile or two away from a bike route. The MTA expects the bicycle racks will attract a new market of riders. Foothill Transit and Orange County Transportation Authority already use bike racks with great success.

43.6.5 Seattle Metro (http://transit.metrokc.gov/bike/bikeride.html)

Seattle Metro transit agency's entire bus fleet was equipped with bicycle racks in 1994. Bikes can be transported on board any bus on a first come, first served basis. No additional fare is required. Bicycles may be loaded or unloaded at any bus zone at any time, except in the central business district where some restrictions apply. More than 40 000 cyclists use these racks each month.

43.6.6 Safe Routes to School (www.transalt.org/campaigns/school/index.html)

The Bronx Safe Routes to School is a programme managed by Transportation Alternatives and sponsored by school officials, local governments and the state Traffic Safety Committee. It co-ordinates the efforts of parents, teachers, principals and traffic engineers to identify and fix street conditions dangerous to children walking and cycling to school. Since October 1997 the programme has helped create safe walking corridors at 31 elementary schools. Safe Routes to School is so popular that schools are vying to participate. To be selected for the programme, parents and principals must be actively concerned about dangerous walking conditions and a high number of pedestrian injuries must be documented. Several hundred travel surveys are collected at the participating schools. Geographic Information System mapping packages are used to identify problems areas and develop safe walking routes. Solutions can involve the State Department of Transport installing speed humps, elevated crosswalks, sidewalk extensions and other measures where needed.

43.7 References and further reading

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The Bicycle Information Center (www.bicyclinginfo.org) provides information on non-motorised transport planning and programmes.

The International Bicycle Fund (www.ibike.org) provides a variety of information and resources to support cycling for transportation and recreation throughout the world.

Local Government Commission (www.lgc.org) provides resources for neighbourhood planning and pedestrian/bicycle improvements, including 'Designing Safe Streets and Neighbourhoods', 'The Economic Benefits of Walkable Communities' and 'Why People Don't Walk and What City Planners Can Do About It' fact sheets.

Oregon DOT Bicycle and Pedestrian Planning (www.odot.state.or.us/techserv/bikewalk/obpplan.htm) shows non-motorised planning at its best.

The Pedestrian Information Center (www.walkinginfo.org) is a pedestrian planning and safety information clearinghouse supported by the Federal Highway Administration.

44

Safer routes to Danish schools

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44.1 Introduction

The municipal reform in 1970 entailed that Danish municipalities became responsible for primary and lower secondary schools, bus transport of school children and the majority of roads, and that they should pay for these services through their tax revenue. The creation, by physical measures, of safer routes to Danish schools on municipal roads will benefit the municipality, due to reduced costs to school buses. Moreover the municipality has many options to improve children's road safety and change their travel habits, for example, through physical measures on roads or through changes in school hours.

The Danish Road Traffic Act has, since 1976, joined the police and road administrations to implement measures that protect children against moving vehicles on their way to and from school. The law for primary and lower secondary schools was changed in 1977. Municipalities must provide free travel between school and home for pre-school to class 3 children who have school routes journeys longer than 2.5 km. The distance is six km for children in classes four to nine and seven km for children in class ten. Municipalities must also provide free travel for children who have shorter school journeys, if concerns related to child safety make it particularly necessary. A circular from the Ministry of Justice in 1978 specified the concept school route and when such a route should be classified dangerous. In short, the legislation means that school children must be provided with relatively safe routes to school. If the municipality assess a school route as dangerous, it must, if possible, make the route safer by implementing physical measures, or otherwise provide free travel.

In practice, the local authority can choose the number of roads to be classified as dangerous. The legislation does not set a specific minimum

level of safety. Systematic risk assessments have only been conducted in a few school route cases (Rasmussen and Schmith, 1980). Safer routes to school are, therefore, almost entirely a local policy issue. The point of reference for the legislation was bloody. The child casualty rate on the Danish roads was among the highest in Europe in the 1960s and early 1970s. The child casualty rate has diminished faster in Denmark than in most other European countries during the 1980s and 1990s. Is this a result of local measures in Danish municipalities? Also, how has children's travel changed since the implementation of the legislation? This chapter is based on a report by Jensen and Hummer (2002) and gives answers to these questions.

44.2 Local measures, 1995–2000

The Danish Transport Research Institute carried out an enquiry among all Danish municipalities in 2001 (Jensen and Hummer, 2002). Some 181 of the 275 municipalities answered the enquiry and described their safer routes to school measures and efforts to change children's transport mode choice to and from schools in the period 1995–2000. The answers did not enable the researchers to determine how many children and accidents the individual measures could affect. However, responses enabled identification of which municipalities had made school route studies and other special measures directed towards school children's transport above a certain minimum level. An assessment based on detailed information about several municipalities pinpointed that the responses to the enquiry did not reveal all of the special measures except school route studies.

Some 19 % of the municipalities did not carry out measures besides, perhaps, campaigns at the start of the school year and adjustments of school bus routes and school districts. Some municipalities in this group did not carry out any changes regarding school children's transport at all. Of the municipalities, 41 % made school route studies during the period 1995–2000. In school route studies, children and parents answer questions about route choice, road safety, perceived risk and transport mode choice regarding the school journey. Some municipalities carry out questionnaire surveys on all schools and in every class, whereas others select, for example classes three, six and nine in one or two schools. Afterwards, the municipality suggests several physical measures based on the answers and analyses of accident data. After having consulted the schools and the police an action plan to improve the school routes is often set up by the road administration in the municipality. Most school route studies are part of the development of local road safety plans. The overlap of high-risk locations and spots, where children feel unsafe, is large (Magelund, 1992). School route studies are therefore very valuable in the development of local road safety plans, because the number of accidents is often so low that it is impossible to identify black

spots from accident data alone. All municipalities that made school route studies also made other special measures.

Some 40 % of the municipalities only made other special measures in the period 1995–2000. Several of these municipalities had made school route studies before 1995 or completed questionnaire surveys about perceived risk in traffic among all citizens. This group of municipalities often analysed accident data and a close co-operation between schools and road administrations took place before the implementation of measures. Other special measures predominantly consisted of:

- physical measures to improve child road safety, management of car traffic at schools and an increased level of service for walking and cycling;
- reduced school bus fares;
- road safety campaigns and schemes to discourage car travel of children to and from school.

Estimations based on a random test of 107 municipalities by Marfelt (2001) show that municipalities that made school route studies between 1995 and 2000 had an average road safety budget for the year 2001 of €10.1 per inhabitant. The budget among municipalities doing only other special measures was just €3.4, but, surprisingly, €9.1 per inhabitant in those municipalities that did not carry out measures besides school start campaigns and minor adjustments. These municipalities must have implemented a lot of local road safety measures without focusing on children.

The road safety evaluation of local measures consisted of time-series analyses and meta-analyses of the health risks to 6–16 year olds, i.e., traffic injuries per inhabitant and school children's share of all traffic injuries. Health risk is here defined as the number of traffic injuries per 1000 inhabitants. The number of school children and their average age has a major influence on the number of traffic injuries that occur in a given municipality, and the evaluation adjusted the results due to changes in demography. The municipalities that did not carry out measures were used as the control group in order to estimate the effect of school route studies and other special measures. The evaluation indicates that school route studies do not have a significant direct effect on child safety. However, school route studies nearly always result in other special measures. The best estimate from analyses is that other special measures have improved child safety by 10–15 % during the period 1995–2000 corresponding to a 2–3 % traffic injury reduction per year. This conclusion is close to the 95 % significance level. It is not possible to state a precise level of measures needed to obtain this injury reduction in a given municipality. About half of the improvement of child safety is due to the special measures in the municipalities in the years 1995–2000, if the above conclusion is correct. The other half of the improvement must be ascribed to other developments. The amendments of the legislation in the late 1970s therefore seem to be a success and have created the foundation for safer routes to school.

44.3 Children's perceived risk and physical measures

Pupils can point out locations in school route studies where they feel unsafe on school journeys. The locations are often perceived as risky, because of high motor vehicle speeds or high volumes of motor vehicles. Junctions are more frequently mentioned as risky than road links. Children's most often mentioned causes to their unsafe feelings are:

- high motor vehicle speeds;
- high motor vehicle volumes;
- high volumes of heavy vehicles like lorries and buses;
- poor sight conditions;
- confusing parking conditions;
- confusing junctions;
- drivers neglecting to give way;
- missing road lighting;
- poor maintenance of roads and paths;
- missing cycle tracks and footways.

Table 44.1 presents the relationship between perceived risk and the physical measures that municipalities often use to make children feel safer. One measure missing from the list is zebra crossings. Municipalities have pointed out that it is rarely adequate to add zebra crossings, as few pedestrians cross the road at just one point. Zebra crossings give a false sense of safety, because motorists often do not give way. Median islands should be constructed instead of marking zebra crossings.

The management of car traffic around schools has been a major issue in many municipalities in the period 1995–2000 due to significant increases in car traffic volumes at schools. Kiss-and-learn spaces (spaces meant for parents to drop their children off at schools), information to parents about stopping and parking, creation of one-way streets and traffic calming at schools have been some of the most used measures to cope with increasing traffic volumes. Time-limited parking, speed limits and one-way streets have been implemented at some schools. Some schools have also introduced different start and finish times for children in different classes in order to diminish the volume of traffic in the school run.

44.4 Children on the move

In order to identify trends in children's school travel trips, four travel surveys on children's transportation may be compared. The methods used to collect travel data in the surveys are very different and there must be reservations about the comparability of the survey results. The survey from October 1978 was based on home interviews of 1217 representative Danish school children in pre-school class up to class 10. The survey from June to November 1993

Table 44.1 Relationship between causes of unsafe feelings in children and frequently used physical measures

Cause of unsafe feeling								Frequently used physical measures
High motor vehicle speed	Poor sight conditions	High motor vehicle volumes	High volumes of heavy vehicles	Confusing give way conditions	Cars driving too close to cyclists	Lack of safe pedestrian crossings	Drivers not respecting give way signs	
✓								Humps
✓								Pinch points
✓								Raised junctions
✓								Town gates
✓								Rumble strips
	✓							Remove/cut planting
	✓							Remove/relocate road signs
	✓							Remove/relocate fixed objects
	✓							Marking and traffic islands at junctions
		✓	✓					Cycle tracks
		✓	✓					Signalised pedestrian crossings
				✓				Re-marking
				✓				Give way markings
				✓				Through-going footways or cycle tracks
					✓			Cycle lanes or cycle tracks
						✓		Raised junctions
						✓		Stop signs
							✓	Improved road marking
✓	✓							Median islands
✓	✓							Cycle tracks
✓	✓							Wide paved shoulders
✓	✓							Mini roundabouts
✓	✓		✓					Reconstruction of Y-junctions to T-junctions
✓	✓	✓	✓					Paved shoulders
	✓	✓						Coloured asphalt outside school entrances
✓		✓					✓	Staggered stop lines at signalised junctions
✓		✓				✓		Reduced speed limit
✓		✓				✓		Median islands at pedestrian crossings

was based on home interviews of 1003 children aged 6–15 years from all counties in Denmark. The telephone survey from 1998–2000 is representative for Denmark and all months of the year, but covers a much wider age range,

10–84 year olds. Lastly, the school route studies of 1998–2000 from ten municipalities include trips to school among children in pre-school class up to class 10. Tables 44.2 and 44.3 show children's mode choice on school journeys based on the travel surveys. The tables show that the levels of cycling are higher and the levels of car and public transport lower in school route studies (1998–2000) compared to the telephone survey (1998–2000). The surveys indicate that the share of children driven to school in cars has tripled between 1978 and 1998–2000. The proportion of younger children walking to school has fallen by 40 % since 1978, whereas the level of cycling and use of buses for school journeys by both young and old children has only diminished slightly. The categories 'Bicycle and moped' and 'Bus and train' in Tables 44.2 and 44.3 could be re-named simply bicycle and bus, because use of mopeds and trains is very low among children on school journeys and also on other journeys.

The dominant mode of transport on school journeys is the bicycle. However, in pre-school, and classes one and two there is almost an even split between walking, bicycle, car and the bus, whereas the bicycle accounts for around half the school journeys in classes five to ten. Walking to school decreases a little as a child gets older. The use of the car decreases and cycling increases until class seven from where it stays roughly the same. The use of public transport on school journeys is almost the same for all classes (see Fig. 44.1). Based on several analyses it is fair to conclude that the number of children driven to an average Danish school has doubled between 1993 and 1998–2000. About five to ten per cent of this increase in car traffic is due to a rise in car ownership among families with children. About 5–15 % of the increase is related to school closures and 25–30 % is due to a lower average age among school children. However, the majority of the increase in car

Table 44.2 Transport mode choice of younger children (6–10 yrs) on school journeys

Survey	Walking (%)	Bicycle and moped (%)	Car (%)	Bus and train (%)
October 1978	39	33	10	18
June and November 1993	24	42	21	12
School route studies 1998–2000	23	36	23	17

Table 44.3 Transport mode choice of older children (11–15 yrs) on school journeys

Survey	Walking (%)	Bicycle and moped (%)	Car (%)	Bus and train (%)
October 1978	24	52	3	21
June and November 1993	15	68	6	12
School route studies 1998–2000	21	58	5	16
Telephone survey 1998–2000	22	49	9	20

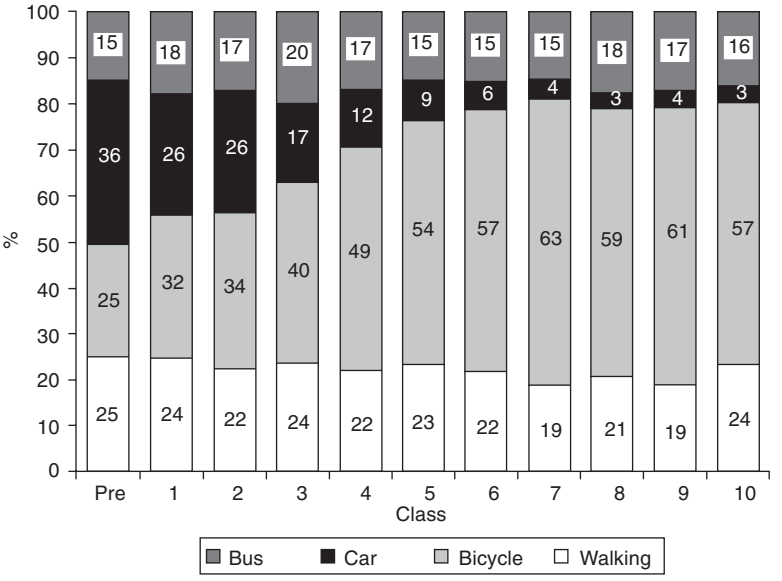

Fig. 44.1 Transport mode choice on journeys to school for pre-school class to class ten, based on school route studies in ten Danish municipalities.

traffic on school journeys is caused by shifts in attitudes among children and parents. Pupils in privately owned schools have a longer school journey than pupils in public (state) schools, and therefore travel more by car and bus. Analyses on 10–16 year olds reveal that age, sex, public transport supply, car ownership, school journey length and land-use structures have an impact on children's transport mode choice. An example is that 73 % of all trips are made on foot and bicycle among children with a school journey shorter than 1.5 km, whereas the corresponding proportion is just 26 % when the school journey is longer than 7.5 km (see Fig. 44.2).

Parents are sometimes asked in school route studies why their children are driven to school by car. The most frequently mentioned reasons are ranked and listed below:

- parents are also travelling on the same route;
- the school route is perceived to be dangerous;
- the school journey is too long to walk or cycle;
- the age of the child is too low for independent transport;
- younger siblings are driven;
- the weather;
- lack of cycle tracks.

Both young and old children walk less in 2003 and are driven in cars instead as Tables 44.4 and 44.5 show. We can conclude that trends in 6–10 year olds' transport modes in leisure time resemble the trends of journeys to and from school by comparing Tables 44.2 and 44.4. The 11–15 year olds have tripled

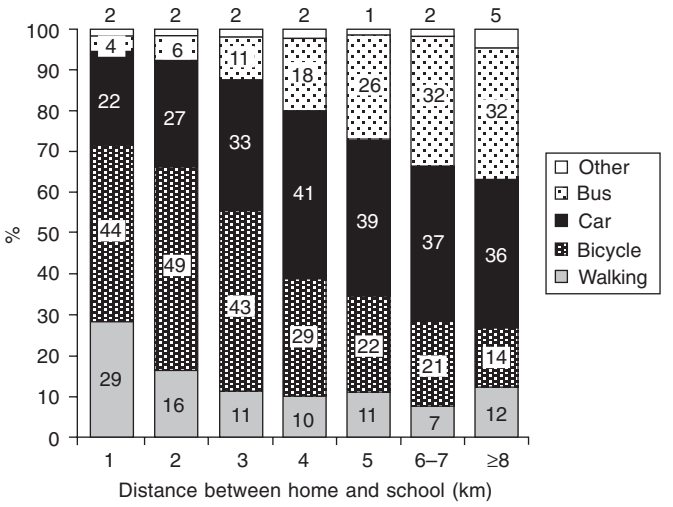

Fig. 44.2 Modal split for all trips among 10–15 year olds with different school journey lengths based on telephone interviews 1998–2000.

their car trips during the same period for all journeys and have also lowered their level of cycling by about 30 % on journeys in their leisure time from 1978 to 1998–2000. The high level of cycling in the early 1990s from 1978 and until 1998–2000 has also been registered through traffic counts of cyclists. The rise in cycling up to the early 1990s can partly be explained by the building of thousands of kilometres of cycle tracks. A cohort effect has been detected. Six year olds started to shift away from cycling in 1988 onwards; seven year-olds in 1989; and sixteen year olds from 1998. The change in travel is primarily a result of a less positive attitude towards cycling. A possibility is that parents – due to increasing car traffic volumes, road safety campaigns, the media etc. – have more concerns about their children's safety

Table 44.4 Transport mode choice of younger children (6–10 yrs) on all journeys

Survey	Walking (%)	Bicycle and moped (%)	Car (%)	Bus and train (%)
October 1978	36	33	19	12
June and November 1993	21	41	31	7

Table 44.5 Transport mode choice of older children (11–15 yrs) on all journeys

Survey	Walking (%)	Bicycle and moped (%)	Car (%)	Bus and train (%)
October 1978	27	52	8	13
June and November 1993	15	62	17	6
Telephone survey 1998–2000	20	41	26	13

and set new limits for their children's independent mobility. The use of cycle helmets grew from 1990 onwards in Denmark and attitudes towards their use might have resulted in fewer cycle trips among children. However, the downward trend in cycle traffic started before the growth in use of cycle helmets.

44.5 Child safety: the teenager problem

It is widely assumed that child road accidents result from inadequate knowledge and skills. A review of hundreds of studies, however, shows that, overall, three factors are very important to the accident rate:

- cognitive and meta-cognitive skills;
- the level of dependent and independent activity in traffic areas;
- motivational and other personality factors, e.g., low adherence to responsible social values.

Studying the actual risk per trip, hour or km that children experience reveals that the risk among older children is highest for any individualised mode of transport (see Fig. 44.3), despite the fact that older children have better skills. Older children sustain more injuries due to longer travel time and higher speeds, which result in increased travel on major roads, and to lower adherence to responsible social values than young children. Older children are often passengers in cars driven by older siblings and friends, who have only recently passed driving tests and have a much higher accident risk than do the parents of the younger children. Young children use safety belts more

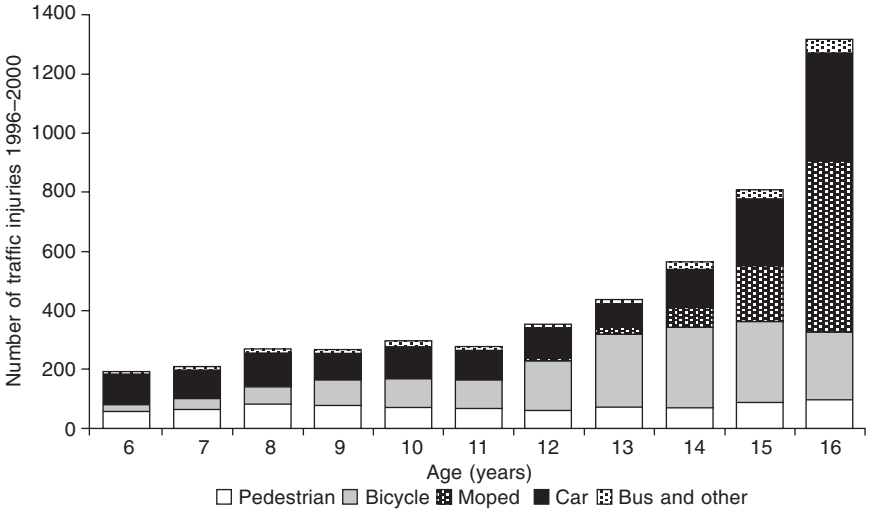

Fig. 44.3 Injuries among children (1996–2000) split by modes of transport and age levels.

often than the older children do. Older children are more often intoxicated and have greater access to independent transport during the evening and night than young children.

The number of children aged 6–16 years killed and injured in road traffic dropped by 46 % during the period 1985–2000. About one quarter of the reduction in injuries is due to a drop in the number of children and a lower average age. Increasing numbers of children and an increasing average age will, all things being equal, result in a rise in the number of injuries in the period 1998–2009. The number of deaths, and severe and slight injuries per child, have fallen by 58, 56 and 8 % respectively during the years 1985–2000 among 6–16 year olds. The corresponding data for the rest of the population are 37, 43 and 28 %. The health risk has dropped by 65 and 45 % in the period 1985–2000 for, respectively, 6–7 and 8–11 year olds, while the risk has only fallen by about 30 % for 12–16 year olds. The variations in accident severity and health risk developments can partly be explained by deviating trends in the use of safety belts and helmets. Children aged 6–11 years have increased their use of passive safety equipment much more than the rest of the population. Increased use of safety belts and helmets can explain about 30 % of the reduction in health risk among children in the period 1985–2000. The major changes in children's choice of transport mode can be a contributory cause to the deviating trends in health risk.

44.6 Conclusions

The successful Danish legislation from the latter half of the 1970s, which combined the police and road administrations to implement measures that protect children against moving vehicles on school journeys, may include highly relevant lessons for non-Danish readers. Studies clearly show that local safer routes to school projects and increased use of safety belts among children are the most important causes to the major reductions of children's risks on the roads in Denmark. The legislation has been successful to motivate local authorities and hence increase the number of safer routes to school projects. There is a need to focus road safety education and campaigns more towards teenagers and motivational and other personality factors if these efforts should be more fruitful. Traffic calming and provision of better facilities for pedestrians and cyclists are dominant elements in Danish safer routes to school projects. The levels of walking and cycling among Danish children have decreased despite impressive safety gains and improved physical conditions for cyclists and pedestrians. Studies call attention to the conclusion that influencing parents' and children's attitudes through campaigns towards increasing levels of walking and cycling is highly important if children's travel is to develop in a more sustainable direction as regards economy, social relations, environment and health. Attention to school structures is

also highly important, because long school journeys are probably one of the largest threats to the creation of more sustainable transport.

44.7 References

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45

Cycling and social inclusion

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45.1 Introduction

LSE Housing is a research group within the Economic and Social Research Council (ESRC) Centre for Analysis of Social Exclusion (CASE) at the London School of Economics. LSE Housing specialises in action research projects, working with communities who are developing practical local responses to social exclusion. In early 1998, LSE Housing was asked to carry out an investigation into the potential for cycling to reduce exclusion on low-income housing estates. This work was commissioned by the Ashden Trust, a charitable trust with an interest in sustainable transport and cycling. We started from the initial idea that poor transport links contribute to social exclusion on isolated, low-income housing estates because people there find it harder to access facilities, training and jobs, and that cycling could help improve these links. This chapter reports on the research and practical action that resulted from this initial investigation, and how the findings changed the way we looked at the links between cycling and social inclusion. We used the CASE definition of social exclusion which defines inclusion as participation in socially valued activities (Burchardt, Le Grand and Piachaud, 2002: 30). It takes into account multiple dimensions of exclusion including income, employment, informal economic activity, social networks and empowerment.

45.2 The beginning – investigating existing action

Information was gathered from 73 existing cycling projects using a postal questionnaire, and entered into a cycling projects database. We found these projects by contacting:

- projects funded under the then Department of Transport's 'Cycle Challenge' grants scheme;
- projects we knew of already;
- projects recommended to us by cycling project workers, and other people with knowledge of this area of work, such as local authority cycling officers.

This initial investigation produced some interesting results and highlighted a different aspect of the links between cycling and social inclusion on low-income estates. We found a very wide range of local cycling projects around the UK, as summarised in Table 45.1. These included cycle recycling projects (where old bicycles are collected and renovated), cycle pools (providing cycles for communal use, for example within an office or community), BMX and off-road cycle tracks, and a circus that used cycles as a basis for its acts.

The projects reported a wide range of positive outcomes, and although the single most often reported outcome was 'cycling promoted', non-cycling related outcomes were reported by many of the projects (see Table 45.2). These non-cycling related outcomes included delivering greater involvement and engagement of local people in local activities, improved self-esteem for people involved in the project, providing new services and training, all of which can make a positive contribution to social inclusion in low-income communities. We also found that non-cycling related aims such as crime diversion, building self-confidence and gaining skills were reported as the motivation behind projects nearly twice as often as cycling related aims such as cycling promotion or promoting safer cycling.

We had a range of concerns about the original idea of promoting cycling as an answer to the problem of poor transport for people living on low-income peripheral estates. For example, many people aspire to owning a car and are not interested in cycling; there are many cases where cycling is not a practical solution, for example for the elderly and people with young children; and we did not want cycling to appear as a 'poor man's alternative'. The results from the initial study suggested a different, and much more promising, angle. People running local cycling projects were managing to achieve impacts that made a positive contribution to social inclusion through, for example, improving people's skills, providing new services and building confidence. What is more, they often saw these impacts as being key to what they were doing. The projects' aims and motivations were often to give young people something to do, provide training, or help deliver local services rather than solely the promotion of cycling.

45.3 Developing new action around local cycling projects – an action research approach

LSE Housing decided to further investigate these links between cycling and social inclusion, and to look at how more cycling projects, having these

Table 45.1 The range of different types of project, and project activities, from the authors' database of existing cycling projects in the UK (1998)

Type of project	Brief explanation	Number of projects on database
Cycle recycling	Project where old cycles are taken in and worked on until they are usable again. There are many variations within this theme, for example young people, unemployed, skills training, bikes sold, and bikes given to participants	15
Cycling to work	A project that promotes and facilitates cycling to work for employees, including: promotion, cycle parking, shower and changing provision, cycle purchase vouchers, training, Bicycle User Groups, information, research and recommendations	6
Cycle promotion	A project concerned with promoting cycling, for example through publicity, promotional events, work with employers, advice	6
Cycling activities for young people	For example, cycle trips or cycle skills training for young people	6
Cycle parking	A project concerned with providing cycle parking facilities	5
Cycle centre	A centre providing facilities for cyclists such as parking, showers, repairs, cycle hire, cycle promotion	5
Cycle pool	A project providing a pool of cycles, or cycle equipment, for hire or lending out	4
Cycling in schools	A project aimed at promoting and facilitating cycling to school, for example by providing cycle parking, promotion, teaching, training, on-road infrastructure improvements	4
Transport integration	A project researching and/or facilitating the integration of cycling with other forms of transport, for example buses, trams etc.	4
Training	Including training in cycling safely, training in maintenance, and training linked to employment	3
Cycle hire	Cycles available for hire	2

Table 45.1 *(Cont'd)*

Type of project	Brief explanation	Number of projects on database
Cycle taxi service	A taxi service using rickshaws or four wheeled cycles to carry passengers	2
BMX park or off-road cycling track/route	A designated area with ramps and other equipment for use by BMXs; a specific route or track designed or designated for off-road cycling	2
Build yourself a bike scheme	A project providing tools, space, advice and old bikes for members of the public to build themselves a working bike	1
Cycle circus	Circus and clown acts using cycle props and touring by cycle	1
Cycle delivery	A project delivering parcels by cycle	1
Cycling activities for people with disabilities	A project providing specialist cycles to allow people with disabilities to cycle	1
Donation of cycles to homeless people	A one-off donation of cycles to a homeless persons charity. The cycles being distributed to homeless individuals or being made available to homeless people using hostels as pool bikes	1
Bicycle manufacture, supply and hire	A business manufacturing, supplying and renting out specialist cycles	1
Sponsored ride organisation	A project specialising in organising and running sponsored cycle rides	1
Supply of cycles and maintenance training to Southern countries	A project that sends old cycles from the UK to poor Southern countries, where they are fixed and maintained with associated training for people in the recipient countries	1
Advertising using cycles and specialist cycle trailers	A business that uses cycles and specially designed cycle trailers for advertising and promotional events	1
Total		73

Table 45.2 Summary of the broad categories of successful outcomes reported by cycling projects from the cycling projects database

Successful outcome reported	Number of times reported
Cycling promoted	36
Project successful in itself (for example, met own targets, project popular, success has led to expansion, project sustainable)	21
Delivered involvement, engagement and/or self-improvement for users	20
Provides new, and/or uses existing services and facilities	18
Increased cycling, e.g., more people cycling to work	17
Successful financial outcomes	13
Provided training and skills	11
Positive environmental impact	7
User satisfaction	6
Achieved joining-up/linking of issues	5
Provided promotion for the organisation(s) involved	5
Promoting or improving health	3
Reduced cycle crime	2
Positive impact on transport in general	1
Total, reported by 54 projects	165

additional benefits, could be encouraged and supported. There was relatively little existing action on local cycling projects with a social inclusion focus, and no research could be found that focused on this sort of project. It was therefore decided to get actively involved in developing new projects. Taking an action research approach, where the researchers get actively involved in what they are investigating, would also have the following advantages:

- by being involved in the development of local projects we would be well placed to investigate what the projects could achieve, how they work in practice and how local communities and community based organisations would respond to them;
- we would develop a good understanding of what was needed to encourage and support the development of new local cycling projects and could then disseminate this understanding in order to encourage others to develop new projects.

The Ashden Trust supported LSE Housing to establish four pilot projects on low-income estates in London and, following this, to run a national programme of support to help existing community groups develop their own cycling projects. We set out to develop projects that would deliver locally relevant

social inclusion outcomes using cycling as a focus, but not as the central aim.

Described below are two examples of projects that resulted from this work, and the range of social inclusion outcomes achieved by the projects. This is followed by a description of the different ways in which we supported the development of new cycling projects. Some of the conclusions drawn from this work, especially in relation to new approaches to promoting cycling, are discussed, and, finally, some practical resources are highlighted to help others use these findings and support more action on local cycling projects.

45.4 Case studies – what is possible

The following two examples illustrate the way in which cycling can be used locally to achieve social inclusion outcomes and meet local needs. They also illustrate two of the different approaches LSE Housing took to support new project development, as discussed in more detail below. The first case study involved us taking the lead in developing the project, and the second had us providing close support to another organisation that was developing a project.

45.4.1 Case study 1 – the Downham Cycle Taxis project

During our initial survey of potential ideas and interest in the London boroughs, it emerged that the sustainable transport officer for the London borough of Lewisham was interested in developing a cycle taxi scheme in Lewisham's shopping centre. He had also been involved in a consultation exercise on a large estate called Downham, where elderly people had identified lack of transport and local mobility as significant problems. Downham is a low-income estate approximately one mile across. It is hilly, with poor public transport and low levels of car ownership. There are no buses that travel all the way from one side of the estate to another, and some hilly areas with essential services, such as a doctor's surgery, have no buses serving them. The estate has a high proportion of elderly residents and very few shops. There are no black cabs and mini-cabs are expensive for those living on a low income.

During consultation carried out by the Downham Elderly Health project, elderly people reported that this situation was having a negative effect on their quality of life and health, limiting their ability to access services and facilities, take part in social activities, and remain independent. The Downham Cycle Taxi project was developed to try and help meet this need by providing free, or very cheap, accessible local transport for elderly people. LSE Housing began the scheme by developing an action plan and proposal for the project, and raised funding for the pilot on the basis of this. Funding was raised from Downham Pride (the Single Regeneration Budget project for the estate), the Ashden Trust, and Lewisham's Sustainable Transport cycling budget.

A project co-ordinator was appointed in June 1999, who was one of the few people in the country with previous experience of running a cycle taxi service, and the project was launched in July 1999. Initial disbelief and embarrassment from elderly people quickly turned to enthusiasm as they realised that the new service allowed them to make trips that they could not make before as well as lead more independent lives. Almost three years later (June 2002), the Downham Cycle Taxi project, now a registered charity, is still running and is used by around 60 elderly people each week. It also now offers a home delivery service. Despite numerous problems and set backs, and an ongoing need to improve the project's management and win charitable funding, the project has successfully helped meet the needs of elderly people living in Downham and made a difference to many people's lives. Its main positive impacts, reported by users through informal feedback and questionnaire surveys, and observed by project workers, include:

1. Flexibility and freedoms for users, and support in maintaining independence. Many users report that they can now make journeys that they could not without the service, and some have reported that the taxis are the only way they get to spend time out of their homes. An elderly user said:

   > It's been wonderful, I don't have anyone else to do this for me and if it wasn't for them [Cycle Taxis] I wouldn't be able to do these things. Before if I wanted something, shopping or go down to the post office I had to rely on neighbours or sometimes my friend, when she was well, which wasn't always. Now I can hop in and I'm away wherever I need to go I can, I don't have to trouble anybody. (Downham Cycle Taxi project, 2002)

2. Valuable social contact and informal support. The Cycle Taxis and deliveries project provides a social service for older people who are not eligible for statutory support. The service helps elderly people to socialise with their friends and, for more isolated elderly people, provides interaction and informal supervision from the riders. Drivers often help elderly clients carry their shopping and carry out occasional odd jobs such as fixing leaking taps.
3. Improved personal safety. The scheme has a positive impact on personal safety. The riders help people who are unsteady on their feet. The door to door service has also increased personal safety, and feelings of security.
4. Employment. The taxi service has provided new employment opportunities in an area of high unemployment. The four riders and the administrator employed by the service are local people who were previously unemployed.
5. A flagship for sustainable community transport. For example:
   - the cycle taxi project is featured in a National Cycling Forum leaflet about innovative cycling schemes;

- the project has provided information, advice and inspiration to help a new cycle taxi project that has been set up in Manchester;
- the project has attracted national press interest.

45.4.2 Case study 2 – the Focus cycle club

The Focus Centre is a youth centre on a low-income housing estate in Hounslow, London. A local single parent started attending as a volunteer helper at the estate youth club after his son came home complaining that 'it was rubbish'. The single parent had a personal interest in cycling and after finding out about the support programme that LSE Housing had developed to help local cycling projects, he applied and was successful. The community volunteer attended a training course in May 1999, as part of the LSE Housing programme, on how to develop a project. He arranged training and accreditation independently to become an accredited off-road cycle leader (he also helped some youth workers get training and accreditation). He successfully applied for a small grant from the LSE Housing support programme that allowed him to purchase some mountain bikes. He started working with young people from the centre who had previously not shown interest in any of the activities offered at the centre. Cycling was not their first option and they had to be persuaded to 'give it a go – I'll bring you back if you don't like it'.

First of all they went out on rides in a five mile radius. This allowed the young people to experience what was available locally, as many of them had not left their own estate or explored the area before. As the young people got fitter and keener, they started training regularly and went on a mountain biking residential in North Wales to build up skills and enthusiasm. The project worker reported that involvement in the project broadened the young people's horizons both geographically and culturally. He described how they had started to consider the implications of their own behaviour on others. For example, the young people started speaking to people they met on rides and learned to respond when people talked to them in country lanes. They stopped throwing litter and became more considerate towards others in public settings.

There were also benefits in their local community. The project is based on an estate with problems of racism. The group took part in a charity ride for the Sickle-cell society. Sickle-cell disorders affect mainly non-white people. The young people were in a white minority on the ride and despite initial anxiety – 'we'll be stabbed' – received a positive reception that opened up their horizons and taught them to trust people more.

45.5 Providing support for new cycling projects

We helped develop new projects in the following ways:

- leading the development of pilot projects;

- ongoing intensive support to help existing groups develop projects;
- one-off basic information, advice and support to help existing groups develop projects;
- encouraging other practitioners to provide practical support for new cycling projects, by promoting and disseminating our findings and approaches.

The scope of the different approaches is summarised in Table 45.3.

45.5.1 Leading the development of pilot projects

LSE Housing led the development of four pilot projects on low-income housing estates in Hackney and Lewisham, London. The projects were a cycle taxi and delivery service for elderly people (see above); a cycle delivery service for housebound housing association residents; a cycle recycling project with young people; and a cycle skills project with young people at two adventure playgrounds. This involved all aspects of developing a new project: from conceiving the initial project ideas and catalysing initial interest and action; through bringing partners on board, researching needs, developing project plans, and securing funding; to finding premises, buying equipment, employing workers, establishing steering groups, helping with day-to-day troubleshooting and involvement in building the long-term sustainability of the projects.

45.5.2 Intensive ongoing 'hands-on' support for existing groups

We provided intensive support to eight youth groups over a one year period, helping them work on various projects, including: weekly cycle trips, cycle recycling projects, mountain biking, and a cycle pool maintained by young people. The support we provided involved:

- an initial advertisement of the support programme through relevant newsletters and networks, such as the National Youth Agency magazine, Cyclists Touring Club magazine, Tenant Participation Advisory Service newsletter and a mail out to Principal Youth Officers for each local authority in England;
- choosing eight groups on the basis of an initial application form;
- a training course covering working together as a group and developing a community project;
- a training course covering more practical aspects of setting up cycling projects specifically;
- researching relevant information for the groups, such as how to get insurance for a cycling project;
- administering a small grants pot, including helping groups develop their applications;
- ongoing contact, advice, support and 'work chasing' to keep the projects' momentum going;

Table 45.3 The scope of the different approaches taken to support the development of cycling projects

	Basic support	Intensive support	Pilot projects
Number of projects receiving support	26 (plus 3 more which were too late to be included in this analysis)	8	4
Time period	Over approximately 18 months	Over approximately 18 months	2 over approximately 4 months; the other 2 over approximately 2 years
How the support was delivered	One-off written response, plus one-off telephone follow up. Some also received one-off telephone advice	Repeated telephone contact and advice Repeated written information, etc. Residential training courses Group visits	Lead role in developing and securing funding (all 4 projects) Lead role in establishing pilots (2 of the 4 projects) Role in continued running and troubleshooting (2 of the 4 projects)
Outcomes (in terms of 'whole' cycling projects)	9 out of 14 groups who provided feedback said that the support had had some positive impact on their projects	4 new cycle projects 2 existing cycle projects developed	4 new cycle projects

- 'consultancy' support with specific tasks, such as help with clarifying plans and developing action plans;
- site visits to meet the groups and provide advice and help with planning the projects.

45.5.3 Basic support for existing groups

We provided basic information, advice and support to 26 groups, involving:

- advertising that the help was available;
- providing telephone advice and information;
- providing written help and information sheets, for example on funding sources and training;
- providing contacts for established projects and other organisations that could provide help.

How the support helped

Some of the principle ways in which our ongoing intensive and basic support helped the groups involved take action were:

- a number of the projects reported that the offer of support had led them to take action on what had previously only been an idea or vague interest;
- providing ideas for projects;
- support with project development, such as action planning, proposal writing, working successfully as a group;
- providing specific, specialist information, such as where to get insurance or training and accreditation to take young people mountain biking;
- providing funding, and advice on other funding sources;
- providing ongoing motivation and helping support the momentum of the projects;
- providing training in specific skills, such as how to teach safe on-road cycling, as well as in general skills such as planning a project;
- providing helpful contacts;
- providing confidence and a sense of legitimacy.

How our support matched the needs involved in establishing new projects

The three approaches to supporting new project development respond to the wide spectrum of needs associated with establishing new projects. Table 45.4 presents a summary of the range of support that can be required to establish a new community project and the extent to which different approaches to providing support can meet these needs.

45.5.4 Promoting and disseminating our findings and approaches

We actively disseminated and promoted our findings with the aim of encouraging and supporting the development of other new cycling projects For example we:

Table 45.4 A summarised spectrum of help needed to set up a cycle project, and the extent to which each of the three approaches supported project development

Type of help	Basic support	Intensive support	Pilot projects
General information/advice ideas	↓		
Contacts with others			
Information and advice on specific issues			
Information and advice on organisational questions			
Help involving others/selling idea			
Ongoing encouragement and pushing			
Training in non-management skills e.g., maintenance			
Training in organisational/management skills			
Handholding/outside help for a specific task			
Funding			
Ongoing handholding – repeated involvement		↓	
Taking a lead in setting up the project			↓

- established an ongoing national support programme for cycling projects in partnership with an independent organisation;
- ran a seminar for practitioners and policy-makers;
- published a research report, articles and a practical help pack.

45.6 Lessons from the work

45.6.1 Local cycling projects and social inclusion outcomes

Small-scale cycling projects can deliver local social inclusion outcomes that communities consider to be important, as the earlier case studies illustrated. The main social inclusion outcomes that were reported and observed during this work are summarised in Table 45.5.

The social inclusion outcomes achieved by small-scale local cycling projects are similar to many achieved by other types of community action projects, such as community cafés, community crèches, and community led youth work. For example, outcomes such as involvement and engagement, training and new services were reported from a range of community action projects supported by the Trafford Hall Gatsby project (Richardson and Mumford, 2002).

As well as these similarities, local cycling projects are community action projects that achieve more unique dual social and environmental outcomes. These projects are responding to immediate community needs while often at the same time contributing in some way to sustainable transport and an improved environment, through, for example, using human powered vehicles to provide local services. Local cycling projects can achieve combined social, economic and environmental benefits and contribute to sustainable development at the local level. They are part of a growing sub-section of community

Table 45.5 A summary of the social inclusion outcomes reported and observed during work with local groups developing cycling projects

Impact	Example
Direct social inclusion outcomes	
Involvement and engagement	Young people who were otherwise excluded from education and youth provision taking part in a rewarding and constructive activity (for example, cycle recycling)
New services and facilities	Transport and delivery service for elderly people; cycles for communal use
Positive financial impacts	Funding or in kind support brought into an area
Employment	New jobs created; new skills and qualifications
Training and skills	Safe on-road cycling skills for young people; mechanics skills from cycle recycling
New resources	Cycles made available for young people and youth clubs
Positive health impacts	Young people taking more exercise; greater mobility, independence and confidence for elderly people; greater on-road safety
Positive publicity for those involved in the project	Positive local news stories about cycling projects on stigmatised estates
Capacity building outcomes[1]	
Personal development	Volunteers and workers receiving training, learning new skills, and increasing in confidence
Group development	Groups learning how to work together better, and developing new skills, such as action planning techniques
Increased confidence and ability	Groups growing in confidence as they moved forwards with their projects and achieved successes

[1] These impacts were added when the projects were developed and led by community groups, since a wide range of outcomes associated with developing and taking self-help action also resulted.

action responses that are making this additional contribution (Church and Elster, 2002).

45.6.2 Implications for promoting and increasing cycling and sustainable transport and for wider sustainability agendas

During this research, we found evidence to suggest that local small-scale cycling projects that have an impact on local social inclusion have the potential to interest and engage a much wider audience than conventional approaches to cycling promotion centred on the benefits of cycling as a means of transport and for health and leisure. A study of the aims that had motivated people and local groups to get involved in developing cycling projects showed that the majority were non-cycling related (see Tables 45.6 and 45.7). Many of the

aims stated were relevant to issues that tend to be high on the list of priorities for many communities, for example, providing training and skills, providing youth activities and crime diversion.

This could provide an important additional route to engaging interest in cycling. People and communities are much more likely to respond to a cycling project that addresses issues that are high on their agenda and of local importance. Cycling can be an effective means of transport, and of getting fit and having fun, but the accessibility and appeal of these benefits is limited. Cycling could be of interest to a community group whose members would never get on a bike themselves, because it provides activities for young people or a new service for elderly people. If cycling proves to be a successful tool to address these high priority needs then it will not only be perceived as a more positive thing, but also may well have spin-offs in terms of increased cycle usage. For example, the projects that we were involved with led to young people with better road cycling skills, and more confidence to use cycling to get around.

Table 45.6 Stated aims of groups applying to LSE Housing for support with developing cycling projects

Stated aim	Number of groups
Youth involvement, engagement and self-improvement	27
Training and skills	19
Providing youth activity	18
Facilities and services – providing new and using existing	17
Health – promoting and actually improving	16
Promote cycling	14
Using cycling for transport	12
Crime diversion	10
To access locality and countryside	8
Economic issues, such as training and jobs	7
Improve the environment	6
Contribute to LA21/sustainable development	3
Reduce cycle crime	3
Total	160 (reported by 39 projects)

Table 45.7 The stated aims of groups/organisations when setting up cycling projects, categorised as cycling related or non-cycling related, from the cycling projects database

Stated aim	Number of projects
Non-cycling related e.g., crime diversion, self confidence, skills	24
Cycling related e.g., promoting cycling	14
Total	38 (reported by 19 groups)

Table 45.8 Potential contributions that significantly increased local cycling project activity could make to governmental and non-governmental agendas

Agenda	Potential contribution
Sustainable transport	Direct increases in cycle transport use Winning more public and political support for cycling, from a starting point of social inclusion impacts
Sustainable development	Delivering solutions to local needs that meet social, environmental and economic targets at the same time
Neighbourhood Renewal Unit's agenda for neighbourhood renewal	Community led responses to local need, delivering social inclusion outcomes on low-income estates
Community development and capacity building	As a focus for relevant and achievable local self-help responses to local need, that allow communities to develop their own action while learning and building skills

The same argument goes for engaging policy-makers. Cycling is not a high political or policy priority. Issues such as crime diversion, jobs and youth activities are. Again, projects that use cycling as a tool to deliver these higher priority outcomes can help engage interest in cycling more generally. We ran a seminar following this work that attracted good levels of interest from policy-makers from both local and central government, including the Government's Social Exclusion Unit. A significant expansion of local cycling project activity in the UK has the potential to contribute to a number of governmental and non-governmental policy agendas, as shown in Table 45.8. We recommend that more weight be given to promoting cycling as a tool that can meet many local and policy priorities, rather than more conventional approaches to promoting cycling as a means of transport or keeping fit.

Other organisations have used a similar approach to engage local communities with work on sustainable transport more generally. For example, Stockport metropolitan borough council have used a cycling project that offers diversionary activities for young people to engage the local community with a wider regeneration project that includes a transport action plan. The council officer who we spoke to reported that local people now see cycling as an activity that contributes to regeneration in their area, and three-quarters of the people short-listed for a cycling officer post, including the successful applicant, were from the local community (Turner, 2001).

45.6.3 Promoting and supporting more local cycling projects

We can conclude that:

- there is widespread interest in cycling projects and activities at the

community level, and the idea of cycling projects tends to meet with interest and enthusiasm, especially when social inclusion outcomes are also achieved;
- there is a wide range of ideas among existing small-scale cycling projects, and some very imaginative and innovative projects taking place;
- youth, local authority and voluntary services are keen to get involved in cycling projects;
- small-scale cycling projects do work – they can practically deliver on a range of linked social inclusion, environmental, and cycling outcomes;
- a wide range of different types of support can be required to help set up new cycling projects, from basic information to 'handholding', funding and capacity building. The support needed will depend on factors such as the experience and capacity of the group wanting to develop the project and the type of project. Most of these needs can be met. We developed and tested three different approaches to doing so, all of which could be replicated. These represent a range of different types of support that can be tailored to meet a range of needs.

45.7 Practical resources

Those wanting to take the ideas in this chapter forward, and help develop new local cycling projects, may find the resources in Box 45.1 useful (although they all have a UK focus).

Box 45.1 Practical resources to support more local cycling project action

Organisations offering support/national support programme
Bike Links is a UK-wide national support programme that helps community groups develop cycling projects. They can be contacted at: Cycle Project for the North West, 1, Enterprise Park, Agecroft Road, Pendlebury, Manchester, M27 8WA; Tel: +44 (0)161 736 6366; http://www.cycling.org.uk.

The London Cycling Campaign has a Community Cycling Project that provides support to community cycling projects in London, UK. They can be contacted at: The London Cycling Campaign, Unit 228, 30 Great Guilford Street, London, SE1 0HS; Tel: +44 (0)20 7928 7220; http://www.lcc.org.uk.

Practical help pack and practical guidance
The National Tenants Resource Centre at Trafford Hall has produced a help pack on developing community cycling projects, entitled the 'Cycling Help Pannier' and is available from: Trafford Hall, Ince Lane, Wimbolds Trafford, Nr Chester, CH2 4JP; Tel: +44 (0)1244 300246; http://www.traffordhall.com.

A report, with extensive practical guidance, from a seminar held at the London School of Economics on cycling and social inclusion, is available from: CASE, London School of Economics, Houghton Street, London, WC2A 2AE; Tel: +44 (0)20 7955 6679.

Research report and other information
The UK's National Cycling Forum has produced a 'Cycling solutions' information sheet that features the Downham Cycle Taxi Project. This is available from: The National Cycling Forum Secretariat, Zone 3/23, Great Minster House, 76 Marsham Street, London, SW1P 4DR; Tel: +44 (0) 20 7944 2977; http://www.nationalcyclingstrategy.org.uk.

A research report published by CASE covers this work in more detail and is available from: http://sticerd.lse.ac.uk/case.

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Part IV

Case studies

46

Best practice in pedestrian facility design: Cambridge, Massachusetts

Cara Seiderman and Rosalie Anders, City of Cambridge, MA, USA

46.1 Introduction

Cambridge, which is across the Charles River from Boston, Massachusetts, is widely regarded as being one of the most pedestrian-friendly cities in the United States. Some of this is fortuitous history, as most of the city's infrastructure was created before automobile-oriented development became dominant. The city is also compact and dense, with 100 000 people living and 120 000 working in its 6.2 square miles. It has a wonderful mix of land-uses, with institutions, housing, retail and businesses all on top of one another. Because it is so compact, many destinations are close to each other, and the streets and sidewalks are lively and inviting. Home to Harvard and Massachusetts Institute of Technology (MIT), as well as to smaller colleges and research institutions, Cambridge has a large student population, which contributes to the number of pedestrians. About 25 % of the city's residents walk to work, and another 25 % use the region's public transportation system, which serves the city well.

Having the right development pattern for a pedestrian-friendly city is not enough; there are unfortunate examples of great cities that have become unfriendly to pedestrians, usually when automobiles are given priority in policies and infrastructure development. While Cambridge suffered some of this during the years after the Second World War, over the past decade the city government has made liveability and walkability a priority, as its policies, programmes and implemented projects demonstrate.

46.2 Creating a pedestrian mandate

While it is generally an inviting place to walk, Cambridge has a lot of car and truck traffic. As a result, it did not meet 1990 federal clean air standards, and the city council took action by passing an ordinance in 1992 requiring that a number of steps be taken to reduce the amount of drive-alone traffic. This Vehicle Trip Reduction Ordinance is the legislative basis for the city's pedestrian and bicycle programmes. It mandates a formal and permanent city programme, with bicycle and pedestrian plans and a co-ordinator to both encourage cycling in the city and to 'focus the attention of the city [government] on the needs of pedestrians'.

In 1994, through an intensive community process, residents and representatives of the business community and the city's institutions created a 25 year growth document for the city, which laid out what they wanted Cambridge to become. They envisioned a city where walking, biking and using public transport are the norm for how people get around and set out policies in relevant areas (urban design, transportation, etc.) These documents give the city government a solid basis on which to act in improving the pedestrian environment. This is important when there are conflicting community interests, for example, when creating a mid-block crossing eliminates a parking space, or when wider sidewalks might require eliminating a travel lane. The policies are backed up by strong support from the city administration. The incorporation of pedestrian matters into the work of all relevant city departments – public works, traffic and parking, community development, public health and police – is essential to ensure that the best practices are carried out across the board. However, the true integration of pedestrians into the city system has only been made possible by many people working together, both within the city government and the broader community.

Detailed below are two bureaucratic processes which are included here as 'best practices' because they are important lessons in how to make things work. The first example of best practice is having a system in place that not only encourages but, in fact, requires interdepartmental communication, co-operation and co-ordination on projects. This ensures that good opportunities will not get lost (e.g., fixing a pedestrian crossing when the street is repaved under a maintenance programme) and that more people feel ownership of the issues (e.g., the department doing the resurfacing automatically checks to see whether any pedestrian issues need to be addressed – or better yet, identifies the need and proposes the solution). In Cambridge, an inter-departmental transportation committee meets monthly to foster project co-ordination.

The second best practice ideal is having a good means of citizen input. Cambridge has an official pedestrian committee appointed by the city manager, which includes representatives from neighbourhoods throughout the city, City staff, and representatives from Harvard and MIT. In addition, City staff attend community meetings and sit at information tables at outdoor events.

46.3 What plan?

Many places start a new programme by creating a plan. Instead, Cambridge staff wrote the plan largely based on the programmes already in place. By working through issues on real programmes and projects that were being implemented, the city departments, with substantial input from citizens – most notably the pedestrian committee – were able to come to an agreement on what the policies should be. In addition, people were able to see the ideas in practice and could discuss how they worked and suggest ways in which a system or policy could be refined. The plan is essentially a formalisation of the work the city was already doing.

46.4 All in the details

As anybody who walks knows, details make the difference. To walk is to pass through the city at its most intimate level; each stretch of sidewalk, each piece of street furniture, each tree, and each intersection matter. For a city to encourage walking, every street needs to be easy to cross, all the sidewalks need to be in good condition and the streetscape needs to be pleasant and feel safe. Active use of the ground floors of building and building design is also important. Buildings that are oriented to the sidewalk and passing pedestrians invite people to walk.

46.4.1 Urban design and zoning

Many urban design issues are not controlled by municipal government, but sensible zoning can regulate some. Cambridge has included in its zoning code some key requirements that support pedestrian-oriented development. As this is not the place for a treatise on the zoning code, below are listed just a few elements that have been adopted as examples of how zoning can be used to help improve the pedestrian environment (the items noted only apply to certain districts):

- active ground floor uses (e.g., retail);
- specified percentages of fenestration (windows);
- placement of ground level parking at the back or sides of buildings, not fronting the street;
- design requirements for parking garages;
- orientation of building entrances to the closest pedestrian crossing (for larger buildings or corner buildings);
- incentives for some of the new construction in some commercial areas to be housing, to create a better mix of uses.

46.4.2 Sidewalks

Cambridge has sidewalks on both sides of virtually all its streets, although on some older streets the sidewalks are too narrow. It is helpful to have standards so that when roads are reconstructed, sidewalks can be created that meet the standards. Requiring city staff to look at how sidewalks might be brought up to these standards can determine whether or not all the vehicle travel lanes are necessary or whether they are wider than necessary.

46.4.3 Street furniture

Cambridge is incorporating street furniture into its projects as elements such as benches, trash cans, appropriate scale lighting and bus shelters are important for pedestrians. Bicycle parking, which is not always considered a pedestrian amenity, is also important. Too often, cyclists are not accommodated and are forced to attach their bikes to whatever street furniture there is and may end up blocking the sidewalk. Cambridge has post-and-ring parking, where each unit holds two bikes. This parking works well on the narrow sidewalks and also enables bicycle parking to be conveniently located throughout commercial areas.

46.5 Navigating the streets

While many factors of the street environment affect pedestrians, what has made Cambridge an increasingly pedestrian-friendly place is the fundamental assumption that pedestrians should get equal or higher priority in the design of roads and how traffic management is planned.

46.5.1 Use of the public realm

The public right of way that creates street networks in the US is often divided so that motor vehicles get almost all the space (parking and travel lanes), bicyclists are forgotten, pedestrians get a small space on the side, and landscaping and street furniture are squeezed onto that same small space. Cambridge standards are such that in any new street (and there are few opportunities for creating new streets) all users are accommodated safely and comfortably. In addition, opportunities for redistributing the right of way on existing streets are sought throughout the city: restriping to add bicycle lanes, reducing asphalt to widen sidewalks, etc.

46.5.2 Crossing the street

Cambridge has engineered ways to make it easier for people to cross the street and given this a priority both in the physical design of crossings and in traffic signal design. Below are some of the ways in which this is done:

- Tighter turning radii – the goal is to keep the corner radii to the minimum necessary in order to slow turning traffic and shorten pedestrian crossing distances. Large trucks must take most turns in the city very slowly – this makes them much less intimidating for people on foot.
- Crosswalk visibility – the city standard for marking crosswalks is use of the high-visibility international crosswalk marking (also known as 'zebra stripes').
- Pedestrian-friendly signalisation policies – the city adopted a set of policies meant to better balance the management of all road users through busy intersections. These can have a tremendous impact on the pedestrian experience of a place. Key examples are:
  - Shorter signal cycle lengths. Cambridge policy is to have signal cycles that are no more than 90 seconds long, except in extraordinary circumstances. This is very important for making walking attractive, as pedestrians are very sensitive to long waits (shorter waits are good for drivers as well, of course). Long waits tend to mean that pedestrians will either cross without regard to the signal, or if the traffic is bad enough, choose not to walk at all.
  - Concurrent signals and few push buttons. Pedestrians are given 'walk' phases when parallel traffic moves rather than an exclusive signal, where all vehicle traffic is stopped before pedestrians cross on their own phase. This means fewer delays for pedestrians (and drivers). In addition, pedestrians get an automatic walk phase without having to rely on pushing a button. An extremely valuable supplement to the concurrent walk phase is the 'leading pedestrian interval' (LPI), where pedestrians are given a few seconds of walk time before parallel traffic is given a green light. This enables the pedestrians to start crossing and be in the middle of the crosswalk before vehicles begin to turn. Motorists are then forced to obey the law and yield. There are circumstances when volumes and conflicts are great enough that exclusive signals are a better option. In many cases, the pedestrian phase appears without reliance on a button, but where pedestrian volumes are low or intermittent, buttons are still used.
  - Countdown signals. These signals provide pedestrians with information about the amount of time they have to cross until the light changes. They have proven to be helpful and popular in locations where they have been installed.

46.6 Traffic calming

Traffic calming is a way to design streets so that vehicle speeds are kept low and all users are able to use the streets safely and comfortably. In Cambridge, traffic calming projects are carried out with particular attention to pedestrians, both in setting priorities for projects and in project design. Projects are not

executed merely to slow vehicle speeds but to improve pedestrian safety. Thus, for example, the city does not randomly place speed humps or speed tables, but instead builds raised crosswalks or tables at intersections to slow traffic where people cross the street. In 2000, Cambridge won a Pedestrian Project Award for its Pedestrian Focus in Traffic Calming from the Institute of Transportation Engineers (ITE) and the Partnership for a Walkable America. Described below are three of the traffic calming tools used specifically as pedestrian enhancements.

46.6.1 Kerb extensions

Kerb extensions – also known as bulb-outs or neckdowns – extend the sidewalk or kerb line out into the parking lane, which reduces the effective street width (see Fig. 46.1). Kerb extensions significantly improve pedestrian crossings by reducing the crossing distance by visually and physically narrowing the roadway, improving the ability of pedestrians and motorists to see each other, and reducing the time that pedestrians are in the street. They also prevent illegal parking close to the intersection, which, as well as reducing visibility for pedestrians and motorists – an especially big problem given the proliferation of large Sport Utility Vehicles (SUVs) – can make it impossible for fire trucks to get around corners. Because there is kerbside parking on most streets, the kerb extensions, which jut out just short of the parking lane, do not interfere with bicycle travel.

46.6.2 Raised crosswalks and intersections

Raised crosswalks and intersections bring the level of the roadway up to that of the sidewalk so that pedestrians cross on an even surface and motorists

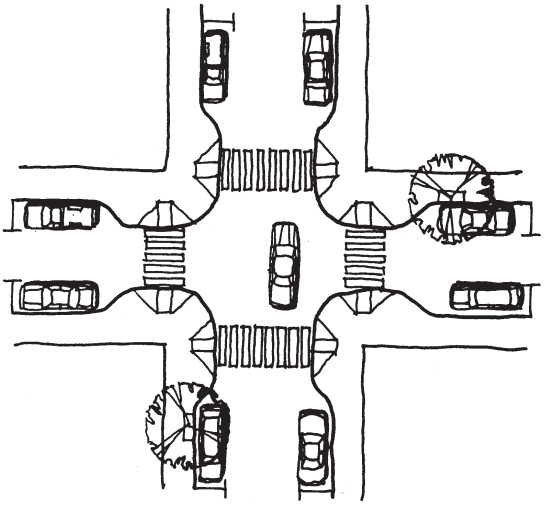

Fig. 46.1 Kerb extensions. Source: courtesy of the City of Cambridge.

experience a grade change as they go over them. They slow down traffic and they convey to motorists that the intersection is territory that they share with pedestrians (see Fig. 46.2).

46.6.3 Crossing islands

Crossing islands are raised islands placed in the centre of the street at intersections or mid-block to help protect crossing pedestrians from motor vehicles. They are particularly useful at crosswalks without signals, where pedestrians can cross the street dealing with only one direction of traffic at a time. They can also serve as a traffic calming device, because they usually cause a horizontal shift in the path of travel of the motorist. They also make the crosswalk much more visible to the motorist.

46.7 Complementary programmes

There are a number of complementary policies and programmes being carried out that directly or indirectly benefit pedestrians. Many of the city's efforts are aimed at promoting other forms of sustainable transportation – public transport and bicycling in particular – and reducing the number of vehicle

Fig. 46.2 Raised intersection in front of a school.

trips made to and in the city. One of the more dramatic undertakings has been the Parking and Transportation Demand Management (PTDM) Ordinance. Passed in 1998, this ordinance requires anyone adding vehicle parking spaces to commit to an approved plan to limit the number of single occupancy vehicle (SOV) trips going to a particular site. The approved plan must include specific ways the proponent will promote non-SOV travel and the projects are subject to ongoing monitoring to ensure compliance. Benefits to pedestrians are given both by fewer vehicle trips being made in the city and in the specific improvements and programmes required to promote and enhance walking instead of driving. The PTDM Ordinance won a Planning Project Award in 1999 from the Massachusetts Chapter of the American Planning Association.

46.8 Some specific projects

Below are listed three projects that have made Cambridge a more pedestrian-friendly city.

46.8.1 Central Square – sidewalk takes over asphalt

Central Square, an important mixed-use area (called a 'square' in local parlance, but really a linear stretch along the city's major road, Massachusetts Avenue), is the site of one of the city's biggest street renovations. A community consensus that walking and cycling need to be a priority made it possible to put this street on a 'road diet', reducing the travel lanes from four (in some places five) to three, widening sidewalks, and adding bicycle lanes. Kerb extensions were installed as well, and the crossing of Massachusetts Avenue was reduced from an average of 70 feet to an average of 50 feet. International/zebra crosswalks were installed at frequent intervals along the street and pedestrians are able to cross easily. Traffic moves slowly and the square feels like a pedestrian area.

With the wider sidewalks there is room for sidewalk cafés, and for seven or eight months of the year patrons of coffee shops and restaurants can be found sitting at outdoor tables. Trees were planted, and many benches installed. The new sidewalks have a concrete travel zone and a wide brick kerb zone for benches, trees and tables, which makes the walking surface easier while making an aesthetically appealing urban design statement. Another improvement was at a major intersection, where a right turn slip lane was removed. Pedestrians, with a concurrent signal and a leading pedestrian interval, are well into the intersection before vehicles begin right turns (no left turns are allowed) and motorists must manoeuvre the turn slowly, with great care. The street is as congested as it always was, but there is no evidence that removing a travel lane increased congestion or diverted traffic to other streets. The square is friendlier, safer and more prosperous.

46.8.2 Fresh Pond Parkway – making a roadway walkable

Fresh Pond Parkway, a road owned by a regional authority, is congested with commuter traffic passing into and through the city, and traffic volumes surpass 50 000 motor vehicles on weekdays. It borders the city's reservoir, which functions as a major park for residents. Incursions by adjacent businesses such as gas stations, fast food chains and strip malls had made much of the road an almost continuous kerb cut. There was only one pedestrian crossing with signals along a stretch of about a mile, and the continuous traffic made crossing elsewhere not only dangerous but virtually impossible. The roadway reconstruction created pedestrian and bicycle facilities along the parkway, with new sidewalks and paths. Four new signalised crossings now make the recreational facilities around the reservoir accessible on foot from the neighbourhood which had previously been cut off by the road. New landscaping and lighting make the sidewalks along the parkway feel like a place where pedestrians are expected and welcome.

46.8.3 Golden Shoes – a reminder that walking is fun

In addition to the physical infrastructure projects and programmes this chapter has focused on, the city council also engages in extensive outreach and promotional activities under the logo, Cambridge Walks (Fig. 46.3). Among the most popular of the city's promotional events is the hunt for golden shoes, held in May. One hundred old shoes are spray-painted gold, and many of them are decorated by school art classes. The shoes, with instruction tags attached, are hidden around the city throughout the month in places where people on foot can find them. The finders can redeem the shoes for a gift certificate for a free pair of sneakers and a chance to enter a draw for a $1000 walking shopping spree in the city. The sneakers and shopping prize are all donated. The event encourages people to get out and walk and conveys a message that walking is a fun family activity.

Fig. 46.3 Logo for promotional activities.

46.9 Conclusion

By creating consensus through its ordinances and visioning, and through developing a pedestrian plan, Cambridge has both the legislative and community basis for giving pedestrians more of a priority in its planning efforts. When projects are carried out there is now a community expectation that pedestrian needs will be included. Our hope is that as the city becomes more pedestrian-friendly, increasing numbers of people will choose to walk for transportation, for pleasure, for their health and for the health of the community.

47

Designing streets for people

Barry Sellers, Wandsworth Borough Council, UK

47.1 Introduction

The report *Designing Streets for People*[1] was first published in 2002 as a basis for consultation in June 2000 by the Urban Design Alliance in association with the Institution of Civil Engineers. A small inter-professional working group convened in 1999 to review the role of streets within the urban environment and decide how, with recognition of their changing role, they can be designed to be more responsive to people's needs. The review also needed to address several issues emanating from the Urban White Paper *Our towns and cities: the future*,[2] the work of the Urban Task Force, *Towards an Urban Renaissance*,[3] The Department of the Environment, Transport and the Regions' *Planning for the Communities of the Future*,[4] and *A Better Quality of Life*,[5] the *National Strategy for Neighbourhood Renewal*[6] (launched by the Government in January 2001) and the framework for modernising local government. Cognisance was also taken of parallel work undertaken by English Heritage's *Streets for All*[7] and the former DETR *By Design*[8] and *Encouraging Walking*.[9]

47.2 Evidence and key findings

The initial work drew upon evidence of issues raised by local authorities and was followed by a presentation to a group of practitioners, academics and representatives from a number of organisations. The presentation of evidence was in the form of written, visual and oral submissions. These focused on the changing role of the street and highlighted a spectrum of problems and

Fig. 47.1 Visual clutter: traffic signals and other signing.

issues that were emerging with respect to the processes of management, design and maintenance of streets.

Over the last few decades the debate about the role, use and design of our streets has shifted from rigid adherence to standards and criteria favouring the motor vehicle to one where there is an increasing recognition that urban streets need to be more responsive to the needs of people. Once people can begin to claim space, the streets attract more people. The emergence of the café culture at the end of the twentieth century witnessed the transformation of many of our urban spaces for alfresco eating and drinking *à la* continental Europe. Evidence was presented about the lack of co-ordination of the various processes that govern the management, design and maintenance of the public realm. This has led to a proliferation of visual clutter, particularly signing (Fig. 47.1), due to poorly thought out schemes, inadequate standards of maintenance exacerbated by the frequency of openings by utility contractors, and generally a lack of consideration for the pedestrian. The evidence revealed entrenched attitudes by some professionals and fragmentation of responsibilities with regard to managing the public realm. The group also looked at how businesses manage complex processes.

47.3 Vision for the street

The report recognised that if the urban renaissance of the public realm is to be realised then we must consider a vision for the street that acknowledges the needs and involvement of people. Management processes need to be

reviewed and refreshed to ensure that activities affecting the street undertaken by different agencies are properly co-ordinated. Strategic policy guidance should not be narrowly focused but co-ordinate action across agency and professional boundaries. Legislation needs to be reformed and updated. Management, professional and technical skills need to be re-examined. This vision needs to bring about excellence in the quality of the public realm.

47.4 Street Excellence Model

The *Business Excellence Model*,[10] developed by the European Foundation for Quality Management (EFQM®) formed the basis of the Street Excellence Model (SEM). The Business Excellence Model is a practical framework that helps organisations, both public and private, to apply fundamental principles of good management. At its heart is a set of universally applied criteria that have been developed following analysis of world-class organisations. The model is a non-prescriptive framework concerned with the pursuit of excellence, and is based on nine criteria (see Fig. 47.2).

The SEM represents the application of the EFQM® to the management processes that impact upon our streets. The model potentially provides a rigorous management tool for evaluating the performance of an organisation in delivering its responsibilities in respect of the management and co-ordination of activities affecting the public realm. It can be linked to Best Value, Investors in People and Benchmarking, as its emphasis is on continuous self-assessment through performance review. It has the potential, through the identification of meaningful and robust performance measures and outcomes, to take on board the processes identified in the *Designing Streets for People* report,[1] in achieving the 'vision' for streets in the future. Amongst others this would include processes for co-ordinating and integrating management, design and maintenance of streets, for collaborative and inter-disciplinary working and for involving the community. The SEM has the benefit of challenging the historic mind-set underlying current practice. The report recognises that the application of the model does, however, need to be developed.

47.5 Urban management and governance

All too often the management processes that impact upon the street are not co-ordinated. There are a considerable number of organisations (e.g., telecommunications operators) whose activities involve installing apparatus in streets. They pursue their activity from a single focus perspective. What is missing is a holistic vision for the street. Better co-ordination could lead to sharing of infrastructure for services below ground and improved visual integration within the street scene. Public authorities in good faith commission a variety of different strategies, on walking, cycling, parking, signing, traffic

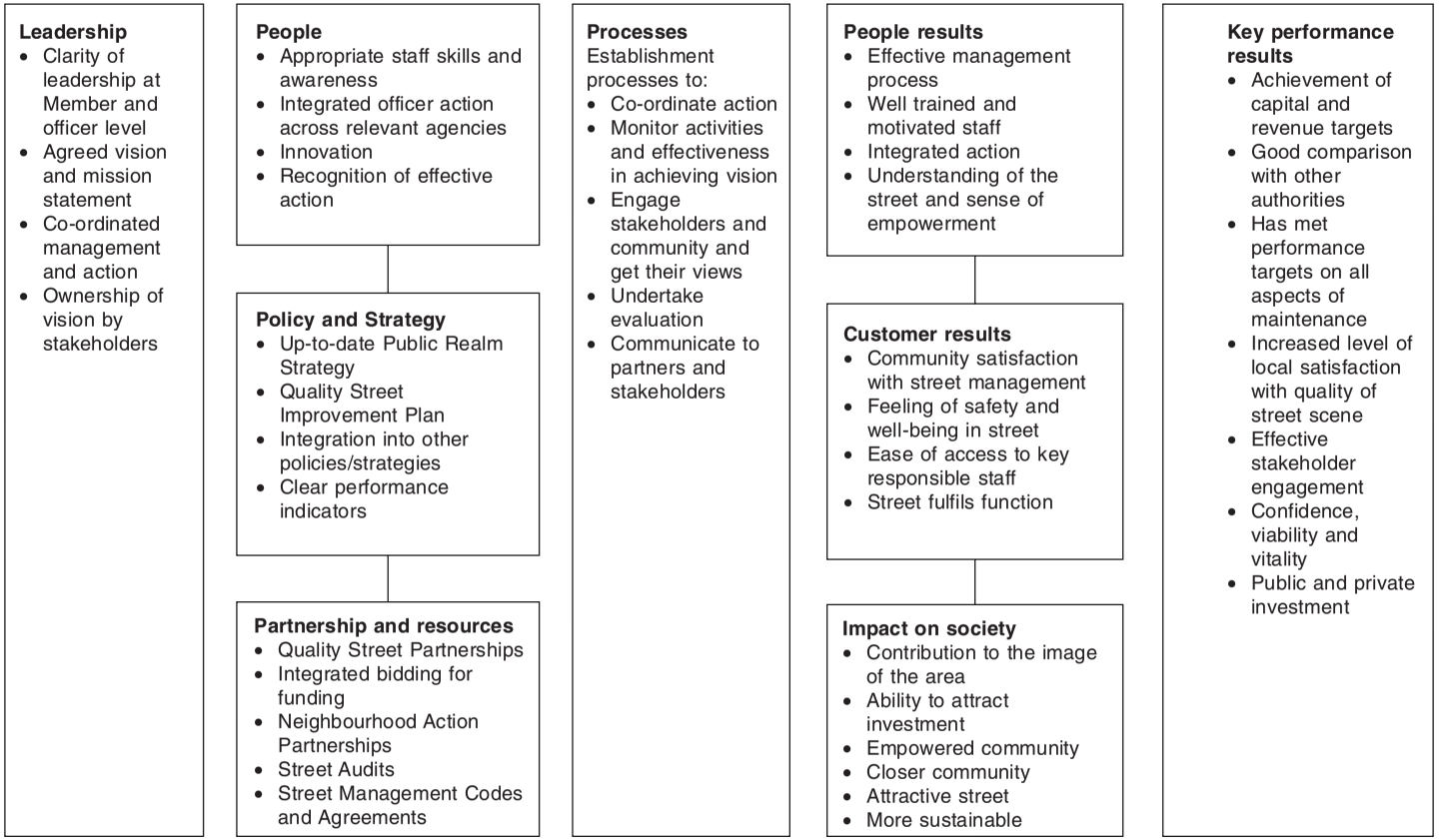

Fig. 47.2 Street Excellence Model. Source: courtesy of ICE and UDAL.

calming and so on but often fail to adequately make the necessary connections between them, and indeed in some instances there may even be elements of conflict. Public authorities need to respond to the challenge of joined up thinking on planning and transportation issues. The task of co-ordinating decisions on policy, budgeting and resource allocation is inevitably made more difficult if different departments and committees deal with planning and transportation matters.

One of the elements identified as part of the SEM is the Public Realm Strategy. It represents one of the potential tools enabling local authorities to establish a clear framework for co-ordinating and integrating various policies and strategies for all aspects of the public realm (see Fig. 47.3). Their preparation is featured in the Urban Task Force's report.[3] It says 'a Public Realm Strategy which requires local authorities to plan comprehensively for all aspects of the public realm, should either form part of the Local Plan or should have a clear relationship with it, possibly in the form of Supplementary Planning Guidance'. The Task Force's recommendation in this area was to 'require local authorities to prepare a single strategy for their public realm and open space, dealing with provision, design, management, funding and maintenance'. Public Realm Strategies may be prepared as part of an Urban Design Framework or Community Strategy for town centres, town extensions and neighbourhood renewal. They should focus on the complex and multi-layered nature of the issues that impact on the public realm, which are not the responsibility of

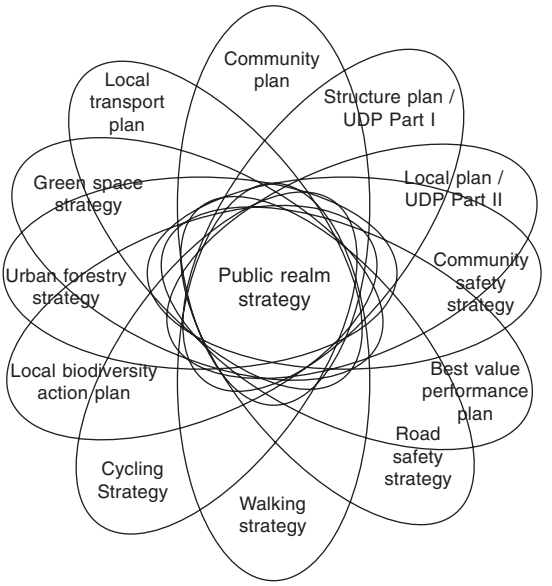

Fig. 47.3 Public Realm Strategies can co-ordinate a number of plans and strategies. Source: courtesy of ICE and UDAL.

any single profession but demand an approach that is inter-disciplinary and collaborative. Involving the business and residential community in their preparation is critical to engendering a sense of ownership of the process.

The Government's Comprehensive Spending Review in 2001 targeted the improvement of public spaces. Improving public spaces is one of seven cross cutting reviews that will shape the Government's spending commitments for the next decade. Sir Stuart Lipton, Chairman of the Commission for Architecture and the Built Environment (CABE) has said in response 'Improving the quality of the public realm is a central issue for Government and shows their thinking about the importance of public spaces'.[11] Public space will now be a key issue for government departments, who will have to demonstrate what they are doing to make better public spaces. Therefore, local authorities bidding for funding are likely to be better placed if they have a Public Realm Strategy in place. What should such a Strategy include, and who should prepare it? All too often public realm spending has been focused on dealing with single issues and has frequently failed to demonstrate joined-up thinking.

A Public Realm Strategy needs to focus on people; their activities, how they use public spaces and how those public spaces interface with their homes, workplaces and places of entertainment. A key component that connects these is walking. Whilst walking is a mode of transport, it is also much more than this. Walking is a link between activities and the connections between those activities is a fundamental consideration in the design of cities. Putting people's needs at the heart of any Public Realm Strategy will bring into play many other issues. These issues include:

- public safety and security;
- walking and sitting;
- access to public transport;
- lighting;
- public art;
- traffic speed;
- parking;
- cycle provisions;
- loading and unloading;
- signing;
- alfresco eating and drinking;
- location and design of building entrances;
- cultural events;
- access for people with disabilities;
- pollution and air quality;
- children's play;
- trees and soft landscape;
- furnishing public spaces;
- quality of maintenance of public spaces.

Several local authorities are in the forefront of considering the needs of

people in designing streets. These include those of York, with the successful 'Footstreets' project aimed at making the shopping environment more attractive, and Birmingham, where two new civic squares have been created, breaking through the barrier of the ring road to create pedestrian crossings, and improving the canal banks. Elsewhere, Lancashire county council and Edinburgh city council are producing policy documents aimed at improving the needs of pedestrians.

A Public Realm Strategy should involve the local community in its preparation and be subject to public scrutiny as part of any Development Plan Inquiry process. At present, matters which are the responsibility of the Highway Authority cannot be legally challenged as part of this process as the inspectors are only able to deal with land-use matters. It is suggested that the Public Realm Strategy should feature as part of the Community Strategy that will be the over-arching local authority policy vehicle with which both the proposed Local Development Frameworks (announced in the DTLR's Green Paper *Planning: Delivering a Fundamental Change*[12]) and Local Transport Plans must conform.

The need to empower the community is taken further in the report as part of Modernising Community Governance. It highlights the complexity of dealing with the interaction of the various activities that are permitted, or require permission to use streets, as well as the installation of street furniture. Local authority attitudes and responsibilities towards the public realm have received media criticism. This is as a result of the clutter of signs, frequency of utility openings and quality of reinstatement, insufficient allocation of space for pedestrians and cyclists, poor quality of maintenance, lack of civic pride, street crime and dealing with the placement of tables and chairs on pavements outside restaurants. The report advocates adopting a more proactive approach in particular areas. There is a perception by the community that a single point of contact for services affecting the street is desirable. Some local authorities such as Wandsworth Borough Council have introduced a 'one-stop' counter to help co-ordinate information and advice to the community.

The report suggests that Street Management and Design Codes could be prepared for individual streets. The Codes could prescribe certain activities that could take place within streets, replacing the need for owners of individual premises to apply for planning permission or a licence. This method would require a change in legislation but is aimed at simplifying procedures whilst making the process more accountable by involving the stakeholders. This partnership with the stakeholders of the street is referred to in the report as a Quality Street Partnership. This is, quite simply, an agreement between the users and the local authority, which would set down the conditions applying in respect of specified activities. Encouraging the involvement of the stakeholders in the improvement of streets can have positive benefits. They are more likely to volunteer their own time, effort and resources if they can see the benefits of that investment. They may participate in a systematic assessment of their street, with professional consultants as part of a street

audit or 'Placecheck' initiative. Following successful pilot projects, the latter went nationwide with the first National Placecheck Day (22 September 2001).

Exploring creative ways of funding improvements to the public realm is central to the process. The SEM model has the potential to enable local authorities to critically examine whether budgets are being used economically, efficiently, effectively, equitably and consistently with good environmental management. Partnership funding arrangements in association with the setting up of Town Improvement Schemes (TISs), neighbourhood renewal, 'Home Zones' and Single Regeneration Budget initiatives, involving businesses, the local community, local authorities and other agencies, should be pursued.

The report advocates revising legislation. Highway legislation has evolved primarily to cater for the needs of the motor vehicle. We now recognise that far greater priority needs to be given to pedestrians, cyclists and the community who are directly affected by street activities. There needs to be a shift in emphasis to reflect emerging attitudes so that, for example, a duty of care is imposed on motorists for the safety of pedestrians and cyclists. Licensing of activities and controlling utility company operations are other areas where reform of legislation is needed. New regulations often require more signing. To avoid this additive process we need to think differently about our streets and critically examine the need for signing and lining. There are exemplar schemes at home and abroad that seek to 'break the mould' and overcome the 'clamps' to good urban design. Rochester High Street (Fig. 47.4) provides an example of what can be achieved.

Finally, the report identifies deficiencies in training, at a professional level where skills are required to cut across traditional disciplines, as well as training for those implementing schemes. In response to the former, a cross-disciplinary management qualification (MBA in Urban Street Management) is advocated to focus on urban management and governance, design and development. It should include the Street Excellence Model, Best Value, cross-service delivery and budgeting, as well as skills in leadership, community involvement and empowerment. A deficiency in urban design skills was identified particularly within local authorities. There were also shortcomings in the teaching of urban design skills within professional courses dealing with the environment. A further aspect concerned the quality of workmanship on street works. The report advocated the need to train people in street craft, notably, traditional masonry and pavior skills, which could form part of the National Vocational Qualification (NVQ) system. This skills deficiency has been endorsed by the findings in CABE's report, *Urban Design Skills*.[13]

The report recognises that the application of the Street Excellence Model (SEM) requires further development in order to fully test its potential in the area of urban street management. In this respect it suggests a broadly based working partnership be set up involving the Urban Design Alliance (UDAL), the DETR, local government, businesses, academics, the British Quality Foundation and community representation. The Model recognises the need for local government to pursue excellence in the delivery of services to the

Fig. 47.4 Holistic approach: Rochester High Street.

community. The setting up of 'one-stop' services, providing a single point of contact to enable the public to interface directly with the local authority on matters relating to the street, is advocated. More work is needed on the mechanisms for involving people to enable them to participate more fully in ways to 'refresh' the areas in which they live through Quality Street Partnerships. The findings of the inquiry recognised that some of our legislation requires modernising so that it is more responsive to the needs of pedestrians, cyclists and people with mobility impairment. Professionals need to equip themselves with new skills, and graduate courses in the environmental professions need to embrace urban design as part of their core curricula. They must also recognise the need to think differently by collaborating across professional boundaries and to view the built environment in a holistic way, by being more proactive than reactive. The opening up of spaces such as Somerset House in London (Fig. 47.5) represents a step in the right direction. There is

Fig. 47.5 Opening up spaces for the public: Somerset House, London.

also a need to foster innovation and test ideas through demonstration projects in order to help bring about a change in thinking.

47.6 Evidence of the House of Commons Select Committee

The UDAL working group, along with the Institution of Civil Engineers, were invited to submit evidence to the House of Commons Environment, Transport and Regional Affairs Committee. The evidence was presented to members of the committee in June 2001 as part of the proceedings on *Walking in Towns and Cities*.[14] The committee made a number of recommendations, three of which were in direct response to the evidence presented from the *Designing Streets for People* inquiry:

- that each local authority establishes a small team of experts in street design working with engineers and planners on projects affecting streets and new development;
- that guidance should be issued promoting the co-ordination of all work affecting the function and appearance of streets and public spaces and setting out best practice mechanisms for implementation and monitoring;
- that the quality of engineering work be raised by the introduction of, and subsequent requirement for, qualifications. Contracting supervision and quality assurance procedures should be tightened.

47.7 The Government's response

In November 2001 the Government responded to the Environment, Transport and Regional Affairs Committee's report. They welcomed the detailed considerations that the committee had given to the subject of walking in towns and cities. The Government made a number of recommendations in its response.[15] These included:

- 'A philosophy of danger reduction should replace the prevailing orthodoxy of accident reduction. It can be more effective in reducing pedestrian casualties, leads to a better urban design and is more convenient for pedestrians. As part of this shift, guard railings and staggered crossings, which are barely used on the Continent, should be scrapped where traffic speeds can be reduced'.
- 'Street management is unco-ordinated and suffers from the involvement of a plethora of professionals. We endorse those recommendations of the Designing Streets Inquiry, which apply to the establishment of street management strategies, street management codes and design codes'.
- 'We recommend that each local authority establish a small team of experts in street design who could work with highway engineers on all projects affecting streets and with planners on new developments'.
- 'We recommend that consolidated guidance be issued, which promotes the co-ordination of all work affecting the function and appearance of streets and public spaces and sets out best practice and mechanisms for implementation and monitoring'.

The Government also mentioned in its response that it had appointed the Commission for Architecture and the Built Environment (CABE) to carry out a research project to consider and define the primary influences on the achievement of quality in the streetscape, what the barriers to achieving them are, and what mechanisms there are for exerting influence to improve standards. The CABE commissioned consultants Alan Baxter Associates and EDAW to prepare this report, *Paving the Way*,[16] which was published in 2002.

47.8 Conclusion

The Designing Streets for People inquiry has been successful in leading the way in challenging the organisational arrangements of public authorities to achieve better co-ordination in the design, management and maintenance of streets. It suggests the key to this is through the use of the Street Excellence Model that provides a coherent framework for measuring the performance of an organisation. It is hoped that this model will be developed further and that public authorities will pilot this as part of their Best Value reviews. Certainly it has already prompted some organisations to reappraise their attitudes and

question their organisational arrangements in dealing with matters affecting the street. The Audit Commission, in their report entitled *Street Scene*,[17] have recently endorsed the recommendations of the Designing Streets for People inquiry. Given their influence on the Best Value process it is hoped that many local authorities will heed the recommendations of the Designing Streets for People inquiry, and the Government's response, and orchestrate a change in their corporate thinking. The ultimate goal is achieving excellence in the quality of the public realm.

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48

Bicycle theft in France

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48.1 Introduction

Theft is recognised, by all bicycle use surveys, as the most important factor limiting the development of urban cycling after road safety concerns. Despite this, very little research into the problem has been carried out in France. The first part of this chapter presents the main results of our research; the second part looks at possible measures for reducing theft. The overview that we will present here is the result of work carried out by Frédéric Héran of the IFRESI-CNRS research laboratory, with assistance from Nicolas and Laurent Mercat and Yann Lemartet from Altermodal, a consultancy firm specialising in low-impact transport solutions.

Several investigation methods were used in succession:

1. A nationwide survey of 1103 cyclists was carried out in order to better define the phenomenon. The survey was done in 15 French towns by interviewing passing cyclists. This type of approach naturally creates a bias towards regular cyclists and underestimates the influence of more occasional cyclists.
2. Work with focus groups, with people chosen according to their type of accommodation (old, private apartment buildings, modern apartment buildings, subsidised housing, etc.), in order to look at problems with existing bicycle parking facilities and to consider more suitable arrangements.
3. Legal research into town planning and co-ownership legislation, and into labour laws, in order to examine all potential forms of action.
4. Discussions with bicycle and security system manufacturers, as well as with the AFNOR (French Industrial Standards Authority).

5. Meetings with insurance companies to look at bicycle insurance policies and the main types of insurance claim.
6. Analysis of around 100 theft statements, in conjunction with the police forces of three French towns, to look at the methods used by thieves and the circumstances of each theft. These data could then be compared with the results of our survey. Proposals for modifications to the process of recording thefts.
7. Investigation of the situation in other European countries. Research was carried out in Denmark, France, Germany, Switzerland and The Netherlands.

48.2 Characteristics of theft

Every year, 400 000 bicycles are stolen in France. However, the statistics for bicycle thefts in France are very unsatisfactory because:

- the data collected by the police are incomplete as thefts are only rarely reported. Most reports of thefts are made in order to facilitate an insurance claim. These statistics are of limited value as bicycle thefts are not classified separately and the theft of uninsured bicycles from public places is greatly underestimated;
- the statistics compiled by insurance companies, in order to calculate the insurance risk, are usually more precise but they are not published and are not compiled on a national scale.

Of the 1103 cyclists interviewed during our survey, 624 had already been victims of bicycle theft at least once, e.g. 57 % of the cyclists interviewed had had a bicycle stolen. The total number of bicycles stolen in our sample was 1018, with 45 % of cyclists having had more than one bicycle stolen. Taking into account the length of time the subjects had been cycling, each year six per cent of urban cyclists have a bicycle stolen. Of the estimated 21 million bicycles in France, 5 million are regularly in a situation where they may be stolen. By extrapolating our figure of 6 % to the number of bicycles exposed to theft (24 %), around 300 000 bicycles are stolen every year. Another 100 000 racing and touring bicycles must be added to this figure, giving a total of 400 000 bicycle thefts per year. The survey showed that the average value of a stolen bicycle is €200, so the 400 000 bicycles that are stolen represent a total of nearly €80 million. The number of bicycles stolen is higher than the number of cars (300 000 per year), but 75 % of motorists recover their vehicle, compared to just 6 % of cyclists.

Obviously, bicycle theft occurs in all European countries and, paradoxically, the rate of theft is higher in those countries where bicycle use is more common. This can be explained by the fact that bicycles used for daily transport, as is common in northern Europe (The Netherlands, Denmark), are more exposed to the risk of theft than those used only for leisure purposes,

Table 48.1 Statistics for bicycle theft in selected European countries

Country	Population (millions)	Number of bicycles (millions)	Bicycle sales per year (millions)	Bicycle thefts per year (units)	Thefts per inhabitant (%)	Thefts related to no. of bicycles (%)	Thefts per yearly sales (%)	Market share for bicycle (%)
The Netherlands	15	15	1	900 000	6	6	90	29
Denmark	5.2	4	0.4	100 000	2	2.5	25	17
Belgium	10	5.8	0.4	100 000	1	1.7	25	14
Germany	82	41	5	600 000	0.7	1.5	12	11
Great Britain	60	22	2	686 000	1.1	3.1	34	2
France	60	21	2.5	400 000	0.7	1.9	16	3

which is often the case in southern Europe. Germany is an exception to this rule as the rate of theft is relatively low despite a high degree of urban bicycle use and a significant rate of bicycle ownership (Table 48.1).

48.3 Effect of theft on bicycle use

Theft has already been identified, by most surveys carried out in France, as a serious obstacle to the development of urban cycling. Our survey confirms this. Of the victims of bicycle theft, 23 % do not buy another bicycle. Considering the fact that, over a 10 year period, 60 % of cyclists are victims of bicycle theft, the potential number of urban cyclists is reduced by 14 % every 10 years. Of cyclists who do replace a stolen bicycle, 46 % buy a new bicycle immediately, 27 % buy one a month later and 27 % at least a year later.

48.4 Effect of theft on the bicycle market

Although only 28 % of bicycles stolen are second hand, 50 % of replacement bicycles are bought second hand. Bicycle theft seems to lead cyclists to make do with cheap products, often less safe, less comfortable and less well-equipped. Theft should be a cause for concern for manufacturers as 23 % of replacement bicycles cost less than €80. The number of extra bicycles sold does not compensate for the reduction in price – about 20 % less – of the bicycle bought after a theft.

48.5 Theft and cyclist behaviour

The behaviour of the cyclist is often a very important factor in the risk of theft. Inexperienced urban cyclists often buy a good quality, new bike but often underestimate the risk of theft. Most:

- do not buy an adequate bike lock;
- do not take enough precautions when they park their bike, i.e., it is not always locked up, not attached to a fixed point, left with frame unlocked, left in an inappropriate place, etc;
- have a new bicycle that is more attractive to thieves.

The difference in risk is considerable as the rate of theft for cyclists with less than 5 years cycling experience is 0.53 thefts per year, compared with 0.03 thefts per year for cyclists with more than 20 years experience (Fig. 48.1). With time, cyclists who persevere and buy a replacement bicycle are more and more likely to buy a good bike lock and to systematically attach their bicycle to a fixed point when they leave it. Although only 6 % of bike locks used when the bicycle is stolen are of acceptable quality, 33 % of replacement bike locks are satisfactory. The risk of theft is reduced and the bicycle gets older, reducing its attractiveness to thieves.

Parking conditions for bicycles may be an important factor in thefts, but the behaviour of cyclists is also a factor in a great number of cases. This also helps to explain the difference in risk for experienced and inexperienced cyclists:

- in 22 % of cases the bicycle was not locked because it was only left for a very short time and, especially, because it was on private property and the owner did not think it necessary to lock it;
- 95 % of cyclists who have been victims of theft used a poor quality bike lock;
- 57 % had not locked the frame, only the wheel;
- 32 % had not locked the bicycle to a fixed point.

Combining all these factors reveals that only four per cent of stolen bicycles were correctly locked up!

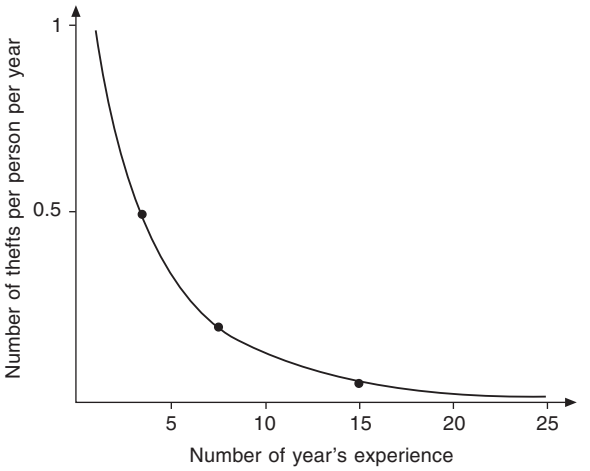

Fig. 48.1 The reduction in the likelihood of bicycle theft with increasing cycling experience.

48.6 Location and time of theft

Even though the risk of theft is most commonly associated with public places, almost half of bicycle thefts take place on private property, generally in communal bicycle parks, in the courtyards of apartment buildings and in stairwells (Fig. 48.2). There are several reasons for this:

- the design of most bicycle parks is currently totally unsuitable. Despite the fact that, even in a densely inhabited area, a bicycle can be an efficient means of transport, most bicycle parks are not equipped with bars enabling the bicycle to be attached to a fixed point, and bicycle parks are often out of sight, so thieves have all the time they need to take a bicycle;
- the precautions taken by cyclists on private property are generally much less rigorous than those taken in public places;
- numerous housing areas and offices in the centre of towns do not have bicycle parks, leading cyclists to leave their bicycles in unsuitable places.

Bicycle theft is highly seasonal: more than half of all thefts occur during the months of April, May, June and July. This curve follows not only the curve of bicycle use in France and therefore the number of bicycles at risk, but also the curve for bicycle sales. Two bicycle thefts out of five, in our sample of more than 1000 thefts, happened at night, most frequently when the bicycle was left on private property (Fig. 48.3).

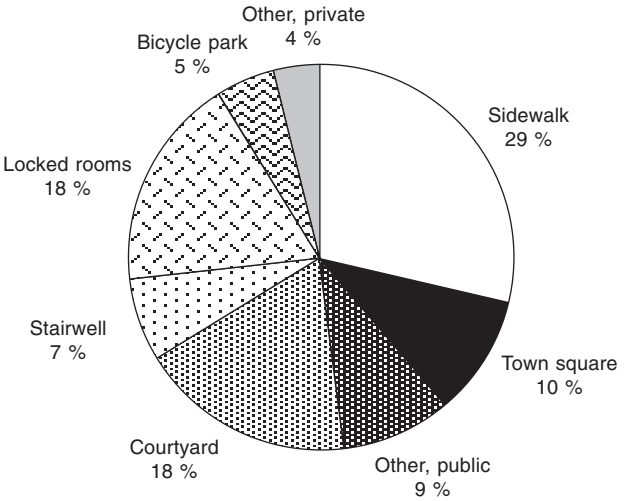

Fig. 48.2 The location of bicycle thefts.

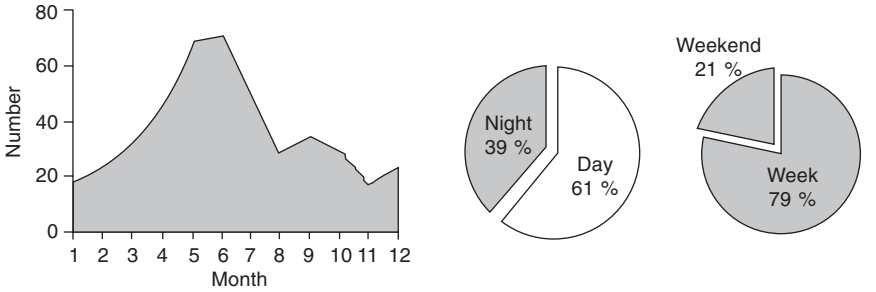

Fig. 48.3 The timing of bicycle thefts.

48.7 Identification and recovery

Only three per cent of stolen bicycles are returned to their owner in good condition. This figure is not at all surprising given the fact that:

- only half of all cyclists report thefts to the police. Most believe that the administrative procedures are a waste of time given the low recovery rate. Those who do report a theft generally do so for insurance reasons;
- only 15 % of owners know that their bicycle has an identity plate;
- 26 % of victims do not know the frame number of their bicycle;
- 59 % do not have the sales receipt for their bicycle.

When a stolen bicycle is recovered, it is very often down to luck or due to the victim's own efforts. Only 18 % of cyclists who confirm that they have recovered a stolen bicycle acknowledge that was this due to the efforts of the police.

48.8 How to solve the problem

48.8.1 Inform users and all concerned parties

The bicycle theft problem, which is likely to grow with the development of urban cycling in France, can only be addressed through the application of a range of measures. Our survey showed very clearly that the behaviour of cyclists was often a significant factor in the theft of their bicycles. The difference in the level of risk between experienced and inexperienced cyclists is great and demonstrates the need to make new cyclists, the thieves' principle targets, aware of the problem. Steps which can be taken include:

- improve awareness of the problem in order to reduce the risk. A cyclist who is aware of the risk is more likely to take the steps necessary to protect his or her bicycle: buy a good quality bike lock, systematically lock the frame to a fixed point (public or private place, long- or short-term), tag bicycles with a security code;

- promote good bicycle parking habits;
- provide information on what to do in case of theft.

Several communication methods provide a good cost-effectiveness ratio:

- a sticker campaign on parked bicycles, suggesting a 'parking check-up';
- distribution of leaflets about bicycle theft and its prevention in the most vulnerable bicycle parks (communal areas, school and university bicycle parks, public places). The promotion of anti-theft measures could be undertaken with the support of insurance companies;
- press campaigns in April and May, when less experienced cyclists start cycling again and when theft is most common;
- distribution of advice leaflets, by distributors, when the bicycle is sold.

48.8.2 Include good bicycle parking practices in town planning legislation

Town planning legislation covering new buildings and major modifications to existing structures includes provisions to oblige lessors to consider the provision of bicycle parking in the same way that they do for car parking. French legislation has recently been changed to make consideration of bicycle parking obligatory. Experience shows that, even when set down in writing, this regulation is rarely applied or applied too haphazardly and with facilities that are inappropriate. It is therefore essential to:

- improve local authorities' awareness of this legislation;
- promote the provision of suitable facilities by drawing up 'standard' articles that are sufficiently precise in terms of the type of parking area, its location and the number of spaces provided;
- have effective checks on their application.

48.8.3 Promote the use of good practice to designers of private housing and lessors

Town planning legislation allows for the inclusion of bicycle parks in new buildings but the texts do not sufficiently allow for the application of good practice to each case and to consider the details as to how the facilities will be provided. As well as a regulatory approach, it is essential to train architects, developers, local authorities and lessors in the techniques to be adopted in each specific case. Several European countries, including Switzerland, The Netherlands, Belgium and Denmark, have produced technical guides covering the subject. France lacks a good technical and methodological guide on the provision of suitable bicycle parking facilities, but this is being improved.

48.8.4 Provide good, well-designed bicycle parks in existing apartment buildings

The lack of parking and the poor design of bicycle parks is often a factor in bicycle theft, especially in apartment buildings. Even though regulations exist for new buildings, the provision of facilities in existing buildings is a big problem. Several possibilities have been examined:

- persuade local authorities to acquire space on the ground floor of buildings (garages, disused shops), perhaps for small groups of buildings rather than individual buildings, in order to provide residents with bicycle parking. Access could be based on a badge system;
- develop the principle of locked bicycle garages, near the attendant's office, in town centre underground car parks;
- modify co-ownership legislation to promote the development of bicycle parking in private co-owned buildings. This last point, which could have quite widespread repercussions, would probably be very difficult to implement under French law.

48.8.5 Develop a certification system for bike locks and identification techniques for bicycles

The use of poor quality bike locks is very common in France, and remains one of the most important factors in bicycle thefts. The qualitative analyses that we carried out during the interviews show that the consumer is highly confused by the extremely wide price range of bike locks. The relationship between price and effectiveness is very difficult to see. It is important to introduce a system of quality certification for bike locks, in order to show the benefits to be gained from buying a good quality lock and to make the choice of lock easier. The establishment of this certification should be accompanied by an active promotional campaign, supported by the manufacturers.

When a bicycle is stolen, everything must be done to try and recover it. The identification of bicycles by a security code would seem to be an essential element in improving the chances of recovery. All of the interested parties to whom we spoke insisted on the need for manufacturers or distributors to tag bicycles (either mechanically or electronically) before they are sold. The limiting factor in electronic tagging, a technically straightforward and inexpensive technique, is the availability of scanning equipment within police forces. As far as the information management for such a scheme is concerned, it would only be necessary to create a central database for bicycles that have been reported stolen, as has been done for video recorders, thus avoiding the expense of logging all bicycles.

48.9 Conclusion

The results of our research have shown that bicycle theft is an increasing problem in France. On average, a higher proportion of cycles are stolen per annum than cars, with 57 % of cyclists interviewed having been the victims of bicycle theft. This is mainly due to a distinct lack of awareness of the risk of theft, cyclist inexperience and poor parking provisions. In order to reduce the number of bicycle thefts each year, it is necessary to introduce a range of methods to raise the awareness of the risk of theft, to instil good parking habits and to inform of the necessary action to be taken if theft occurs. There are a number of cost-effective options available for achieving this awareness and reducing the number of thefts. The main methods for promoting awareness among bicycle users include sticker and press campaigns, distribution of leaflets at vulnerable cycle parks around the country as well as to new buyers from bicycle distributors. The improvement of cycle parking facilities will also reduce the number of thefts and can be achieved by the incorporation of good bicycle parking practice into town planning legislation and in the design of private housing. Provision of well-designed cycle parks in existing apartment buildings, development of a certification system for cycle locks and the tagging of bicycles for easier identification if stolen are also possible ways for reducing such theft. Implementation of these cost-effective methods can help to reduce bicycle theft and increase the number of urban cyclists in France and, indeed, everywhere.

49

Breaking out by bike: cycling courses as a means of integration and emancipation

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49.1 Introduction

In The Netherlands the words 'cycling' and 'foreign women' are not often seen as having any connection to each other. Yet, they go together well. Since the early 1980s there have been courses in cycling for foreign women in The Netherlands, not necessarily because the Dutch think that foreign women should learn to ride a bicycle, but because foreign women themselves express their need to do so. One might wonder why. Many foreign women have never learned to cycle. As girls or young women they were not allowed to do so. In many countries, it is considered dishonourable for women to cycle. Often, women are not allowed to wear trousers, and cycling in a skirt is considered impossible. The main reason foreign women living in The Netherlands want to learn to cycle is that cycling in this country is considered a basic need, especially for those who do not have enough money to own a car.

49.2 The bicycle in daily life in The Netherlands

In Dutch cities the bicycle is a very common and convenient form of transportation. It is also a cheap mode of transport, which is why bicycles are so prominent in Dutch traffic. The infrastructure is geared towards accommodating bicycles in many places. It is far easier to get to shopping centres, day care centres, schools, the city centre or to one's job by bike than it is by car or by using public transport. Local councils promote and stimulate the use of bicycles. So, for short trips (less then seven kilometres) a lot of people use a bike.

The role a bike plays in daily life differs for men and women:

> In their daily mobility, women use – voluntarily or not – their own feet, the bicycle or public transport to a much higher degree than men. The everyday life of women is characterised by many short trips which they organise in transport chains, in contrast to men who make few, but long-distance, trips . . . Women's everyday responsibilities involve many additional trips, which are typical for female mobility: shopping, accompanying their children to kindergarten, school, friends, sports, trips to the physician, to the town hall, etc. (Lehner Lierz, 1997)

Below are three examples demonstrating the convenience of the bike, compared to public transport in the city of Tilburg. Figure 49.1 shows Ahmed's commuting time by bicycle (27 mins) compared to public transport (47 mins). Ahmed lives in Tilburg West and works in an industrial area 3.3 km from his residence. He leaves his home in the morning and comes straight home after work. Figure 49.2 shows Azoumi's overall journey time by bicycle (36 mins) compared to public transport (78 mins). Azoumi is a foreign woman with a child, living in the centre of Tilburg. Her daily journey uses a transport chain that is typical of female mobility. In the morning she brings her son to primary school (3 km). Then she goes to school herself (1 km). In the afternoon, when her lessons end, she picks up her child from primary school and goes to the shopping centre (3 km), that is 1 km from home.

Figure 49.3 shows Hamsa's overall journey time by bicycle (41 mins) compared to public transport (46 mins). Hamsa lives in the north of Tilburg

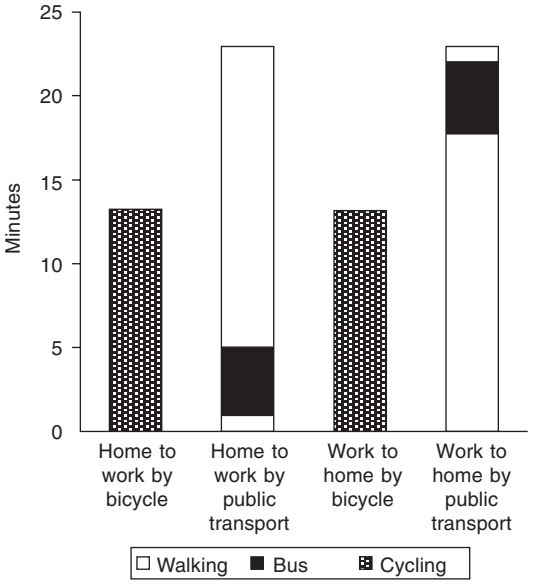

Fig. 49.1 Ahmed's commuting time by bicycle compared to public transport.

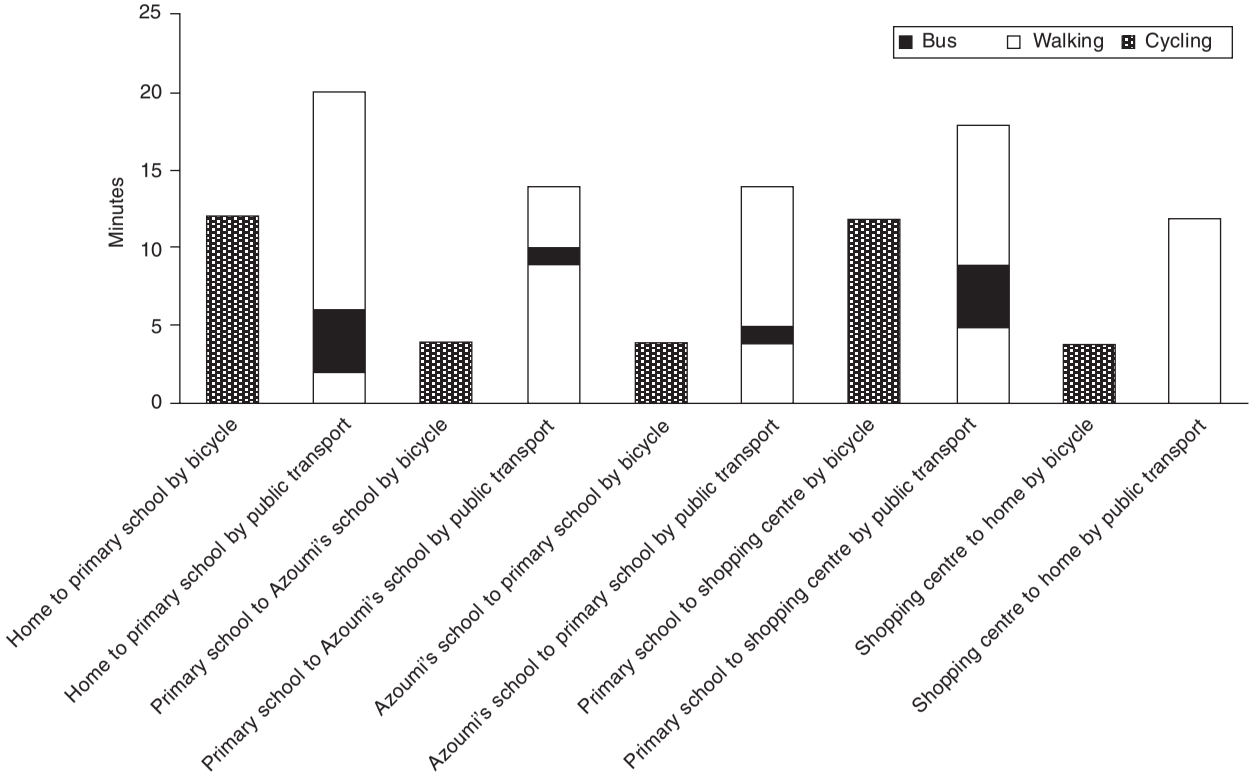

Fig. 49.2 Azoumi's overall journey time by bicycle compared to public transport.

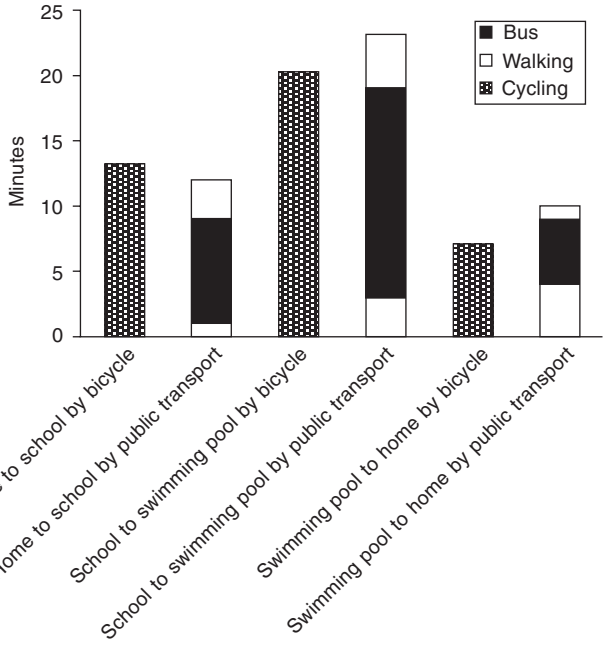

Fig. 49.3 Hamsa's overall journey time by bicycle compared to public transport.

and she goes to her school 3.3 km away in the western area in the morning. In the afternoon there is a swimming lesson in the pool in Tilburg Noord (5.1 km). After swimming she goes straight home, which is 1.8 km away. These last two examples demonstrate not only the convenience of the bike, but also its importance, as women generally make more trips than men: 'Women with children have the highest rate of mobility, independent of whether they are employed or not. Their daily number of trips is significantly higher than the average' (Lehner Lierz, 1999). The majority of cycling course participants in The Netherlands are women with children. It appears that these women in particular see the advantages of cycling.

49.3 Reasons to take bicycle lessons

Everybody who has visited The Netherlands knows that riding a bicycle is a very common form of transport. To the outsider and to the average Dutch person, it seems everybody can ride a bike. However, many foreign inhabitants of The Netherlands do not know how to ride a bicycle. Although a number of foreigners living in The Netherlands have acquired the skill, many of them cannot or dare not face the traffic in the streets. Some foreigners are helped by friends, colleagues or members of their families who arrived in the country earlier. Others are trained in bicycle riding and traffic rules at community

centres and centres for foreigners. One of the places in The Netherlands where such training is given is the Centre for Foreign Women in Tilburg.

All participants on the bicycle course come voluntarily. The women who come to the centre are from different backgrounds and are from such diverse countries as Morocco, Turkey, Somalia, The West Indies, Iraq, Iran, Afghanistan, Venezuela, Portugal, Greece and Ghana. Some are girls, others young women and some are elderly. Some have a high level of education and others have not ever attended a course. There are working women, housewives, women looking for jobs and students. Some are sportswomen; others have never practised a sport.

All these women have different reasons to learn how to ride a bicycle. The following quotes illustrate some of the main reasons why women want to attend the bicycle courses:

- Judith from Kenya: 'Firstly because everybody was biking, I was the only one who was walking. And secondly to be more quick and independent'.
- Dilek from Turkey: 'It has to do with my freedom. In Turkey I could go anywhere independently, I had a driver's licence. That licence is not valid in The Netherlands, so bicycling was the only way to regain my freedom of movement'.
- Suzanne from Ghana: 'Bicycling is healthy and easy. I think I would be fatter if I did not ride my bicycle. Because I do not practice any sports, biking is my aerobics'.
- Cevriye from Turkey: 'I knew how to ride a bike, but after a collision with a car I did not have the nerve to get back on my bike and go into the traffic'.

A question that we regularly hear is: 'What about foreign men and boys? Don't they want to learn how to ride a bike?' Some 99 % of bicycle courses in The Netherlands are organised for women. For many years this has been taken for granted. Now that the courses for women are getting more publicity and people are beginning to recognise their success and value, some men and boys are asking to be involved as well. However, the truth is that most men and boys are not scared to participate in traffic on their bicycles at all, even without knowing the rules of traffic. Hardly any ask for cycling courses or traffic regulations courses, and as long as the Government does not force all new inhabitants to learn the rules of traffic for cyclists, there will hardly be any courses for men and boys.

49.4 A means of integration and emancipation

In Tilburg, women may take the cycling course at various meeting points in town, where they are trained in groups of nine. On average, 35 women attend the weekly course in Tilburg. There is a lot of demand for the course, as the

waiting list of 50 women demonstrates. Our experience in these courses has shown that learning to cycle can be an activity that contributes to the integration and emancipation of foreign women in Dutch society. It can help these women to:

- adapt to the local usages and modes of transportation;
- broaden their mobility;
- enhance their sense of equality;
- enhance their sense of freedom.

These are all aspects of integration.

If learning how to ride a bicycle is to contribute to emancipation, more than just teaching the mechanics of bicycling is required. The course material and approach should also aim at enhancing self-esteem. The teachers should treat all learners extremely respectfully, no matter how diverse the group is. The learners should be allowed to master the skill of cycling in their own individual manner (Fig. 49.4). The teachers should be open to new experiences and encounters in which they learn something as well. In this manner, learning how to ride a bike may be a process in which the learners enhance their self-confidence and sense of dignity through the process of learning how to cycle (especially if they thought they would never be able to do it). As Judith from Kenya says: 'I learned cycling, so I can learn anything'.

49.5 From bicycle lessons to the Cycling Centre

In the early 1990s I started to teach women to cycle. I started doing this as a volunteer in the Centre for Foreign Women. We were a small group of Dutch women that in fact had no idea how to do this well. In the process of learning how to teach cycling I tried to be open to the views and customs of all our different participants. I have learned to see how difficult cycling is; how different transportation needs are in various countries; how differently safety in traffic is regarded in different cultures, etc. Together with my collegues I have been able to develop a teaching method for cycling that can be used across cultures and countries. We have also developed course material for lessons in traffic regulations. Many women attending the course could not read or write Dutch well enough and learnt best by studying pictorial representations of traffic situations. With the aid of various subsidies we were able to develop and publish our own course material by 1996. We combined the introduction of this course material to a symposium on *Safety in bicycling and in traffic for foreigners*. This was our first step towards presenting the phenomenon of bicycle lessons for foreigners to the outside world.

The symposium netted us enthusiastic responses from course providers in other cities. Since that time we have sold the course material nationwide to over 400 clients in The Netherlands. We have also built up a network in

Fig. 49.4 Fatma masters the skill of cycling. Source: courtesy of Ton Toemen.

which we organise workshops, train trainers, course providers and volunteers and give advice on the telephone. In 2002 a second symposium was organised on the subject *All children have the right to learn to cycle safely*, as there are far too few schools and organisations that train children from foreign backgrounds to cycle safely. All these activities stem from the Cycling Centre.

49.6 Nationwide bicycling activity

As yet, no research has been done on the phenomenon of bicycle courses and lessons about traffic regulations in The Netherlands. As to the scale of activities,

in Tilburg (1 of the 10 biggest cities in The Netherlands with some 190 000 inhabitants), the following can be reported. After the presentation of the cycling centre's course material in 1996, members of the municipal Department of Road Safety in Tilburg provided the centre with extra annual funding to enable us to organise and execute the courses in a professional manner. The centre has now begun work with other organisations in Tilburg. In 2001 it had 80 participants who, on average, needed 18 bicycle lessons and 8 traffic regulations lessons to finally take part in traffic independently and safely. However, the impact of the cycling courses is not limited to the 80 women themselves. Most of the participants are mothers, who are strong role models for their children. A mother who cycles regularly will stimulate her children to cycle and to do it as safely as possible. In this manner the cycling courses will work as a catalyst to promote bicycle use amongst foreigners living in The Netherlands.

As to the scale of the activities on a national level, the following estimations can be made. There are roughly 300 centres (community centres, centres for women, centres for refugees, schools etc.) where such courses are given to foreigners. At least 20 people per year are taught at every centre. In some schools this number is much higher, up to 150 pupils (girls and boys) per year. This means that at least 6000 foreigners follow a bicycle course in The Netherlands every year. In most places there is a lack of funding and not enough good teachers. Time and money are wasted because people set out to reinvent the wheel, so to speak, but the Cycling Centre aims to change this. By publishing and distributing our methodology and materials we hope to contribute to the improvement in quality of the courses elsewhere and we hope to increase the number of courses. Publication will also help to make the courses visible to a greater public and to show that they are essential for many foreigners if they wish to fully integrate into Dutch society.

49.7 The role policy-makers can play

It has taken approximately 15 years, from the early 1980s to 1996, for our courses in Tilburg to get the necessary extra subsidies that allowed us to organise and execute them in a professional manner. In many places in The Netherlands there is still no extra budget to do so. There are a number of reasons for why this is the case:

- civil servants, politicians and sociological researchers do not know the phenomenon 'bicycle and traffic lessons' exists, or they do not acknowledge its importance;
- the position of foreign women and their organisations in Dutch society is marginal and virtually invisible;
- in general, road safety is viewed in terms of physical measures rather than through an educational approach;

- bicycling is simply too common in The Netherlands, so most people do not stop to think that there might be people that do not dare to get on a bike;
- to many larger organisations for foreigners in The Netherlands, bicycles are seen as low status and the subject of traffic in general has no priority;
- for cycling organisations and organisations for traffic safety, on the other hand, stimulating foreigners to ride a bicycle has no priority either.

However, for policy-makers on the local level there is the chance to do something in this field. Many people are interested in joining a cycling course and are motivated to use the bicycle in their daily lives. Unfortunately, many organising centres lack money to deliver good quality courses. With financial support from local government, the quality of the courses could be improved and the number of participants per year could rise. The budgets needed are very small, especially if compared with the costs for constructing roads and cycle paths. The challenge for policymakers, together with social workers, schools and centres for refugees and foreigners, is to think of ways to tempt all foreigners that come and live in The Netherlands to include cycling in their daily lives.

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50

Network promotion: increasing bicycle use in Perth, Western Australia

Colin Ashton-Graham, Government of Western Australia, Australia

50.1 Introduction

This chapter examines the successful revival of cycling within the Metropolitan area of Perth, Western Australia. A combination of infrastructure, service provision, promotion and travel behaviour change tools have been applied to partially reverse a 15 year decline in walking, cycling and public transport use. Measures of success and evaluation of the outcomes are presented that support the continued investment in the Perth Bicycle Network and TravelSmart programmes. Operational lessons are shared and future programme proposals are set out.

50.2 'Perth – a City for cars'

'Perth – a City for cars' is a tongue in cheek sticker produced by community activists that are against a planned road extension near the port city of Fremantle. Whilst it is likely that the campaign against the road will be won, the wider picture of Perth's infrastructure and travel patterns supports the intended irony of the community concern. The city has near world record levels of car use with some 80 % of all trips being made by car as a driver or passenger. The share of trips made by 'green modes' are 12 % by walking, 6 % by public transport and just 2 % by cycling (Socialdata Australia, 2001a). Perth has also achieved a remarkable homogeneity with just a few mode share points difference between the travel patterns of suburbs near the city and of the rapidly developing outskirts. This transport homogeneity is born of the high availability of road space throughout the urban area. Perth, like Los

Angeles, has planned for peak hour road capacity and it is quicker to travel by car to almost all destinations for the majority of its 1.4 million residents. The affluent population chooses car ownership to near saturation levels of 679 vehicles per 1000 residents.

The potential to reduce the level of car use in Perth is assisted by mobility patterns similar to those of a European city. More than 40 % of all trips made are less than 3 km in length and almost 60 % of trips are less than 5 km. A flat topography, dry climate and availability of public open space also make the city theoretically suited to walking and cycling. These potentials are examined in more detail later.

50.3 Transport policy context

The combination of an increasing propensity to use the car and a rapidly growing population suggest that Perth would experience a doubling of traffic by 2029 over mid-1990s' levels. The environmental, health, lifestyle, urban amenity and equity issues associated with a doubling of traffic led the Government of Western Australia to adopt a strategy to counter these traffic trends (Government of WA, 1995). The Metropolitan Transport Strategy (MTS) set targets to double the share of trips by cycling and public transport and to increase walking by 25 %. The MTS was supported by plans for a Perth Bicycle Network (Transport WA, 1996), travel demand management initiatives (Transport WA, 1999), walking development (Transport WA, 2000) and public transport innovations (Transport WA, 1998). Many of these programmes remain part funded and are compromised by a continued road building programme.

50.4 Balanced transport implementation

A number of implementation programmes are working to add balance to transport provision in Western Australia. The major levers being applied are provision of infrastructure; reallocation of road space; corridor planning driven by outcomes; community empowerment; information and persuasion; pricing signals and supply control. Many of these programmes work in close concert under the co-ordination of a Balanced Transport Systems team in the State Government.

The Perth Bicycle Network (PBN) Plan is a strategic network for the metropolitan area. Delivery is envisaged over 12 years, in 3 stages and within a €70 million budget. Once completed, the strategic network will provide 1400 km of path and on-road cycling facilities. The €17 million first stage is completed and the second stage has commenced with partial funding commitment. A public transport plan includes new 'smart-card' ticketing

technology, a cost neutral restructuring of services to provide high frequency bus corridors, improved stop-specific timetable information and the construction of an €800 million new rail line to the southernmost regional centres.

TravelSmart Individualised Marketing is a 10 year, €17 million programme to offer households practical information and motivation on using alternatives to the car. The approach has demonstrated substantial car traffic reductions. The first 2 stages of delivery are funded by €4 million and are due for completion in mid-2005. Upon completion of Stage 2, TravelSmart Individualised Marketing will have been offered to more than 10 % of the metropolitan population.

At the community level, 10 of the 30 Metropolitan local governments are engaged in a process to develop TravelSmart action plans. Travel survey data are used to lead a community learning process aimed at achieving culture change within the community and local government. A series of Integrated Transport Plans have achieved strategic outcomes such as the reduction of land reserves for future roads that would have destroyed properties, and the construction of a new bus bridge to provide an alternative to a congested road crossing of the railway.

For the Central Business District (CBD) a Perth Parking Policy has been established to limit increases in parking supply through development control. The supporting Perth Parking Management Act (1999) established a license fee for all non-residential parking in the CBD area. The revenue from the licencing system is hypothecated into provision for public transport, cycling and walking facilities in the area. The revenue raised in 1999/2000 was €2.2 million, and property managers chose to take out of commission an estimated 6000 parking spaces of the 60 000 available (Brown, 2001).

50.5 The planning process – potential for change

In 1995, the Perth Bicycle Network Plan was developed through a process of community involvement which generated preferred bicycle routes and identified barriers to access. The draft network was then surveyed to identify required works and to cost and prioritise the network. Best practice elsewhere (Mathew and Graham, 1995) was used to shape a network which includes extensive on-road routes, strategic shared paths and end of trip facilities. The network signage was not defined in the original works surveys and was developed in 1997 in readiness for the completion of the first routes.

The behavioural component was developed under the TravelSmart message between 1997 and 2000 (see Chapter 29). Investigation revealed that lack of social acceptance, or an informed preference for the car, dominate the reasons why cycling and walking are not used more. By contrast, public transport is not used because of a lack of awareness of the services available. More detailed analysis of these levels of awareness, acceptance and motivation are

used to inform the type of information campaign that can be best applied to ensure that the bicycle network and public transport services are more fully utilised.

50.6 Perth Bicycle Network implementation

The components of the Perth Bicycle Network are:

- Local Bicycle Routes (LBRs) – signposted routes on low-trafficked local streets providing access to local facilities. Priority is provided by constructing path sections to link culs-de-sac street systems and constructing crossing facilities of major roads.
- Principal Shared Paths (PSPs) – High quality arterial routes along the five freeway/rail corridors linking major regional centres to the CBD. In Stage 1 the system is being constructed to provide key road crossings and 3 metre wide path alternatives to hostile road environments, the remainder of the system being on low-trafficked streets. By completion of Stage 3 the Principal Shared Paths will be fully separated from road traffic (see Fig. 50.1).
- Regional Recreational Paths (RRPs) – a system of paths through green corridors and along the river and coastal foreshores. Path provision is determined by demand ranging from 2.5 metre shared paths through to 5 metre separated pedestrian and cycling facilities. Recreational paths serve both recreational and commuting usage.
- Priority Spot Improvements (PSIs) – 20 major barriers to cycle access are identified for priority works, such as new bicycle bridges and underpasses.

Fig. 50.1 A Principal Shared Path (PSP).

- Central Area Access – projects to link together the arterial routes through the CBD and to establish links to major trip attractors such as office developments and retail areas.
- Generic Improvements – an unallocated pool of funds to fix common problems such as obstructions in paths, poor kerb ramps and for the installation of bicycle lanes.
- End of Trip facilities – an unallocated pool of funds for provision of cycle parking in public places.

Some 86 % of the network coverage is made up of Local Bicycle Routes at a cost of 12 % of the programme budget. Other budget allocations are 51 % to Principal Shared Paths, 12 % to Spot Improvements, 12 % to Recreational Paths, 5 % to CBD access and the remainder to parking and generic projects.

The programme was scheduled to commence with the low expenditure, high coverage Local Bicycle Routes and build up to the more complex tasks of construction in the rail reserves and on the foreshore areas. It has taken 5 years to complete 90 % of PBN Stage 1. One per cent of the network (by distance) proved unfeasible due to land ownership or control issues. The Principal Shared Paths are behind schedule due to complex leasing arrangements and problems with the management of design issues associated with the proximity of the electrified rail operation. Stage 1 of the programme is substantially complete and Stage 2 has commenced with partial funding commitment in place. The achievements of Stage 1 have been:

- securing flow of funds from the roads budget into the bicycle network;
- securing land from the railways to create Principal Path corridors;
- agreement from 29 of the 30 local government authorities in Perth to support and part fund the network concept;
- construction of a Shared Use Path through the CBD;
- delivery of most of the major structures required to provide safe access;
- completion and signposting of all the Stage 1 on-road Local Bicycle Routes;
- upgrading of sensitive river foreshore paths;
- user satisfaction with the new routes at 65 % and satisfaction with priority routes at 90 %;
- bicycle use up by between 20 and 50 % (depending upon survey location) between 1996 and 2001.

50.7 Promotions – maximising the use of the asset

The construction phase has been supported by five promotional initiatives:

- Signage of the routes – 6000 signs were erected as Stage 1 routes were completed. The signs are a combination of route codes on directional arrows and full destination and distance finger boards. Signage at every

direction change, or at least at every 500 m is used to maintain legibility of the preferred on-road bicycle routes.
- Information products – Perth Bicycle Maps (and more localised Access Guides) have been produced to provide full information on the network of paths and streets.
- Media openings – a few of the more expensive or striking projects have been officially opened at special public events or Parliamentary bicycle rides.
- Cycle Instead campaign – a strong cycling icon and call to action have been developed to tie in a range of promotions. A television campaign positioning cycling was run during the network construction phase. Follow-up radio media and participation events have been used to motivate cycle use.
- TravelSmart programme – Individualised Marketing has been applied to promote walking, cycling and public transport use to a population of 35 000 in South Perth. The results show that cycle use increased by 61 %, but that the increase was predominantly from existing cyclists making more trips (Socialdata Australia, 2001b). Substantial increases in public transport use and walking, combined with a 14 % reduction in car trips, have justified the expansion of the TravelSmart programme to 150 000 of the population by 2005 (see Chapter 29).

50.8 Monitoring outcomes

A series of screen lines, spot counts and cordon counts (collectively known as Group A sites) was established in March 1998 (the first year of the Perth Bicycle Network programme) to record base line usage and to monitor progress year on year. Screen lines record the migration of users from existing corridors of streets onto new facilities, spot counts provide information on rising usage for isolated facilities such as foreshore paths; and cordon counts provide a picture of the trend in overall bicycle use. In addition to annual counts, an intercept survey was established to record user awareness of the network and satisfaction with the facilities. The most striking results are:

- between 1996 and 2001 the Perth CBD cordon counts show a steady increase in cycle use of 20 %. For the same period the Fremantle (regional centre) cordon counts show a steady increase in bicycle trips of 60 %;
- a 13 % increase in usage across the Local Bicycle Route corridors between 1998 and 2000 (n = 861);
- a 10 % migration of users from alternative roads onto completed Perth Bicycle Network routes;
- a 53 % increase in usage (1999–2000) of newly upgraded/constructed Spot Improvements, Principal and Recreational Paths (n = 2481);
- a 165 % increase (1999–2001) in usage of the Principal Path alongside

the Freeway following the installation of a bicycle bridge crossing a major highway (n = 228);
- a 188 % increase in usage (1999–2001) of a foreshore path, upgraded from a rough and constrained 2 metre wide path into a top quality 3 metre wide facility (n = 317);
- a 167 % increase in usage of a busy foreshore path following duplication for pedestrian and cycle use (n = 142);
- intercept surveys recorded 64 % satisfaction with the facilities in 1999 (ARRB Transport Research, 2001; see Fig. 50.2).

The outcomes of the TravelSmart programme were monitored using random sample travel diary surveys. Surveys reporting one day of travel for 700 households before and after the intervention are combined with a neighbouring control group to provide a very complete travel behaviour measure. The results (Fig. 50.3) show that the travel behaviour change intervention increased cycle use by 61 % and reduced car driver trips by 14 % (Socialdata, 2001b). These changes were sustained more than 18 months after the intervention, and reduced the share of car driver trips below the level measured in a Perth-wide travel survey in 1986.

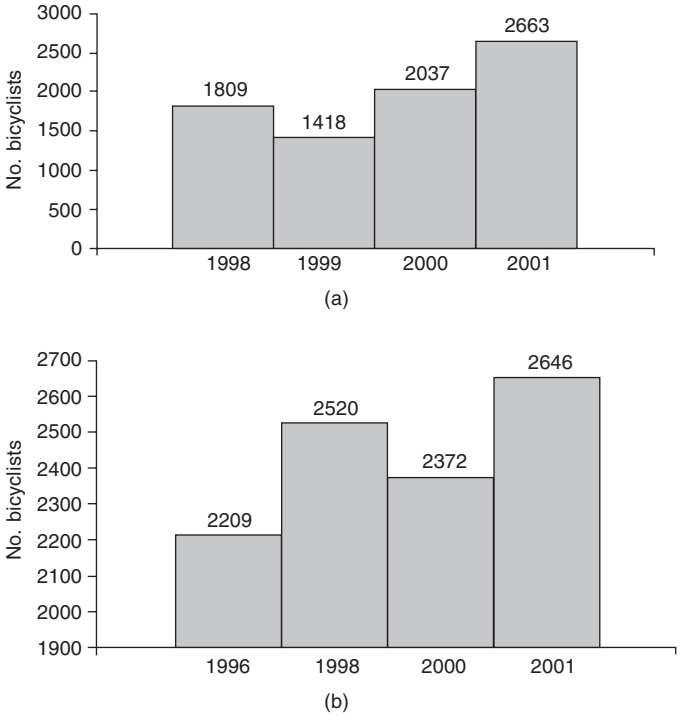

Fig. 50.2 Numbers of bicyclists: (a) aggregated scores for Group A sites, 1998–2001; (b) aggregated scores for Perth Central Business District, 1996, 1998, 2000 and 2001.

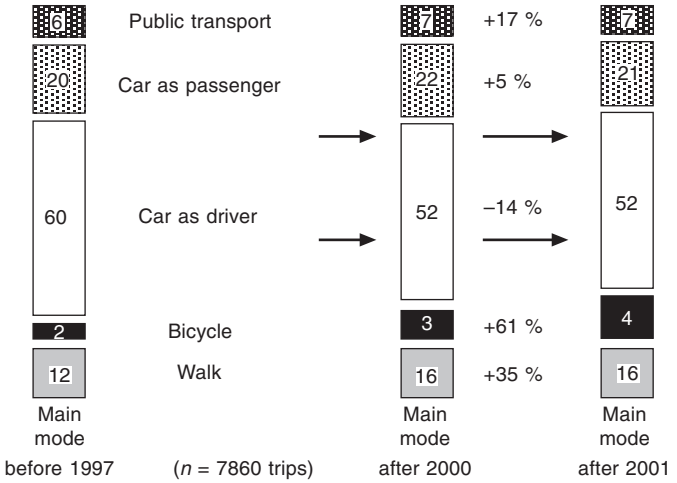

Fig. 50.3 Impact of TravelSmart Individualised Marketing on 35 000 residents of South Perth. Source: Socialdata (2001b).

50.9 Evaluation of impact

The Perth Bicycle Network has been a success in attracting new bicycle trips and in achieving migration of existing trips onto preferred (safer) routes. A basic socio–economic analysis of the impact of the PBN and associated *Cycle Instead* campaign can be generated using cordon count data and derived benefits from shifts to cycle use. The costs of Perth Bicycle Network Stage 1 and the data on bicycle usage trends and actual outcomes when discounted over 10 years suggest a benefit to cost ratio of 6:1. To perform this calculation, the value of additional bicycle kilometres are taken to be 10 euro cents, based upon the benefits of displacing a proportion of car kilometres less the costs of operating a bicycle (health benefits and accident costs associated with bicycling are assumed to be equal).

The localised TravelSmart Individualised Marketing programme has been evaluated (Ker and James, 1999) as generating a benefit to cost ratio of 16:1. This analysis assumes that the impacts of the intervention are lost over a 10 year period. Evidence to date shows that the impacts were fully sustained for two and a half years following the pilot intervention. If the impacts are not lost, the benefits may be in excess of 30 times the cost of the intervention (Transport WA, 2001 and Ker, 2002).

50.10 Lessons

The following lessons have been learnt:

- Plan the project budget with a start year for design work only. This is

important to avoid under-expenditure in the first year. The Perth Bicycle Network project was approved part way through the first financial year, and with four broadly equal years of budget. The schedule could not be met and the project manager's time was diverted into negotiating funding variations.

- Scope projects and commence land ownership negotiations and development approvals prior to the first budget year. The range of ownership, environmental, heritage and risk management issues associated with path construction away from road reserves can be complex. It took 18 months in Perth to secure leasing arrangements between State Government agencies sufficient to enable construction of paths in rail reserves.
- Facilitate, encourage and reward local government partners. Most cycle routes will be in road reserves controlled by local government. The integrity of a regional network depends upon agreements as to the alignment, standard and schedule for facilities. The Perth Bicycle Network worked well in this respect because it employed a regional co-ordination team of three staff who were able to liaise with local government staff.
- Push the design envelope. A lack of experience in providing for cycling at the local level can lead to a conservative approach to facility design. In Perth the Local Bicycle Routes suffer from under-design because the main roads authority will not sanction bicycle lanes at minimum widths commonly used elsewhere in the world. The Principal Shared Paths suffer from over-design, such as attempting to meet three per cent gradients on bridge structures, which resulted in expenditure exceeding the budget.
- Prioritise and spread capital intensive projects. It is important to generate expectation and frustration as part of the process of funding a long-term programme. The Principal Shared Paths in Perth were constructed in short sections according to prevailing road safety issues across the network. The impact of this strategy has been to establish incomplete, yet functional, routes quickly and to generate pressure to find more budget to complete the 'missing' links.
- Set up area-wide monitoring. Precisely because cycling is efficient and low impact it is difficult to demonstrate increasing usage. By setting up screen line, cordon count and intercept surveys the Perth Bicycle Network has been able to demonstrate real support and transport outcomes.
- Integrate bicycle network provision into broad strategies. Traffic management and road and rail construction present the opportunity to provide for or destroy cycling facilities. The Perth Bicycle Network plan was produced as a local map, laminated and given to road agencies. It hangs on the office wall of most senior engineers in Perth. Attention to the planning process has secured the construction on a number of PBN routes as part of other major works.
- Put equal funding and emphasis on engineering projects and behavioural solutions. Travel behaviour change techniques are emerging as a very

effective tool for increasing cycle use. In Perth the happy accident of adding TravelSmart Individualised Marketing to the basic Perth Bicycle Network in South Perth produced a rapid growth in bicycle mode share, equivalent to the ten year targets for many cities worldwide.

50.11 Conclusion

The Perth Bicycle Network has been a major stand-alone success, attracting both current and new bicycle trips to it within the first four years of implementation. Whilst there is no direct evidence to link the broad *Cycle Instead* campaign to bicycle use, it is reasonable to assume that increasing the profile of cycling will add value to the network. The stand out success is TravelSmart Individualised Marketing which delivers rapid increases in cycle use independent of network provision. As a package of measures the PBN and TravelSmart deliver transport outcomes at a fraction of the cost of road capacity projects. In addition to financial savings (deferred road building) the package delivers multiple health, social and environmental benefits.

By the end of 2003 the Government of Western Australia will have invested €26 million, over a period of 6 years, in delivering a strategic bicycle network across Perth and a travel behaviour change programme to 150 000 people. The next steps in Western Australia are to mainstream the PBN and TravelSmart into fully funded and long-term programmes.

The views expressed in this chapter are those of the author and are not necessarily representative of the Government of Western Australia.

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Updates on the TravelSmart programme and links to the Perth Bicycle Network can be found on the website (www.dpi.wa.gov.au/travelsmart/).

51

Promoting cycling in Italian cities: the case of Padua

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51.1 Introduction: changing attitudes to the urban environment

A sustainable transport strategy became a necessity for the municipality of Padua in the 1980s, with a dramatic increase in car traffic and its damaging impact on the urban environment. Most of this increase occurred in the historic city centre, where most of the city's shopping and administrative facilities were based, together with its famous university. All these sectors expanded significantly in the post-war period, within a framework of existing buildings and a largely unchanged street network, still shaped on roman and medieval patterns. However, similar problems of congestion also developed with the growth of the city beyond the historic centre. This growth depended on the old radial road structure of the pre-industrial city, based on the network of medieval town gates, and was characterised by a thick ribbon development sprawling along the main routes out of the city.

By the 1980s the resulting congestion was overwhelming the transport infrastructure throughout the city and its suburbs. Research suggested that almost 130 000 people (55 % of the total population) made two or more daily trips, mainly to and from the central business district and shopping area. At the same time, a new environmental awareness began to develop, not least amongst city officials personally affected by the impact of congestion and pollution on their quality of life. They and others became increasingly concerned about the need to preserve the city's heritage which was seen as central to its identity and economic well-being. As a result, Padua was one of the first Italian cities to participate in the *Healthy Cities* programme sponsored by the UN World Health Organisation (WHO) and to sponsor research in sustainable development.

In the 1980s the regional government asked the city administration to prepare an up-to-date development plan for the city designed to regulate all future urban development, including traffic management and environment quality. It was recognised that investment should not just be channelled into controlling motor car use, but that equal resources should be given to promoting alternatives to a population more and more likely to feel reliant on car use to meet their transport needs. A key underlying principle in transport planning was to increase the number of short distance trips made by cycling and walking, and to make public transport an attractive choice for longer trips. As part of this overall process, the municipality set up a special advisory group in 1986 with the task of preparing a cycle path and pedestrian walkways master plan, which was completed and approved in 1989 with detailed schemes for the inner city and 2 suburban recreational areas. This plan took as its starting point one encouraging fact. Research suggested that the number of daily trips by foot or bicycle within the inner walled city in particular (30 % for pedestrians and 10.5 % for cyclists) was comparable to the number of trips by car (44 %) at the end of the 1980s, with public transport accounting for the remaining 13.5 %. Cycling in particular was still regarded by many of the city's inhabitants as an established feature of city life. A key element in transport planning was to support and encourage this existing cycle culture.

51.2 The planning timetable

The whole network was planned in three phases. Phase A (around 35 kilometres) was designed to provide the most basic and urgent infrastructural improvements to the central city area and key districts. Its objective was to achieve key short-term improvements which would reinforce the value of the following phases. In particular, it sought to integrate several existing or planned cycle paths which had developed in isolation. A number of cycle paths were developed to run across the city (particularly from north to south), linking the rail and bus stations, the university complex, the central shopping area and key housing areas lying outside the city centre (Fig. 51.1). Phase A has cost an estimated €1.6 million. Phase B (about 35 additional kilometres) was designed to complete the overall infrastructure so that all districts had a basic link into the city centre. It was planned to start three years after Phase A with a three year completion schedule. This phase, costing an equivalent amount to Phase B, provided the foundation for Phase C in which individual districts gradually built up the network in their own areas at an estimated cost of over €2 million.

Initial planning concentrated on meeting essential safety requirements whilst ensuring speed and economy of construction. This was possible because many of the existing streets could be adapted with limited additional construction. Around 90 % of the network was developed from existing pathways, with only 10 % requiring building from scratch. The main initial

Fig. 51.1 From the railway station a direct cycling and walking route was developed to link the bus station, university campus and city centre, to form a new route through the disused gas-works area.

investment was focused in such areas as reshaping crossroads and signposting. Substantial investment was restricted to a few strategic points to ensure the maximum efficiency of the network as a whole. Following the examples of similar schemes in Delft (The Netherlands) and Münster (Germany), it was assumed that increased cyclist and pedestrian use of the new infrastructure would allow a second phase of more substantial investment to maintain and improve the network.

51.3 Planning principles

Promoting cycling immediately raised the issue of safety. The largest number of injuries and fatalities through road accidents are in an urban setting with non-motorists more likely to be injured or killed than motorists. It was essential to take action to deal with the perceived (and indeed real) dangers to pedestrians and, in particular, cyclists posed by motorised traffic. Measures were introduced to limit the flow of motor vehicles into the city centre and to develop parking facilities linked to public transport. The main solution, however, was to develop a dedicated infrastructure for cycling and walking. A standard design feature for cycle-ways has been protection for cyclists. Where they could not be diverted away from motor traffic altogether, or very clearly separated, cycle-paths were raised to pavement level or semi-raised to demarcate them clearly from the road. All cycle-paths are designed to allow two-way flow on one side of the street to make the best use of space and to make it easier to manage intersections with other routes. These standard design features ensure that cyclists feel safe and enjoy a sense of autonomy (Fig. 51.2).

To be genuinely useful and convenient, the cycle and walkways network needed to be a multi-purpose infrastuctural web supporting the varied and changing trip requirements of individual cyclists. It needed to embody the sense of freedom and flexibility regarded as one of the most important reasons for cycling as a mode of transport, providing the potential to travel direct from door to door. In doing so, it could be contrasted with the constraints of driving and parking a car and the relative rigidities of public transport in reaching a city destination. Such an infrastructure was created by identifying all the destination points of interest to most citizens and then connecting them using the most suitable route. Planning also involved ensuring that the city centre was linked to each surrounding district and that districts were linked to each other. Despite the constraints of the existing transport infrastructure, it proved possible to develop a substantial infrastructural web which, within the municipality, could provide up to 300 km of dedicated, protected cycle-ways and walkways, accounting for one-third of the existing municipal street pattern (Fig. 51.3).

A key element in developing this infrastructure was flexibility in building up the individual links in ways appropriate to local circumstances and resources. The central planning team provided basic co-ordination, setting common design criteria to fit local environment resources and to ensure that they linked effectively into the network as a whole. It also provided specific cycling expertise, to manage and also reshape intersections where one line of motor traffic crossed another and presented a potential safety risk for the users of the walk and cycleways web. In many cases, local links in the network needed little building work but relied more on improved traffic management, such as traffic calming and dedicating more space to pedestrians with clearly demarcated cycle-ways to allow cyclists to share such areas with pedestrians. Building work was restricted to dealing with major barriers to the network such as main roads.

Fig. 51.2 The most common cycle routes in existing streets are the result of a reduction of the carriageway, often reducing motor traffic to one-way and reshaping parking. Cyclists are protected by a continuous line of twin concrete kerbs or by raising the cycle route.

As a result of this new infrastructure, cycling and walking allow citizens and visitors to enjoy more fully those features that make Padua a rich urban environment: the walled inner city, the range of historic buildings, the maze of picturesque streets and waterfronts, lively squares and markets. All of these features were not only inaccessible to car drivers but were spoiled by car dominance. The cycling and walking network was laid down in such a way that the main historical, cultural and social spaces of the old city fitted quite naturally into the general scheme. The result has been to preserve the

Fig. 51.3 Layout of Padua's general scheme for cycle routes and walkways, which shows that approximately one-third of the municipal street network could be used with minimal change to create a complete and coherent system of reserved and protected routes all over the city.

old city in a way that is beneficial to the environment, individual citizens and the city's economy. The old roman crossed pattern of streets became the blueprint for the inner city cycling and walking plan. According to the detailed scheme for the inner core, the site of the city's medieval walls has provided particular opportunities for walkways and cycle paths, for example along the embankments of the canals that were later built along the line of the walls. As an example, the 11 km long Venetian wall provides a continuous cycle path and walkway for moving around the city and doubles as a tourist attraction (Fig. 51.4). It has also allowed the city authorities to conserve the remains of the city walls more easily because they have become an important part of the transport and economic infrastructure.

An additional feature of central planning of the cycle path and walkway network has been the objective of linking, where possible, the green spaces in the city such as parks and river and canal banks. Cycle routes through parks, for example, have proved a useful way of avoiding busy roads, as well as a way of encouraging full use of such green spaces. Indeed, the network has provided opportunities for planting many more trees and plants within the built environment. An example is creating green borders to cycle paths to provide a barrier separating the cycle path from motorists and to prevent parking on the cycle path whilst, at the same time, improving the local environment (Fig. 51.5).

Finally, the development of the network has, with limited additional investment, allowed the authorities to improve the appearance of the city's streets generally and has contributed to improving the quality of some more

Fig. 51.4 The layout of cycle routes and walkways tries wherever possible to combine utility and amenity, and underlines features such as the Venetian wall and adjoining green ramparts, now turned into a park.

deprived neighbourhoods. An improved transport infrastructure, with easier access to work, shops and schools, has made a number of districts more attractive, encouraging new residents who, in turn, could attract new investment and amenities. With the exception of a few historic sites, which required special treatment, the network was built with common basic construction features. These included the use of pale red natural gravel for paving of cycle paths (based on Dutch experience), an emphasis on horizontal rather than vertical barriers protecting cyclists and signposts specially designed for cyclists. These common features should help make the network look distinctive, raising its profile and encouraging greater use by cyclists.

51.4 Conclusions

In summary, the cycle path and pedestrian walkways scheme was conceived as a comprehensive multi-purpose tool to promote the greater use of walking and cycling for short distance commuting, and increased use of public transport for the mid- to long-distance commuter via a better integrated transport system. It was hoped that the scheme would support a broader improvement in the quality of urban living with resulting economic and other benefits, making best use of the limited financial and technical resources available to the municipality.

The development of an infrastructure for walking and cycling has been in progress for over ten years. Whilst Phase A has been completed, Phases B

Fig. 51.5 Green spaces on the outskirts of the city often provide an ideal location for cycle routes. There is also the opportunity to improve these otherwise neglected areas at the same time.

and C are still ongoing, several years after their planned completion dates, because of financial constraints and political delays. Despite these delays, the scheme has still achieved its main goal in controlling car use. Facing an estimated 20 % increase in car ownership in the city between 1991 and 2001, the proportion of trips within the city made by car reduced slightly from 44 % to 43 %. Cycling has increased its share from 10.5 to 18 % of trips in this period, whilst walking has reduced from 32 % to 18 % in favour of public transport, which has increased its share from 13 to 21 %. Phase A has

been completed with a number of changes from the original plan. The main difference has been in the large parts of the city centre originally planned as pedestrian and cycle-only areas. In practice, the use of traffic calming measures, developed under two later traffic management plans, has allowed mixed use of these spaces by cars, pedestrians and cyclists. This compromise has allowed the main goal of controlling car use to be achieved, and it has met the demands of local shopkeepers and residents. However, this solution has been criticised on broader environmental grounds as not achieving the goal of true urban sustainability and reducing the potential attraction of a car-free city centre.

Some cyclists persist in using the traditional road network, despite the existence of dedicated cycle paths, partly out of habit and partly because the infrastructure is not complete in some areas of the city. There also remain conflicts of interest between motorists and cyclists with, for example, a persistent level of parking on cycle paths by commercial vehicles, especially in the city centre. However, the experience of a number of European cycle cities like Padua has shown that, with the right municipal vision and commitment, the building of a relatively inexpensive cycling and walking infrastructure can provide a significant step towards realising the dream of an alternative city with a richer and more sustainable quality of life for its citizens.

52

Promoting walking in British cities: the case of York

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52.1 Introduction

In July 2001, the City of York Council launched a travel awareness marketing campaign to promote and increase walking in the city. The campaign focused on promoting the health, social and environmental benefits of walking, in particular for short journeys. The campaign also attempted to deconstruct some of the appealing but often misleading language and imagery of motor industry advertising. Developed with support from the Selby and York Primary Care Trust and The Pedestrians Association, the campaign ran until February 2002. The walking campaign has now been used by eight other local authorities, including Fort Collins, Colorado and has been praised by health and transport professionals from California, Brussels and Australia. This chapter discusses the development, implementation and results of the travel awareness marketing campaign conducted in York. It argues that advertising campaigns are a low cost and effective measure to reduce car dependency and encourage walking.

52.2 Links to transport strategy

Since the early 1990s, walking has been at the forefront of York's transport strategy. In 1992, York was one of the first local authorities in Britain to adopt a walking strategy. This document, since updated and revised, has provided the blueprint for many other similar documents around the country. Two of the key aims of this strategy are to encourage more walking in York in order to enable more people to benefit from improved fitness and health

and reduced stress, and to reduce the use of motor vehicles and levels of congestion.

At the heart of the city's transport strategy lies a commitment to a 'hierarchy of transport users', which recognises the importance of promoting less environmentally damaging modes. First published in 1988, the hierarchy has been updated and the full order of priority of this hierarchy, as published in the City of York Council's Local Transport Plan (LTP) (2000) is:

1. Pedestrians
2. People with mobility problems
3. Cyclists
4. Public transport users (includes rail, bus, coach and water)
5. Powered two wheelers
6. Commercial/business users (includes deliveries and HGV)
7. Car-borne shoppers and visitors
8. Car-borne commuters

Over 16 % of all journeys to work in York are made on foot and within the main urban area this figure increases to 23 % (City of York Council Local Transport Plan, 2000).

52.3 Objectives of the campaign

The campaign aimed to contribute towards the objectives of York's walking strategy, by raising awareness of the benefits of walking and increasing its appeal and credibility as a viable mode of transport. Specifically, the objectives of the campaign were:

- to increase walking and reduce car use in York, particularly for the journey to work but also for other trips as well;
- to raise awareness amongst York residents of the benefits of increased walking, particularly better health, and the health risks from high levels of car dependency.

The walking campaign also aimed to readdress the imbalances of image and perception between the motorised vehicle and non-car modes. It looked to test whether it was possible to begin to challenge the pervasive car culture and the domination of car industry advertising with a marketing campaign that was different (at least in local authority circles) and, as a result, noticeable and persuasive amongst the public.

52.4 Campaign strategy and plan

The central tenet of the campaign strategy was that walking needed to be promoted in a campaign of its own. Consequently, it was decided to focus

exclusively on walking, which in the past had always been the poor relation of the 'cycling and walking' double act. Although walking is at the apex of York's hierarchy of transport users, it had been cycling that had taken centre stage and earned the city its reputation as one that promotes sustainable transport. It was thought that walking deserved the spotlight for a while, not least because new evidence was coming from employer travel surveys that was beginning to show that some car drivers, particularly women, might consider switching to walking rather than cycling.

The campaign strategy was also informed by the work of Professor Chris Wright, who has argued that 'de-marketing' the car may be one of the most valuable and low cost tools available to transport professionals wanting to reverse society's dependence on motorised vehicles. Wright and Egan (2000) argue that the car as a status symbol and an extension of the driver's personality needs to be dispelled in order to reduce car dependency. Consequently, the campaign aimed to imitate the style and language of car advertising to promote walking and in the process expose some of its implicit claims regarding the pre-eminent place of the car as a mode of transport.

Research and analysis of car advertising within the media illustrated a range of messages, emotions and styles upon which to base the walking campaign – a sense of freedom, attractive lifestyle images and family values being strong throughout. The campaign therefore captured these vital components and applied them to walking, presenting the mode of travel in an alternative light. Figures 52.1 and 52.2 show two of the campaign images.

Fig. 52.1 '0–60 paces in 29.7 seconds' walking campaign image. Source: courtesy of City of York Council (2000).

Fig. 52.2 'Life support machines' walking campaign image. Source: courtesy of City of York Council (2000).

'0–60 paces in 29.7 seconds . . .' encompassed the traditional measure of performance in sports cars whilst at the same time illustrated that, for shorter journeys, walking is often a quicker, healthier and more convenient alternative. 'Life support machines . . .' looked to address the protective perception of cars in the family environment. The inclusion of adult and children's footwear, arranged in positions to mimic a traditional family car, focused on the protective benefits of walking resulting through simple, regular exercise.

The strategy of the York walking campaign contrasted with the more traditional approach to travel awareness, which has been to focus on themed events, such as Green Transport Week (www.eta.co.uk), 'In Town Without My Car!' Day (www.22september.org) or Bike Week (www.bikeweek.org.uk). Whilst these events can be useful in raising awareness of some of the issues, it is suspected that the proliferation of awareness days and weeks, from the serious to the silly, may have caused campaign fatigue amongst the public. Moreover, another weakness of awareness raising events is that they can easily be ignored by the target audience by virtue of the fact that they are so short – the less committed can easily participate during an event, for example by cycling to work on a particular day, but revert to driving for the remainder of the year.

The walking campaign's strategy was to sustain a public presence over a longer period of time, therefore enabling the walking message to be repeated and reinforced. To achieve this, media space that car drivers were most likely to see, such as bus backs and the rears of city centre car park tickets, were booked for three month intervals. Postcards were produced and circulated to

the city's leading employers and city centre bars and cafés. The more traditional use of leaflets was abandoned because the car driving target audience would be unlikely to read through a leaflet explaining the disadvantages of car use and the benefits of walking. In addition, leaflets do not have the re-use value of a postcard. The campaign was unveiled to the media and public at a launch event to maximise media coverage.

52.5 Measurement and evaluation

Evaluation is an important part of any marketing or promotional campaign work. Undertaking some form of evaluation provides important feedback on successes and failures and can help to improve future campaigns and methods of targeting audiences. The evaluation consisted of 500 on-street surveys of York residents, aged 16 and over. The interviews took place at eight different locations around the city. Quota sampling was carried out to ensure the sample was representative of the York population (on a sample size of 500, results are accurate to ± 4.4 %). An independent market research agency was commissioned to undertake the evaluation in February 2002.

The evaluation aimed to address three specific areas; recall, message and impact:

- Recall and awareness. Did residents recall seeing the campaign? For a campaign to have any effect on behaviour it first has to been seen by the target audience. Measuring the level of recall would show to what extent the campaign had been able to compete with better financed campaigns for the attention of its target audience. This could also indicate whether the campaign had used effective media space.
- Message. Was the campaign clearly understood and interpreted accurately by its target audience? The campaign message needs to have clarity if the target audience are to change their behaviour as desired by the message sender.
- Behavioural impact. Had the campaign affected car drivers' behaviour? The evaluation asked questions to reveal whether the target audience had reduced their car use and instead increased their pedestrian trips as a consequence of the campaign.

In addition, the interviewee's opinions were sought on the appeal of the campaign images and whether they thought it was important for the local authority to run persuasive campaigns to reduce car use.

52.6 Results

52.6.1 Recall and awareness

The campaign had been seen by 32 % of interviewees. This was an increase on the previous two travel awareness campaigns run in York. Awareness levels were slightly higher amongst car drivers and considerably higher in households with a car in comparison with those that did not have access to a car (35 % and 21 % respectively). This indicates that the choice of media space was reasonably well targeted. Surprisingly though, awareness of the campaign was higher (43 %) amongst cyclists. This could simply be due to the fact that cyclists are often caught in traffic behind buses, therefore are exposed to the communication message for comparatively longer periods of time. In addition, the cycling community in York is active in promoting sustainable transport, and therefore is naturally going to be interested in an advertising campaign that contributes towards similar aims to its own.

Recall of the campaign was highest in the youngest age groups (16–24 and 25–34) and gradually decreased in each subsequent age category. Similarly, awareness of the campaign was highest amongst the AB social economic group and decreased in step with each social class. Respondents were asked which of the eight posters they recalled seeing before. Unsurprisingly, the results indicated that the posters used predominantly in the campaign leading up to the evaluation were remembered most of all. Three-quarters of respondents remembered seeing the posters on the back of buses, with higher levels of recall amongst car drivers and households with cars, presenting reassuring evidence that the choice of media had been correct. Only a small proportion recalled seeing the postcards, which questions either the validity of this choice of medium or whether the postcards were distributed to the right places.

52.6.2 Message

In addressing the second evaluation question, the results revealed that 77 % of respondents interpreted the campaign as encouraging more walking, with 66 % linking the walking campaign with promoting better health. In designing the campaign a concern was that the focus on footwear could lead to the campaign being misinterpreted as a shoe advertising campaign. The results showed that only 17 % of respondents interpreted the campaign in this way. Consequently, the evaluation demonstrated that most people exposed to it were able to understand and accurately interpret the message.

52.6.3 Behavioural impact

The evaluation asked respondents whether they walk more now than they did a year before. The results show that 40.6 % ($n = 28$) of car drivers (interviewees were asked how they usually travel to work) who had seen the campaign

reported an increase in their walking, compared with 29.6 % (n = 40) of car drivers that had not seen the campaign. The results, which suggest a modest effect on behaviour, are however not significant in such a relatively small sample size. Consequently, they can be seen as encouraging but more research is needed before it can be concluded that an advertising campaign to promote increased walking can be effective.

52.7 Discussion

Advertising by the competition (the motor industry) represents a continuous challenge to the desirability of walking and other sustainable travel alternatives. This arguably has a long-term effect of weakening the choice to walk, whilst also increasing the desire to travel by car. The car, arguably, has become one of the strongest status symbols in western society. The perception of the car as representing the individual's values, status and even their personality is reinforced by multi-million pound advertising campaigns (see Chapter 19). Some portray cars as a vital member of the family and an essential element within people's lives. The evocative messages of car advertising are, however, quite detached from the reality of car ownership and use. The open spaces and exhilarating, happy lifestyles that car manufacturers generate are very often in stark contrast to the experiences of the average daily commute.

Local and national government and other organisations that have used campaigns to persuade people to reduce their car use have shied away from using the tools of communication that appear to work so well for the motor industry. Instead, sustainable transport campaigns have traditionally focused on the realities of congestion, pollution, global warming and poor health. The use of negative evidence-based messages in sustainable transport communications seems to have failed to have any impact at all.

The walking campaign by comparison represents an early attempt to capture some of the evocative imagery and language usually employed by car manufacturers for an alternative mode. However, with limited resources for the campaign, total success was never to be expected and so the campaign needs to be placed in perspective. According to the Advertising Standards Authority (ASA) the total spent on UK car advertising in 1998 was in the order of £650 million (www.asa.org.uk). The walking campaign cost less than £15 000.

The results of the walking campaign and the interest generated amongst transport and health professionals, both nationally and internationally, testifies the potential for this approach to marketing and promoting alternatives to the car. As the infrastructure to enable journeys to be made by sustainable transport is developed there is, in turn, an increasing and real need to focus on the marketing and active promotion of these modes. In the same way that car manufacturers cannot expect a growth in sales of a new model without intensive marketing and promotion, local and national governments cannot

expect to see increases in walking, cycling or public transport levels without similarly intensive campaigns. As a result, it could be argued that the incentive to encourage society to reduce the use of cars needs to come increasingly from a marketing perspective.

52.8 Conclusion

York's walking campaign has succeeded in a number of different ways. On a local scale, it has continued to raise the awareness of sustainable travel issues in York and maintains the city's strong association with walking. In terms of travel behaviour, the evaluation of the campaign points towards a modest positive impact, although at the same time, recognising the statistical non-significance of the results which may be due to the sample size. This aspect of the campaign, whilst limited, should be viewed as encouraging and identifies a key area for research within further travel awareness campaigns.

In terms of style and imagery, the walking campaign has challenged the traditional approaches often used by local government in promoting sustainable transport. This new tactic has been widely praised and the campaign could therefore be seen as taking travel awareness a step forward into an alternative, exciting and hopefully successful approach. Through York's walking campaign, the issue of how local and national government undertakes travel awareness campaigns and promotions has been given a new angle. Finally, the walking campaign will have succeeded even further if, through the dissemination and discussion of the results in this chapter, a broader debate is generated addressing the role, style and need for travel awareness campaigns within local and national transport policy.

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53

The UK 'Walking the way to Health' Initiative

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53.1 Introduction

The 'Walking the way to Health' Initiative (WHI) is a major new UK venture. Its aim is to increase the health and well-being of disadvantaged and sedentary people by promoting regular and brisk walking within local communities. Over a two year period it has expanded from a pilot phase to a full nationwide initiative. Its main activities are to grant aid and support community based 'walking for health' schemes, to provide every volunteer and professional with training, to implement a nationwide accreditation system to recognise and encourage good quality in local schemes, and to monitor and evaluate the impact of the local schemes on the quality of life of participants.

The WHI is a joint initiative between a well-established health charity, the British Heart Foundation, and a new government body, the Countryside Agency. Extra funding comes from the UK lottery via the New Opportunities Fund distributing body and through sponsorship from Kia Cars as part of their 'Think Before You Drive' campaign. The WHI represents a convergence of interests for the British Heart Foundation and the Countryside Agency. The Foundation is the leading national charity fighting heart and circulatory disease – the UK's biggest killer. It funds research and increasingly education programmes and life saving equipment. It wants a national programme on the ground to tackle physical inactivity, which is one of the main risk factors linked to heart disease, alongside smoking, a fatty diet and high blood pressure. The Foundation wishes to place walking at the centre of its programme of public health and education investment.

The Countryside Agency is responsible for advising government and taking action on issues relating to the social, economic and environmental

well-being of the English countryside. It wants to reach out to the millions of people who do not yet have the confidence or skills to visit and enjoy the countryside. This Initiative offers a new way of encouraging less active people to experience the pleasures of walking, firstly on their doorstep, and later to develop an appreciation – if they wish – of green spaces in town or countryside.

53.2 The rationale for 'walking for health'

The WHI is based on the reasoning that fitter people have a greater chance of living longer. Modern lifestyles discourage many from being active; fewer people walk and at least seven in ten people do not take enough exercise to benefit their health. Some doctors call this the 'silent epidemic'. Nevertheless, walking is almost perfect exercise; requiring no equipment or expense, it is the best way for people from all walks of life to become more active. Evidence shows that regular walking can improve confidence, stamina, energy, weight control and life expectancy. Walking can also reduce the risk of coronary heart disease, strokes, diabetes, high blood pressure, bowel cancer, Alzheimer's disease, osteoporosis, arthritis, anxiety, and stress. Any amount of walking is better than none. Gentle strolling is a good start for people who are not used to exercise. Brisk walking is the goal, because the heart reaches its natural 'training zone' when it has to work a little harder than normal. The ideal amount of physical activity is 30 minutes of any moderate intensity exercise, 5 days a week. People are more likely to start and then continue walking when they have fun, enjoy their surroundings, feel a sense of achievement and value the company they walk with.

53.3 The pilot phase

The concept of promoting walking for health in the UK was first tested in a medical and community setting during 1995 by Dr William Bird at his Sonning Common surgery. A second local scheme was set up in Wokingham in 1997 in a larger catchment area. The idea for the pilot phase arose in 1998 as the Foundation and the Agency were receiving many requests for funds to set up 'walking for health' schemes following the popularity of the Sonning Common scheme. However, many of them contained fundamental flaws, some attempting to reinvent wheels, others lacking thought about the target audience and the message, others unclear about implementation or evaluation.

There was clearly a demand for local action, but set within a systematic framework that would enable schemes to benefit from services that could be most effectively provided centrally. The aim of the pilot phase was to test the potential for promoting 'walking for health' to both sedentary and disadvantaged

people by setting up, in trial form, the main processes for a national initiative. This was to ensure that any future expansion would be realistic and deliverable. Early behind the scenes activity included carrying out a needs assessment, drawing up guidelines for setting up local schemes, networking and promoting good practice, and combining evaluation and other evidence as to what methods are effective in promoting walking.

53.4 Demonstration schemes

The UK's first two 'walking for health' schemes concentrated on two main activities. Firstly, providing programmes of short led walks for people who needed company and the reassurance of a group. Secondly, to deliver easy to digest information on local walking routes for those who would walk more, and independently, if they knew where to go. The pilot phase included setting up four national demonstration schemes. Their purpose was twofold, to gauge the validity of the role of led walks and easy to digest information with more difficult to reach communities in areas where the health record was known to be relatively poor, and also to test out new and innovatory methods to promote walking.

Walsall has the second highest rate of coronary heart disease in the West Midlands, and one in five residents are clinically obese. The scheme here uses public art to stimulate community involvement and has created a novel incentive scheme 'Ground miles' to offer rewards for walking. Eastbourne, on the south coast, has a large population of older retired people. This scheme has introduced to the UK an internationally renowned concept called the 'Slí na Sláinte' or 'path to health'. This is a route based signing system using brightly coloured designs, first developed by the Irish Heart Foundation. Leicester has a large Asian community where coronary heart disease is 40 % higher than the city average. This scheme is working with existing community groups to raise their confidence and interest in walking for health. Keighley in Yorkshire, a traditional industrial area undergoing regeneration, is the location for the fourth scheme. This scheme is focusing on making improvements to the local walking environment and developing road skills for young people. All schemes have provided useful first hand experience about the issues, challenges and successes faced in planning and implementing local schemes.

53.5 The nationwide initiative

The nationwide initiative started in England in October 2000 and will run for five years. Further expansion is also planned for Scotland, Wales and Northern Ireland, involving local partners who will work within the UK-wide venture.

The thinking behind the expanded programme is to bring about a fundamental change in attitudes to being active. In the 1980s it was impossible to conceive of smoke-free public places. The vision is that in the foreseeable future it will become the norm to be physically active. To achieve this the programme needed to be big enough to get a critical mass of people on the move.

This expansion was made possible by securing additional funding. The budget for the 3 year pilot phase was £385 000 whereas the budget for the nationwide initiative is £11.6 million. Funding has come from five sources. The British Heart Foundation and Countryside Agency, pleased with the early progress of the pilot phase, increased their funding to £1.2 million each. A bid was submitted to the newest lottery distributing body, the New Opportunities Fund. The Fund had set up a programme to support the establishment of 'healthy living centres' which were designed to address some of the needs in the Government's public health policy *Saving Lives: Our Healthier Nation*. The WHI was seen as fitting the strategic requirements for these centres. Kia Cars offered to be the lead sponsor initially on a yearly rolling contract. The WHI fitted their need to be seen as a responsible car manufacturer who advocated avoiding the use of their product for short journeys when alternatives such as walking or cycling were feasible. The final source of funding is local health authorities or local councils who are expected to co-fund local schemes. The WHI now has clear targets to fulfil, including benefiting the health of 1.5 million people and providing 200 grants to local groups to set up 'walking for health' schemes.

The Countryside Agency is responsible for day to day implementation. A small dedicated team has been established to promote the WHI in target areas, to provide grant aid and technical support to assist local groups set up schemes, to support schemes during their development and implementation and provide managerial and financial information to the funders. Each local scheme will be locally owned and managed by partnerships comprising local health authorities, local councils, businesses and landowners, communities and the voluntary sector.

Tailor-made training is being provided locally to enable volunteers and professionals to have the skills and knowledge to make their own scheme successful. The contents have been carefully developed over the last two years. An accreditation system has been introduced to ensure that individual schemes within the Initiative work to common quality standards. The accreditation system will also be available to other 'walking for health' schemes that are not receiving financial support but who can benefit from association with the Initiative. Each scheme will be subject to independent checking and inspection. A tried and tested evaluation protocol has been developed for use with all schemes so that a common core of comparable data can be accurately collected, analysed and presented both for individual schemes and the entire Initiative. Evaluation methods carried out for the pilot phase have been adapted and simplified for the 200 new schemes. Eleven indicators have been set for each scheme ranging from, for example,

an increase in walking amongst participants on led walks to the number of people who get involved as volunteers. Standard questionnaires have been produced to help collect data.

The WHI has developed a wide range of promotional and marketing materials including a web site (www.whi.org.uk), printed literature and a promotional video. One benefit of being associated with a sponsor is that they are creating additional publicity over and above that which the Initiative could fund itself. A useful role of the WHI is to ensure that the local schemes have the support they need to enable them to concentrate on their objectives. To this end several services have been developed to address concerns raised by local schemes, one example being public liability. Some people have been deterred from implementing schemes due to fears of the consequences of a participant breaking a leg or suffering a heart attack. With legal experts good practice advice has been prepared for GPs, scheme organisers, landowners and participants. Insurance cover for public liability has been provided at no cost for all schemes and individuals where training courses have been successfully completed.

53.6 Conclusion

The WHI is designed to raise levels of physical activity in a population that is becoming increasingly sedentary. It focuses on walking because this is seen as the most successful type of activity to promote to inactive people. However, it is also making a practical contribution to the 'new wave' of transport policies which are giving greater prominence to walking as a mode of transport. The WHI has been able to show that by encouraging people to rediscover the habits and pleasures of walking it can encourage other positive lifestyle changes, including being less dependent on the private car for short journeys. As the Initiative begins to unfold there will be increasing value in sharing experiences and learning from other walking programmes.

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Cycle training and the promotion of cycling

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54.1 Introduction

In the film 'Field of Dreams' Kevin Costner plays an Iowa farmer. While working in his corn field he sees a vision of part of the field turned into a baseball diamond and he hears a voice that tells him 'If you build it, he will come'. He builds the baseball field and ghosts of baseball greats turn up to play on it. The story is typical, if high quality, Hollywood 'feel good' fare, but it is very similar to the British approach to providing cycle lanes and facilities for cyclists in the 1990s. 'If you build them, they will come' could so easily be the mantra. Unfortunately, 'Field of Dreams' was just that, a Hollywood dream, and so is the dream of cycle lanes alone creating more cyclists. They haven't.

In spite of growing investment in cycle facilities, the unprecedented emergence of the National Cycle Route Network, and the National Cycle Strategy targets of quadrupling cycling by 2012, there has as yet been no renaissance in cycling as a means of travel. On the contrary, cycling's share of travel remains below two per cent of all journeys. Probably the biggest bar to increasing cycling is the British cycling culture and the image of cycling that the general public have. Until this can be changed, the big increases targeted in the National Cycling Strategy will not be achieved, or even approached.

54.2 British cycle culture

The advent of the mountain bike has encouraged a growth in leisure cycling within the UK, a trend that began in the 1980s. Off-road and leisure cycling

are increasingly popular, with cycle ownership doubling from 10 million to 20 million bikes between 1985 and 1995 (Bicycle Association, 1996). According to the Cyclists' Touring Club (CTC), the main lobby group for cyclists in Britain, some 90 % of cycling in the UK is now purely for leisure purposes, with over 3.6 million people using their bicycles on a weekly basis (CTC, 2002). Some six million adults are estimated to cycle overall (General Household Survey, 1996). For most of these, cycling is not considered a serious means of transport.

The picture that British society paints of the commuter cyclist is one of a fanatical lunatic with a death wish. Cycling 'eco-warriors' are ripe for ridicule. 'No sensible adult would seriously consider cycling in today's traffic!' would be a typical comment. Whilst mountain biking on off-road tracks is trendy, particularly for those who carry their wheels to the countryside on the back of their four-by-fours, cycling in town is a bit of a joke. The image of cyclist training is even worse. Asked about cyclist training, most adults would conjure up a picture of children on a playground cycling round cones in an effort to pass their cycling proficiency test. This training, carried out by worthy volunteers, is seen almost as a rite of passage, but only really a bit of a joke, and certainly only for children.

Unfortunately, the general state of cyclist training in the UK is very much reminiscent of the state of cycling as a whole. The Government's road safety strategy in 2000 estimated that only 30 % of children had access to some form of cyclist training (Department of Transport, 2000). Of these, at most only half had access to training that was carried out on the road. Most training is still carried out by volunteers, although a growing number of courses offer professional instructors. Each local highway authority organises its own training, so the provision is wholly piecemeal.

The worrying factor is that the majority of the current generation of parents will not have an experience of cycling as a means of transport. If training is not available, they do not have the necessary knowledge to pass on essential cycling skills to their children. Thus, without training, the children of these parents are unlikely to be allowed to make cycle journeys on the roads. This poses real problems for creating a future cycling culture.

The CTC estimates that of the UK's six million regular cyclists, only around one million cycle regularly on the road as a means of transport. The increasing amount of cycle-friendly infrastructure on our roads has not as yet encouraged the other five million to use their bicycles for road transport. It is a worrying deduction that the current generation of children, without training, or parents who can cycle with them, will be tempted to use this infrastructure even less. However, children want to cycle, as a means of transport.

In 1999 the City of York Council carried out a journey to school survey in all its schools (City of York Council, 2000). Whilst the survey established how children travelled to and from school, they were also asked by what mode they would like to travel. Not surprisingly the most popular choice for

primary school children was cycling. This peaked at 48 % of children in the final year of primary school while only 3.4 % of these actually did cycle to school. The York findings are duplicated by those found in the Young TransNet online travel survey, which has data from over 200 schools. Primary School age is the age when, traditionally, children receive cyclist training. Both the above surveys show that the desire to cycle to school halves in the first year of secondary school and then continues to decline. In adulthood the desire to cycle is unlikely to increase.

Reliable data on cycling in Britain are, sadly, scarce, which is in itself a reflection of how cycling has been marginalised as a serious activity. However, in the absence of robust data, it would seem common sense to suggest that adults are more likely to convert to travelling by bike if they have had prior experience of cycling in childhood. Providing the opportunity at the time when the desire to cycle is at its height is thus a necessity if any targets to increase cycling are to be met. The last two years of primary school therefore become the key battleground in creating a future cycling culture and in this cycle training plays an essential role. It is clear that these children want to cycle. However, to enable them to fulfil this desire the adults who make decisions for them – their parents and teachers – must be convinced that it is safe enough for them to do so.

There are three main elements required to give the adults who are the gatekeepers to children's cycling the confidence to permit them to cycle. These are safe routes to school, secure cycle parking at school and cyclist training. If any of these elements are missing this will act as a serious deterrent to increased cycle use. In a handful of cases infrastructure and cycle parking have fostered high levels of cycling, but these are cases where the cycle routes to school have been virtually all off-road. On these, parents do not have to fear that their children are interacting with motor traffic. For the vast majority of schools the option of building off-road cycle paths does not exist. Even if the roads around these schools can be made significantly less hazardous, training is the final ingredient needed for parents to gain the confidence that their children can use them.

54.3 The effectiveness of cyclist training

Most local authority road safety officers will be able to recount stories of parents contacting them and insisting that they will not allow their children to cycle until they have undertaken training. Unfortunately, there has been little substantial research to determine the level of deterrence that a lack of training has on parents' willingness to allow their children to cycle. There is, however, some reasonable research on the effectiveness of training in improving the competence of child cyclists.

In 1976 a questionnaire survey of parents in the county of Hereford and Worcester found that children in a group that had not been trained were

between three and four times more likely to become cycle accident casualties than a similar group that had undertaken cycle proficiency training (Hereford and Worcester Council, 1976). The trained cyclists also cycled on the roads and to school more than the untrained group. Some 97 % of parents of the trained group felt their children were capable of cycling on their own while only 79 % of parents of the untrained children thought their children were similarly competent.

In 1979 the Transport and Road Research Laboratory (TRRL) carried out two separate pieces of research into the effects of child cyclist training. The more extensive piece of work compared the performance of three groups of children whose performance was similar before training (TRRL, 1979). One group undertook training on the road, the second was trained in the playground and the third received no training at all. Both trained groups showed a large reduction in errors, but the group trained on the road were significantly better than those trained in the playground. The improvements were still apparent 6–8 months later, although not so marked. The untrained children showed no improvement.

A further study in Britain by the Transport Research Laboratory (TRL), the successor to the TRRL, found that trained child cyclists may be three times less likely to become a casualty than those who had not been trained (TRL 1990). Questionnaire surveys of children in the London borough of Bexley carried out between 1987 and 1991 found that trained children were more likely to ride on public roads, busy roads and to school (London borough of Bexley Council, 1992). They were also less likely to be involved in accidents, both on and off-road. The most recent comprehensive study was carried out by the TRL in 1996. This involved 2000 children aged 12–13 years, half of whom had received some form of training 2 years previously and half of whom had received no training (TRL, 1996). The trained children had received a range of different forms of training enabling the relative effectiveness of these to be studied. The children completed a questionnaire on road safety knowledge and risk taking, undertook a practical cycling test on the road and filled in a ‘cycling log book’, detailing their cycling behaviour over a one week period. In the practical test 75 % of trained cyclists were judged to be relatively ‘safe’. Only 53 % of untrained cyclists were considered ‘safe’. Children who had received on-road training spread over a number of weeks during which they were taught to develop problem solving techniques performed best, particularly if they had received some follow up training at secondary school. There was no observed difference in levels of cycling between the trained and untrained children. As these studies show, there is a consistency in the research findings. We can confidently conclude that children trained on the road will be safer and are likely to cycle significantly more.

54.4 Best practice

In 2000 the Royal Society for the Prevention of Accidents (RoSPA) published its guidance on cycle training (RoSPA, 2000). This attempts to offer advice to bodies offering a full range of types of child cyclist training both on and off road. It also states what is considered to be best practice. For child cyclist training the best practice recommendation reflects the finding of the 1996 TRL report mentioned above. It also goes further by discussing best practice in instructor selection and training and by giving advice on health and safety. The guide covers secondary school courses as well as those in primary schools.

The City of York Council is widely recognised as delivering training that adheres closely to the RoSPA best practice guidelines. York has employed a team of professional cyclist instructors since 1993. The team now numbers more than a dozen instructors, all of whom are experienced cyclists. They offer pedestrian training for children aged 7–8 years, basic cyclist training for children aged ten or more, advanced cyclist training for children in secondary school, adult training for those aged 14 or more and family training for parents wishing to cycle with children younger than 10 years old. This training is now available to all children and adults in York.

The York team is constantly seeking to improve its training and has introduced a range of formal instructor training courses and assessments for its own members. These are also offered to other local authorities and voluntary and professional bodies. The Council runs a growing number of instructor training courses each year to satisfy a constantly expanding demand for such training. Professional training is becoming more and more popular.

The anecdotal experience of the York training team confirms the findings of research. Advanced training in secondary school (which is one-to-one and involves an extended road journey), is only offered immediately to children who have undertaken basic cyclist training in primary school. This is because children who have not received basic training were discovered to lack the competence for safe road riding, whereas their trained counterparts were found to be very competent. Children who have had no basic training receive extra training at secondary school before undertaking their advanced session. Further anecdotal evidence from York (car) driving instructors also suggests that children who have received cyclist training are much more aware of cyclists when learning to drive. This makes sense and it is hoped that proposed future research will show a significant link between cyclist training and improved car driver performance.

York takes training very seriously, yet the delivery of training to more than 3000 of its young and old citizens each year is comparatively cheap. The total annual cost is around £70 000, a substantial proportion of which – about £20 000 – is raised from course fees. Extrapolating the York costs to the whole of the UK, the complete range of York training could be offered to all, free, for less than £30 million per year at 2002 prices. Considering the

potential gains, this would be an exceedingly small price to pay. What is more, if such funding were made available, training could be available to all in around two years.

Best practice should be professional in its delivery. This not only guarantees that a quality product is on offer, it also gives out the message that this is a serious business. A professional image for cyclist training will reflect positively on the development of the overall cycling culture that is desired. It also reflects the reality that, in the current climate of health and safety and of over protection of children, it would not be acceptable to entrust the safety of children in the learning of a potentially hazardous activity to anyone other than properly trained and experienced professionals.

54.5 Making best practice available to all

The current piecemeal system of training provision mitigates against best practice being made available to all. Yet the impetus for change is there and gaining momentum. Cycling organisations like the CTC and Sustrans are actively supportive of the potential of training and the Department for Transport is becoming more interested too.

A model for establishing effective cyclist training does exist in the regime for motor cyclist training. This requires training only to be delivered by accredited training bodies that must deliver to a national standard. For cyclist training it is clear that the RoSPA best practice delivered by the likes of York are an adequate standard. Bodies delivering training to this standard could become accredited and thus eligible for funding. Training administered in this way would also provide an excellent opportunity for partnerships between the public and private sectors.

The CTC is also keen to see a unified qualification and training structure for cycle leaders and instructors. This would enable cyclist instructors to have a broader qualification covering off-road leisure cycling, on-road safety training, cycle group leading and competitive cycling coaching. By unifying all these separate disciplines and types of cycling, such instructors would be able to maximise the potential for converting leisure cyclists into road cyclists as well.

54.6 Conclusion

Cycling is still a Cinderella activity in the UK, but the growing focus on training is an essential ingredient in changing that image. It is not the only factor required to develop a comprehensive culture of on-road cycling, but without it, there can be no prospect of real change. The most exciting aspect of promoting training is that it provides a win win scenario – safer cyclists that cycle more – that could be delivered very quickly.

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