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Promoting cycling in the U.K. – Problems experienced by the practitioners

Marcus Jones

During the first half of 2001 a series of seminars were held in eleven English local authorities as part of a project to promote the U.K. National Cycling Strategy. More than 700 delegates attended these seminars, about half of which were local authority officers with some responsibility for cycling. Presentations at the seminars were chosen so that some focused on conveying the core messages of the National Cycling Strategy, while others described local case studies.

Opportunities were provided through discussion sessions to exchange information amongst the delegates and to seek their opinions on the main barriers to increasing the use of cycling in the U.K. Amongst many issues raised was the continued poor quality of cycling infrastructure, which was linked, *inter alia*, to both a lack of suitably trained professionals and a low priority given to cycling by local politicians and senior officers.

Keywords

U.K. National Cycling Strategy; local practitioners; implementation barriers

Local Transport Plans, Planning Policy Guidance & Cycling policy: Issues & future challenges

Hugh McClintock

This article assesses current policies for the promotion of cycling, especially in urban areas and with particular reference to implementation of the latest official advice from the UK Government in its Guidance on Full Local Transport Plans and its revised guidance on planning and land use policy, Planning Policy Guidance Note 13.

Keywords

Cycling, Local Transport Plans, Land use planning and transport, PPG 13

Planning for more cycling: the York experience bucks the trend

James Harrison

Experience in York has shown that it is possible to promote cycle use whilst also improving cyclists' safety. Key lessons which have been learnt are that isolated cycle facilities will not affect people's modal choice on their own. However, sustained investment at a realistic level can bring about significant changes in people's travel habits. The cycle network needs to be based on strategic planning to ensure that coherent, continuous routes are created. Security has also been shown to be important – both in terms of personal security and safe parking facilities.

Finally, 'soft' measures to promote cycling can complement the physical infrastructure. Partnerships with other organisations have proved very

worthwhile to enhance the overall image of cycling. Relating cycling to health, in particular, has allowed the City of York to move towards a very positive message which people can relate to their own lifestyle aspirations.

Keywords

York, cycle planning, growth in cycle use

Guidelines for a safety audit of bikeway systems

Cameron T. Matwie & John F. Morrall

It is noted at the outset that the bicycle is recognised as a legitimate transportation mode, especially in the context of sustainable transportation systems.

However, bicycle facilities need to provide the cyclists using them with a high level of safety. Unexpected, abrupt changes in horizontal and vertical geometry and cross-section are hazardous to cyclists. Such hazards can be minimised though a safety audit or at the initial design phase by following good design practice.

A safety audit of the existing bicycle facilities in Calgary, Alberta was undertaken as a case study to determine the relative safety of different bicycle facilities. With the many km of bicycle facilities in the City of Calgary there are many examples of safe and unsafe situations, and locations where mitigation measures have improved safety.

Lateral and vertical clearance, sight distance, grades, pathway/street furniture, lighting, directional signage, pathway/roadway width, and ride quality were reviewed as part of the audit. These design elements formed the basis of the field investigation that was undertaken as part of the safety audit. Each of these design elements has the potential to either increase or decrease the safety to a cyclist depending on the situation.

The principles and guidelines of what constitutes a comprehensive safety audit for bikeway systems are outlined. Examples of good practice and unsafe situations along with potential applications of the safety audit process for bikeway systems are also discussed.

Keywords

Bikeway systems & facilities, Calgary, safety audit

Translating cycling policy into cycling practice

Tim Ryley

Further insights are offered into how UK cycling policy, as promoted in the National Cycling Strategy, can be translated into cycling practice, for example through encouraging a modal shift from the motor car to cycling. The extent of UK motor car dependency, the viability of cycling as an alternative transport mode, and possible measures to achieve a modal shift are discussed. Segments of the population who cycle or who might be encouraged to cycle are considered,

incorporating Scottish Household Survey data for Edinburgh.

Keywords

Cycling, Edinburgh, modal shift, market segmentation, policy

Another look at Germany's bicycle boom: implications for local transportation policy & planning strategy in the U.S.A.

Heath Maddox

There are conflicting views regarding the substantial growth in cycling in Germany since the early 1970s. Pucher argues that it is almost entirely attributable to public policy. A number of German experts would give planning and public policy far less credit, and attribute this growth in cycling instead to other factors, such as urban congestion, the oil shocks of the 1970s, environmental awareness, and changes in urban form. The article that follows is an attempt to explain the two diverging viewpoints and draw conclusions that nevertheless prove useful in the quest to promote cycling as a legitimate mode of transport. It calls for a more involved type of strategic planning that, in addition to traditional policy measures, seeks to build political consensus and power by strengthening community groups and coalitions.

Keywords

Bicycle boom, Germany, public policy; environmental, economic and social factors

A Nicaraguan Street Clash

Joe Grengs

The provision of transport services in León, Nicaragua is becoming increasingly difficult for the city

government in the face of rapid urbanisation and a shrinking public budget. Some citizens have responded by turning to the bicycle to meet their transportation needs. But the city government promotes automobile-dependent urban development whilst penalising bicyclists with a tax and license requirement. City officials have failed to meet their purpose of eliminating dangerous traffic congestion, in part because of misguided policies and plans, and in part because bicyclists have resisted government authority.

Keywords

Bicycles, informal sector, Nicaragua, planning, politics, transport

Shanghai: The greatest cycling city in the world?

Annemarie de Boom, Richard Walker & Rob Goldup

As China opens up to the world, enjoying 10% GDP growth per year, and experiencing the first stage of the development of mass car ownership, can it and will it retain the high levels of cycle use which characterise its great cities?

Earlier this year, the authors spent several months in the city of Shanghai, as part of the Colin Buchanan & Partners (CBP) study team reviewing the transport policies of the Shanghai Master Plan for 2020 on behalf of Xu Kuangdi, the Mayor of Shanghai, and drafting his Transport White Paper. Establishing that cycling has an important role to play in the world-class transport system planned for the new World City of Shanghai was a key challenge for the study team.

Keywords

Cycling, planning, traffic, Shanghai

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Welcome to this special issue of World Transport Policy & Practice on cycling.

Is cycling part of the problem or is it part of the solution? You can consider this a rhetorical question but it might be argued that the answer depends on what is considered to be the problem. Nowadays, the discourse around transport in scientific journals, at conferences and even in the news generally revolves around the basic agreement that there is too much traffic and that something needs to be done about it. But if you examine that commonly held agreement more closely, you start to realise that “too much traffic” means many different things to many different people. For example, is it too much for the roads to cope with or too much for people to cope with? Too much for the environment to cope with or too much for the economy to cope with?

Furthermore, when you look beyond the important but narrow context of the western industrialised nations you find that the problems take on a different appearance all together. Many countries would contend that they do not have enough traffic – or not the right kind – for their people to have access to jobs, education, healthcare and other opportunities they should be able to utilise. And crucially, transport – and therefore traffic – is the lifeblood of all western, consumer economies, which – with the failure of the centrally-planned, production-focussed economic experiments thus far – seem to have become the model to which all nations aspire. So if you have not got enough traffic to support such an economy, then you need more – and inevitably as economic systems develop out of localised contexts, there will be more. However, the great thing about cycling is that it can be part of the solution, whatever your view of the problem. It only depends on the perspective.

In Great Britain today, cycling remains a very marginal mode although attitudes towards it are changing and there are notable exceptions such as the cities of Cambridge and York. After decades of neglect at the political level, the profile of cycling as a ‘serious’ mode of transport started to rise in 1996 with the Conservative Government’s publication of the National Cycling Strategy. Although this document contained a lot of reasonably detailed advice to local authorities on how to cater for cycling and cyclists, the strategy is best known for the targets it set for modal increase: doubling the number of cycling trips in Great Britain from the 1996 baseline to 4% by 2002 and again to 8% by 2012.

Although it now looks certain that the 2002 target will not be achieved, the National Cycling Forum,

which was set up to promote the strategy, is still working to raise the mode’s profile and to help more local authorities to actively embrace it as a part of the solution to the current transport crisis (Jones). It is in fact debatable – if the targets set in the original strategy were ever realistic especially since they were very broad (and it was never made clear) – how different local authorities with very different levels of cycling (ranging from 16% to 0.5% of all trips) were supposed to contribute to it. Another problem was that there was no comprehensive monitoring of the mode, and many local authorities still do not know what is their baseline modal share of cycling. Against this background it will be difficult in many areas to establish what difference any new measures for cycling have made to the use of the mode. This is an important issue, which the government needs to tackle if it is serious about wanting to increase cycling levels. In addition, the government needs to provide more targeted funding for cycling measures thus overcoming the problem of many local authorities regarding cycling as a low priority and being reluctant to allocate their generally strained resources to providing for it. Along with this carrot, we need to see better enforced requirements for local authorities to consider this mode seriously and provide adequately for it in their transport system.

Nevertheless, the targets included in the National Cycling Strategy did succeed in providing a national context within which local actors could argue for more resources to be dedicated to cycling issues and thus it was seen to signal – at least on paper – a change in national policy makers’ attitudes to the bicycle and its users. Much more remains to be done in practice and McClintock provides an overview of the challenges which still need to be faced in Britain if cycling is to reach a level comparable to other European countries such as the Netherlands, Denmark or Germany.

One of the barriers to cycling policy implementation, for example, is a widespread (but often misdirected) concern that cycling is unsafe. Some politicians are reluctant to encourage it because they worry that accidents will increase and many people do not want to take it up because they fear for their safety and wellbeing. However, experience in York (Harrison) has shown that increased levels of cycling do not have to mean more accidents – particularly if they develop together with a more sensible management of motorised traffic, such as speed reduction and road space reallocation. In addition, there is much transport designers and engineers can do to ensure that cycling facilities are safe and convenient

to use and Matwie and Morrall provide a good introduction to systematic safety audits for new and existing cycle lanes and networks.

Along with getting policy makers and practitioners to improve cycling provision, one important step is convincing people to actually make use of the new (and existing) facilities – and this question is addressed in the paper by Ryley.

Assuming an agreement on the stance that cycling should be part of the solution, what can be learned from countries which have high levels of use of this mode? Is this due to a more enlightened political stance, greater foresight on the part of decision makers or simply good weather? Can any of the contributing factors be deliberately replicated? While the subtle cultural trends which influence the general public's use of the bicycle can never be recreated on a transport planner's drawing board, there are still important lessons to be learned from looking across national and cultural boundaries (Maddox). This is true both for places as diverse as Britain, which has to work its

way up from very low cycling levels, and León in Nicaragua, where city planners consider existing high cycling levels as a problem rather than an asset (Grengs). And then there is Shanghai, with cycling levels western cities can only dream of, where decision makers have to be persuaded gently that if they look at it from the right perspective the solution to many of their transport problems is already rolling through their streets (de Boom *et al*).

High levels of cycling keep people healthy and cities attractive, they reduce congestion and pollution and they give people, who cannot afford a car, access to facilities and places they cannot reach on foot. Hopefully, the ideas and opinions found in this issue – and elsewhere – will help to ensure that the bicycle becomes a more widely accepted symbol for health, social inclusion, quality of life and visionary transport policies.

Philine Gaffron
Guest Editor

Promoting cycling in the U.K. – Problems experienced by the practitioners

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Opinions expressed in this article are those of the author only and should not be taken to represent the National Cycling Forum.

Abstract

During the first half of 2001 a series of seminars were held in eleven English local authorities as part of a project to promote the U.K. National Cycling Strategy. More than 700 delegates attended these seminars, about half of which were local authority officers with some responsibility for cycling. Presentations at the seminars were chosen so that some focused on conveying the core messages of the National Cycling Strategy, while others described local case studies. Opportunities were provided through discussion sessions to exchange information amongst the delegates and to seek their opinions on the main barriers to increasing the use of cycling in the U.K. Amongst many issues raised was the continued poor quality of cycling infrastructure, which was linked, *inter alia*, to both a lack of suitably trained professionals and a low priority given to cycling by local politicians and senior officers.

Keywords

U.K. National Cycling Strategy; local practitioners; implementation barriers

Introduction

The National Cycling Strategy (NCS; DoT¹, 1996) was launched in July 1996. It aims to:

- establish a culture favourable to the increased use of bicycles for all age groups;
- develop sound policies and good practice; and
- seek out effective and innovative means of fostering accessibility by bicycle.

Implementation of the NCS is co-ordinated by the National Cycling Forum, which comprises representatives from central and local Government, business and the voluntary sector.

¹ The Department of Transport (DoT) and the Department of the Environment merged to become the Department of Environment, Transport and the Regions (DETR) in May 1997. This was changed to the Department of Transport, Local Government and the Regions (DTLR) in June 2001, with some Environment functions demerging to the Department of the Environment, Food and Rural Affairs. Note that slightly different transport arrangements apply in the devolved administrations of Scotland, Wales and Northern Ireland, and also in London. <http://www.dtlr.gov.uk>

As part of a project to promote the NCS, AEA Technology organised a series of regional seminars at eleven locations in England. Funding for these seminars was provided by the Department of Transport, Local Government and the Regions (DTLR), which has responsibility for transport in England, but not Wales, Scotland or Northern Ireland. The seminars were intended to raise the profile of cycling and to provide an opportunity for the practitioners to share ideas amongst themselves. There were more than 700 delegates, about half of whom were from local authorities and included cycling officers, travel plan co-ordinators, engineers, road safety officers and a handful of health promotion staff. The remaining delegates were a mixture of consultants, cyclists' groups, bicycle and equipment suppliers, travel plan co-ordinators from the private sector and public transport operators. Most of the participants were therefore involved in some way in the promotion of cycling, so this provided a good opportunity to explore the problems they face. This paper looks at some of the key issues that were raised during the discussion sessions. Although this cannot be regarded as a scientific study, there were nonetheless a number of issues that were raised repeatedly at a number of the seminars, so the author considers this to be a valid assessment of the problems.

The seminars

The seminars generally followed a structure intended to ensure that certain core principles were addressed at each. Each began with a presentation summarising the NCS and providing an overview of the benefits to individuals, society and business of an increase in the levels of cycling. To provide some context, the NCS dates from 1996 and sets a target to quadruple the number of cycling trips by 2012, from the 1996 baseline (DoT, 1996). Progress to date has been limited and the earlier target to double the number of trips by 2002 will not now be achieved, although it appears that cycle use may no longer be in decline (DTLR, 2001). However, since 1999 the U.K. Government has set up a new system for funding local authorities, the Local Transport Plan (LTP; DETR, 2000). Under the LTP arrangements, increased funding

has been made available for cycling schemes so the 2012 target is still considered to be achievable.

The seminars were not simply intended to show that cycling is a 'good thing'; the intention was to demonstrate how cycling can play an important part in meeting the wider policy and business objectives of different organisations. Thus cycling as a low impact mode of transport can replace many journeys currently made by car, contributing to traffic reduction targets and environmental objectives. As cheap transport it can help to tackle social exclusion by linking communities with jobs, services and leisure opportunities. As a form of exercise easily accommodated into the working day cycling can help improve the fitness of the population thus contributing to health improvement targets (HEA, 2000). By getting adults out of cars and out and about in the streets it also helps to improve the vitality and security of the urban environment – an important aspect of regeneration (CEC, 1999).

At some of the seminars there were presentations giving local and regional examples of such linkages between cycling and different policy areas. For example, Liverpool Health Authority (North-West England) has conducted a Health Impact Assessment of the Local Transport Plan. Consultant Adrian Davis of Adrian Davis Associates, has reviewed 91 Health Improvement Plans, which are local area-based plans for improving health and reducing inequalities in health (Davis, 2001). Of these, only 26 stated the health value of cycling and only 16 identified the Local Transport Plan as having a key role to play in public health. Working with The Cycling Project for the North West, a regional partnership for cycle promotion and The University of Manchester, Stockport Metropolitan Borough Council (near Manchester) has worked on social exclusion projects using cycling as a way to get disadvantaged teenagers more closely involved in their communities (The Cycling Project for the North West, n.d.). Further research into cycling and social exclusion has been carried out by the Centre for the Analysis of Social Exclusion at the London School of Economics (Elster, 2000). Through its work on the National Cycle Network, the British transport charity Sustrans has collected evidence of the benefits to the local economy that arise from cycle tourism (Sustrans, 1999).

At each seminar we also provided a presentation from a consultant on 'meeting the needs of cyclists', focusing on the infrastructure and design principles needed to create routes that will encourage increased numbers of cyclists to use them. The intention was to address some of the problems that occur repeatedly with U.K. cycling schemes, which are often regarded as catering insufficiently for experienced cyclists yet fail to meet the needs of new and insecure cyclists. In the U.K. the main source of guidance for engineers has

been *Cycle Friendly Infrastructure* (IHT, 1996), more recently complemented by *Guidelines for Cycle Audit and Review* (IHT, 1998), which describes a methodology for incorporating cycle-friendly principles into new schemes and assessing existing roads and junctions for their suitability for cyclists. A number of *Traffic Advisory Leaflets* are also available. Published by DTLR, they are often used to publicise the results of trials of new research and design techniques, so do not necessarily reflect normal practices.

For a cycle route to be popular with cyclists (and thereby effective at increasing cycle use) it needs to conform to some basic quality criteria. These are often summarised as five core principles:

- Coherence: a path should form part of a wider network and be of consistent design standards throughout its length;
- Directness: should follow a route favoured by cyclists without detour;
- Attractiveness: well lit and signed and with aesthetically pleasing surroundings, for example;
- Safety: infrastructure designed to minimise danger; and
- Comfort: smooth, well maintained surfacing and gentle gradients with features that avoid complicated manoeuvres and sudden interruptions.

'Safety' alone is not sufficient to encourage people to cycle. Traditionally safety for cyclists and pedestrians has been provided through measures that impede their progress, for example barriers, staggered and indirect crossings, detours through subways and over bridges, etc. If the other four criteria are not met cycling is unlikely to be considered preferable to other modes and there will be no incentive for people to take it up. Perhaps the most basic principle, often forgotten, is that the bicycle is a vehicle and requires sight lines and turning radii appropriate for speeds up to 20 mph; considerably higher than the pedestrians with whom cyclists are frequently expected to mix on equal terms.

A key issue relating to the design and provision of cycle routes is that different groups of cyclists have quite different needs, as do cyclists undertaking different types of journey. Thus an off-road path may be the most appropriate way to take children around a roundabout, but experienced commuter cyclists will prefer to take the much quicker route via the road. It follows that designers need to consider separate provision for the different levels of skill and experience. For example Oxfordshire County Council has developed a concept of 'twin networks' where children and inexperienced cyclists will be catered for with off-road, shared use and quiet road routes while experienced cyclists will be helped to use the road network, for example with junction treatments and

cycle lanes (Oxfordshire Co. Co., 1999).

Issues raised by delegates

In order to make best use of the experience of the delegates the seminars included at least an hour for structured discussion where possible. Although over two hundred questions were asked during the course of the seminars, most of these could be grouped into seven core themes (see Table 1) that were raised repeatedly and are discussed below.

Poor quality of cycle provision

Complaints about the poor quality of many U.K. cycling schemes provided a recurrent theme in every seminar. This was widely regarded as a serious barrier to increasing the amount of cycling. Common concerns included:

- Conflict with pedestrians on shared-use paths, particularly those that take space from existing pavements;
- Lack of continuity, for example with 'give way' at every side road and even at private driveways and use of the 'Cyclists Dismount' sign;
- On-street cycle lanes that are too narrow, encouraging drivers to pass too close and leading to conflict with motorists when cyclists need to leave the lane, for example to pass an obstacle or to turn right;
- Street furniture creating obstacles in off-road routes;
- Poor surfaces on off-road routes;
- Road junction design that puts cyclists in danger, for example large roundabouts with high entry and exit speeds, especially those with more than one approach lane;
- Off-road paths that take inconvenient, circuitous routes, especially around difficult junctions; and
- Off-road shared-use paths creating an expectation in the mind of motorists that all cyclists will be using them rather than the road.

The problems occur at many levels:

- cycling left out of the impact assessments and early planning stages of new developments;
- flawed designs being used that do not meet the needs of users (including traffic calming schemes);
- poor quality and lack of attention to detail when schemes are implemented; and
- lack of maintenance after the scheme is built.

Reasons given for this include lack of support from senior management and/or councillors; engineers and planners not being properly trained and negative attitudes from some members of staff. It is worth noting that some of the complaints came from cycling officers who felt they lacked the support of colleagues and management. A common problem appears to be a failure to implement in practice cycle-friendly policies

that are already adopted: many of the complaints about infrastructure were made about local authorities whose cycling strategies are widely praised. While several delegates said their local authority endorsed the 'road user hierarchy', which prioritises vulnerable road users above motorised traffic, few had actually applied it in practice.

Technical guidance and training

Many delegates asked technical questions of a specific nature, not all of which could be answered by reference to published guidance. Many felt that the available guidance was inadequate and that current professional training did not make up for the deficiencies. Furthermore, because design guidelines for cycling and walking are only advisory, and are not part of the technical specifications normally used for road design (e.g. see the *Design Manual for Roads and Bridges*), several delegates felt that cycling and walking were too easily overlooked and that mandatory procedures would be better.

Poor cycle facilities at destinations

The provision of poor quality route facilities, both on- and off-road, is matched by a lack of cycle parking and, where it is provided, continuing bad practice in its design and location. Again this reflects the low priority of cycling for most facility managers and a poor understanding of their needs. Typical problems include:

- the use of cycle racks that support bicycles only by the wheels, which can cause damage while making it difficult to lock the bicycle securely by the frame;
- bicycle racks located too far from where they are needed or where access is difficult;
- concealed locations with poor security; and
- unattractive locations, for example by refuse skips.

Developing local cycling strategies

There was a lot of discussion around the issues that must be taken into account by a local authority as it develops a cycling strategy. Some specific topics were:

- How should a strategy deal with the needs of different types of cyclist?

Table 1: Core themes raised by delegates at the seminars

- Poor quality of cycle provision
- Technical guidance and training
- Poor cycle facilities at destinations
- Developing local cycling strategies
- National Policy
- Cycling to work and school
- Promoting cycling

- Should the emphasis be on providing route-based 'cycling facilities' or safer roads for all road users?
- Methodologies for setting targets and monitoring progress;
- Ensuring cycling is properly considered in new development; and
- Consultation: who with and how?

National Policy

A number of questions were asked concerning national policy making and law enforcement. Although important, these are not directly related to the promotion of cycling, which is the topic of this article. However, a summary is given for completeness:

- There were concerns that existing road traffic law and its enforcement do not provide sufficient protection for vulnerable road users (in particular speed limit enforcement and penalties for motoring offences);
- Should helmets and/or bells be made compulsory?
- Fiscal incentives that discourage car use and support travel plans; and
- Health and Safety at Work legislation applied to cycling for work

Cycling to work and school

Considerable importance was attached to encouraging cycling to work and school. Cycling to work already accounts for nearly 40% of journeys by bicycle – the single most important journey purpose (DETR, 2000) – and, as has already been noted, provides an ideal opportunity for people to fit regular exercise into their daily routine. Cycling to school provides an opportunity to encourage children to take up cycling and get into the habit while they are still young. The questions raised on these subjects were mostly of a practical nature, and included:

- Requests for advice and promotional resources to help 'champion' a project;
- Information on setting up Bicycle User Groups;
- Sources of funding/financial incentives;
- Information on health, safety, training and insurance; and
- Where to obtain facilities, especially quality cycle racks.

Promoting cycling

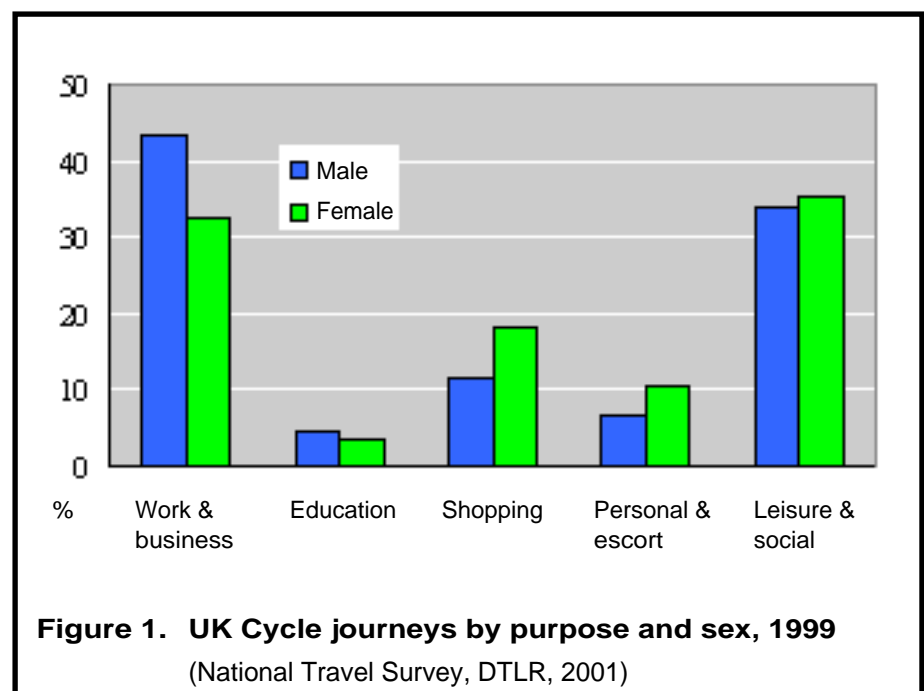
One of the main objectives of the project is to win over key decision-makers for cycling. While very few of the delegates were senior managers or councillors, they were

able to discuss the kind of problems they had experienced with senior management and to offer ideas on how to convince them of the benefits of cycling. There was also a lot of discussion about how to promote cycling to the general public which, although not directly the target of the project, is vital in generating political support for cycling. The key points and questions are summarised:

- Key decision makers need to be convince that cycling is relevant to their objectives, for example improved public health, urban regeneration, social exclusion and other policy drivers;
- Has an exaggerated impression of danger been created, through spending so much time discussing the risks of cycling, that it deters people from cycling?
- Are decision makers willing to accept examples and evidence from other European countries where cycling levels are higher?
- How can we overcome the perception that cycling is for losers; particularly amongst poorer sections of the community?
- How can we encourage more women to cycle (including school age girls)? (see Figure 1)
- Can cycling be made fashionable? and
- Will encouraging leisure cycling lead to an increase in utility cycling, particularly in urban areas?

Discussion

After eleven seminars we have experienced a range of views on what must be done to get more people cycling. We have met a lot of highly motivated people doing their best, often with limited resources, who are starting to see the results of their success in increased numbers of cyclists. We hope that the



seminars have helped the exchange of information about successful schemes so that best practice examples can be followed. However it is clear that there is a need to find other ways of promoting the exchange of ideas between practitioners.

We also encountered many of the problems people are experiencing. A recurrent problem is the continued poor quality implementation of many cycling facilities. Similarly, key policies – in particular the hierarchy of road users – were rarely applied in practice, often because of lack of understanding or support from senior management. Poor quality schemes have led to considerable cynicism amongst existing cyclists and the bad press they generate can have the undesirable effect of undermining political support for cycling in general.

Underlying these problems is the difficulty faced by many local authorities in finding suitably trained staff to deliver their transport plans. It is clear that cycling (and walking) have been neglected from the training of the majority of transport planners and engineers, leading to severe problems when schemes are implemented. Perhaps not unconnected with this is the status of design guidance on cycling: the fact that most guidance is advisory and is provided through a number of separate leaflets and publications may have allowed cycling to be treated as an optional add-on, rather than fundamental to good highway design.

Of course, there is more to cycling than infrastructure. Indeed, it could be argued that the best cycling facility is a road with lots of other cyclists on it, something that places like Oxford, Hull and Cambridge have achieved long before serious efforts were made to provide dedicated cycling facilities. Cycling in these places is mostly on the existing (often congested) road network, yet cycling levels are higher there than in, for example, Milton Keynes where a dedicated comprehensive cycle network has been built. This suggests that 'cycle routes' are neither a necessary nor sufficient condition for high levels of cycle use. Attention must be given to other factors, like the availability of car parking at employment sites, distances between where people live, shop, work and go to school, the urban environment, traffic speed on roads, congestion problems for motorists, etc. In particular, attention must be given to cultural attitudes.

There was much discussion at the seminars about attitudes to cycling and some of the barriers that must be overcome if more people are to take up cycling. Often there is an image problem – cycling is widely perceived to be transport for the poor, so many of those who would benefit most from it are reluctant to do so. Perhaps this can be countered by emphasising the fitness and lifestyle aspects of cycling: if suburb-bound

Sports Utility Vehicles can be promoted using images of an aspirational, outdoors, adventurous way of life then surely cycling can?

A number of delegates were concerned that many of the cycling schemes currently being developed are more likely to encourage leisure cycling than utility cycling. There was a lot of debate about whether leisure cyclists are likely to become utility cyclists; and current evidence suggests that amongst existing cyclists in the U.K. there is little transfer between leisure and utility cycling (Gardner, 1998). One undesirable consequence of encouraging leisure cycling might be an increase in rural car traffic caused by tourists driving to cycle on off-road trails. However, when trying to grow any market it is unwise to assume that new customers will behave in the same way as existing ones. New utility cyclists have to come from those who can already ride a bike; and leisure-only cyclists might be willing to take up utility cycling if conditions are improved.

The image problem is particularly evident in attempts to persuade women to cycle, in particular teenage girls. Unfortunately, it is often the attitude of male cyclists, especially boys in school, that deters them. Women are also more likely to be put off by fears of vulnerability to attack, yet the risk is greatly exaggerated in popular opinion and in any case would be reduced if more adults cycled and walked.

There is one fear that definitely can be tackled, and that is the fear of bicycle theft. The lack of secure cycle parking continues to be a problem, as was unfortunately demonstrated at many of our seminar venues. Sadly, even where new cycle parking has been installed, examples of bad practice abound, with bicycles chained to railings next to empty butterfly stands. The humble Sheffield stand could be the single most important development in the promotion of cycling!

Conclusion

Many of the difficulties delegates reported come back to cycling being given low priority by senior management and councillors. Despite all its benefits, cycling is unlikely to gain significant political support unless it can be linked to other higher-profile policy objectives. However, cycling can play an important role in other policy areas that certainly are regarded as important. It seems obvious that cycling can contribute to transport objectives: reducing congestion and traffic reduction. It is therefore important that this is reflected in the Local Transport Plan (LTP). There are many other local and regional policy initiatives in which cycling can play an important role, so perhaps the way ahead is to focus on the wider agenda. Let's get cycling into health promotion, social exclusion, urban renewal, the design of livable

communities, tourism and the rural economy. This is quite a challenge, but in the longer run it is more likely to succeed.

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Local Transport Plans, Planning Policy Guidance & Cycling policy: Issues & future challenges

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Abstract

This article assesses current policies for the promotion of cycling, especially in urban areas and with particular reference to implementation of the latest official advice from the UK Government in its Guidance on Full Local Transport Plans and its revised guidance on planning and land use policy, Planning Policy Guidance Note 13.

Keywords

Cycling, Local Transport Plans, Land use planning and transport, PPG 13

Introduction

The 1996 National Cycling Strategy (NCS; DoT, 1996) called for a quadrupling of cycle use within 12 years, an ambitious target but one to be considered in the context of very low cycle use in comparison with most neighbouring countries in continental Europe, especially countries like the Netherlands and Denmark. In Dutch towns and cities, for example, cycling commonly accounts for 25-30% of trips and indeed there are places with a modal share of 40-50%. In the UK relatively few places have more than 10% of trips by bike and these are mostly to be found in the flatter and drier east of England – York, Peterborough and Cambridge for example.

The NCS remains a very important milestone in British cycling policy. Its targets were incorporated, without amendment in the Integrated Transport White Paper (DETR, 1998). The same document announced a revised system for local transport funding, with the introduction, from 2000 of 5-year Local Transport Plans and Strategies. The purpose was to encourage local authorities to implement new transport policies reflecting the national ones in the White Paper and

with more secure and longer term funding than in the previous regime of 'TPPs' (Transport Policies and Programmes).

In a sense the adoption of the NCS marked the culmination, in policy terms, of the evolution of a much more positive view of the role of cycling in transport policy that had been growing since the publication of the British Medical Association report on cycling (BMA, 1992). Essentially this rejected the previous prevailing view that cycling was a dangerous and marginal means of transport that ought not to be encouraged and said that the potential benefits of encouraging a substantial switch to cycling, in terms of 'life years added' vastly outweighed the potential negative effects, even within the existing inadequate policy framework.

Since that time the importance of this line of argument, and of general health considerations in transport policy, has continued to grow not just because of concern about the serious effects of motor-car derived pollution (despite cleaner motor vehicle technologies) but also because of the increased awareness of the very large long term health costs of an increasingly unfit population, far too dependent on sedentary activities like driving or sitting in cars, or sitting in front of computers and televisions. There is much more appreciation of the kinds of arguments the BMA report put forward, emphasising the need to combat this through encouraging the take-up of forms of moderate activity that most people can relatively easily incorporate into their daily routine, walking and cycling in particular.

Following the publication of the NCS by the DoT³, local authorities were encouraged to prepare their own comprehensive local cycling strategies. However, this was met with a patchy response. More recently the

² Hugh McClintock maintains a comprehensive website of sustainable urban travel bibliographies, with a particular emphasis on cycling and walking, all regularly updated, together with a full list of relevant organisations, contact details and URLs at:

<http://www.nottingham.ac.uk/sbe/planbiblios/> Click on 'Planning Bibliographies' and then 'Sustainable Urban Travel'. These sites form part of a wider range of Planning and Planning-related topics. Comments both on the structure of the lists and on individual items within it, including missing items, inaccurate classifications, etc., would be welcome.

³ The Department of Transport (DoT) and the Department of the Environment merged to become the Department of Environment, Transport and the Regions (DETR) in May 1997. This was changed to the Department of Transport, Local Government and the Regions (DTLR) in June 2001, with some Environment functions demerging to the Department of the Environment, Food and Rural Affairs. Note that slightly different transport arrangements apply in the devolved administrations of Scotland, Wales and Northern Ireland, and also in London. <http://www.dtlr.gov.uk>

DETR has encouraged local authorities to review them, and incorporate cycling strategies in Local Transport Plans. Furthermore, this advice, published in 2000, has been incorporated into the Government's revised Planning Policy Guidance Note on land use planning and transport, PPG 13 (DETR, 2001),

Guidance on infrastructure provision for cyclists.

If the provision of technical guidance on the design of infrastructure was all that was needed to promote cycling there would have been a big increase in cycling by now in the UK. There is plenty of very useful material available, far more than in the case of walking, which has only much more recently increased in importance on the transport agenda. From the early 1980s the Department of Transport and its successor in 1997, the Department of the Environment, Transport and the Regions, published an extensive series of free traffic advisory leaflets on cycling (DoT, 1981 onwards & DETR, 1997 onwards). These give very useful detailed guidance on a wide range of issues, mostly to do with special cycle infrastructure and closely related matters such as traffic-calming. Many of these summarise work done by the Transport Research Laboratory (TRL) and others. New leaflets are regularly published.

Also very important, and consolidating the advice available in the DETR leaflets as well as other sources in the UK and elsewhere, are the revised guidelines on cycle-friendly infrastructure published in 1996 by the Institution of Highway and Transportation (IHT, Bicycle Association & CTC, 1996). This document, a complete revision of the IHT's previous guidance of 1983, was prepared in close collaboration with the Cyclists' Touring Club and the Bicycle Association and reflected the detailed work of a number of other independent experts. Unlike the 1983 IHT guidelines it was concerned with far more than just how to design special facilities for cyclists, placing the role of facilities in a wider context where more importance was to be attached to traffic reduction and traffic-calming as well as special consideration of cyclists' needs at junctions.

The 1996 IHT guidelines reflected a view, increasingly common among some cycle campaigners and also some highway engineers, that too much reliance had been placed on planning and engineering approaches to cycling provision and, in particular, special facilities. Indeed, it seemed that some authorities had come to think that the provision of special facilities alone was sufficient to show their good intentions towards cyclists, regardless of the detailed quality of their design, construction and maintenance. A general reluctance to take space from the motor car often added to the poor quality of facilities.

As well as recommending a much more selective approach to the use of special facilities for cyclists, the revised IHT guidelines stressed the importance in any cycle infrastructure of a number of criteria adopted from the very comprehensive Dutch 'Sign up for the Bike' Guidelines (CROW, 1993). These are: Coherence, Directness, Attractiveness, Safety and Comfort.

These criteria are easy to pay lip service to but it often seems quite hard to translate them into practice. For example the coherence of a cycle route may be marred by other schemes, such as general traffic management schemes, environmental improvements, or road widening projects, where the existence of the cycle route is overlooked, resulting in some severance or narrowing or other features that make it harder to use. Comfort is of particular importance for cyclists but very easy to overlook when maintenance budgets are under severe pressure. The result has often been that what may have, initially, been good quality surfaced paths deteriorate, becoming much less attractive to use and giving cyclists the impression that, after all, they are effectively still regarded as second-class users.

In line with the general increased official encouragement to local authorities to reallocate highway space from private motor vehicles in favour of buses, cyclists and pedestrians, there has also been an increased willingness to accept the need to make general road conditions safer for cyclists. This is particularly important in the many parts of older towns and cities where limitations of space, and the intensity of current development, make it much harder to achieve good quality special facilities for cyclists.

The last few years have seen much more encouragement by the DETR of local councils to adapt the general carriageway to the needs of cyclists, for example in providing contraflow cycle lanes on one way streets (very much reflecting the importance of the 'directness' requirements in the IHT guidelines) and advance stop lines, to make cyclists' turning manoeuvres at junctions much safer. These have been generally successful although there are still a good many local authorities tending to equate provision for cyclists too readily with 'off-highway' cycle paths.

In making ordinary road conditions safer for cyclists the IHT published a further series of guidelines, on Cycle Audit and Review (IHT, 1998). These are intended to ensure in particular that the needs of cyclists are not undermined by general highways and traffic management schemes that ignore cyclists' interests, with a series of cycle audit steps. Cycle review procedures are similar but are applied to existing highway layouts, to remove any cycle-hostile features. These guidelines can also be used to review the quality of special cycle infrastructure. So far it would seem that progress in applying the cycle audit

and review procedures has been slow, possibly in part at least because some see them as cumbersome and time consuming and requiring staff resources than cannot easily be made available. Some authorities have attempted to provide their own simpler versions. Even these can help to encourage wider awareness within councils of cyclists' needs.

Making the general road system safer for cyclists also means paying much more attention to the needs of cyclists in the detailed design of traffic-calming schemes and in other speed reduction measures. The 1996 IHT guidelines gave much useful advice on traffic-calming and the interests of cyclists, as well as pedestrians, in terms of speed reduction. These should be greatly enhanced by the adoption of the measures proposed in the DETR's Speed Management Review in 1999 (DETR, 2000a).

Local transport plans and cycling

As well as benefiting from the general changes in transport policy since 1998, cycling has started to benefit greatly from the increased funding for alternatives to the car with the adoption of the new Local Transport Plans, greatly extending the funding available for cycling under the older TPPs – even in those areas with 'package approach' funding in the early 1990s. This was made very clear, for example, in the DETR Guidance on Full Local Transport Plans published in March 2000 (DETR, 2000b). This set out the following minimum requirements for cycling:

- A discrete strategy for encouraging cycling which establishes a clear target that contributes to the national targets for increasing cycle use;
- Evidence that cyclists have been given a high priority;
- Evidence that encouraging cycling is part of all transport policies including road safety strategies;
- Evidence of interaction with local planning authorities to ensure that land use and development planning allows and encourages people to cycle;
- Evidence that there has been a review of the road network to establish where improvements are needed;
- Assessment of the quality of existing cycle networks to identify where improvements are necessary; and
- Programme of measures to improve safety of cyclists and reduce conflicts with other traffic, including pedestrians

The same document outlined the following characteristics of a good LTP as regards cycling:

- Adopts a formal order in which planners consider the needs of different types, placing cyclists near the top;
- Partnership for action with health, education, commercial and voluntary bodies;

- Plans for improvement of physical provision to be based on methodical application of the Cycle Audit and Review guidelines (published by IHT);
- Cycle audit of all road and traffic schemes;
- Aims to improve interchanges, and increase opportunities for combined cycle and public transport journeys;
- Encourages cycling through TravelWise, Green Travel Plans, Local Agenda 21 and School Transport Plans; and
- Minimises conflict between pedestrians and cyclists.

It is interesting, in reviewing this advice, to see the changes in official advice and guidance in recent years. This is particularly noticeable not just in the greater prominence recommended for cycling in local transport but also in the increased emphasis since the late 1990s on minimising conflict with pedestrians. This certainly reflects political pressure from pedestrian groups over perceived dangers from cyclists, on shared paths as well as on footways and in pedestrian areas, often aggravated by irresponsible cycling behaviour. However, it also perhaps reflects in part the poor standard of some existing provision for cyclists. For example, shared paths have often been created from footways without widening, and the effective width has been reduced by a failure to move back sign poles and other street furniture. Sharp bends on paths can also create dangers for both pedestrian and cycle users. Frequently quality has been overlooked in cycling provision. The need for quality has received much more recognition in DETR guidance, including PPG 13. However, it remains to be seen how far in practice quality will improve, given the apparently still fairly widespread ignorance of cyclists' needs, the increasing general shortage of people with the skills required to implement the new post-1998 White Paper transport planning agenda and the relatively labour-intensive nature of many cycling schemes, even if they are much less costly than larger-scale highway infrastructure.

Successive DETR guidance has tended recently to recommend much more sparing use of shared path solutions, emphasising at the same time that local authorities should be much more prepared to cater for cyclists by taking space from the carriageway rather than the footway. Detailed advice on accommodating cyclists and pedestrians has been published by the CTC (CTC, 2000) after research which showed that shared paths were often unpopular with cyclists as well as with pedestrians. The published PPG 13, on this often particularly contentious issue, stressed that local factors were likely to be of particular importance in assessing the acceptability of shared use solutions, a slightly more supportive stance than found in the PPG 13 draft revision of the previous year.

With a greater general willingness to provide safer on-carriageway solutions for cyclists, including cycle lanes and shared bus and cycle lanes there is perhaps some prospect that conflicts between cyclists and pedestrians may gradually lessen. These prospects will also be much greater if at the same time there is much more emphasis on reducing speeds of motor vehicles – and enforcing them – since both cyclists and pedestrians suffer from this common abuse. Lower speeds and more cycle-friendly road layouts will provide much less reason for cyclists to take to riding on footways as a refuge from hostile road conditions.

The joint interest of cyclists and pedestrians will also benefit from the increased implementation of projects like 'Safe Routes to School' and 'Home Zones' designed to reduce the impact of traffic, improve air quality and give space back to local people as well as to improve safety. In such schemes, as with traffic-calming, getting the detail right is particularly important if they are to maximise their potential to improve conditions for cyclists, and detailed consultation with cycle and other user groups is vital to help this. In general, another vital lesson is the importance of thinking through the likely impact on cyclists of all local planning and traffic management schemes. So often in the past the value of specific improvements for cyclists, such as good standard facilities, has been undermined by the introduction of changes elsewhere on the local road system, such as new roundabouts, that have aggravated conditions for cyclists.

Similarly, cycling should be considered in conjunction with other modes, in the spirit of the emphasis on integration in the 1998 Transport White Paper. Here again, much can be learned from best continental practice, including the common use in several countries by rail users of bikes for their journeys between homes and stations and, in many cases, especially in the Netherlands, for trips at the end of the journey between the station and the workplace or other destination. In this regard, it should be noted that the DETR advice in PPG 13 is particularly strong on the importance of interchanges, with good cycling and walking access. For cyclists good quality convenient, well-lit and secure bike parking facilities are essential, both short term and long term, as well as safe, convenient and well-signed cycle access from a variety of directions.

There is also scope for cycling to be integrated with bus services as well as trains, with secure bike parking, especially at major bus stations and at more important bus stops, for example in suburban and other areas with less frequent stops and services. In the case of rail and bus services encouraging such combinations can extend the catchment of the public transport service.

The promotion of cycling

Another great boost to cycling in Britain in recent years has been the extensive effort that has gone into the development of the Sustrans National Cycle Network (NCN), particularly since the award of a £ 45 million (€75 million) grant from the National Lottery funded Millennium Commission in 1995. Although particularly focusing on rural routes, and building on Sustrans' earlier work of upgrading disused railways and canal towpaths, the project has already started to bring very important benefits to urban cyclists, with extra funding becoming available for cycle paths, Toucan crossings, Advance Stop Lines and contraflow cycle lanes, for example. In Nottingham, where the flagship Inverness to Dover NCN route enters the city from the north before heading west towards Derby, it has resulted in the provision of numerous new facilities for cyclists in a part of the city that had seen far fewer than the south of the conurbation.

The promotion of cycling has also been greatly helped by the development of this project. The NCN is one of the most successful projects to receive Millennium Commission funding and the opening of the first 8000 kilometres of the NCN in June 2000 received extensive publicity. Many other NCN routes are due to open in the next 5 years and cycling will benefit further from Sustrans' increased involvement in projects such as Home Zones and Safer Routes to Stations, in addition to further work on its very successful pioneering Safer Routes to School projects, in partnership with local councils, since the mid-1990s.

It has become increasingly clear that the promotion of cycling must involve a range of approaches, going beyond the provision of infrastructure and associated publicity. The many health and environmental advantages of cycling and walking are being recognised by the public as well as by various experts. Increasing concern about obesity reaching 'epidemic' proportions can only add to this recognition. It was also recognised in the former Department of Transport's Cycle Challenge programme in the mid-1990s which focused on other approaches to cycling policy than the provision of cycle routes. Several of these projects had a strong health promotion focus and some, as in Nottingham and Cambridge, focussed on working with employers to encourage cycling to and from work. Incentives have included expanded and more secure bike parking, showers and lockers together with financial incentives such as mileage allowances for using bikes for work purposes and loans for the purchase of bikes and accessories. The revised PPG 13 also stresses the importance of employers providing good quality information on alternative transport, including cycling access to and from the site, for both

visitors and employees. This is also very important but, to be taken seriously, needs to be based on close consultation with existing and potential cycle users. It also needs to be sustained so that, for example, cycle stands are not removed to make way for new expansion, without making compensatory provision and indeed without making further provision for the expansion.

Some challenges for the future

While it is easy to bemoan the situation for cyclists in the UK in comparison with many of our continental neighbours it is important to bear in mind that the situation is now very different from that which prevailed until the early 1990s. Even leaving aside the special cases of some of the early postwar new towns with attempts at special physical provisions such as Stevenage, Harlow and Milton Keynes (from the 1970s) there are quite a number of older towns and cities with a record of some provision for cyclists that goes back to the early 1980s or even late 1970s. These include York, Cambridge, Peterborough, Oxford, Middlesbrough, Nottingham, Bedford, Bristol, Southampton and Edinburgh. In addition there are a number of London Boroughs which have shown a sustained commitment to cycling and which tried to maintain the momentum for cycling in London generally established for a few years by the former Greater London Council in the early 1980s, with its dedicated cycling project team. There are signs that the new London Government arrangements, introduced in 2000 with a Mayor and Assembly (after the Greater London Council had been abolished in 1986), should help to renew this commitment and cyclists should certainly be among the beneficiaries from the proposed congestion charging scheme in Central London due to be introduced in 2003/4.

Although results of these efforts, in terms of generating new cyclists, rather than just providing better conditions for existing cyclists, were often only modest (McClintock, 1992) there have been several cases of impressive increases in cycling. For example, in the greater Nottingham area, part of which was the focus of much cycle facility development in the 1980s and early 1990s, recent surveys by the City and County Councils showed an increase, over ten years (1990-2000) of 18.7% in cyclists using the network, compared with an increase of only 11.4% off the network and a 20.8% decrease in cycling nationally (Nottingham City Council & Nottinghamshire County Council, 2000). As the current full Local Transport Plan for Greater Nottingham comments 'this clearly demonstrates the success of the network to deliver real increases in cycle use'.

Whilst the national cycling policy framework remained relatively cautious – and even at times distinctly discouraging – until the late 1990s, much

work was done for cyclists which was of varying quality and value to users, though. Some of the poorer schemes were marked by a greater readiness to take space from pedestrians than from drivers, for example, and awkward features such as uneven kerbs and even dangerous ones such as sharp bends and poor inter-visibility were not that uncommon. Many schemes were fragmented, suddenly abandoning cyclists at points where they most needed protection and signs and markings were also often poor, even before vandalism and poor maintenance made them worse.

A great deal of useful research work has been done on cycling over the years, particularly in the 1990s by the Transport Research Laboratory. Much of this recent work has looked at more advanced forms of cycle facility such as contraflow cycle lanes, Toucan Crossings and Advance Stop Lines. Such forms of on-road provision have tended to be more widely appreciated than some cycle paths and shared paths. In addition to evaluations of specific cycle facilities the TRL has done much more general work on traffic-calming and the impact of particular types of feature on cyclists' safety, comfort and convenience. Advice on monitoring of cycle flows has also been included, to help with the increased requirements for monitoring in Local Transport Plans. However, there remain many important challenges in provision for cyclists and these will have to be tackled effectively if the revised DETR targets are to be met. They include:

- Land use planning
- Making general roads and streets safer for cyclists
- Expanding the promotion of cycling
- Training of cyclists
- Expanding the integration of cycling with other modes and policies
- Improving professional training and current awareness

Land use planning

Since 1994 Government planning advice has encouraged planners to make provision for forms of transport other than the car and to reduce car dependence. This advice was strengthened in the 2001 revision of PPG 13. Following this advice has become all the more important with projected major new housing development in many different parts of the country. Higher density developments to encourage the shorter distances that can favour cycling and walking, steering most development to areas well served by public transport and local facilities, and detailed layouts designed to promote safe, convenient and attractive direct routes are all fundamental to encouraging cycling and walking for short trips.

Making general roads and streets safer for cyclists

Provision for cyclists in older urban areas is always going to be more difficult because of constraints of space and existing development. However, the way forward must be to rely more on making the general road layouts safer for cyclists to use, with less reliance on special cycling facilities and, above all, shared paths. Full use of cycle audit procedures and those for cycle review (covering existing roads and streets) will help in this regard as will a much greater emphasis on lowering speed limits and enforcing them. Furthermore the quality of cycle networks should be reviewed, to ensure that all existing facilities do play a net positive role, for less confident cyclists at least. Quality as well as quantity of cycling provision is important and the former needs to be given more emphasis, in initial design and construction and in maintenance. Maintenance is particularly important for cyclists, both on special facilities and on the highway and this also is a vital dimension of quality.

Expanding the promotion of cycling

Promotion of cycling has started to receive more emphasis and this greater emphasis should continue in partnership with wider travel awareness and health campaigns, other public bodies, and commercial and voluntary organisations. There will be increased opportunities to promote cycling through other very important sustainable transport schemes such as Home Zones and Safe Routes to School and Safe Routes to leisure projects. Partnerships with local employers are vital as are partnerships with the police, particularly in giving a higher profile to reducing cycle theft. The NCS had a series of recommendations on bike security, including a comprehensive assessment of the adequacy of local bike parking but these do not appear to have been widely taken up. Cycling needs to be promoted for purposes other than leisure and work, for example for shopping and other utility trips, and personalised travel advice should be easily available. For all types of trip secure bike parking is important but the location of such facilities need to be well signed and publicised. This basic kind of cycling promotion is very important but cycling promotion can also take many more sophisticated forms such as the on-street bike rental 'City Bikes' schemes pioneered in Copenhagen and since adopted in several other Continental European cities.

Training of cyclists

An important part of Safer Routes to School projects is the training of young cyclists, as well as providing safer access routes and bike parking at

schools, and including relevant curriculum content. At the same time there is increased recognition, for example by the DETR and the CTC, of the importance of Adult Cycle Training, to give confidence to adults returning to cycling, often after many non-cycling years. A number of local initiatives have already started in some areas but these need to be expanded and co-ordinated nationally, including the development of nationally recognised accreditation standards for providers of training. Expanding adult training is also a way in which the problem of irresponsible cycling, which attracts regular negative local press coverage, can be addressed, although there is a difficult challenge in ensuring that those who most need to benefit from training do in fact receive it.

Expanding the integration of cycling with other modes and policies

Cycling policy is being integrated more and more with wider planning and traffic management decisions in line with the principles of the 1998 Integrated Transport White Paper, and this must continue as well as the further integration with other policies and strategies on health, leisure, tourism, air quality, climate change, etc. Cycle use of bus lanes has become widespread but, as in the case of traffic-calming, the great potential benefits for cyclists of such provision can be undermined by poorly thought through design details. Permitting motorcycle use of shared bus and cycle lanes, as in Bristol, can be controversial and most other places in the UK have, at least so far, been reluctant to follow this example. The reintroduction of trams in British cities, has had a mixed record in the provision for cyclists in their detailed arrangements. Integration with public transport, especially rail services, is of great importance for longer trips and there is much to learn from Dutch experience, in particular. Furthermore, as with other more sustainable modes, cycling can be greatly helped by wider transport policies restraining car traffic, especially the reallocation of road space away from cars and reduce car parking provision, especially in the case of new developments. PPG 13, in its final published form, seems to water down the advice on this latter point, on maximum car parking standards, that was in the 1999 draft revision. This is regrettable since experience in other countries (as well as the UK) shows traffic restraint, by a variety of means, is essential to increase cycling significantly (TRL, 1994).

Improving professional training and current awareness

Many local authorities do now have cycling officers, or cycling and walking officers, to help ensure that cyclists' needs are specifically attended

to but it would appear that this awareness has often been slow to permeate more widely. Achieving this wider awareness is essential to ensuring that cyclists are given quality provision, based on a real understanding of the needs of – and reflected in getting the details right for – different types of user. Related to this is the challenge of ensuring that those responsible for decisions on the planning, delivery and promotion of cycling have access to the latest technical guidance and relevant research findings, using electronic as well as written sources and other methods such as conferences, seminars and workshops. Meeting this challenge is being made harder by the general shortage of people with relevant skills to implement new Local Transport Plan policies.

The CTC, which for over the last 20 years has greatly increased its interest in the plight of daily cyclists as well as cycle touring, embarked in 2000 on a 'Benchmarking' project to help raise standards of good practice, working closely with a groups of local authorities (Russell & McIlroy, 2001). This initiative should also be a great help in tackling the challenges for the future and in helping to raise further the recognition that cyclists have started to be given in local transport policy. It will also complement similar cycle benchmarking exercises in some other European countries and should help the all too vital need to exchange experience at international as well as national level.

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Planning for more cycling: the York experience bucks the trend

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Abstract

Experience in York has shown that it is possible to promote cycle use whilst also improving cyclists' safety. Key lessons which have been learnt are that isolated cycle facilities will not affect people's modal choice on their own. However, sustained investment at a realistic level can bring about significant changes in people's travel habits. The cycle network needs to be based on strategic planning to ensure that coherent, continuous routes are created. Security has also been shown to be important – both in terms of personal security and safe parking facilities.

Finally, 'soft' measures to promote cycling can complement the physical infrastructure. Partnerships with other organisations have proved very worthwhile to enhance the overall image of cycling. Relating cycling to health, in particular, has allowed the City of York to move towards a very positive message which people can relate to their own lifestyle aspirations.

Keywords

York, cycle planning, growth in cycle use

Background

Historically, York has always had a high level of cycling. As the city is compact most trips are well within cycling range. It is also flat and enjoys a relatively dry climate. Conditions, therefore, are right for cycling. The city's primary employment, based on the traditional factory settings of the rail and chocolate industries, has also tended to favour cycle use. Like the rest of the UK, however, cycle use declined greatly throughout the 1960s and 1970s.

Huge growth in car use over the same period resulted in the inevitable congestion problems common to most urban areas. This was aggravated by the ancient street and land use pattern of the city. In the 1970s plans were drawn up for a major inner ring road project which would have required the demolition of a large number of properties including many listed buildings. Fortunately this was eventually turned down following a public enquiry.

In the mid-1980s a new political

administration, faced with increasing public dissatisfaction with congestion, undertook a comprehensive review of the city's approach to transport planning. This came at a time when academic and professional opinion was shifting away from the prevailing attitude of building additional capacity to solve congestion. An opportunity therefore existed for a radical rethink of policy which led to the adoption of a new Transport Strategy in the late 1980s.

The Strategy

The new Transport Strategy, for the first time, explicitly sought to promote cycling, together with other socially and environmentally sustainable transport modes. At the heart of the strategy lies a hierarchy of road users which was (and still is) used to guide both design and funding priorities. The hierarchy (now slightly modified) is set out in Table 1.

Another key part of the overall Transport Strategy was a Cycling Strategy. This formally set out the Council's policies to promote cycling. The two main objectives of this were to improve conditions for existing cyclists, especially their safety, and to encourage a transfer of journeys from private cars to cycles. To achieve these objectives a policy framework was developed. The fundamental policy was to develop a city wide network of safe cycle routes. This proposed network was adopted in 1988 and is complemented by the provision of secure cycle parking facilities. Since the adoption of the network, its implementation has been overseen by a dedicated cycling officer whose remit also involves further development of cycle policy and advice to other

Table 1. York's highway use hierarchy

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

Note. 'pedestrians' explicitly includes those with mobility difficulties

departments throughout the Council and to other organisations throughout the city.

In 1996, following the reorganisation of local government, York became a unitary authority with new boundaries including a rural hinterland around the built up area. This new area is 10 times the area of the old city and its population of 175,000 compares with the old city's 100,000. This new responsibility meant that the adopted network needed to be reviewed to include the new area. The full proposed network is some 200 km of which 100 km have been constructed.

Funding of Cycle Infrastructure

The majority of funding for new cycle facilities now comes from central government via the Local Transport Plan settlement. Thanks to the government's recent change in emphasis in terms of transport, the money available for cycling projects is much enhanced meaning that progress will take place more rapidly over the next few years than it has in the recent past. Roughly £600,000 is programmed in the financial year 2001/2002 for cycle specific schemes whilst many other schemes included in the capital programme will also have significant benefits for cyclists. This figure compares with an average of nearer £200,000 over the first few years of the Strategy.

Another important source of funding for cycle infrastructure is new development. Whenever developments of any significant size are proposed, developers are required to implement access improvements to the site. Emphasis in York is for pedestrians and cyclists to be considered first in this respect. This allows more cycle schemes to be built than would otherwise be possible but also means that some sections of the network get built in isolation due to the location of a particular development. Forward planning of the proposed network means that advantage can be taken of these developments and that these improvements eventually tie in with the city's strategic network.

The Cycle Network

The network of proposed routes was developed to link all major generators and attractors of cycle trips. These include residential areas, schools and colleges, workplaces, shops and leisure facilities. The ultimate aims of the network are to allow all cycle trips to be made on safe routes and for these trips to be as convenient by cycle as they would be by car. This means that routes need to be direct and continuous as well as safe. To achieve this, a combination of on-road and off-road routes have been identified. Additionally, locations posing particular difficulty for cyclists, such as large junctions, are either avoided or modified.

Over the years it has become apparent that cyclists do not form a single homogeneous group. There are those who are prepared to take a small detour to avoid

busy routes or to get away from traffic altogether and those who will take the shortest and quickest route regardless of traffic levels and speeds. On top of this, many people who enjoy using quiet, traffic free routes during daylight hours are loathe to do so after dark. This is due to the feeling of insecurity caused by remoteness. A dual network is therefore emerging to cater for different types of cyclists and different trip purposes.

Unsurprisingly, the most popular routes are those which are traffic free, well lit, in full public view and more direct than the alternative road.

Since the proposed network was developed, 100 km have been constructed. This comprises completely traffic free routes, off-road tracks adjacent to the highway and on-road cycle lanes together with special facilities at junctions. The network is made up of roughly 60 km off-road and 40 km on-road.

As with most transport networks, the cycle network is largely made up of radial routes to the city centre. This is not entirely the case, however, as cycle trips by their nature tend to be fairly local and, therefore, are often entirely suburban. Nevertheless the city centre remains the focus for very many trips and so the major routes follow this pattern. The single most important feature of the central area is the large pedestrian priority zone which encompasses over 30 streets in the city centre. This is known as the 'Footstreets'. In this zone, motorised traffic is strictly controlled throughout the day. During the core shopping hours it is excluded completely with the exception of certain permit holders who are allowed on specified routes. In effect the zone is pedestrianised at these times. Cyclists are allowed special privileges; outside the core hours they are allowed to cycle unhindered within the footstreets. Within the core hours, cycling is not permitted but cycle parking facilities are provided both within the footstreets and, in larger numbers, at the edge of the zone. There are over 1000 secure cycle parking spaces in the central area.

In addition a virtually traffic free route has been provided for cyclists skirting around the edge of the footstreets. This serves as the equivalent of an inner ring route allowing cyclists to traverse the city centre on the north-south axis without doing battle with the busy traffic that inevitably surrounds the pedestrian priority area. This route is made up of several residential streets which are closed to through traffic except cycles. As well as providing the north-south route it also gives good access to a large cycle parking area on the edge of the footstreets.

City Centre Bridges

Also in the central area, but outside the footstreets, is the river Ouse. This has three bridges all of which are available to all traffic and which are very busy.

Cyclists have not been specifically catered for on these bridges due to the lack of available width. This means that in crossing the river, cyclists have to mix with general traffic. A recent scheme which recognises this and conforms to the Council's policy of promoting cycling is on Skeldergate bridge – one of the three central bridges. Until recently this bridge had a two lane approach to traffic signals at one end. One of the general traffic lanes was removed to allow for the introduction of a dedicated cycle lane on the approach to the signals for cyclists turning right, and a lane which allows left turning cyclists to by-pass the signals altogether. This had inevitable consequences for the traffic capacity of the signals leading to much greater queuing on the approach to the bridge. However, several months later this has now been accepted by the motoring public and has huge benefits for cyclists. This is typical of the approach now being taken to help cyclists. At many locations the only way to provide meaningful help for cyclists is by reallocating road space away from motorised traffic. A piecemeal approach has been taken to avoid an outcry from motorists which is likely to result if many such schemes were introduced at the same time.

This approach is more radical than would have been politically acceptable a few years ago. At that time, space was often made for cyclists by either allowing them to share footways or by narrowing footways to allow for a cycle lane to be introduced. Recent changes in both local and national emphasis now allow such sensitive decisions to be made. To create space for cycling, the presumption now is to reallocate away from motorised vehicles and not from pedestrians.

The Magic Roundabout

Another recent innovation in design is the Heworth Green roundabout (see Figure 1). This has replaced a complex priority junction on a main radial about 1 km from the city centre. Emphasis in the design was again to create a junction which would allow safe passage for the 800 cyclists who use the junction each day. Roundabouts on fast, busy roads are not renowned for their cycle friendliness so traffic signals were first considered. Modelling of a signalled junction revealed that this would result in an unacceptable amount of queuing for motor vehicles. A roundabout design was then developed which incorporated annular cycle lanes. When this has been tried elsewhere in the U.K. it has been conventional to set the cycle lanes tight against the kerb on the outside of the roundabout, a position which puts cyclists away from the field of view of following drivers and in a vulnerable position at each entry and exit point. In this design the cycle lanes have been moved nearer to the centre of the roundabout. This puts cycles more directly in the sight

line of drivers. Additionally, on the approach to each exit, the lanes split into two so that it is clearer whether cyclists are turning off or continuing around the roundabout. As well as the innovative cycle lanes, the roundabout also features a geometry which encourages low vehicle speeds – the so called 'continental design'. This effect is further enhanced by the cycle lanes which make the roundabout look smaller. Average entry speeds have been brought down to 17 mph compared with 31 mph before. The roundabout has been in place for 8 months and no accidents have been recorded in this time. In the 5 years prior to its introduction, 18 accidents had occurred. Queuing has increased significantly on the inbound approach to the roundabout but has been kept within reasonable limits. Outbound queuing has been reduced.

The Millennium Bridge

The highest profile addition to the cycle network in recent years is the Millennium Bridge. It crosses the river about 1 km south of the city centre. This is the only river crossing south of the city centre before the outer ring road which is a high speed dual carriageway about 3 km from the centre. Movement between the south-east and south-west parts of the city was therefore difficult before the bridge was constructed. The journey was both circuitous and involved busy roads including one of the busy central bridges mentioned previously. The new bridge for pedestrians and cyclists was built with funding from the Millennium Commission, the City Council, the Joseph Rowntree Foundation and local businesses. The bridge links important cycle routes on either side of the river and the network is planned to be further augmented by the construction of a major new route linking the bridge to the western suburbs. The bridge was opened in spring 2001 and is already attracting 2000 users per day. Just over half of these are cyclists. Because of the difficulty in making these cross-river journeys before the bridge was built, it is expected that it will lead to a significant transfer of trips to cycling. Comprehensive monitoring is taking place to assess this effect.

Because of its high profile, the Millennium Bridge has helped to enhance the image of cycling in general.

Marketing

Marketing, publicity and promotion are vital elements of a strategy to encourage more people to cycle. Simply providing the infrastructure on its own is unlikely to have as great an effect. In York a number of initiatives have been undertaken. These include direct publicity for the network and promotional campaigns as well as associated activities to raise the profile of cycling.

Publicity for the network is mainly done in three ways. The first is to use the media to publicise individual schemes as they get built. The second is through a district wide cycle route map. This not only fulfils the conventional role of a map but also makes people aware of the extent of the facilities. The map is made available widely and not just in the usual cycle outlets. In this way it is hoped to spread the message to non-cyclists. Information about the cycle network also appears on the Council's website. This is proving to be a useful means of disseminating information.

The third is a city wide cycling marketing campaign, targeting car drivers. The campaign uses media space that is most likely to reach the target audience, such as the reverse side of car park tickets and bus rears. Although there are many personal and societal benefits from increasing levels of cycling, listing them all in a communication campaign would lead to a confusing and complex message that would be unlikely to register with the target audience. Consequently, the campaign focuses on one motivation for cycling at a time. In 2000, the campaign focused on the health benefits, particularly reducing the coronary heart disease risk factor, which is Britain's largest single cause of premature death. Follow up interview surveys revealed that this campaign was successful in getting the message across to the car driving target audience.

A significant aspect of this campaign is that it has been run in partnership with the Selby and York Primary Care NHS Trust. This is important because it moves away from the negative feeling that the Council is trying to bully people into not using their cars towards a much more positive message.

Reducing Social Exclusion

An unusual and inspiring project which also involves partnerships with a number of agencies is the Recyclist Project. This project affords young unemployed people an opportunity to gain work experience in a supervised environment. Trained staff help them to refurbish unclaimed bicycles which had been stolen. An unusual feature is that at the end of the five weekly sessions each person is allowed to keep the bike they have worked on. This promotes pride in the work they have carried out but also gives them more freedom to travel to jobs or education opportunities in the future. This project clearly has benefits across a range of fields including education and social inclusion as well as transport.

Maintenance

For cycle networks to be useful they need to be well maintained. This has proved to be a problem as no system existed which was well suited to this task. Over the last few years maintenance has been carried

out as part of the general highway maintenance work. This has its limitations as the staff are not familiar with the levels of intervention needed to provide for safe and comfortable cycling. This is added to by the fact that a system – and staff – dedicated to highway maintenance is not physically well equipped for cycle route inspection. Often urgent attention is needed but on a very small scale. For example, if broken glass is reported on a cycle path, it needs to be dealt with the same day. To employ standard highway maintenance staff and machinery is the proverbial hammer to crack a nut.

Over the last few months a new system has been set up which has had a profound beneficial effect on network maintenance and illustrates how the scale of the operation needs to match the scale of the task. Two part time rangers have been employed who are dedicated to cycle path maintenance. Between them they patrol the entire off-carriageway network using bikes equipped with trailers and hand tools. This enables them to carry out all day to day maintenance including cleaning, broken glass removal and vegetation control. They are also able to report more major problems to the highway maintenance team. The rangers have a high profile due to their trailers and high visibility clothing which means that users are aware that the maintenance issue is being taken seriously. It is now intended to equip the rangers with mobile telephones so that they can respond even more quickly to complaints and also contact the appropriate authorities in the event of any misuse of the network.

The value of this new arrangement cannot be overstated. The network is now consistently in good condition and free from broken glass whereas in the past many users were put off using certain paths because of these problems.

Monitoring

Monitoring of the network is important to both the Council and central government. We need to provide evidence of the value of the network to ensure future funding but also to allow us to prioritise how future expenditure is allocated. The principal tool is surveying the level of usage.

Historically, monitoring has been carried out through manual counts. This has now been augmented by automatic traffic counters using induction loop technology. The benefits of these are two-fold. Firstly they allow the collection of much more data than

Table 2. Targets for the modal share of cycling journeys to work and to school

Year	2000	2006
Journey to school	5.25%	7.2%
Journey to work	18.6%	20.6%

would be possible through manual counts. Secondly they allow us to monitor trends and daily weather-induced variations. Once a year we count all traffic at a cordon surrounding the city and on the river bridges. As this is a one day count only, and particularly as it takes place in October, it means that the cycle counts are very vulnerable to fluctuations caused by the weather. With the permanent counters in place, this data can be adjusted to take this into account. We are therefore able to see patterns emerging over time.

Every 10 years the national census provides reliable data on journeys to work. The last of these for which data is available was carried out in 1991. In 2000 the City of York Council carried out household interview surveys to inform the Local Transport Plan process. This gave us an opportunity to update the journey to work data (see Table 2).

Usage & Targets

One of the main objectives of the Cycling Strategy is to increase usage. Until the installation of the automatic traffic counters, our most reliable source of data was the census information. This revealed that, from 1981 to 1991 we had maintained a largely stable level of cycling to work. This, in fact, is thought to mask a drop in the early 1980s followed by an increase. For the built up area which made up the whole of York's administrative area until 1996, the journey to work figure was 22.1% in 1981 and 20.3% in 1991.

In 1996, following local government reorganisation, the boundary change means that we have inherited a much larger geographical area; commuters with longer journeys are now included in the data. It also means that people living near to the new boundary are more likely to work in nearby towns and cities rather than in York itself. The 1991 figures were therefore recalculated to reflect the post 1996 boundary. This revealed that 15% of all journeys to work were by bike. The household interview survey carried out in 2000 showed that this figure had risen substantially to 18.6%. This is a very encouraging outcome.

Experience elsewhere has suggested that long term investment in cycle infrastructure and promotion is needed to induce a significant modal shift and this is borne out by experience in York. A significant point in this respect is that the first sections of the network to be constructed were inevitably isolated whereas over the last few years a genuine sense of a coherent network is beginning to emerge. Now many journeys are catered for on a continuous basis promoting confidence in even the least experienced cyclists.

An interesting monitoring exercise has just begun relating to the Millennium Bridge. Because the bridge creates distinct new journey opportunities, there is a potential for significant modal shift. To

examine this properly we fitted automatic counters on all paths in the vicinity over a year before the bridge was completed. These have now been complemented by counters on the bridge approaches themselves. In due course, we will carry out interview surveys on the bridge to assess not only origin and destination information, but also to ascertain how such journeys would have been made before the bridge was built.

York has five targets relating to cycle usage. The central ones are for the proportion of journeys to work and school. The current and target figures are shown in Table 2.

Safety

Whatever success the strategy achieves in terms of cycle usage, it is important that this is not attained at the expense of cycle safety. Table 3 shows recent trends in cycle casualties which reveal that safety has, in fact, been improved. It is particularly pleasing to note that the number of Killed or Seriously Injured people has gone down by more than 50% while overall cycle levels have increased.

Future Aspirations

The next few years will see big improvements in the cycle network. This is due of more generous funding from central government with a stronger emphasis on green transport issues. For York this means that we will spend roughly three times as much per year on cycle infrastructure over the next few years as we have in the past. We are concentrating on two specific tasks. The first is to identify remaining gaps in the existing network and to fill these. This recognises the need for continuity discussed above. In this context very good value can be achieved by the implementation of quite small schemes that overcome a particular difficulty in an otherwise continuous route. The second task is linking the larger outlying settlements to the city centre. In both cases priority will be given to those schemes which have the greatest potential for modal shift away from cars.

Acknowledgement

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Table 3. Road traffic accidents in the city of York

1996 to 1998	KSI	Slight	All Severities
All Cyclists	15	109	124
Adult Cyclists	13	89	102
Child Cyclists	2	20	22
1991 to 1993	KSI	Slight	All Severities
All Cyclists	38	109	147
Adult Cyclists	33	87	120
Child Cyclists	5	22	27
KSI= Killed or Seriously Injured			

McClintock (ed.) (forthcoming) *Planning For Cycling: Principles, Practice and Solutions for Urban Planners*
Woodhead Publishing, Cambridge.

Guidelines for a safety audit of bikeway systems

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Abstract

It is noted at the outset that the bicycle is recognised as a legitimate transportation mode, especially in the context of sustainable transportation systems. However, bicycle facilities need to provide the cyclists using them with a high level of safety. Unexpected, abrupt changes in horizontal and vertical geometry and cross-section are hazardous to cyclists. Such hazards can be minimised through a safety audit or at the initial design phase by following good design practice.

A safety audit of the existing bicycle facilities in Calgary, Alberta was undertaken as a case study to determine the relative safety of different bicycle facilities. With the many km of bicycle facilities in the City of Calgary there are many examples of safe and unsafe situations, and locations where mitigation measures have improved safety.

Lateral and vertical clearance, sight distance, grades, pathway/street furniture, lighting, directional signage, pathway/roadway width, and ride quality were reviewed as part of the audit. These design elements formed the basis of the field investigation that was undertaken as part of the safety audit. Each of these design elements has the potential to either increase or decrease the safety to a cyclist depending on the situation.

The principles and guidelines of what constitutes a comprehensive safety audit for bikeway systems are outlined. Examples of good practice and unsafe situations along with potential applications of the safety audit process for bikeway systems are also discussed.

Keywords

Bikeway systems & facilities, Calgary, safety audit

Introduction

It is now generally recognised that road safety audits should be a fundamental part of transportation planning, design, construction and maintenance. While road safety audits have been conducted for some time in countries such as Great Britain, Australia, and New

Zealand, uniform procedures have not yet been adopted in Canada. In order to establish uniform guidelines for conducting road safety audits, recently the Transportation Association of Canada has formed a steering committee to produce guidelines on conducting road safety audits.

While the concept of road safety audits is relatively new in Canada several road safety audits have been undertaken in Alberta, British Columbia, Ontario, Nova Scotia, and New Brunswick. The primary focus has been on existing roadways, roads at the draft and detailed design stages, and roads at the pre-opening stage. To date, safety audits of bikeway facilities have been overlooked in the overall review of urban transportation facilities. The literature review uncovered only one reference pertaining to bicycle facility audits (IHT, 1998).

Calgary: a case study

An in-depth safety audit of the existing bicycle facilities in Calgary, Alberta was undertaken as a case study to determine how safe or unsafe these facilities are to cyclists. This safety audit was a system wide operational review of the regional pathways (off-street facilities) and bikeways (on-street facilities) within the City of Calgary. Within the city there are approximately 3800 km of roadway of which 200 km are designated as bikeways. In addition there are approximately 400 km of multi-use pathways.

The case study of Calgary's bicycle facilities that was undertaken as an initial safety audit for bicycle facilities included the evaluation of approximately 280 km of this network. Due to the extent of this review and the many km of bicycle facilities in Calgary, a large number of safe and unsafe situations were identified. In addition to these, a number of locations where mitigation measures have been implemented to improve bicycle safety were also identified. Rail crossings, road crossings, river crossings, pedestrian overpasses, pedestrian underpasses, basic pathway sections, and pathway intersections were all handled in a variety of different ways yielding many unsafe and safe examples. It should be noted that while the Calgary bikeway

system is used as a case study, examples of best practice and design guidelines are generalised.

For the most part it was determined that, like roads, bicycle facilities are designed, operated, and maintained in a safety conscious manner. However, it was also determined that, like roads, bicycle facilities have certain physical characteristics that can make them unsafe. These unsafe characteristics may not be obvious or apparent to an individual who does not have knowledge of, or experience with, cycling and cyclists.

Through the case study and initial bikeway safety audit, 15 common occurrences of safe practice and unsafe situations were identified. These characteristics are listed in Table 1. Depending on the situation each of these characteristics either increased or decreased the safety of the facility. The photographs shown in Figures 1 through 6 illustrate examples of situations that have either decreased the level of safety or provided a desirable level of safety to the users. In addition to these 6 examples, numerous safe and unsafe situations were found during the case study. However the overall level of safety provided to cyclists via the physical environment along the bicycle facilities appeared to be good.

Figure 1 shows an example of poor sign placement. These signs are obstructed from both the views of cyclists and motorists in both directions along the bikeway. Figure 2 shows an example of confusing and contradicting signage. The top sign is an on-street bicycle route sign showing a right turn. The bottom sign does not belong, as the message it displays does not correspond to the message of the bicycle route sign.

Figure 3 shows an example of good bicycle route signage. This reserved lane sign is along a temporary bidirectional pathway that was implemented as part of a pathway detour.

Figure 4 shows an example of a pinch point along a bicycle route. Here the roadway narrows underneath a bridge forcing the cyclists into the driving lane. Bikeway continuity is not provided. Figure 5 shows an example of a wide curb lane along a bicycle route. There are two distinct driving lanes and a parking lane. The curbside-driving lane has additional width (6.8 m) that accommodates both a vehicle and a cyclist side by side. Figure 6 shows an example of a marked bicycle lane along a roadway with traffic calming. The roadway width from the centreline to the edge of the curb bulbs is 4.3 m providing sufficient width for a cyclist and a motorist to share the road. The actual bike lane is 1.8 m wide.

Road safety audits

The purpose of conducting any road safety audit is to establish existing risks to road users and to make recommendations on how to minimise them. The basic premise of a safety audit includes identifying physical elements within road schemes that are safe, could be made safer, or that should be fundamentally changed in order to improve, or provide, a safer travelling environment. The intention is to clearly ensure that road safety has been addressed to at least the same degree as other roadway requirements (G.D. Hamilton Associates, 1998).

The road safety auditing process itself can be undertaken at any one, or all, of the planning,

Table 1. Examples of Good Practice & Unsafe Situations

Good Practice	Unsafe Situations
Good Directional Signage	Inconsistent or Missing Directional Signage
Wide, Zero Lip Curb Cuts	No Curb Cuts at Pathway/Roadway Interfaces
Good Pathway Intersection Traffic Control Signs	No Pathway Intersection Traffic Control Signs
Good Placement of Bollards/Street Furniture	Poor Placement of Bollards/Street Furniture
Good Warnings of Low Clearance	Inadequate Vertical Clearance or Warnings
Sufficient Width vs. Volume	Inadequate Width vs. Volume
Sufficient Lateral Distance to Obstacles	Inadequate Lateral Distance to Obstacles
Clearly Marked Hazards and Obstructions	Unmarked Hazards and Obstructions
Clear Pavement/Pathway Markings	Poor or Missing Pavement/Pathway Markings
Good Vegetation Setbacks/Maintenance	Vegetation Overgrowth of Pathways and Signs
Good Visibility and Sight Distance	Inadequate Visibility and Sight Distance
Good Surface Condition and/or Type	Poor Surface Condition and/or Type
Good Pathway/Roadway Crossings	Poor Pathway/Roadway Crossings
Good Construction/Detour Signage	Inadequate Construction/Detour Signage
Sufficient Lighting	Insufficient Lighting

Table 2. Off-Street Bikeway Checklist

Criteria	Description	Checked	Notes & Comments
Bikeway Width	Is the width of the bikeway sufficient?	<input type="checkbox"/>	
Bikeway Volume	What is the volume of cyclists & other bikeway users along the bikeway? (e.g. pedestrians, in-line skaters, others)	<input type="checkbox"/>	
Width/Volume	Is the bikeway width/volume adequate?	<input type="checkbox"/>	
Gradient	What is the percent grade along a specific section of the bikeway? What is the length of the grade?	<input type="checkbox"/>	
Obstacles/ Obstructions	Are there any obstacles or obstructions on the bikeway that could be a hazard to a cyclist? (e.g. benches or bus shelters, vegetation or trees, bollards on the pathway, stairs on the pathway, bridge piers, expansion joints)	<input type="checkbox"/>	
Lateral Clearance	Is there a sufficient distance from the edge of the bikeway to obstructions? (e.g. trees, signs, benches, light standards)	<input type="checkbox"/>	
Vertical Clearance	Is there a sufficient distance above a typical cyclist to overhead obstructions? (e.g. signs, structures, trees)	<input type="checkbox"/>	
Sight Distance	Is the visibility provided along the bikeway sufficient for a cyclist to see obstructions? (e.g. other cyclists, fallen trees)	<input type="checkbox"/>	
Curb Cuts/ Wheelchair Ramps	Are there curb cuts at appropriate places along the bikeway? Are the curb cuts of a sufficient width & slope, & with a low or zero lip height?	<input type="checkbox"/>	
Landscaping	How does the adjacent landscaping affect the bikeway? (e.g. natural grasses, trees, shrubs, drainage ditches adjacent to the bikeway, sprinkler locations & times)	<input type="checkbox"/>	
Surface Type	What type of material is the bikeway surface made of? (e.g. asphalt, concrete, gravel, shale)	<input type="checkbox"/>	
Surface Quality	What type of condition is the bikeway surface in? (e.g. cracked, rutted, root intrusion)	<input type="checkbox"/>	
Lighting	Is there adequate lighting along the bikeway? Day? Night? (e.g. in heavily wooded areas, in tunnels, under bridges)	<input type="checkbox"/>	
Surveillance	Is there any surveillance along the bikeway that provides a safe environment? (e.g. informal)	<input type="checkbox"/>	
Signage	Is there adequate signage along the bikeway in order to provide sufficient information to cyclists? (e.g. directional, informational, route identification, warning, traffic control & detour signs)	<input type="checkbox"/>	
Pavement Markings	Are there adequate pavement markings along the bikeway? (e.g. centrelines, stop bars)	<input type="checkbox"/>	
Pedestrian Bridge Width	Is the clear width of the bikeway over pedestrian bridges adequate?	<input type="checkbox"/>	
Bridge/ Slope Railings	Is the height of the railing sufficient? Is the railing type of a safe design? (e.g. catch a handlebar end or a pedal)	<input type="checkbox"/>	
Bikeway/ Bikeway Intersections	What type of intersection treatment is in place for a bikeway/bikeway intersection? (signage, sight distance, angle of intersection, desire lines)	<input type="checkbox"/>	
Bikeway/ Roadway Intersections	What types of treatments are in place at a bikeway/roadway intersection? (e.g. bollards, signage, continuity, visibility)	<input type="checkbox"/>	
Seasonal/ Temporary Closures	Is there an alternate route available for cyclists in the event of a bikeway closure?	<input type="checkbox"/>	
Bikeway Location	Where is the bikeway located? How does the location affect the operation of the bikeway? (e.g. boulevard or parkland)	<input type="checkbox"/>	
Cyclist/ Motorist Interaction	How do vehicles affect the operation of the bikeway? (e.g. headlight glare, travel direction)	<input type="checkbox"/>	

preliminary design, detailed design, substantial completion, or in service stages. At each stage, the roadway scheme is evaluated for safety only. Safety audits are not intended to be a critique of the design. It is the responsibility of the design engineer, or the design team to ensure that the roadway scheme meets current standards and guidelines. However, it is important to note that a roadway scheme that meets

current standards and guidelines is not necessarily safe (C-TEP, 1998). As a result, road safety audits are becoming increasingly more important in transportation planning, design, construction, and maintenance.

Table 3. On-Street Bikeway Checklist (part 1)

Criteria	Description	Checked	Notes & Comments
Lane Width(s)	Is the width of the bikeway sufficient? (shared lane, curb lane, bike lane, shoulder)	<input type="checkbox"/>	
Number of Lanes & Configuration	How many lanes are there (directionally & overall) including bike lanes?	<input type="checkbox"/>	
Overall Width	What is the overall roadway width? (edge of pavement to edge of pavement)	<input type="checkbox"/>	
Parking	Is there on-street parking along the bikeway? What type (e.g. parallel, angle, reverse angle) & turnover rate?	<input type="checkbox"/>	
Posted Speeds/ Actual Speeds	What is the posted speed limit along the bikeway? What are the actual operating speeds of motor vehicles along the bikeway? How do these affect bikeway operation?	<input type="checkbox"/>	
Volumes	What are the traffic volumes along the bikeway? Hourly? Daily? Directionally? Curb Lane(s)?	<input type="checkbox"/>	
Turning/ Turning Volumes	What are the turning volumes along the bikeway? How many conflict points are there? How do pedestrians affect turning?	<input type="checkbox"/>	
Traffic Mix/ Composition	What is the traffic mix along the bikeway? %Cars? %Trucks? %Buses? %Cyclists? %Pedestrians?	<input type="checkbox"/>	
Cyclist Volume	What is the volume of cyclists along the bikeway? What could the volume be if the bikeway was safer for cyclists?	<input type="checkbox"/>	
Continuity	How continuous is the bikeway for cyclists? Does the bikeway provide a continuously safe route without unsafe situations?	<input type="checkbox"/>	
Connectivity	Does the bikeway connect to other bikeways? Does the bikeway connect to desired destinations safely?	<input type="checkbox"/>	
Discontinuous Geometry	Does the geometry of the bikeway change suddenly producing squeeze points? (e.g. under bridges, lane narrowing)	<input type="checkbox"/>	
Bus Stops	What is the number & frequency of bus stops along the bikeway? (conflict points)	<input type="checkbox"/>	
Side Roads/ Driveways	What is the number of side roads & driveways along the bikeway? (conflict points)	<input type="checkbox"/>	
Roadside Barriers	Are there barriers adjacent to the roadway that are hazardous to cyclists? (w-beam, GM)	<input type="checkbox"/>	
Geometrics	How do the roadways geometric characteristics affect a cyclist? (e.g. look at the roadway from the perspective of & location of a cyclist)	<input type="checkbox"/>	
Gradient	What is the percent grade along a specific section of the bikeway? What is the length of the grade?	<input type="checkbox"/>	
Longitudinal Obstructions	Are there any longitudinal obstructions on the bikeway that could be a hazard to a cyclist? (e.g. cracks, pavement seams, potholes near the curb & gutter, drainage grates, rumble strips, elevation differences, roadside debris, sand/gravel)	<input type="checkbox"/>	
Lateral Clearance	Is there a sufficient distance from the edge of the bikeway to obstructions? (e.g. curbs, sidewalks, light standards)	<input type="checkbox"/>	

Bikeway safety audits

Purpose

Although road safety audits examine roadways from the perspective of all users, their primary focus is on the automobile and motorised transport. As a result, the impacts of a roadway scheme to other road users can be overlooked, especially if the auditor, or audit team, is not specifically conducting the audit from a non-motorised point of view. In particular, the safety needs and requirements of a cyclist are substantially different from that of an automobile. In addition to these, the facilities used by cyclists vary and are not limited to roadways alone.

In comparison with motor vehicles using roadways, the bicycle is the most vulnerable. Generally, on-street bicycle facilities are some form of a roadway that is shared by bicycles and automobiles. These shared facilities are frequently designed and built with automobile transport as a first priority, with the bicycle usually being one of the final considerations, if it is even considered at all. For that reason it is worthwhile to conduct the safety audits of bikeway facilities from the point of view of the cyclist. This viewpoint will assist in minimising the risks to cyclists associated with proposed or existing roadway schemes.

Table 3. On-Street Bikeway Checklist (part 2)

Criteria	Description	Checked	Notes & Comments
Vertical Clearance	Is there a sufficient distance above a typical cyclist to overhead obstructions? (shouldn't be a concern due to the fact that motor vehicles require more vertical clearance)	<input type="checkbox"/>	
Sight Distance	Is the visibility provided along the bikeway sufficient for a cyclist to see obstructions? (visibility & sight distance should be judged & observed from a cyclists point of view)	<input type="checkbox"/>	
Driveway Entrances	Are the driveway entrances/exits along the bikeway adequate for cyclist? Is the elevation change between the road & the driveway small enough for a cyclist to handle without having to dismount? (e.g. low or zero lip height)	<input type="checkbox"/>	
Surface Type	What type of material is the bikeway surface made of? (e.g. asphalt, concrete, gravel)	<input type="checkbox"/>	
Surface Quality	What type of condition is the bikeway surface in? (e.g. cracked, rutted, pot holes, seams, gutter/pavement edge)	<input type="checkbox"/>	
Lighting	Is there adequate lighting along the bikeway? Day? Night? (e.g. in tunnels, under bridges)	<input type="checkbox"/>	
Surveillance	Is there any surveillance along the bikeway that provides a safe environment? (e.g. informal)	<input type="checkbox"/>	
Signage	Is there adequate signage along the bikeway in order to provide sufficient information to both cyclists & motorists? (e.g. directional, informational, route identification, warning, traffic control, & detour signs)	<input type="checkbox"/>	
Pavement Markings	Are there adequate pavement markings along the bikeway? (e.g. centerlines, stop bars, bike lane markings/delineation, bike stencils,)	<input type="checkbox"/>	
Traffic Calming	How does traffic calming affect the safety of a cyclist? (e.g. curb bulbs, closures, diverters, roundabouts)	<input type="checkbox"/>	
Intersection Configuration	How does the intersection type & configuration affect the safety of a cyclist? (e.g. shared through/turn lanes, double/triple turns, channelization)	<input type="checkbox"/>	
Intersection Control	What type of traffic control is used at the intersection & how does it affect the safety of a cyclist? (e.g. yield, stop, signal)	<input type="checkbox"/>	
Signal Timing	How does the signal timing affect the safety of a cyclist? How does the coordination of consecutive signals affect the safety of a cyclist?	<input type="checkbox"/>	
Loops/ Detection	Does the signal detection affect the safety of a cyclist? Are special loops or detectors in place that can be activated by a bicycle or cyclist?	<input type="checkbox"/>	
Ramps/ Interchanges	How do interchanges & ramps along the bikeway affect the safety of a cyclist? Have provisions been made for cyclists at these locations?	<input type="checkbox"/>	
Structures	How do bridges or subways affect the safety of a cyclist? (e.g. lane widths, obstruction both longitudinal & lateral, expansion joints)	<input type="checkbox"/>	

In the off-street (pathway) environment, the situation is the reverse, with the cyclist being at the high end of the user classification rather than the low end. In most cases, pathways are designed and built from a recreational perspective, and not necessarily based on geometric design guidelines. Geometric design elements, such as horizontal and vertical alignments, along pathways that may be safe for other pathway users, such as pedestrians and runners, may not be safe for cyclists. Since these facilities do not fall under the classification of a roadway, a typical road safety audit of these facilities would not be applicable.

However, these facilities are an important component of the non-motorised transportation network. Thus a bikeway safety audit should be conducted of bicycle and multi use pathways in order to minimise the risks faced by cyclists using these facilities.

Principles

The principles of a bikeway safety audit resemble very closely those of a road safety audit. One primary difference is that a bikeway safety audit is conducted from the perspective of a cyclist only. Taking this into account emphasises the fact that roadway and pathway characteristics will affect a cyclist in a very different way than they will either a vehicle or a pedestrian.

For a planning or design stage bikeway safety audit, the audit must be conducted independently from the design team. This ensures that the analysis of the proposed design, for safety, from a cyclist's point of view can be fully undertaken without preconceived opinions about the safety of the design. The independence also brings in experts in safety engineering. Unless carried out by the original designer, safety audits of existing bikeways are intrinsically independent because of the fact that they are conducted some time after the planning and design has been fully completed.

The bikeway safety audit process needs to be well documented in order to provide a record of what aspects were reviewed and what comments or recommendations were made. Once a bikeway safety audit has been completed and recommendations presented, all responses to the findings also need to be well documented. This documentation is completed in order to obtain a record of what decisions were made and what measures were, or will be, taken with respect to the audit findings. Formal documentation for both of these aspects of a bikeway safety audit is essential to the success of the audit (C-TEP, 1998).

The most important principle of a bikeway safety audit is the experience of the auditing person or team. Since this is an audit designed to look at the safety provided to cyclists using bicycle facilities, the auditor must have knowledge of cycling skill, of

cyclists' safety requirements, and experience of what physical characteristics can be hazardous to cyclists. This experience can only be obtained by observing many km of bicycle facilities from the saddle of a bicycle.

Guidelines

Bikeway safety audits need to be conducted from a cyclist's point of view. Thus all bikeway safety audits should be done in conjunction with a field investigation. For planning and design stage audits this is not physically possible. However, it is possible to cycle something that has reached substantial completion in the construction process or something that is fully completed and at the pre-opening stage. Only with a field investigation on a bicycle will an auditor gain a full appreciation from a cyclist's view.

Bikeway safety audits need to be conducted at different times of the day and at different times of the year. Conditions during the middle of the day are drastically different from those at night. Unmarked obstacles close to a bicycle facility may not be seen at night as easily as they are during the day. Similarly, warning signs need to be in place and visible at night. Additionally, conditions on the pathways will be dramatically different in the springtime after the winter snowmelt than they will be during the middle of summer. Furthermore, conditions along the bicycle facilities during the winter need to be taken into account when determining how safe a facility may be.

Local and national guidelines and standards need to be taken into consideration when undertaking a bikeway safety audit. The new Geometric Design Guide for Canadian Roads (TAC, 1999), the Bikeway Traffic Control Guidelines for Canada (TAC, 1998), and The Calgary Cycle Plan (City of Calgary, 1996) were key documents used during the analysis of the data collected during the case study. All available and applicable guidelines and standards should be used during the evaluation of the safety provided by bicycle facilities.

The use of checklists in the completion of a bikeway safety audit is recommended. Checklists guide the auditor through the audit process and list most of the characteristics of bicycle facilities that need to be examined during the audit. They also aid in the formalisation of the audit by providing a means of documentation. Photographs and video are also beneficial to the documentation of the audit.

Tables 2 and 3 are checklists for the safety audit of off-street and on-street bicycle facilities. These checklists include the criteria that should be examined as part of the bikeway safety audit and a brief description of how the criteria can affect the level of safety provided to a cyclist using the facility. These checklists were prepared after a review of the

case study data and through consultation with local cycling experts and safety skill instructors. In order to make an accurate assessment of the safety situation and provide valuable recommendations, all of the appropriate characteristics should be examined as part of the bicycle safety audit process.

Ongoing Monitoring

Once a bikeway safety audit has been completed and the recommended improvement implemented a review should follow as the next step in the safety audit process. A formal review process is essential to ensure that the original audit has been effective in improving safety. Safety enhancements to bicycle facilities should not be considered as single occasion improvements. Certain bicycle facility characteristics including vegetation and debris can change seasonally while other characteristics such as pavement markings and signage may not change a great deal over the course of a few years, but will change over time.

The important aspect relating to ongoing monitoring of bicycle facilities is that of change. The condition of bicycle facilities is not in a static state for extended periods. Thus, a system of single occasion bikeway safety audits will not be sufficient for the life of the facilities. A system of regular reviews needs to be in place so that safety concerns can be addressed before they actually become safety problems. It is important to note that ongoing maintenance of bicycle facilities contributes greatly to the safety of bicycle facilities, however maintenance alone is not a substitute for a safety audit.

Applying safety audits to bikeway planning

The results of a bikeway safety audit can be used for more than just the consideration of recommendations and the implementation of improvements. For the most part, the roadways that are included in an urban bikeway network are those roadways that have been deemed to be safe for the majority of cyclists. However, there are several different types of cyclists with various levels of cycling skill that use urban roadways. Cyclists can in fact be broken into 7 distinct groups: children, novices, utilitarians, commuters, tourists, racers and couriers.

Since cyclists themselves are not restricted to a limited on-street bikeway system, the safety audit could be used to classify all streets as cycling streets based on how safe they are compared with a skill level. If we compare cycling with downhill skiing and use a similar classification approach we would be able to create a cycling network that was restricted only by cyclists' abilities. As in skiing, the beginner runs are generally safe for skiers of all levels of abilities. The intermediate runs are safe for people who have a higher skill level than a beginner, but would not be recommended for a beginner. The expert runs are

considered safe for those with a much higher skill level, but would not be recommended for those with a lower skill level. Here the choice of runs is left up to the skiers themselves. At some point each run would have been evaluated to determine its relative safety and the skill level required for that run.

If we were to consider an urban roadway network in the same manner, we would be able to classify all of the roadways based on the relative safety that they provide to cyclists and the skill level that is recommended. By so doing, the urban bikeway network could be expanded to include every street and would no longer need to be limited to those streets that are safe for most cyclists. The choice of roadways would be left up to the cyclist based on their personal skill level and comfort level. Residential roads could be classified similar to the beginner runs of a ski hill whereas collector and arterial roads could be classified similar to the intermediate runs on a ski hill. The number of skill levels involved in the evaluation of the roadways would depend on the size of the urban area and the type of roadways with 3 being used as a minimum (similar to a ski hill) and 5 or 6 being used as a practical maximum.

The acknowledgment of a cyclist's skill in the evaluation of the cycling network will lead to the development of a more complete multi tier system. Furthermore, once the evaluation has been completed and the classifications assigned, recommendations could then be implemented for improvements to certain roadways to enhance their safety and the cycle friendliness. This would facilitate the enhancement of the bikeway system by striving to provide more routes that require less skill, thereby increasing the availability of safe cycling routes to more cyclists.

Ongoing study

In 1998 the UK Department of the Environment, Transport and the Regions published its 'Guidelines for Cycle Audit and Cycle Review'. The guidelines are primarily focused on assessing the cycle friendliness of a carriageway (roadway) or cycle track (pathway). However, even though these guidelines are the only known guidelines specifically relating to the audit of bicycle facilities, they are not designed to be a safety audit of bicycle facilities (IHT, 1998).

This work in the development of guidelines for the safety audit of bikeway systems needs to be further developed and adopted. Also, the application of safety audits for planning extensive cycling networks needs to be considered and evaluated further. As long as cycling is recognised as having physical, environmental and sustainable transportation benefits, the number of cyclists will continue to increase. It is imperative that cyclists be provided with facilities which offer them a high degree of personal safety. In

order for this to be achieved, broad scale bikeway safety audits need to be conducted, including all roadways which cyclists are allowed to use. In addition, leadership and support in this area needs to come from a high level, in order for bikeway safety audits to achieve the necessary level of acceptance, recognition and appreciation.

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Translating cycling policy into cycling practice

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Abstract

Further insights are offered into how UK cycling policy, as promoted in the National Cycling Strategy, can be translated into cycling practice, for example through encouraging a modal shift from the motor car to cycling. The extent of UK motor car dependency, the viability of cycling as an alternative transport mode, and possible measures to achieve a modal shift are discussed. Segments of the population who cycle or who might be encouraged to cycle are considered, incorporating Scottish Household Survey data for Edinburgh.

Keywords

Cycling, Edinburgh, modal shift, market segmentation, policy

UK Transport Policy

The UK Integrated Transport Strategy has increased the policy emphasis towards sustainable modes of transport such as cycling. As part of the overall strategy, the National Cycling Strategy (DOT, 1996) proclaimed boldly that 'cycling has a bright future, contributing significant benefits to the nation' (p. 2). Ambitious targets were set to double cycling trips by the year 2002 and to quadruple them by the year 2012 (from a 1996 baseline of 16 bicycle journeys per person per year). Although these targets have since been lowered (DETR, 2000a) to a trebling of 2000 cycling levels by 2010, they still represent a policy commitment to cycling. However, though targets may have been set, it is another issue if these targets will be achieved, particularly as they are not legally binding. When setting targets, it is always questionable whether they are unrealistic aspirations or easily achievable goals. Arguably, the former is the case for cycling.

Political will, sufficient funding and support from the general public are all required if the rhetoric is to be translated into the reality of increased cycling levels. Of these three elements, the emphasis in this paper is on the general public and how they might respond to cycling policy. There may have been a change in policy emphasis encouraging alternatives to the motor car, but there is little evidence of a long-term change in individual travel behaviour. However, not enough time has elapsed since the National Cycling Strategy was published for there to be a

proper assessment of long-term behavioural change.

This paper offers further insights into how UK cycling policy can be translated into cycling practice, against a background of encouraging a modal shift from the motor car to cycling. The extent of UK motor car dependency is contrasted against the viability of cycling as an alternative transport mode. Measures to achieve a modal shift from the motor car to cycling are put forward. Segments of the population who cycle or who might be encouraged to cycle are considered, incorporating Scottish Household Survey data for Edinburgh.

Motor car dependency

The UK mirrors a global trend in developed countries of a rise in motor car ownership and use as individuals travel more frequently and over greater distances. The last 12 years or so have seen a dramatic increase in UK car use (mileage per person per year rose by 41% between 1985-86 and 1997-99) at the expense of sustainable modes of transport such as cycling (mileage per person per year fell by 10% for cycling between 1985-86 and 1997-99), as shown in Table 1. However, this data indicates that the decline in cycling levelled out during the 1990s and there are signs of a recent increase in cycling levels.

The dramatic increase in car ownership and use, coupled with the many advantages of travelling by this mode, makes many parts of the UK population particularly dependent on the motor car. Liebling (1998) shows that most motorists would find it difficult to live without access to a motor car. In the survey about 80% of 1,500 motorists agreed with the statement 'I would find it very difficult to adjust my lifestyle to being without a car', highlighting the difficulty in encouraging any form of modal shift away from the motor car.

Although there are many undesirable side effects of motor car use – such as noise pollution, stress and road accidents – the two main problems associated with the motor car are air pollution and congestion. Motorists' response to these two problems was also documented by Liebling (1998). To ease pollution, motorists would like to see the production of more fuel-efficient vehicles and more use of public transport to be encouraged. To ease congestion, motorists would like to see the road network managed more efficiently to increase capacity

and make public transport use more attractive. Thus motorists are willing to put forward suggestions to overcome pollution and congestion, but are not so keen on measures that restrict car ownership, car use or their own personal travel. Most people recognise the problems associated with the motor car, but are not prepared to act altruistically. Instead, they would rather that others change their travel behaviour.

Cycling as a viable alternative to the motor car

Public transport is usually the first mode put forward as a viable alternative to the motor car, but cycling can be an equally or more convenient alternative to the motor car for short journeys. Most cycling trips are journeys of less than 5 miles (8 km), with the highest proportion between 2 km and 8 km. Cycling is therefore particularly suited to the urban environment because people tend to be closer to where they want to travel, making journeys shorter than in non-urban areas.

The benefits of cycling include:

- Convenience: Cycling enables door to door transport;
- Cost: A bicycle is cheap to buy and use;
- Environment: Cycling does not contribute to air or noise pollution;
- Exercise: Regular cycling can help fitness levels; and
- Health: Regular cycling can help with heart disease, weight control and stress.

However, many of these advantages do not compare favourably with those offered by the motor car. Travel by bike may be cheaper than by motor car, but a large proportion of the adult UK population can afford to own and run a motor car (72% of households had regular use of at least one car in 1999 – Table 3.14, DETR, 2000b). Cycling may be convenient, but the motor car also offers door to door transport. There are many barriers to cycling, although safety due to danger from traffic, both real and perceived, is widely acknowledged as the primary one. Other barriers include the weather, hilliness and distance. Some reasons people give for not cycling, such as the weather and the gradient, are difficult to change through policy measures. Others, such as safety and distance, could be improved through policy measures. For example, the installation of a new cycle path may make journeys along a route more attractive to cyclists by increasing safety and/or convenience.

Measures to achieve a modal shift from cars to cycling

A conceptual framework is needed to examine a modal shift from the motor car to cycling. Modal shift implies a change in transport mode chosen for a specific journey or part-journey (e.g. if linked with public transport). The actual mode choice of an individual is a complex process, and can depend on the characteristics of the traveller, the characteristics of the journey and the characteristics of the transport

	Miles per person per year						Percentage change
	1975-76	1985-86	1989-91	1992-94	1995-97	1997-99	1985-86 to 1997-99
Walking	255	244	237	199	195	191	-22
Bicycle	51	44	41	38	39	40	-10
Car	3199	3796	4806	4954	5187	5334	41
Motorcycle/ moped	47	51	37	32	30	29	-43
Van/ lorry	183	228	301	281	262	227	-1
Other private	166	164	157	153	145	135	-18
Bus	483	406	398	355	345	347	-15
Surface Rail	289	292	366	298	294	332	14
Other public (including air)	67	93	131	129	169	171	190
All modes	4740	5318	6474	6439	6666	6806	28
Percentage of mileage accounted for by car (including van/ lorry)	71	76	79	81	82	82	0
Average Journey Length	5.1	5.2	5.9	6.1	6.3	6.5	25

Taken from Table 1.2, DETR (2000b)

facility. Individuals' choice between transport modes is often broader than the modes of interest in this research, namely the motor car and cycling. These choices include a change in mode which is not the motor car or cycling (e.g. from the motor car to public transport) and a change in the 'undesired' direction – from cycling to the motor car.

However, interest in this paper focuses on measures that could achieve a modal shift from the motor car to cycling. There are two types of measures, 'sticks' or push factors that force people away from the motor car, and 'carrots' or pull factors that entice people to cycle. This paper considers the pull factors of cycling policy initiatives designed to encourage more people to cycle.

The first consideration in encouraging cycling is the provision of cycle-friendly facilities and the development of cycle routes and networks. Safe cycle-friendly facilities are recommended at locations where road and traffic conditions are particularly dangerous for cyclists, such as busy road junctions and crossing-points of heavily trafficked roads. A number of road based innovative cycle schemes, such as Advanced Stop Lines, Toucan Crossings and contra-flow cycle schemes, have been introduced in the UK to overcome some of these problems. In addition, non-road based innovative cycle facilities, a more recent concept in the UK, can provide a focal point for cycling in a city. Examples include cycle centres (complete security, changing and maintenance facilities for cyclists in a town or city) and city bike schemes (hire bikes and special parking racks across a city).

It is also recommended that cycling policies contain a range of 'soft' measures, which complement the provision of cycle-friendly facilities. These measures could include promotional events, advertising, employer initiatives (e.g. Green Commuter Plans), school initiatives (e.g. Safer Routes to Schools) and integrated transport initiatives.

Market segmentation

Examination of a modal shift from the motor car to cycling leads to the following question: who out of the population might be encouraged to cycle? A starting point is the section of the population who currently cycles. By examining their characteristics, it is possible to assess who in the rest of the population displays similar characteristics, and who might therefore be encouraged to cycle.

The population can be considered as a market. The process of market segmentation can be defined as 'the division of a market into distinct subsets of customers having similar needs and wants' (Mowen & Minor, 1998). Typically a market is segmented according to demographic variables such as age, gender, household structure, income and geography. These are the types of variables examined in this study, together with transport variables, to aid the identification of the market segments that cycle and consequently of those who might be encouraged to cycle. Davies *et al.* (1997) segmented the population according to current cycling habits, and developed the following four categories:

- 1) those who cycle already;
- 2) those who wouldn't take much persuasion to change;
- 3) those who would take a lot of persuasion; and
- 4) those who would always try to stay in their cars whatever measures are introduced.

Within the general population there appears to be a group of people in favour of non-motorised modes (cycling and walking). A large household survey of attitudes to car ownership and use (Cullinane, 1992) identified them as people who represent the vanguard of a movement wanting to help the environment, the

Table 2. Adult bicycles present in Edinburgh households against income, household location and presence of children

<i>Income</i>	No adult bicycles in household		Adult bicycles present in household		Total
Less than £6000	143	86.7%	22	13.3%	165
£6000 – £10000	210	87.1%	31	12.9%	241
£10000 – £15000	190	71.4%	76	28.6%	266
£15000 – £20000	107	64.8%	58	35.2%	165
£20000+	157	48.0%	170	52.0%	327
Total	807	69.3%	357	30.7%	1164
<i>Location of households in Edinburgh</i>					
City Centre	63	63.0%	37	37.0%	100
North	179	67.5%	86	32.5%	265
East	179	73.7%	64	26.3%	243
South	216	68.6%	99	31.4%	315
South West	31	70.5%	13	29.5%	44
West	109	78.4%	30	21.6%	139
North West	13	50.0%	13	50.0%	26
Total	790	69.8%	342	30.2%	1132
<i>Children present?</i>					
No	686	75.7%	220	24.3%	906
Yes	149	50.2%	148	49.8%	297
Total	835	69.4%	368	30.6%	1203

community and/or their children. Titheridge, Hall and Hall (1999) carried out a segmentation study focusing on the type of people who already use non-motorised modes. They tended to be people living in high residential density (local employment opportunities); not owning a car; who had moved into the area in the past year and those in part-time employment (more likely to be local). Cyclists thus tend to have specific characteristics. This research is intended to take such segmentation studies further.

A local case study of Edinburgh

Edinburgh is often quoted as a UK city taking the lead on sustainable transport issues (described in Hazel, 1998). It has many distinctive features, such as high population density rates and low car ownership rates, which make it particularly suitable for cycling. Transport policy in Edinburgh is outlined in its 'moving FORWARD' Local Transport Strategy (City of Edinburgh Council, 2000). The strategy aims to reduce private car use by improving the sustainable transport alternatives such as cycling, walking and public transport; to increase the amount of road space available for sustainable modes and to minimise commuter parking in new developments. In terms of cycling policy initiatives, the Council has committed itself to develop a cycle network; install advanced stop lines at appropriate signalled junctions; allocate appropriate road space to cyclists and install better cycle parking on streets and at public transport interchanges. Figure 1 shows a cyclist on Princes Street, able to travel eastbound on a stretch of road designated for buses, taxis and bicycles only. Therefore, the policy framework appears to be in place in Edinburgh to encourage a modal shift from the motor car to cycling. The question remains whether it will be fully implemented and whether people will actually change mode.

A sample from the Scottish Household Survey was obtained to start the process of examining segments of the population who cycle and segments of the population who might be encouraged to cycle. This is the first in a series of surveys and models to be examined and developed as part of the research. The sample consisted of 1,203 households living in Edinburgh, interviewed in 1999, and contained socio-economic, transport and journey information.

Across a number of different statistics on travel behaviour, only small segments

of the sample were found to cycle, consistent with findings elsewhere. Of the 614 working adults, 24 (3.9%) cycled to work (233 drove, 37.9%), primarily for reasons of convenience, speed and exercise. A similar proportion of adults had made at least one journey over 400 m by bike in the week prior to their interview 44 (3.8% of 1153) to reach a destination and 45 (3.9%) for pleasure). Although numbers are too low to make any significant conclusions, indications are that cyclists tended to be male and lived near to the centre of the city.

To identify potential cyclists, households in the sample with adult bicycles (368 individuals or 30.6% of the sample) and households without access to a motor car (502 or 41.7% of the sample) were considered. These statistics are indicators of potential cyclists because it is easier to start cycling if a bicycle is readily available and/or a car is not available to the household. It is of interest that most of those who had access to a bicycle, also had a motor car (270 or 73.4%). This market segment is a viable sub-group to target (AA, 1993). Relationships were investigated between these two variables and the three variables of income (5 bands), household location (7 spatial areas within

Table 3. Motor vehicles available for use by household against income, household location and presence of children

<i>Income</i>	No motor vehicle available for use by household		Motor vehicle available for use by household		Total
Less than £6000	120	72.7%	45	27.3%	165
£6000 – £10000	174	72.2%	67	27.8%	241
£10000 – £15000	123	46.2%	143	53.8%	266
£15000 – £20000	43	26.1%	122	73.9%	165
£20000+	23	7.0%	304	93.0%	327
Total	483	41.5%	681	58.5%	1164
<i>Location of households in Edinburgh</i>					
City Centre	52	52.0%	48	48.0%	100
North	84	31.7%	181	68.3%	265
East	122	50.2%	121	49.8%	243
South	119	37.8%	196	62.2%	315
South West	17	38.6%	27	61.4%	44
West	82	59.0%	57	41.0%	139
North West	5	19.2%	21	80.8%	26
Total	481	42.5%	651	57.5%	1132
<i>Children present?</i>					
No	425	46.9%	481	53.1%	906
Yes	77	25.9%	220	74.1%	297
Total	502	41.7%	701	58.3%	1203

Edinburgh) and presence of children (Yes/No). Results are shown in Tables 2 and 3.

The higher the household income, the greater the likelihood that a bicycle and motor vehicle is available to the household. The strength of relationship was greater for motor vehicle availability, due to the greater costs involved in owning and running a motor vehicle. Households with children (297 households, 24.7% of the sample) were more likely to have bicycles and motor vehicles available. Motor vehicles are often regarded as a necessity to take children around; also some adults in households without children may be too old to drive. Regarding bicycles, it may be that as children take up cycling so parents take up cycling as a leisure activity with their children. These relationships were statistically significant (Chi square at the 95% level).

It is to be expected that bicycle ownership/ use is higher, and motor vehicle ownership/ use is lower, towards the centre of a city. Using the seven spatial areas of household location, there were indications of such relationships, but they need to be examined at a more disaggregate spatial level. This will be undertaken with a larger, updated sample from the Scottish Household Survey. In addition, the relationships between household variables will be examined in more depth, using explanatory rather than exploratory analysis.

Discussion

Current cycling policy theoretically creates the potential for a modal shift from the motor car to cycling. But this potential has yet to be translated into actual modal shift. The UK is car dependent, and despite problems associated with the motor car it appears to be difficult to convince people to change mode. For many, cycling has a small role in enticing people out of the motor car. Even if the original target to quadruple cycling levels by the year 2012 is attained, it would only represent 1% of the amount of travel by motor car.

Whilst many do not see much of a role for cycling as a viable alternative to the motor car, for short trips in urban locations a modal shift could actually impact upon traffic levels. If such a shift were to occur anywhere in the UK then Edinburgh, an urban area with sustainable transport policies, would be a prime example. Other research, together with initial analysis of a Scottish Household Survey sample, has shown that the population can be divided into market segments, identifying potential cyclists. To provide a greater chance of success cycling policy initiatives could then be targeted at the appropriate market segments.

The research will be developed using more detailed market segmentation. Variables will be incorporated

such as transport mode availability (e.g. car/ bicycle available to household), socio-economic characteristics (e.g. age, gender, income) and trip information (e.g. mode normally chosen for journey to work/ school). Household location will also be examined to enable localised targeting of specific market segments most likely to contain potential cyclists. An example of appropriate local cycle policy initiatives would be safe, convenient cycle routes to nearby schools and workplaces.

The research forms part of a PhD to assess the potential for a modal shift from the motor car to non-motorised modes of transport (cycling and walking). It will employ a range of surveys and models at both an aggregated and disaggregated level.

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Another look at Germany's bicycle boom: implications for local transportation policy & planning strategy in the U.S.A.

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Abstract

There are conflicting views regarding the substantial growth in cycling in Germany since the early 1970s. Pucher argues that it is almost entirely attributable to public policy. A number of German experts would give planning and public policy far less credit, and attribute this growth in cycling instead to other factors, such as urban congestion, the oil shocks of the 1970s, environmental awareness, and changes in urban form. The article that follows is an attempt to explain the two diverging viewpoints and draw conclusions that nevertheless prove useful in the quest to promote cycling as a legitimate mode of transport. It calls for a more involved type of strategic planning that, in addition to traditional policy measures, seeks to build political consensus and power by strengthening community groups and coalitions.

Keywords

Bicycle boom, Germany, public policy; environmental, economic and social factors

Introduction

The North American literature on planning and promotion of bicycles is replete with references to successful strategies implemented by local and national governments in western European countries with high levels of bicycle use. The Netherlands and the Scandinavian countries figure highly among such examples, as well as Italy, Switzerland, Austria and Germany. Germany in particular has received increased attention in recent years, due largely to the writings and research of John Pucher, Professor Urban Planning at Rutgers University in New Jersey. Pucher is an authority on comparative international analysis of urban transport. Speaking fluent German, he has spent a good deal of time overseas serving as a visiting scholar and conducting research, and he has published numerous articles elucidating the German approach to planning and promotion of bicycle transport.

From the 1970s to the 1990s, Germany experienced substantial growth in cycling, in the order of 50%. Pucher maintains that the 'bicycle boom' in Germany from the early 1970s to the mid-1990s can be almost wholly attributed to deliberate public policy

instruments and infrastructural improvements (Pucher, 1997). However, a number of German scholars would dispute Pucher's thesis and attribute this growth to other, more difficult to influence factors, such as urban congestion, dramatically increased fuel prices due to the oil shocks of the 1970s, increased environmental awareness, and even changes in urban form.

The Roots of German Cycling

To understand developments in the late 20th century, a (very) brief historical overview of bicycles in Germany is useful.

In Germany as elsewhere, the first functional bicycles to emerge in the mid- to late 19th century were playthings for the rich. By the beginning of the 20th century, owing to advances in design and production that offered improved performance at a fraction of the cost, bicycles had developed into the most important form of individual mobility in Germany (Walprecht, 1988). Around this time, a small number of independent local jurisdictions and private clubs responded by constructing the first bicycle paths (Horn, 1990). Although also intended to separate cyclists from pedestrians and horses, a primary justification for these early bicycle facilities was to provide a relatively smooth, stable surface to increase rider convenience, comfort and speed – unlike the bicycle paths of the decades to follow, the main goal of which would be to speed automobile traffic (Briese, 1993).

Motorisation & Marginalisation

While remaining a widely used and practical mode of transportation, the bicycle quickly lost its privileged status to the automobile, a larger, faster and more expensive plaything. In 1925, two million bicycles were produced in Germany as compared to 30,000 personal automobiles, and yet the period was characterised by little or no governmental consideration and/or promotion of bicycles, and almost no provision of special infrastructure (Briese & Wittekind, 1985). In 1930, the bicycle modal split in German cities was generally between 15% and 40%. In exceptional cases such as Berlin, bicycle travel constituted 60% of all trips. Bicycle use peaked in Germany at the end of the 1920s, and as car ownership

rose, began to decline until World War II when private automobile transportation practically ceased to exist. Up until 1950, bicycles are estimated to have been used for greater than 50% of all trips (Horn, 1992).

In the mid-1930s, the German Reich began more active promotion and provision of bicycle facilities, albeit with the chief intention of removing obstacles to automobiles. Increasingly, cyclists were required to use separate bike facilities and were banned from the streets to speed motor traffic. Following a scenario of rapid motorisation now familiar to students of transportation policy, the development of individual automobile ownership in Germany set the tone of transportation politics for decades to come. Once automobiles were widely distributed among those who dictated financial and political power in the transportation sector, bicycles were relegated to the fringe, seen primarily as an inferior mode of transportation for the poor working class, women, and schoolchildren (Briese, 1993).

Rock Bottom & the Birth of the Boom

Perversely, despite still high rates of bicycle use in the post-war period, German transportation planning followed the American model of 'traffic engineering', a model which viewed bicycles as a hindrance to progress (Apel *et al.*, 1992). By the end of the 1960s, as a result of motorisation and the increasingly poor conditions for cycling caused by pro-car, anti-bike transportation policies, the German bike modal split came to a low point of 5% (Briese & Wittekind, 1985; Apel *et al.*, 1992). In German local transportation plans of the 1960s and 1970s, the bicycle was given only a marginal role (Distler, 1985). However, in a few cities with a long tradition of bicycle use, such as Münster and Bremen, bicycles were not completely forgotten, and the share of trips by bike remained around 10% (Monheim & Monheim-Dandorfer, 1990; Apel *et al.*, 1992). During this period in the rest of Germany, it was not uncommon for bicycle paths and tracks from the 1950s and before World War II to be removed to make room for automobile parking (Monheim, 1990). Ensuring safety and speed for motorised transportation was the nearly exclusive goal of transportation policy (Monheim & Monheim-Dandorfer, 1990; Horn, 1990).

Yet despite this official neglect of the bicycle as a legitimate form of transportation, bicycle use began to increase steadily in Germany in the mid-1970s; a development referred to widely as 'the bicycle renaissance'.

Conflicting Opinions

In 'Bicycling boom in Germany: a revival engineered by public policy' Pucher makes a strong case that:

'The resurgence of bicycling as a practical mode of daily urban travel is due almost entirely to public policies that have greatly enhanced the safety,

speed, and convenience of bicycling while making auto use more difficult and expensive.' (Pucher, 1997).

This is an encouraging statement for supporters of cycling to read, and Pucher clearly hopes to inspire planners and policy makers in the United States and elsewhere to attempt to duplicate the German experience. However, a review of the writings of many German transportation academics and expert practitioners reveals conflicting viewpoints that suggest Pucher may have overstated the role of planning and policy in causing Germany's bicycle renaissance. While the German literature generally indicates that public policies have played a key role in maintaining high and growing rates of bicycle use in recent years, it seems clear that a core group of German authors agree that the bicycle boom was not sparked initially by planners and policy makers with a unified goal in mind. Rather, they argue that exogenous factors caused the increase in bicycle use despite transportation policies that mainly served motorists at the expense of cyclists.

In the following passage from their book, *Streets for Everyone: Analyses and Concepts of the Future of Urban Transportation*, Monheim and Monheim-Dandorfer state assertively that cycling initially made a comeback in the 1970s, not because of any deliberate efforts by planners and policy makers, but rather in spite of a near complete lack of any institutional support whatsoever:

'From 1976 to 1982, trips by bicycle increased by 30%, despite a constantly decreasing share of trips by bikes in the prior two decades. This increase cannot be explained by greater attention to policy and planning during the period of growth. The bicycle was rediscovered by the German people as a useful mode of transport before policy makers and planners began to implement measures in its favour. Even in cities with miserable bicycle infrastructure and planning that was absolutely ignorant of bicycles, bicycle use began to grow.' (Monheim, 1990).

Similarly, in an article spanning a century of bicycle planning in Germany, Horn reaches the following conclusion:

'Over the course of its history, the development of urban bicycle transportation has proven to be 'planable' only in a very conditional sense. The essential changes in bicycling's importance came about due to shifts in basic economic and urban conditions and were influenced by new social values and changing popular images of the individual modes of travel. Bicycle planning itself was able to weaken and strengthen tendencies, but never reverse them.' (Horn, 1992).

In *Transport – Environment – Bicycle: Fundamentals of Transportation Pedagogy as Political-Economic Environmental Education*, Briese and Wittekind concur, arguing that cycling once again became an attractive alternative in German towns and cities in the 1970s due to two main factors:

- 1) the high cost of fuel caused by two subsequent energy crises; and
- 2) increased motorised travel times caused by traffic congestion (Briese & Wittekind, 1985).

They describe how, in reaction to poor conditions for cycling typical in this period, citizens' initiatives and cycling organisations sprang into action and forced transportation authorities to begin a renewed effort to accommodate bicycles.

In an article questioning the ability of traditional, behaviour-oriented transportation models to meet the requirements of integrated transportation planning, Holz-Rau offers another possible ground for Germany's increased rates of cycling: the changing spatial structure of German cities. Holz-Rau maintains that the

'... bicycle 'renaissance' is partly attributable to the necessity of riding when fewer destinations are accessible by foot' (Holz-Rau, 1991).

If Holz-Rau's assertion is correct, then it would not be fair to give credit to pro-bike public policies for those bicycle trips that were made by erstwhile pedestrians prompted to cycle by the increased distances between destinations. This is a particularly interesting point, because urban density unquestionably has a strong effect on modal choice, but the standard assumption is that denser cities with a fine-grained mixture of uses will increase rates of walking, cycling and transit and that as distances increase, cycling, walking and transit will give way to the automobile.

Holz-Rau's main point is not simply that the traditional approach to transportation planning fails to recognise the complex relationship between settlement structure and the transportation system, but that by focusing on longer trips, it particularly overlooks the significance of fine-grained structures in individual transportation behaviour. As dense, mixed-use German cities gradually suburbanised and consolidated uses from the 1970s to the 1990s, albeit without reaching the gross proportions of American cities, both car ownership and vehicle kilometres travelled more than doubled (Pucher, 1998). However, as we have seen, during that same period, trips by bicycle also increased dramatically, and it is reasonable to expect that some of these increased bicycle trips represent former pedestrian trips.

Looking back on Germany's bicycle boom from the end of the 1980s, Linder and Hildebrandt reflect on the staying power of bicycling's growth and on the

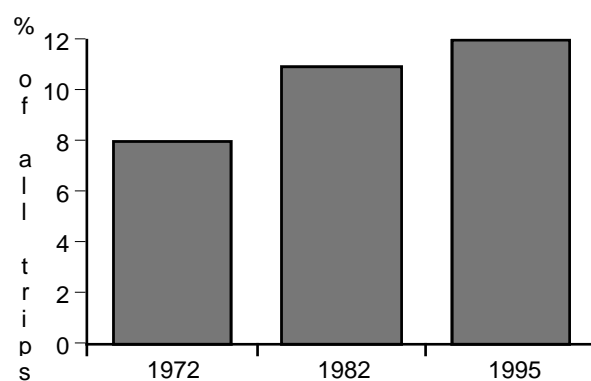
role played by local planning authorities:

'Despite decades of official neglect of the bicycle as a mode of transportation, the public has maintained a latent inclination for cycling to this day, and since the beginning of the energy and environment discussion, a significant increase in bicycle use can be observed in many areas. While rash critics at the beginning of the bicycle boom of the late 1970s declared it as a short-lived fashion trend, the bicycle is still being discovered as the economically and ecologically most sensible mode of transportation for short urban trips and is thus being reactivated for diverse trip purposes... The development of bicycle use in many cities, in a reversal of the previous trend towards motorisation, has accelerated to such an extent that local planning as a rule – with the exception of a small number of exemplary cities – has not begun to meet the actual demands of the cycling public.' (Linder & Hildebrandt, 1989).

Far from the revival in bicycle use engineered by public policy described by Pucher, this passage paints a picture of German cities struggling to catch up with a population that has turned to the bicycle of its own accord.

The unlikelihood of Pucher's assertion, that the bicycle boom was caused almost entirely by public policies, is further attested to by a close examination of the gradual increase in bike modal split from the early 1970s (see Figure 1). By 1982, bicycles had already achieved a modal share of 11% of all trips, but by 1995 the bicycle's share had risen only slightly to 12% of all trips (Brög & Erl, 1985). That is to say that three-quarters of the 50% growth that Pucher points to between the years of 1972 and 1995 (from 8% to 12% of all trips) occurred in the ten years between 1972 and 1982. Despite this rapid growth, according to the literature reviewed here, this decade was largely characterised by an overwhelming lack of

Figure 1. Growth in German Bicycle trips



Source: Brög & Erl, 1985; Pucher, 1997

implementation of effective measures to promote cycling. Over the next thirteen years, when bicycle planning and policy began to enjoy broader currency and improve in quality, bicycles gained only another 1% of overall modal split, a growth of less than 10%.

That being said, the point of this article is certainly not to argue that planning and promotion of bicycles is a waste of time. Nor is it to suggest that poor public policy or a lack of public policy could somehow be more effective at promoting bicycle use than is good public policy. In fact, the viewpoints presented here that dispute Pucher's thesis come from planners and academics who nonetheless enthusiastically advocate promoting bicycle transportation, and some of them have dedicated their professional lives to doing so.

However, if the views of the German experts outlined above are correct, important questions are inevitably raised about the potential effectiveness of even the best-intentioned of policy and planning measures that do not take into account those factors outside the realm of government. If one accepts the opinions of the German planners as I have characterised them, the German experience demonstrates that, given support from larger trends in urban social, economic and physical structures, a substantial modal shift to bicycles is likely to occur even in the absence of effective public policy and planning measures. Conversely, such a modal shift cannot realistically be expected to occur in response to transportation policy in the face of countervailing social, economic and geographic trends. Pucher himself states that in the absence of a '*deus ex machina* boost to cycling in America'... a 'more likely scenario is slow, painstaking progress'... that 'will not produce a bicycling boom, unless the visible success of cycling enhancements in one or two major cities attracts imitators elsewhere'. (Pucher *et al.*, 1999) Planners and policy makers in the U.S.A. cannot be expected to simply follow the German (or the Dutch or the Danish) model for promoting bicycles and reverse the combined transportation effects of environmental apathy, cheap gas, and the many billions of dollars spent in the last decades to promote the automobile above all other transportation options.

Beyond Traditional Roles: the Case for Advocacy

Pucher's recommended approach for bicycle promotion is far from simplistic, and in subsequent articles he and his co-authors address quite clearly the substantial differences between Europe and North America, and the difficulties likely to hinder cycling's growth west of the Atlantic (Pucher *et al.*, 1999; Pucher & Dijkstra, 2000). They outline a comprehensive set of proposals for encouraging cycling that includes not just expanding and improving cycling

facilities and roadways, but also increasing the cost of automobile use, special promotions, linking cycling to wellbeing and, importantly, broadening and intensifying political action.

This last proposal, broadening and intensifying political action, is the most crucial piece in achieving every one of the other necessary tactics to promote cycling. As a general rule, public policies and planning strategies will be most effective when they manifest the demands already present at some level within the population at large. This truth is widely acknowledged in theories regarding the importance of public participation in political and planning processes. As facile as it may sound, planners and policy makers with an environmental and social agenda that includes promoting cycling would do well to remember that successful planning and public policy cannot occur in a vacuum, but rather requires a degree of public approval and partnership. Therefore, any groundswell of support for cycling can and should be harnessed to help create a mutually reinforcing situation in which community activism intersects with policy and planning. This is the challenging part of planning and policy – not what to do (which Pucher and others have thoroughly researched and documented), but how best to go about getting things done.

In response to Pucher's writings on the relevance of Germany's bicycle boom to the American context, Wachs offers a reminder of the power and necessity of political pressure in fostering positive social and political change in the transportation sector:

'In a democracy, there is simply no reason to adopt major changes in policy as a result of scholarly studies or technical findings. There is every reason, however, to adopt policies that respond to vocal and persistent interest groups that demonstrate they have staying power in the political arena... Whether or not cycling catches on in the United States will depend on the success or failure of grassroots movements... (Wachs, 1998).

Wachs describes how the politics of public spending conspire to stack the cards against bicycle friendly programs in the U.S.A. and notes that pro-cycling and anti-auto policies have not been widely adopted precisely because the necessary consensus and power base have not yet been achieved on a broad enough scale. Pucher, too, discusses the role of pro-highway, pro-auto government policies in his writings, and notes the importance of work by advocates in areas such as San Francisco and Seattle in combating such obstacles at the local level (Pucher *et al.*, 2000).

In general (but with notable exceptions), political action by bicyclists at the local level in the U.S.A. is poorly co-ordinated and often not taken seriously by

policy makers. Diehard cyclists are a fiercely independent and opinionated group, and can be incapable of effectively organising except in response to emergency situations, and then sometimes only fleetingly. National groups such as the League of American Bicyclists and the Bicycle Federation of America do exist and do lobby on a state and federal level, but a large gap exists between these professional organisations and the often loosely organised coalitions struggling at the local level. Unsurprisingly, as fractured and unorganised as cyclists are, they lack strong ties to other potential allies working for political and social change; another large gap exists between cycling groups and environmental and social justice groups as well as the emerging smart growth movement.

Conclusions

Perhaps the most important lesson that emerges from the differing views of the causes of Germany's bicycling boom is strategic. If the boom is seen primarily as the result of public policies implemented by enlightened planners and policy makers, the best approach would simply be to copy the policy and infrastructural measures and wait for levels of cycling to grow. If the boom is seen as a more complex outgrowth of social, environmental and economic trends, sustained in part by public policy and planning practice, however, a more sophisticated type of strategic planning is called for – one that seeks to build political consensus and power by strengthening and broadening community groups and coalitions formed in response to these prevailing trends. Champions of the automobile at the local level can be overcome or co-opted by sufficiently organised and savvy advocates, planners and policy makers pooling their forces. The next challenge for pro-bike groups and individuals is to co-ordinate their efforts not just at the local level, but at the regional, state and national levels, pooling resources, comparing notes and gathering clout in order to contend with powerful, well funded and entrenched auto lobbying groups such as the American Automobile Club (AAA) in the U.S.A. or the Allgemeiner Deutscher Auto Club (ADAC) in Germany.

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A Nicaraguan Street Clash

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Abstract

The provision of transport services in León, Nicaragua is becoming increasingly difficult for the city government in the face of rapid urbanisation and a shrinking public budget. Some citizens have responded by turning to the bicycle to meet their transportation needs. But the city government promotes automobile-dependent urban development whilst penalising bicyclists with a tax and license requirement. City officials have failed to meet their purpose of eliminating dangerous traffic congestion, in part because of misguided policies and plans, and in part because bicyclists have resisted government authority.

Keywords

Bicycles, informal sector, Nicaragua, planning, politics, transport

Introduction

Most of my North American friends know Nicaragua only through past news reports about the 'Contra War'. They think of intense conflict at the mere mention of the place. I tell them about a much-less-newsworthy conflict that is intensifying today, a clash that once again pits poor against elite: bicyclists against car drivers. At the same time that a sudden change in the economy brought about an abrupt influx of wealthy people with cars in the early 1990s, thousands of less-fortunate citizens turned to imported bicycles in a manner of self-help. But misguided planning is destroying the hope of affordable mobility for the masses.

León is Nicaragua's second city with a regional population of 200,000. A beautiful colonial outpost founded in 1524, it enjoys a distinctive historical centre where narrow, stone streets are lined with pastel adobe homes capped with red-tile roofs. But like most Latin American cities, it suffers from an explosive population growth that threatens everyone's quality of life. Demands for publicly provided services escalate at impossible rates. One example is street space. Traffic congestion is reaching intolerable levels, in some cases exceeding 1,500 vehicles per hour at unregulated intersections.

Even while struggling to meet expanding needs, León faces economic distress of catastrophic proportions. Before conditions improve Nicaraguans

must first recover from the severe regional recession of the 1980s, a decade of civil war, and a U.S.-imposed trade embargo that left the highest per capita external debt in the world. To make matters worse, the León region suffered three major natural disasters in a 17-month period during 1992 and 1993. Clearly, financing the rapidly growing demand for urban services in León has become an alarmingly difficult task. The government must find alternative ways of satisfying the city's needs for urban services, including transport.

The cycling advantage

Bicycles are an excellent alternative mode of transport in a developing country like Nicaragua because they conserve energy and capital, they're clean, healthy, noise-free, and most importantly they provide cheap mobility for those of limited means. The citizens of León seem to be well aware of these advantages because they're spontaneously and creatively turning to the bicycle to solve their transportation needs in response to their rapidly spreading city. Even though official records are not kept, the number of bikes on the streets of León has grown at an astonishing pace, as observed by the author between 1989 and 1996. That bikes would be popular is not surprising because León is an ideal city for cycling:

- the majority of residents cannot afford an automobile;
- the city is too large for walking and yet compact enough to bike from end to end;
- the terrain is flat;
- the climate allows for year-round use despite a pesky rainy season; and
- as a university town brimming with youth, the bicycle is quickly becoming culturally accepted as a legitimate means of travel.

Furthermore, bikes are such valuable assets that it's common to see two and even three people riding a single bicycle.

Conflict

Unfortunately, planners have failed to embrace the bike, even though it represents a cost-effective way of satisfying the basic needs of poor travellers. While

the citizens of León foster sustainable development on their own initiative, city officials intensify the struggles over street space – by encouraging people to drive cars and penalising those who ride bicycles.

City planners actively promote automobile travel and the principal aim of city plans is to relieve traffic congestion and build more parking spaces. Several examples illustrate how government measures promote automobile driving and clearly favour those who are wealthy enough to own cars. The first example is an elaborate and expensive proposal that called for converting a vast network of streets to one-way traffic to make room for curbside parking. Despite the dramatic growth in bicycle traffic, the proposal ignored the obvious need for bike lanes. The 50-page proposal devoted less than a half page to public transit and mention of bicycles was nearly nonexistent. The central theme was instead a physical design to indulge more automobile throughput and free parking.

Second, the automobile enjoys a favoured status when government implicitly subsidises parking for car owners. To illustrate, the city government constructed a parking lot in 1995 and charged a paltry 50 centavos (U.S.\$ 0.06) to park all day. But the 'right' to park for free was so deeply ingrained that drivers soon refused to pay even this token amount. So the city caved in to the demands of the driving elite and opened the lot to free parking.

Finally, the most troubling example of shortsighted measures was a decision to impose a license and tax on bicycles in 1994. Planners regarded bikes as a safety hazard and a menace in worsening traffic congestion. City planners commonly referred to the intensifying competition over street space as the 'bicycle problem', suggesting that the bicycle was still regarded as a mere plaything that disrupts a driver's right to the road.

The result of measures like these is that cars are grabbing ever more precious urban space – sometimes violently – by pushing out other modes of travel that the neediest people increasingly rely upon. These regulatory planning measures were intended to bring order to a situation that was quickly eluding government control. But implicit in the plans were goals to shape the city into a form that accommodates the economies and lifestyles of more developed countries. Imposing regulations that render the majority of cyclists 'illegal' is misguided for the following reasons:

- Economic Inefficiency
- Social Inequality
- Failure to Achieve Purpose

Economic Inefficiency

The harmful external costs of motorised transport

enormously outstrip the costs imposed by bicycles. Efficiency would call for motorists that clog urban streets to pay directly for the full costs they impose on others. But current plans are back-to-front – motor vehicles are subsidised while the environmentally friendly bicycle is penalised.

Social Inequality

The measures are costly and unfair to low-income citizens. Notwithstanding the bribes and lost labour required to cut through bureaucratic red tape, the monetary cost of the tax and license amounts to 16% of an average Nicaraguan monthly income – far beyond the means of most bicyclists. Even worse, the police confiscate bikes – a valuable economic resource – from riders who ignore the license and tax.

Failure to Achieve Purpose

The fees provide no incentive for a cyclist – such as offering training, safety tips, or maintenance lessons – except to insure against confiscation. But because the police lack the resources to fully enforce the law, few cyclists comply.

Prospects for change

How might the citizens of León induce change? The political power of the driving elite does not derive from the same pluralistic sources as in North America or Western Europe, such as well-funded lobby groups. Countries like Nicaragua suffer not only from tremendous levels of social inequality, but also from a profound mismatch of institutions. The customs, norms and rituals that once regulated the behaviour of the traditional classes – farmers, peasants, piece-rate workers, etc. – have been dislodged by a legal and bureaucratic order that dominates society at large and bolsters a particular set of social interests. The governing institutions of the developing world today did not so much evolve out of but rather were thrust upon traditional ways, imposed by people – like those wealthy enough to own cars – with direct links to more advanced economies at a dramatically different stage of economic and social development.

Given this political context, two steps may offer some hope. Firstly, bicycle activists should study how local political power works. For example, one result of mismatched institutions is an entrenched system of political patronage. Because bicyclists do not enjoy the full privileges of legality, they are more likely to succeed by turning to the tactics used by other informal actors: by resorting to confrontational threats to exert pressure on authorities, or by trading their pledges of support in electoral campaigns in exchange for government recognition. Both require mass mobilisation, which in turn requires building alliances with more powerful groups. León provides a rich source of potential allies, including respected university

student unions, an unusually dense network of Non-Governmental Organisations, and funders with local clout such as Japan's International Co-operation Agency (JICA), an international development agency with an especially prominent presence in the region.

Secondly, the goal of political organising should not be to extract particular favours, such as eliminating the bicycle tax. Instead, the objective should be a long-term, counter-hegemonic change in the way the problem is defined. Innovative institutional changes might bridge the gap between, on one hand, the rigid rules that advance the legitimate interests of government and, on the other, the norms accepted in civil society as survival tactics, like riding an unlicensed bicycle in the streets knowing the act is illegal. Activists might teach government officials about the positive sides of the informal sector, which might help government to promote its own interests in boosting the economy, thus alleviating poverty and improving the environmental quality of a city.

Conclusion

Government seizure of bikes in León has not diminished the hope of people creating their own means of accessing important places in the spreading city. Until steps are taken to meet the needs of the majority, under-privileged citizens will find ways to resist, including riding bikes illegally. Planners can learn from the clash between cars and bicycles. The people of the city clearly need what planners can foster: a more equitable allocation of public street space, where cyclists, pedestrians and vendors are not pushed away by more traffic lanes and parking space. City officials should scrap the license and tax on bicycles, move toward full-cost pricing of car facilities, and promote more cost-effective law enforcement in the streets. Otherwise, the conflict between bikes and cars will continue in spite of authoritarian control measures that achieve no public purpose.

Acknowledgement

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Shanghai: The greatest cycling city in the world?

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Abstract

As China opens up to the world, enjoying 10% GDP growth per year, and experiencing the first stage of the development of mass car ownership, can it and will it retain the high levels of cycle use which characterise its great cities?

Earlier this year, the authors spent several months in the city of Shanghai, as part of the Colin Buchanan & Partners (CBP) study team reviewing the transport policies of the Shanghai Master Plan for 2020 on behalf of Xu Kuangdi, the Mayor of Shanghai, and drafting his Transport White Paper. Establishing that cycling has an important role to play in the world-class transport system planned for the new World City of Shanghai was a key challenge for the study team.

Keywords

Cycling, planning, traffic, Shanghai

A World City under construction

Shanghai is located on the Huangpu River near the mouth of China's great Yangtze River. It is built on flat delta land, crisscrossed by canals which were the backbone of China's traditional internal transport system and still carry large amounts of barge freight. In the early decades of the twentieth century, Shanghai was Asia's foremost trading city – an international city forming the gateway between China and the rest of the world. Now it seeks, through its astonishingly ambitious Master Plan, to regain its status in the front rank of the World Cities.

Since Deng Xiaoping's 'opening up' policy was extended to cover Shanghai in 1990, the city has seen an extraordinary transformation as economic and urban development has proceeded at a furious pace. Rapid redevelopment has seen commercial skyscrapers and shopping malls proliferate in the CBD and along the main streets of both the old British and French colonial concessions. Large swathes of the high-density, low-rise pre-Communist and Communist era housing have been torn down and replaced with 30-storey residential towers. Elevated roads have been constructed north-south and east-west across the city within the Inner Ring Road and link to three new river crossings to the Pudong Special Economic Zone on the east bank of the Huangpu. Pudong has been developed

from virtually nothing, and now the world's third tallest building sits among its spacious, monumental yet still largely empty boulevards. However, despite these enormous changes, large areas of the city still retain their old intimate scale, with tree-lined avenues traversed by trolley buses and winding streets lined with small shops and restaurants, enclosing the dense residential quarters almost impenetrable to motor traffic.

Economic growth and the prospect of work attract many people from other provinces into the city. The municipality of Shanghai now has a population of 14 million and this figure continues to rise. The city's inner area (inside the new elevated Inner Ring Road) covers roughly 120 km² with a population of 4 million and population densities exceeding 80,000/km² in many districts (contrasting with <30,000/km² in inner London's most densely populated wards). Through the combined policies of slum clearance and the construction of New Towns, the 2020 Master Plan seeks to reduce these densities. However, in comparison to other world cities, they are likely to remain high.

Cycling in Shanghai

In 1995, 42% of the municipality's 26.7 million person trips over 0.4 km per day were undertaken by bicycle. We believe this makes Shanghai the world's greatest cycling city. Cycling's popularity can be explained by its affordability and convenience in the dense city where many trips are relatively short. Almost all streets in Shanghai have spacious cycle lanes, many of them fully segregated from vehicle lanes. They are used intensely throughout the day with CBP counting flows of 9,000 cycles per hour on some of the best-used 3-metre cycle lanes. A huge variety of bikes throng the road, including venerable tricycles still widely used for freight distribution through to new mountain bikes costing between £15 and £30, with numerous and somewhat superfluous gears for Shanghai's completely flat road network.

The most striking thing about the operation of Shanghai's road network, and the biggest threat to the safety of cyclists, is the chaos which prevails at road junctions throughout the city. Although car ownership remains very low (about 0.02 motor vehicles per person), the number of vehicles on the city's roads has increased rapidly in the 1990s. Despite the

relatively small numbers, motor vehicles dominate at junctions and cause bad peak-hour congestion. The majority of junctions are signalised to a simple American-style two-stage cycle. Poor accommodation of conflicting movements and poor discipline amongst drivers prevents the efficient operation of the junction and much green-light time is wasted as drivers cut across each other's path. Meanwhile, pedestrians must run for their lives across acres of tarmac without adequate pedestrian islands to provide refuge. Cyclists, whilst located firmly second-bottom in the pecking order, find their safety in numbers as they pick their way through the chaos in large platoons unleashed by the flagmen and women posted at the end of each cycle lane at the busier junctions.

Although the first thought of cycling amongst this scene was daunting, the challenge was too great for the authors to resist. Prior to their arrival, Nick Bursey, CBP Director and Project Manager in Shanghai, had invested in a couple of bicycles and a dashing bright yellow Shanghai cycle cape, and shocked the client team by arriving at the project offices daily by bike. The authors had to live up to this example, and so set off to make their cycling debut on a dark wet Friday rush hour. Surviving a crossing of the widest, busiest, single most dangerous junction in the city, the authors were most surprised to find after a couple of kilometres how quick, convenient and sheer fun cycling amongst so many others was. After the success of this maiden voyage, cycling quickly became the preferred choice for all manner of trips and outings to explore the city.

The transport policy challenge

Given expected continued fast economic growth, the transport policy challenge for the 2020 Master Plan is to build a world-class transport system accommodating:

- a growing population, as people in-migrate from other provinces in search of work;
- a doubling in trip-making per person, as people enjoy the fruits of increased prosperity and leisure time;
- an inevitable increase in average trip length as the densest residential areas are thinned out by slum clearance;
- a growing number of motor vehicles on the road network; and
- a growing demand to remove restrictions on personal car ownership from the newly prosperous.

The client's ambition is to catch up with and outshine other World Cities such as London, Tokyo and New York, through construction of a 12 line, 400 km new urban railway system by 2020 (620 km by 2035), and a 260 km expressway network by 2005. The vision is of the widespread application of high-technology

throughout the operation of the transport system, making Shanghai a world leader in the field.

However, we found that cycling was not initially perceived as having a major part to play in this vision. There prevailed a general reluctance amongst the traffic planners to retain and promote cycling as an integrated part of the world-class transport system. This reluctance arose from views that:

- Cycling is a second-rate mode of transport, and once a reasonable alternative was available (i.e. the high-class metro system), the people of Shanghai would no longer wish to cycle;
- It is impossible to accommodate both a high number of cyclists and an increasing number of vehicles on the city's road network. Cyclists get in the way of motor traffic, and cycle lanes waste valuable road space. Improved efficiency of junctions can only be achieved by taking the cyclists out of the equation; and
- Cycling as a form of transport has an image that is inappropriate to a World City at the forefront of the technological revolution.

Meeting the challenge

Throughout the study, CBP consistently advocated that the city should view its status as the world's greatest cycling city as a strength and an asset to be protected and enhanced. The team set out its vision of a 21st century sustainable world city, which would see the older world cities striving to catch up with Shanghai in terms of the quality of provision for cycling and the level of use.

Therefore CBP set out to address each of the client's main concerns by:

- 1) Focussing on the advantages of cycling as a transport mode in a dense city like Shanghai, irrespective of wider environmental considerations – the speed, cost and convenience advantages to the user for many trip types;
- 2) Demonstrating the benefits of cycling to the traffic authorities with regard to its space-efficiency as a user of road space, and illustrating how provisions for cyclists could be accommodated in the road network. This included proposals for a technical solution to the junction problems – the 'Shanghai Junction'; and
- 3) Destigmatising the bicycle as a second-rate mode of transport by calling upon examples from the richest, most advanced European cities, and to sell 'Shanghai – the world's greatest cycling city' as an attractive image for a World City responding to the 21st century imperative of sustainable development.

The advantages of cycling

CBP's contention was that people are cycling in Shanghai today not merely because they have no

money for the alternative, but because it is quicker and more convenient for many trips. This not only applies to Shanghai, but also to other large cities like London and Paris. Cycling levels are relatively low in the biggest western cities not because of any inherent lack of convenience, but because cyclists have been literally driven off the road through being outnumbered and inadequately protected from motor traffic. Shanghai is lucky in that it already has the 'critical mass' of usage that provides the cyclist with safety in numbers. The downward spiral whereby motor vehicles erode cyclists' road space, thereby leading to people simply giving up on the attempt to get around the city by cycle, thereby allowing further erosion of cyclists' space, etc., can still be avoided in Shanghai.

CBP believes that cycling is a proper complement to the new integrated, modernised trolley bus and metro network planned in Shanghai and that that system should compete with cycling for market share on its merits alone.

Accommodating cyclists in the network

High levels of cycle use are good news for the traffic authorities because of its space-efficiency in terms of road space (and, compared to cars, parking space). CBP nailed the fallacy that 3 m cycle lanes would be better allocated to cars by reference to simple observations of the existing loads carried by vehicle lanes in the city (9,000 person trips per 3 m lane per hour on the cycle lanes, compared to 1,350 person trips/3 m lane/hour by cars).

The mode that must be given only a limited role in the inner area is the car. However many elevated roads are built, the secondary network's capacity will continue to be quickly saturated, even at relatively low levels of vehicle ownership and use, in a city as dense as Shanghai. Hence the strict quota on car licence plates issued should only be lifted as and when a replacement road user charging system is in place to control demand in the inner area.

Avoidance of the downward spiral and retention of high levels of cycle use can be achieved relatively simply by resisting the erosion of the existing extensive cycle provision, and by some key enhancements to make the cycle network comprehensive. CBP set out a series of policies advocated to develop the role of cycling within the integrated transport strategy. They included:

- The provision of safe, convenient conditions for cycling across the entire street network, with the exception of expressways and elevated roads;
- The provision of a continuous, segregated city-wide cycle network;
- The provision of contra-flow cycle lanes on all one-way streets;

- Strict enforcement of the bans on the parking of motor vehicles in cycle lanes;
- The introduction of a new type of junction, the 'Shanghai Junction', at all major junctions where there are significant conflicts between cyclists and motorists;
- The provision of direct cycle routes to rail stations and other major trip attractors in new developments;
- High-quality surfacing, design, signing and landscaping of all cycle lanes;
- The provision of sufficient, convenient cycle parking, in locations where this does not inconvenience other road users; and
- Improvement of safety standards including the use of lights and helmets.

The improvements sought to cycling facilities on road links very much focus on the protection of existing cycle facilities and the reversal of current policies to ban cycling on busy roads in the city. At road junctions however, CBP felt that a radical approach was required to provide the sheer numbers of cyclists (and pedestrians) with the protection they require, and also actually to improve the operational efficiency of the road junctions. This led to the development of the 'Shanghai Junction'.

The Shanghai Junction

The basic concept of the Shanghai Junction is to deal with cyclist movement in a separate phase to vehicle movement. It is a development of the existing 'flag man' system already employed, but with the use of a cycle advance area on each junction arm. Discharge in the cycle phase is maximised by filling a cycle advance area across the full width of the carriageway. When the cycle advance area is emptied, the vehicle phase commences. In this phase the cyclists are held in the cycle lane by the cyclist pre-signal. At the end of the vehicle phase the cyclists fill the advance area ready for their green phase.

Three main concepts for the phasing were debated for the typical four-arm signalled junction:

- 1) To deal with cycle movements from all arms in a single phase with flow in a roundabout arrangement, followed by vehicle phases;
- 2) Cycle phases followed by vehicle phases; and
- 3) Cycle phase in advance of vehicle phase on each arm.

No single 'Shanghai Junction' design is proposed, instead the concept and design principles would be applied to each particular junction to produce the most efficient solution in each case. However, proper provision for pedestrian crossings would be integral to every Shanghai Junction. CBP's initial modelling

showed that the efficiency gains from removing green time wasted on vehicle/cyclist conflict would outweigh the disbenefit of adding phases to the overall cycle. Indeed, it showed substantial benefits from reducing the overall cycle time, despite the addition of extra phases.

Cycling & the Image for a World City

A key problem for the study team in selling cycling as an integrated part of a world-class transport system is its image with decision-makers. Cycling is regarded as something you leave behind if you succeed. CBP worked hard to convey the fact that in some of the richest, most advanced European countries, cycling has now shed this image. Amsterdam, Rotterdam and Copenhagen all have populations of over 1 million, very high GDP per head, and a cycle mode share in the 20-30% range. German cities aspire to catch them up and London is currently targeting 10% as its cycling mode share by 2011.

However, in the West, cycling policies are often sold to decision-makers on the basis of their contribution to global environmental sustainability. The authors perceived that in China this argument must be used with care. Whilst China is enthusiastic for improvement to its people's living environment, with respect to global environmental sustainability it is highly suspicious of prosperous carbon-consuming Westerners trying to 'pull up the ladder behind them' in terms of economic consumption.

China's political imperative is economic prosperity for its people. Average GDP per head is 5% of the UK's. Following the Maoist experiment, arguably there is no longer an appetite for pioneering new models of what economic prosperity actually constitutes. China simply wants to catch up, and there is a huge latent demand for all manner of basic domestic consumer goods.

The automotive industry is one of the five pillars of the Shanghai economy planned for growth, and development of a mass domestic market for cars is very much part of the vision. The 'great car economy' has clearly been the basis of economic success in the USA, Japan and the European Union. Not only are there no apparent reasons why it should not work in China too, there are there no real signs that the rich countries are yet abandoning the great car economy model either.

Meanwhile, the vision of Shanghai's World City transport system has high technology and a world-class metro system at its core. Visits by the city's decision makers to comparator cities such as Singapore, Hong Kong, Tokyo, London, Paris, New York, yielded no evidence of a major role for cycling. A commonly held view was that Shanghai should compete against other cities on the terms of the existing well-understood game: the best metro system, the best

application of technology. Why try to formulate a new game?

It was not within CBP's remit to address all these wider political issues, but CBP made it clear that carbon emissions and global warming are a real issue to which all countries must eventually respond in the 21st century. At mostly less than 3 m above sea level, Shanghai has a particular self-interest in stemming global warming before its negative impacts bite. Here is a clear opportunity for a leadership role amongst major cities in practising truly sustainable transport. Given its existing asset of high cycle use, Shanghai can assume that leadership position in the cycling field at hardly any cost.

If cycling stands on its own merits, as CBP contends, then the image can be built around it relatively easily. CBP supported a new generation of electric bikes and clean, quiet mopeds as the appropriate next step for cyclists who wished to extend their range of mobility. As well as advertising campaigns, CBP tried on a number of occasions to float the idea of the Mayor taking a public ride on a bicycle – the endorsement of the policy, and a step towards breaking down the disassociation of cycling with success in society.

The future

So, did CBP succeed in establishing the importance of cycling in Shanghai's transport system for 2020? This remains to be seen. The Chinese will probably remain sceptical until they see leading Western city choosing this path and provide an answer to the all-important question: can cycling play a major part in the transport system of a large and prosperous World City? If London would implement a cycle network to the standard of those currently found in Amsterdam and Copenhagen, would this generate the same levels of cycle use as currently found in these cities? Or will the Chinese skepticism proved to be just and can these levels only be obtained in inherently smaller cities? The irony of course is that with its established high cycling levels and extensive cycle provisions, Shanghai is in the best position to this answer this question.

In the meantime, CBP would like to proceed to field trials of the Shanghai Junction in the near future. The authors would be delighted to hear of any other experiments with this or similar concepts conducted in China or elsewhere in the world.

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- deal with global as well as local issues
- include the development of the ideas of sustainability, the design of cities and rural areas, transport corridors and international links to improve health, the economy and the environment.

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Articles should normally be between 2,000 and 4,000 words. Shorter articles can be published as 'Comment' pieces. Responses to papers which have appeared in the journal, either as letters to the Editor or as response articles, will be welcomed.

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Articles for publication may be submitted by e-mail attachment to Pascal Desmond. It is useful if authors indicate what software is required to read any attachments and if they include the letter combination 'zq' in the title. Please DO NOT name articles 'whitelegg', 'wtpp' or variations of these.

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