

Sustainable Transport Policy: The Contribution from Behavioural Scientists

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Publication of the UK Government's White Paper on Transport, in July 1998, has raised public awareness of the problems associated with widespread car use. The authors argue that these problems, which largely result from the aggregated choices and behaviour of many individual car users, could be mitigated if the main determinants of car use and the underlying behavioural mechanisms were better understood. This article examines six strategies for changing social behaviour, and some important conditions for reducing car use. Examples are presented of how the insights gained can be applied in practice.

In many countries of the world, the popularity and massive use of motor vehicles are leading to problems of congestion, environmental quality and quality of life in and around towns and cities. It is no longer feasible to resolve these problems through further road building or technical solutions alone, partly because the gains from such measures almost inevitably tend to be overtaken by continued growth of car use. Effective solutions require widespread changes in human behaviour and significant reductions in the volume of car traffic.

In this article, we start from the position that the problems arising from car use result from the cumulative effect of many individual choices and behaviours of car users. Behavioural scientists therefore have a part to play in contributing to the solution of these problems, and it is surprising that they have played a relatively minor role to date. Traffic and transport issues have conventionally been regarded as a challenge for economists and urban planners. These disciplines regularly make implicit assumptions about human behaviour and its determinants. A number of these assumptions prove, on closer inspection, to have limited validity and to be true only under certain conditions. To give some examples, economists frequently assume that humans behave rationally and will always choose the option with the highest utility. Yet people do sometimes make suboptimal decisions, owing to lack of information or through the influence of habit.

Moreover, technologists also assume that their innovations will be used in the way that was intended by the designer. This assumption is, unfortunately, disproved by experience. For example in the Netherlands, people who have installed energy-saving lamps are less inclined to switch them off when not in use; or they extend the use of energy-saving lamps to places that

were not previously illuminated after dark, such as driveways and in gardens. Similarly, a driver whose car has been fitted with a catalytic converter maybe inclined to use it more often because 'it is a clean car'.

Explanations of Car Use

The very widespread use of cars can be interpreted as a large-scale social dilemma, reflecting the conflict between individual and collective interests. From the individual's perspective, the advantages of car use outweigh the negative consequences, such as possible damage to the environment, safety risks and other problems. The negative contribution made by each individual to the sum total of environmental costs and risks seems negligible. Correspondingly, the individual may doubt whether his or her contribution to reducing damage and risks really makes any significant difference. The result is that individuals tend not to feel responsible for such collective problems and it remains attractive to act purely in one's own interest. A secondary point is that many people are pessimistic about other people's willingness to change. We could therefore interpret the current problems of car use as a summative consequence of the behaviour of many individual car users, each of whom is shifting off what are considered to be negligible costs onto society as a whole.

Car use seems to have enormous advantages over alternative means of transport. On the one hand, these advantages are rationally perceived: they include speed, comfort, flexibility, radius of action and carrying capacity. On the other hand, subjective or emotional factors also play a role, such as expressing feelings of power or superiority, or deriving enjoyment from driving (Slotegraaf *et al.*, 1997). Car users can also express their personality through their choice of

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a car and the way they use it. The car has the potential to impress, while catering to feelings of self-worth. Slotegraaf *et al.* (1997) give an extensive overview of what they call such 'intrinsic motives' for car use. Their study shows that there are systematic differences between people, to the extent that intrinsic motives influence car use behaviour. Advertisers take full advantage of intrinsic motives for car use, and policy aimed at reducing car use might well be more effective if it addressed these kinds of motives.

The advantages of car use encourage it to become a habit. People develop activity patterns and a lifestyle which is tuned towards the use of a car. Many other reinforcing factors in society help to support car use. Once car dependency is established (Goodwin, 1995; Steg, 1996), it is very difficult to alter habits and lifestyles. It appears that people will mostly reconsider habitual behaviour only when radical changes are introduced into the situation, causing them to re-evaluate the choices they have hitherto made automatically.

Strategies for Reducing Car Use

Car use is strongly influenced by:

- The circumstances which determine the opportunities available, for example the nature of the accessible infrastructure, the quality of alternatives (public transport), the location of places where people are working, living, shopping and spending leisure time.
- The resources people have, such as the amount of money or time, as well as knowledge.
- Motivational factors, such as physical, psychological and other needs (see for example Batra and Ray, 1986; Vlek, 1996; Vlek *et al.*, 1997).

There is some evidence for thinking that behaviour resulting from rational processes can be changed more easily than behaviour that is habitual in origin.

Several key strategies for altering social behaviour have been proposed. Some of these are directed at changing the structure of the situation, while others are directed initially at changing individual preferences and choices. This article describes four structural strategies and two cognitive-motivational strategies (see also Vlek and Michon, 1992; Vlek and Steg, 1996). The structural strategies are based on behavioural principles: car use can be made less attractive by 'push' measures, or the use of alternatives may be stimulated by 'pull' measures. Push measures restrict people's freedom of choice; pull measures do not. Each of these strategies is based on some, mostly implicit, assumptions about the determinants of behaviour and behavioural mechanisms. These assumptions need to be checked and validated before strategies can be reliably implemented.

Structural Strategies

Car use can be reduced through financial/economic measures. It can be made more expensive and the use of alternative means of transport can be made cheaper. The relevant policy instruments include subsidies, discounts, taxes, fines and tolls. The assumption underlying such measures is that people's response will be rational, and they will choose the option with the highest utility at the lowest costs. However, this does not always happen, since feasible alternatives to car use must be available. Contrary to what policy-makers may think, financial considerations are not, in fact, the main determinants of car use. Research has demonstrated that people often evaluate comfort, speed and flexibility as the main advantages of car use and they are prepared to pay for these advantages (see for example Steg, 1996; Tertoolen *et al.*, 1998). Because car use is only partly determined by financial considerations, demand-price elasticities tend to be low. It is worth noting that during the world oil crisis of the mid 1970s the substantial rise in fuel prices had only a marginal effect on car use. In the long term, people compensated for the rise in fuel prices by purchasing smaller and more economical cars (Mogridge, 1978). Radical rises in the costs of car use could possibly be an effective deterrent, but are unlikely to be easily achievable owing to lack of political or public support.

Car use can also be restricted through the provision of *physical alternatives and physical changes*. This type of strategy relies on directing traffic along certain routes, preventing it from entering designated areas, altering the geographical relationship of popular destinations and using technical apparatus to control traffic in various ways. Often this type of strategy is run in parallel with the promotion of alternative modes. The underlying assumption behind such measures is that behaviour is shaped by circumstances. However, individual preferences might be opposed to these changes. The effectiveness of physical rearrangements is limited to the extent that individuals have already exercised strategic choices about where to live or how to travel, and by the economic requirements of business and services (Owens, 1984). Exhaustive geographical reorganization of origins and destinations of trips is possible only in the long term.

Technological innovations aimed at making cars cleaner to operate have led to substantial reductions in the emission of environmentally damaging exhaust gases. Technological innovations seem to offer a feasible and popular solution, because they involve only a marginal limitation on people's freedom of choice. Correspondingly, while technological measures may be desirable (if not necessary), they are not sufficient to solve the fundamental problems of car use. In the first place, the effect of technological innovations tends to be overtaken by the continued growth in total car use. Thus, the

benefits of technological improvements can soon be submerged by 'volume effects'. There is also a trend for new cars to be more powerful, heavier and therefore scarcely less polluting than older models. The implication is that technological innovations are effective only if used in a controlled manner and in association with other measures. Technological innovations may also have unwanted effects. For example, our research results have shown that the more people favour technological solutions to the problems of car use, the less willing they are to reduce car use and the more they reject measures aimed at this objective (Tertoolen *et al.*, 1998; Steg, 1996). The range of contrary outcomes can, incidentally, include spending the money saved from using more economical cars or appliances on activities which are less friendly to the environment. Finally, radical technological innovations are not easily implemented in many cases: the introduction of electric cars for example requires a widespread adaptation or expansion of the infrastructure needed to keep them in service (Bilderbeek *et al.*, 1993).

A third type of structural strategy is *legal regulation* coupled with *enforcement measures*. Violations of the regulations—if detected—are usually met with some kind of punishment, fine or censure. The underlying assumption here is that laws and rules will be internalized by those affected. However, it is possible that people may resist, or elude, the implementation of the law on a wide scale, leading to the legislation or regulation being discredited and the practical effect being reduced to virtually nil. Effective regulation and enforcement are therefore crucially dependent on majority public support, or at least compliance. Such strategies also require an adequate organization for supervision, monitoring and enforcement. On the other hand, applying a regulation and enforcement strategy may help to increase people's trust in the co-operation of others, because there is some guarantee that their own willingness to comply will not be exploited by others who do not.

A fourth strategy, *organizational change*, uses physical changes in the choices available with changes in the financial and/or social pay-offs. Organizational change strategies are aimed at modifying and adapting the structure and functioning of institutions, organizations and lifestyles, so that they become more supportive of alternative, sustainable transport systems, modes and practices. The underlying assumption behind such strategies is that behaviour is embedded in and conditioned by institutions and organizations in society. There are, however, flaws with this assumption:

- The intended changes must be more or less uniform with the preferences of the groups being targeted.
- Organizations must be willing to fulfil their goals, implement their rules, and express their

culture in a more environmentally friendly way. Environmental considerations will, however, almost inevitably compete with other interests, especially economic interests.

Cognitive-Motivational Strategies

The fifth strategy, *provision of information, education and communication*, involves increasing people's knowledge (for example of transport alternatives), heightening their awareness (for example of environmental impacts) and modifying attitudes, so that the inclination to adopt non-motorized forms of travel is strengthened. The underlying assumption is that people behave in a reasoned way and that behaviour can be modified by altering the perceived costs and benefits associated with particular choices. This assumption is by no means invariably true.

In the first place, feasible alternatives to car use must be available before providing information can have any effect. And because people's attention is selective, there is no guarantee that they will correctly perceive and process the information they receive. At the point when travel habits are being formed, people seldom consider consciously the advantages or disadvantages of different travel modes. Their choices become habitual, especially where the same journey is made over and over again (Aarts, 1996). Habitual behaviour helps to decrease the depth and complexity of the decision-making process, as well as reducing the scope for changing behaviour through persuasion (Verplanken *et al.*, 1994).

Information, education and communications originating from governments have to compete with the mass market advertising campaigns of the automobile industry among many others. The automobile industry spends huge budgets on stimulating the purchase and use of cars, while the money spent by government on promoting alternatives is only a small fraction of this (Steg, 1996). Government information campaigns are relatively ineffective if the choices and behaviour to be encouraged cost much money, time or trouble. Information campaigns, in short, rarely lead to sustainable changes in behaviour when it comes to transport. Moreover, if the behaviour to be changed has significant advantages to the individual, information campaigns may even have a contrary effect to that intended. For example, research has shown that the Dutch are generally very concerned about environmental issues, but this has not resulted in a reduction in car use (NEPP 2, 1993). The discrepancy between actual behaviour (car use) and environmental attitude may seem puzzling; but it has been well recognized in other contexts by social psychologists (Festinger, 1957; Cooper and Fazio, 1984). The phenomenon, 'cognitive dissonance', is an unpleasant psychological tension experienced when attitudes, or attitudes and behaviour, are (or threaten to be) inconsistent with each other.

Inconsistency may be accentuated, for example through mass media advertising. People are motivated to reduce cognitive dissonance, either by reducing car use (behavioural change), or by reducing their environmental awareness (attitude change). Predictions from dissonance theory, supported by research, have shown that environmental attitudes are more likely to change than car use behaviour. One study showed that people who were relatively well environmentally aware, and who used their car very frequently, showed a reduction in their environmental awareness after receiving information about the (negative) environmental effects of their car use (Tertoolen, 1996; Tertoolen *et al.*, 1997).

Cognitive dissonance may also arise when more specific attitudes towards car use are at issue (Steg, 1996; Steg and Vlek, 1996). These studies have shown that the more thoroughly people think about the problems resulting from motorized traffic, the lower becomes their awareness of the associated problems. By thinking over the problems of car use, people were confronted with a discrepancy: they perceive car use as a problem, but they are using a car themselves, and they are not willing to give up the enormous personal advantages obtained from doing so. Most people appeared to manage the sensation of dissonance by evaluating the problem of car use as being less serious than they had previously. Results also showed that especially people who had a relatively high awareness of the problem initially, experienced a lower level of problem awareness after thinking over the issue. Respondents with a relatively low initial awareness of the problem scarcely modified their outlook at all. Two further points can be made about cognitive dissonance. So cognitive dissonance especially arises when people have a relatively high problem awareness, because in their case the discrepancy between attitudes (problem awareness) and behaviour (car use) is particularly acute.

Nevertheless, the provision of information remains an important prerequisite for implementing other policy measures, because people must be informed about the need for such measures and about the nature and seriousness of the problems of car use. Eventually, however, this may help to raise public support for more direct policy measures which restrain car use.

A sixth type of cognitive-motivational strategy consists of *social modelling and support*. This is based on the observation that transport behaviour (and the underlying cognitive structure) is strongly determined by social factors, such as social norms and customs, social comparison processes occurring in status and power seeking, and the public examples set by prominent members of society. In social modelling and support strategies, these factors are exploited, for example by organizing family, company or community support for the modification of people's attitudes, preferences, and habits. They

can be offered behaviour examples modelled by prominent figures in society and their trust in mechanisms of co-operation with others can be stimulated, in order to achieve common goals. However, it appears that in most cases social factors only influence behaviour which is clearly visible by others. If the behaviour is more or less anonymous, social factors have relatively little influence.

Choice of Change Strategies

The first four ('structural') of the six strategies for behaviour change are generally more effective than the last two ('cognitive-motivational') strategies, but they are often not available or not easily implemented. Cognitive-motivational strategies are more easy to design and apply but their effectiveness is generally lower; in many cases, however, they are the only measures that government is prepared to adopt (Vlek and Steg, 1996). The combined application of several strategies, linked to a consistent set of policy goals, is likely to be more effective than the use of a single strategy. The choice of strategies should be based on knowledge of the determinants of that behaviour, and on the underlying decision processes or behaviour mechanisms.

Ideally, policy measures should be designed that are based on more than one strategy, and directed at several of the most important determinants of car use. For example, the introduction of electric cars requires the application of several strategies. These include expansion and adaptation of the infrastructure so that electric cars are widely available and places for recharging them are plentiful. In addition, people need to be informed and educated about the advantages of electric cars and about the way to use them. Financial and economic measures will also be needed to stimulate a widespread change from petrol or diesel fuels to electric traction.

Conditions for Behaviour Change

We can now review the scope for policy measures aimed at reducing car use and the necessary conditions which need to be fulfilled (Steg and Sievers, 1996):

- People should be informed about the collective costs and risks arising from expansion of motorized traffic, *and they must perceive this as a source of serious environmental and societal problems*. This requires, in the minds of the population, a clear characterization of the problems and of the possible consequences of neglecting them.
- People must feel *collectively responsible* for these problems and they need to be convinced that their own personal contribution to solving them will be significant.
- People have to balance the individual advantages which they derive against the collective disadvantages of car use and they must, again,

be convinced that the problems are worth solving.

- Feasible alternatives should be available, either at a superficial (technical) or at a behavioural level.
- Selected strategies for behaviour change should be applied, in order to inform and motivate people, and to enable them to make actual use of alternative opportunities. Effective strategies require clear policy objectives, and a solid and consistent application thereof.
- Interventions by government need public and political support. People should be prepared to accept the need for, and the likely consequences of, policy measures against car use. Such success will depend, among other things, on the legitimacy with which they are perceived (which in turn is connected to problem awareness) and the extent to which the measures taken conform with the existing norms and value patterns (for example about the nature of freedom and justice) in society.

'Golden Rules' for Reducing Car Use

In the concluding section of this article, we offer ten 'golden rules' or principles which should be taken into account when designing policy aimed at reducing car use. These principles are derived from current research on the psychology of car use behaviour. The first three principles are general, while the remaining seven are more specific and address psychological factors and processes. The principles are based on experiences gained by evaluating the effects of recent policy measures aimed at reducing car use in the Netherlands:

- *Policy should be based on a diagnosis of the main motives for car use:* An effective and efficient transport policy should be based on understanding the psychological determinants of car use and the behaviour mechanisms involved. This diagnosis should not only be aimed at detecting individual preferences towards travel behaviour, and car use in particular, but should be aimed at analysing opportunities, capabilities, needs and motivations.
- *Monitoring:* The effects of policy interventions should be clearly evaluated in order to assess the extent to which policy objectives are being reached. Public support for policy measures can be heightened by providing feedback about their effects.
- *Identify relevant target groups:* Generic measures, addressed to the population at large, may evoke unnecessary resistance because they force some people into a corner, or provide opportunities for some people which are not available to others (Steg, 1996). Target groups can be defined on the basis of similar backgrounds, or on the basis of trip motives (for example commuting trips, work-related trips, recreational trips, shopping trips). The development of company travel plans or 'green commuter plans' are examples of targeting.
- *Influencing behaviour is more than a funny television spot:* Communication is but one means of influencing behaviour, and large-scale information campaigns are but one form of communication. Behaviour is not merely the consequence of individual preferences but is determined by the characteristics of the situation in which behaviour is formed. Policy-makers should not merely transfer messages to the public, but should also listen carefully to public reactions and interpret motives, common means and preferences.
- *Feelings are facts:* Not only the 'objective' (i.e. cognitive and rational) factors, but also the emotional and affective factors in car use should be taken seriously. Many drivers look down on bicycle use or public transport, and the privacy provided by the car plays a real and important role in car use behaviour.
- *Make smart use of cognitive dissonance:* The discrepancy between attitudes and behaviour may result in rejection of information, and may even make the provision of information counter-effective. For example, when people receive feedback about the real costs of using cars, they may not reduce their own mileage, but may protest at government 'oppression' or 'exploitation' (Tertoolen *et al.*, 1998) instead. Cognitive dissonance, however, can also be used to influence behaviour. A change in behaviour can be brought about by reimbursing travel on public transport and not by private car for certain purposes: after some time attitudes may also be altered in line with the behaviour change that is brought about—provided of course that public transport is available, efficient and convenient.
- *Individualize social dilemmas:* The individual's sense of responsibility for large-scale societal problems and their solution may be accentuated by reducing them to a more personal level. So public information might stress for example the deteriorating accessibility of jobs and services in a city or neighbourhood, rather than the global increase in car use and its environmental consequences and congestion. The effects of individual contributions to the problem can be made more visible and individual action can appear both more necessary and productive.
- *Habit and 'catastrophes':* Travel behaviour is to a large extent habitual. People seldom respond to measures which simply provide alternative means of transport or to minor changes in the choices confronting them. Changes will however be more likely to occur when there is a minor 'catastrophe'—that is a strong and noticeable change in the situation, which provokes a reappraisal of existing behaviour. Examples of 'catastrophes' are a doubling in fuel prices, or a radical drop in public transport fares, but they could include individual

'catastrophes' such as a change of dwelling or job. In these circumstances people may reconsider their habitual use of cars.

- *Policy measures should correspond with relevant norms and values:* Support for policy measures is dependent on their perceived legitimacy which, in turn, is determined by the extent to which the measures correspond to existing norms and values in society, including notions of justice, fairness and freedom. For example, parking charges will be evaluated as more acceptable if good, and secure parking places are provided. However, if fairness considerations are disregarded, behaviour will tend towards disobedience. It is crucial, therefore, to involve citizens in the planning and evaluation of the policy. The legitimacy of policy measures which restrict people's freedom of choice may be improved by consultation about the aim, necessity and effects of policy measures.
- *Explain the aim of policy measures as well as the intended effects:* Many of the problems associated with continued growth in car use are uncertain in their scope and difficult for ordinary people to understand. For example, many people cannot readily visualize what will happen if they continue to neglect the warnings about congestion and pollution. Clear images about possible futures, avoiding sensationalism and facilitating careful deliberation of future scenarios, is desirable.

In the Netherlands, attempts were made to apply these ten golden rules in several policy fields. The work was carried out within the framework of the so-called 'Policy Practice Test' (PPT), under the authority of the Ministry of Transport, Public Works and Water Management. The aim of PPT is to incorporate knowledge from behavioural sciences into actual policy-making. PPT is directed at all stages in policy-making, from the problem definition phase, through the design and implementation of policy measures, and the evaluation of effects with any accompanying adjustments. PPT has proved useful for policy-makers in several areas, including road pricing, car-pooling and maximum speed limits on highways (Weggemans *et al.*, 1996; 1997; 1998).

The message used in PPT is as follows. First, behavioural scientists and policy-makers defined or specified the important policy issues to be addressed. Second, behavioural scientists analysed the policy area, by applying theories and 'rules' as described in this article to specific policy topics. The results were fed into practical advice which could be used to support or adjust the work of the policy-maker.

For example, in the area around Rotterdam, in the west of the Netherlands, policy-makers were planning to carry out a large-scale mass market advertising campaign to encourage car-pooling. Psychological research had shown, however, that mass market advertising campaigns

were unlikely to be effective in changing behaviour. The application of PPT resulted in advice to concentrate promotion on target groups, and to inform these groups about car-pooling, rather than taking a mass market advertising approach. In this particular example, people living in a specific area were selected as a target group, because the area appeared to offer realistic and workable alternatives to solo car driving. The process of disseminating information about car-pooling was guided by behavioural scientists and information was provided by a variety of ways (lessons in schools, advertisements, and free publicity in newspapers as well as interviews etc. on radio). The information campaign was combined with structural rewards for car-poolers: the car-pool area was equipped with more services and frequent car-poolers were offered free breakfasts. An information centre was opened, to help potential car-poolers in the region. This strategy resulted in a successful car-pool programme and solo car driving declined from 84% to 80%, while car-pooling increased from 16% to 20%. The number of companies reporting that they encouraged car-pooling increased from 39% to 46%.

Conclusion

Policy measures aimed at reducing car use need to be based on careful diagnosis of its main determinants. It is important to identify target groups and tune policy measures towards the main motives of those groups. Behavioural scientists can give a distinctive, innovative and useful contribution to policy-making, not only in the definition of the problem but also in the design, implementation and evaluation of policy measures. In the Netherlands, serious attempts are being made to involve social sciences more directly in transport policy and social scientists themselves are developing methods which enable policy-makers to utilize new understanding and knowledge of human behaviour. The emphasis is not only on generating new insights, but on making effective use of existing knowledge in the policy process. Behavioural scientists cannot however offer simple and general recipes for behavioural change. Advice to policy-makers will always be a matter of made-to-measure strategies. The first results of this approach appear promising but a great deal more work still needs to be done. ■

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