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Individual Behaviour Change: Evidence in transport and public health

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Individual behaviour change Evidence in transport and public health

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Summary

General

1. Behaviour change occurs both as a result of policy interventions deliberately intended to bring it about, and as an inevitable consequence of interventions with other objectives. It has to be seen as a dynamic process that takes place over time, in the context of changes in personal or family circumstances, recognising the importance of habit, churn, context, unintended effects, and substantial variation between individual circumstances and responses.
2. A team of specialists in transport and in public health has compared evidence on behaviour change in the two sectors, based on experience of using legal, economic, and persuasive methods, and also experience of holistic approaches seeking to integrate all these together.

Legislative interventions

3. There have been considerable successes in changing behaviour based on strong enforcement of existing or new laws. This can apply even if the initial legislation was controversial, provided that there is a clear rationale, unambiguous tests of compliance, and a mood which reinforces legislation with social dis/approval. To make it an effective intervention, the behaviour required by the legislation should be unambiguous, easy to be monitored, policed and enforced, be within the competence of the individual to comply, have a clear rationale understood by the public, have a severe and multi-faceted penalty for non-compliance; and have an associated high probability that non-compliance will be detected.

The effects of prices and incentives

4. There is substantial econometric evidence on the responsiveness of demand to price in both transport and health sectors (in relation to the consumption of alcohol, tobacco, and food). Price effects often take some years to build up fully, due to the time scale of forming and breaking habits, and making changes in life style. Prices are rarely the only, and may not be the main, influence on behaviour. Factors moderating the effectiveness of price measures include public acceptability of price increases intended to discourage undesired behaviour, price changes made by other players in the market which may offset changes in government taxes, and illegal responses (e.g. smuggling) by individual citizens. In addition, a variety of social factors (such as social norms) might either increase or moderate the effect of price on behaviour.
5. There has been a considerable experience of using financial incentives to influence individual health behaviour, with mixed results. They are sometimes thought to be rather expensive ways of producing relatively small effects, so tend to be confined to rather specific circumstances. Some literatures suggest that there are psychological advantages in rewarding good behaviour as distinct from punishing bad behaviour

Persuasion

6. There is mixed experience on the use of information, education, training and advertising, which are very dependent on context. The experience seems to suggest that the success of persuasion measures, such as advertising campaigns, is not a matter of simply deciding to have a campaign, but the salience of the creative content, targeting, and the nature of the improvement sought. Meeting the needs of different audience groups through a single campaign is difficult; to make persuasion measures successful it is important to segment the targeted population. Local activity is often enhanced by partnerships with local stakeholders. Persuasive methods also include experience with personalised travel planning, information provision, training, the organised use of group discussions and collective action, and the use of local networks. In each case there are examples of successes where well-designed initiatives have had significant effects on participants.

Holistic approaches

7. Holistic approaches that make simultaneous use of different methods that are pulling in the same direction, and that operate at different levels (e.g., individual, family, neighbourhood, society as a whole), are seen as more effective than partial or one-dimensional approaches.

The promise of behavioural economics

8. Some simple models of behaviour drawn from economic theory or individual psychology seek universality, but do not adequately explain the variation between people and their motivations, so can lead to oversimplified expectations.
9. Recent work on behavioural economics takes a broader view of rationality, recognising the importance of social influence, peer pressure, habit, and ethical or moral influence. Thus a potential unintended effect of using price signals can be to make undesired behaviours more acceptable, reducing the motivation of those who are already influenced by a desire to 'do the right thing'.

Can we 'nudge' people to change their behaviour?

10. 'Nudges' incorporated within the environment of choice making, might help individuals to find and choose better alternatives. A long-established application in road design (predating the label 'nudge') is the use of gateways, sightlines, coloured or textured road surfaces, affecting perceived speed and safety rather than actual conditions. Applications of the nudge approach to transport have not been tested in a large scale or systematically analysed in transport contexts. Therefore their effectiveness remains an open question. One of the limitations of the 'nudge' strategy is that being designed to influence individuals' behaviour through intuitive and impulsive processes of the automatic system they do not challenge or lead to a change to the individual's knowledge, attitudes or values. It is not possible to control the overall context in which nudge initiatives are introduced - and behavioural change achieved by designed nudges might be offset by unintended effects.
11. It seems almost self-evident that an approach which recognises non-economic as well as economic motivations for behaviour must be able to give better insights into how change works; policy interventions can therefore be more successful as well as less intrusive. Nudge approaches are advocated as a cheap and uncontroversial alternative to more challenging public initiatives. However, we judge it unlikely that there is a large latent body of easy, cheap, hardly noticed initiatives that will have big effects without the need to consider more substantial interventions. The real promise seems rather to help to design the bigger initiatives better, that is to add 'nudges' to improve or speed up the effects rather than as a replacement for other interventions.

Grass-roots approaches

12. Individual behaviour is strongly influenced by other people's behaviour and values. Normative relationships, trust and shared values between individuals and within social groups contribute to the success of behaviour change initiatives. Grass-roots driven approaches have been shown to be successful in other fields (e.g. public health, energy use) and there is (as yet untested) potential for using these sorts of techniques to influence transport behaviour.

Heterogeneity in responses to measures

13. There is wide evidence of diversity and heterogeneity in people responses to behavioural change measures in transport and public health. Individuals' behaviours might be traded-off in the aggregated level, leading to so-called 'asymmetric churns', and making it difficult to influence, observe and monitor change.

Understanding, trust, and involvement

14. It is often concluded that public understanding, trust, and involvement in programmes are helpful, and perhaps necessary, conditions for acceptability and compliance. In addition to attitudes towards the addressed behaviour, public attitudes towards the process of intervention are also important. Involvement in the process itself contributes to motivation and behavioural change.

1. Introduction

This is one of a series of think-pieces commissioned by the UK Department for Transport to consider the available evidence on behaviour change in transport, and what influences it. The focus of this paper is individual behaviour change. The approach taken is to augment evidence from within the transport sector with that from the public health sector, by a joint exercise comprising specialists in transport and travel behaviour (Dr Erel Avineri, Dr Kiron Chatterjee, Professor Phil Goodwin, Professor Glenn Lyons, Dr Charles Musselwhite, and Peter Wiltshire, and assisted by Dr E. Owen D. Waygood) and specialists in public health and other non-transport domains (Andrew Darnton, Dr Paul Pilkington, Professor Geof Rayner, and Professor Alan Tapp).

The main focus of the paper concerns the effects of policies deliberately intended to encourage behaviour change for reasons of social, environmental, health, safety or economic objectives.

However, it is emphasised that behaviour change following from policy interventions occurs in a wider context, as a result of other policies which may have entirely different objectives, and changes which are due to other developments in personal or family life, neighbourhood and national trends, and social and cultural influences. Thus the apparent success of any particular intervention will be influenced by the extent to which it addresses deeply embedded habits which are repeated every day (as is the case for some, but not all, commuting trips) or behaviour which is itself volatile and variable from day to day (as is the case for some, but not all, leisure trips). The habitual behaviours also change over time, typically over periods of several years during which major life cycle events occur which affect personal and family circumstances. Thus even when there is an appearance of stability in aggregate statistics, many people will be changing their behaviours in different directions and for different reasons. There is considerable empirical evidence on these broader questions of behaviour change, which is not reviewed directly here (see reviews for example by Chatterjee¹ and Goodwin²), but they underpin all the inferences which may be drawn from specific case studies.

The main types of intervention considered are as follows:

- legislation and enforcement;
- economic interventions, focussing on prices and financial incentives;
- persuasion, considered rather broadly to include education, advertising campaigns, social marketing, and provision of information; and
- holistic or integrated approaches seeking to combine all these instruments.

In transport, the nature of the evidence base includes econometric studies of the effects of changes in prices and travel times, before-and-after studies of particular interventions such as: traffic regulation; travel planning and other smarter choices; experiments; information systems; and campaigns on pro-environmental choices. In public health we have found potentially comparable evidence related to: smoking cessation; drug and alcohol use; obesity; healthy eating; and physical activity.

There are some differences of research tradition between the two sectors, notably in the use of very detailed forecasting models in transport which do not have an exact equivalent in public health, and the use of long-term epidemiological studies in public health which are not standard practice in transport.

¹ Chatterjee, K. (2001). *Asymmetric Churn*. Centre for Transport & Society, UWE Bristol. Available online at: <http://www.tps.org.uk/library/0001chatterjee.pdf>

² Goodwin, P. (2008). Policy Incentives to change behaviour in passenger transport, *OECD/International Transport Forum on 'Transport and Energy: the Challenge of Climate Change'*, Leipzig, May.

2. Legislation and enforcement to change behaviour

Legislation accompanied by enforcement and awareness-raising campaigns has been used in a number of areas of transport and also public health to change behaviour.

2.1 Speed cameras

Enforcement of speed limits using speed cameras has been demonstrated to change behaviour in terms of reducing average speed in and around camera sites, and in turn reducing collisions, deaths and injuries both at camera sites and across wider areas^{3 4}. There are also some unintended consequences (such as drivers speeding up downstream of camera sites⁵ - though without apparent adverse implications in terms of accidents⁶, and some drivers choosing routes to avoid cameras that can lead to accident migration⁷). Overall speed cameras are effective because the public understand how they work (or at least perceive they do) and know what behaviour is required of them and feel they can perform such behaviour.

2.2 Seat-belts

It became compulsory to fit front seat-belts in new cars in Great Britain in 1967, and wearing them became compulsory in stages from 1983 to 1991. Compliance levels have risen over time, with noticeable jumps associated with particular campaigns especially the memorable 'Clunk-Click' campaign. Over the past 25 years the compulsory wearing of seat-belts has been estimated to have saved at least 60,000 lives and stopped 600,000 severe injuries⁸. Recent research⁹ suggests almost everyone understands the seat-belt law and large majorities accept the reasons for it^{10 11}. The notable success of this example of behaviour change can be attributed to:

- clear and unambiguous legislation;
- clearly evident benefits;
- high quality media campaigns preceding and accompanying the legislation;
- vociferous support outweighing the presence of vociferous opposition.

2.3 Drink-driving legislation

Accidents involving drink-driving have fallen over the past 20 years (fatal accidents attributed to alcohol have fallen some 46%). Slight casualties involving alcohol however, rose by 4%. Nearly one in six of all deaths on the road still involve drivers who are over the legal alcohol limit. Drinking and driving occurs across a wide range of age groups but particularly among young men aged 17-29. There is strong public support for drink-driving laws^{12 13} and large majority support for harsher penalties e.g. being banned from driving¹⁴

³ Pilkington, P. and Kinra, S. (2005). Effectiveness of speed cameras in preventing road collisions and related casualties: A systematic review, *British Medical Journal* 330, 331-334.

⁴ Wilson, C., Willis, C., Hendrikz, J.K and Bellamy, N. (2006). Speed enforcement detection devices for preventing road traffic injuries. *The Cochrane Database of Systematic Reviews* 2006(2).

⁵ Blincoe, K. M., Jones, A. P., Sauerzapf, V. and Haynes, R. (2006). Speeding drivers' attitudes and perceptions of speed cameras in rural England. *Accident Analysis & Prevention* 38(2), 371-378.

⁶ Department for Transport (2005). *The National Safety Camera Programme: Four Year Evaluation Report*. <http://www.dft.gov.uk/pgr/roadsafety/speedmanagement/nscp/nscp/thenationalsafetycameraprogr4597>.

⁷ Ibid.

⁸ Fitzpatrick, J. (2008). *Press Release on the 25th Anniversary of Seat-Belt Legislation*. Department for Transport, London.

⁹ Angle, H. Buckley, K., Fearn, A. and Goddard, E. (2007). *Think! Road Safety Campaign. Annual Survey 2007*. Department for Transport, London.

¹⁰ Cauzard, J-P. (Ed.) (2003). *European Drivers and Road Risk: Report on principle analyses SARTRE III*. Published by Institut National de Recherche sur les Transports et leur Sécurité INRETS.

¹¹ Angle, H. Buckley, K., Fearn, A. and Goddard, E., *op.cit.*

¹² Higginson, G. (2005). *Lancashire Partnership for Road Safety: Public Opinion Survey*. ORC, Manchester.

¹³ RAC (2007). *RAC Report on Motoring 2007. Driving safely?* RAC, Norwich.

¹⁵ and tougher limits including a zero-alcohol limit¹⁶. Women, non-drivers and those in lower socio-economic groups tend to be more punitive with regard to drink-driving than men, drivers and higher socio-economic groups, though all groups showed majority support¹⁷. One study of young people suggested that driving under the influence of alcohol is less acceptable than driving under the influence of cannabis¹⁸.

Successfully discouraging and reducing drink-driving behaviour can be attributed to:

- tough penalties;
- high levels of enforcement (including random tests);
- media campaigns (especially those featuring the effects of losing one's license);
- some progress in trying to tackle the norm of socialising with drinks; and
- bringing about social pressure not to drink when driving.

Suspension of a driving license is a measure targeted at drivers who have accumulated a number of certain types of traffic offences, such as drink-driving and speeding. In many countries, penalty points systems are used to monitor the number and severity of traffic offences committed by an individual driver. Objectives of license suspension include: reducing the number of traffic violations; and reducing the number of accidents during the period for which the driving license is withdrawn. Analysing several empirical studies, it was found that driving license suspension has led to a reduction of 17% in the number of accidents¹⁹. To many people, suspension of their driving license could have a significant effect on their routine activities and mobility, and might mean the loss of their job. Both safety and mobility arguments have an effect on public and political acceptability of license suspension measures.

2.4 Smoke-free legislation

The primary declared objective of smoke-free legislation was the protection of employees from second hand smoking at their place of work, though in the event it also reduced the number of smokers and the amount they smoked²⁰. There is some evidence that prevalence of smoking in the population as a whole has reduced in countries where smoke-free legislation has been introduced, though the long term effects are not yet established^{21 22 23}. One longitudinal survey suggested that an important part of the effect on increasing people's intention to quit, was the reinforcement of an atmosphere of social disapproval, not simply concern about penalties²⁴.

¹⁴ DfT (2008). *Public Attitudes towards Road Safety Issues*. Report taken from the British Attitudes Survey 2007. Department for Transport, London.

¹⁵ Cauzard, J.-P., *op.cit.*

¹⁶ DfT (2008). *Public attitudes towards road safety issues*. Report taken from the British Attitudes Survey 2007.

¹⁷ O'Brien, G., Rooney, F., Carey, C. and Fuller, R. (2002). Evaluation of the effectiveness of a dramatic presentation on attitudes to road safety. *Behavioural Research in Road Safety XII*. Department for Transport, London. pp. 195-207.

¹⁸ Thomas J, Kavanagh J., Tucker H., Burchett H., Tripney J. and Oakley A. (2007). *Accidental Injury, Risk-Taking Behaviour and the Social Circumstances in which Young People (aged 12-24) Live: A Systematic Review*. EPPI-Centre, Social Science Research Unit, Institute of Education, University of London.

¹⁹ Elvik, R. and Vaa, T. (2004). *The Handbook of Road Safety Measures*. Elsevier, pp. 1000-1004.

²⁰ Fichtenberg, C.M. and Glantz, S.A. (2002). Effect of smoke-free workplaces on smoking behaviour: Systematic review. *British Medical Journal* 325, 188.

²¹ Department of Health and Children (2004). *7,000 fewer smokers in Ireland*. Available online at: http://www.healthpromotion.ie/uploaded_docs/PRESS_RELEASE_-_RESEARCH_FINDINGS_-_SEPT_004.pdf [last accessed on 10 November 2009].

²² Gallus, S., Zuccaro, P., Colombo, P., Apolone, G., Pacifici, R., Garattini, S. and La Vecchia, C. (2006). Effects of new smoking restrictions in Italy. *Annals of Oncology* 17, 346-347.

²³ New York State Department of Health (2004). *First Annual Independent Evaluation of New York's Tobacco Control Program*. New York State Department of Health.

²⁴ Brown, A., Moodie, C. and Hastings, G. (2009). A longitudinal study of policy effect (smoke-free legislation) on smoking norms. ITC Scotland/United Kingdom. *Nicotine & Tobacco Research* 2009. Advanced access publication: <http://ntr.oxfordjournals.org/cgi/content/abstract/ntp087v1>

2.5 Requirements

A series of requirements can be suggested in pursuit of effective legislative interventions. The behaviour required by the legislation should:

- be unambiguous;
- be reasonably easy to monitor;
- be within the competence of the individual to comply (and to know that they are doing so);
- have a clear rationale understood by the public;
- be well policed and enforced;
- have a severe and multi-faceted penalty for non-compliance; and
- have an associated high probability that non-compliance will be detected.

The legislation needs to be backed up by well designed campaigns, which include reinforcement of the social unacceptability of the penalised behaviour.

3. Economic interventions

Economic interventions are advocated by many economists and policymakers, and are largely favoured for their economic rationale and clear behavioural assumptions.

3.1 The experience of price effects in transport

Conventional economic theory gives price a key role in bringing demand and supply together by influencing both. There is a rich body of evidence on the effects of prices on travel behaviour, coming from three²⁵ main types of study. These are econometric studies - usually of time series data over periods of several decades (the best of which allow for lagged effects over time), modelling studies of the effects of changes in prices using best-practice transport models - usually built on cross-section data (which mostly assume instantaneous effects) and before-and-after studies of the effects of particular real-world policy interventions such as congestion charging (often with a rather short term horizon of one or a few years).

There is a long-lived tendency in discussion of transport policy to say 'price doesn't make any difference to people's choices because they have to travel anyway'²⁶, but the empirical research evidence that price actually does make a significant difference is substantial, consisting of a literature of several hundred published articles which have themselves been periodically reviewed in published literature surveys.

On the public transport side there is a major book edited by Balcombe (2004) including public transport fares²⁷. Concerning the effects of fuel prices and other motoring costs there are several review articles including a synthesis carried out for the DfT in 2004²⁸. This suggests that a 10% increase in fuel price causes a 1.5% reduction in traffic volume in the first year, building up to about 3% over a 5-10 year period. However the reduction in fuel consumption is greater than this - about 4% in the short run building up to about 7% in the longer run. The increase in effect over time implies that behavioural adjustment across the population takes several years to be completed, which may be interpreted as a measure of inertia or habit. The high effect on fuel consumption and vehicle miles implies that behavioural adjustment involve quite a complicated mix of choice-making elements such as: the numbers, lengths, locations and modes of trips; driving styles; and choice of vehicle type.

The imposition of an entirely new pricing system can also have substantial effects, as seen in the experience of congestion charging in London. Transport for London (TfL) reported that traffic within the charging zone reduced by 15%, traffic entering the zone by 18% and congestion by 30%, appearing to reach stability almost instantaneously²⁹. There has not been a full reconciliation of the apparent swift (relative) stability in London and the evidence of lags of some years in most elasticity studies, but this may be due to a very high profile initiative and a very sensitive balance of congestion and traffic such that small changes have very swiftly observable effects. Evidence is still accumulating on what may be the longer term build up of behavioural change at the individual level. The effects were higher than the central range of modelling forecasts which had been made, i.e. with greater traffic reductions and hence less revenue. A 38% increase in bus passengers entering the charging zone was measured with half of this attributed to the charging

²⁵ A fourth source of evidence is the use of stated preference or stated intention 'experiments', where people are asked about their response to hypothetical price changes. This is not thought to be a good direct source of evidence about behavioural response, being more appropriate as an indirect source of relative values.

²⁶ This may come from the economists' convention of calling elasticities which are smaller than -1 'inelastic', misinterpreted to mean 'zero elasticity'.

²⁷ Balcombe, R. (Ed.) (2004). *The Demand for Public Transport: A Practical Guide*, TRL593, Transport Research Laboratory, Crowthorne and available online at: www.demandforpublictransport.co.uk/TRL593.pdf

²⁸ Goodwin, P., Dargay, J. and Hanly, M. (2004). Elasticities of road traffic and fuel consumption with respect to price and income: A review. *Transport Reviews* 24(3), 275-292. Detailed results in www.cts.ucl.ac.uk/tsu/elasfinweb.pdf

²⁹ TfL (2004). *Impacts Monitoring Second Annual Report*. Transport for London, London. Available online at: <http://www.tfl.gov.uk/roadusers/congestioncharging/6722.aspx>

scheme itself and the other half being related to the improvements in service offered (with support from scheme revenue). In July 2005 the daily charge increased by 60% from £5 to £8, and traffic entering the zone was reduced in 2006 by 21% compared to pre-scheme levels of 2002. TfL has estimated that 65,000 – 70,000 fewer car trips were made into the charging zone of which 50-60% transferred to public transport, 20-30% diverted around the charging zone and 15-20% had made other adaptations. Attitudinal surveys found increased support for the scheme after its introduction, as was also found in Stockholm.

3.2. The experience of price effects on health behaviour

Health considerations have increasingly appeared in discussion around taxation on tobacco and alcohol and are now beginning to appear around food (e.g. 'fat taxes'). Conversely subsidies or directed financial supports have explicitly been used to influence patterns of consumption. These have been wide-ranging, including family allowances and free school meals or welfare foods.

Alcohol

In their review of the economic literature on alcohol demand, Leung and Phelps concluded that the price elasticities of demand in the USA were such that a 10 percent increase in the price of each would reduce beer consumption by about 3 percent, wine consumption by 10 percent, and distilled spirits consumption by about 15 percent)³⁰ Other sources consider this an underestimate. To compare US tax measures with other interventions it has been suggested that the complete elimination of alcohol advertising might reduce monthly drinking by adolescents from about 25% to about 21%, and binge drinking from 12% to around 7%. These estimated reductions associated with advertising were substantially less than those which the analysis suggested would result from significantly increasing the price of alcoholic drinks³¹. Again this underlines that 'price works'.

Tobacco

The conventional wisdom some decades ago was that cigarette smoking was relatively unaffected³² by price. Numerous econometric studies now confirm that cigarette demand responds to changes in cigarette taxes and prices. In a 1999 report the World Bank concluded that, on average, a price rise of 10% would be expected to reduce demand for tobacco products by about 4% in high income countries and by about 8% in low and middle income countries³³. The price effect is greatest in poorer countries. In the UK one study of price elasticities of demand for cigarettes assessed them as -0.5 for men and -0.6 for women (with higher elasticities in higher socioeconomic groups). Price was a significant factor in cigarette consumption by age for women in every age group and for men aged 25-34.³⁴ Raising prices have, however, had an unintended effect - the creation of criminal networks around contraband imports, especially where prices are significantly different in neighbouring countries.

³⁰ Leung, S.F. and Phelps, C.E. (1993). My kingdom for a drink...? A review of estimates of the price sensitivity of demand for alcoholic beverages. In: Hilton, M.E. and Bloss, G. (Eds.), *Economics and the Prevention of Alcohol-Related Problems*. NIAAA Research Monograph No. 25, NIH Pub. No. 93-3513. National Institute on Alcohol Abuse and Alcoholism, Bethesda, MD. pp. 1-32.

³¹ Saffer, H. and Dave, D. (2003). *Alcohol Advertising and Alcohol Consumption by Adolescents*. NBER Working Paper No. 9482, May 2003.

³² There seems to have been exactly the same confusion as in transport, where the 'inelastic' demand was misinterpreted as 'zero elasticity'.

³³ Jha, P., de Beyer, J. and Heller, P.S. (1999). Death and taxes: Economics of tobacco control. *Finance & Development* 36(4). International Monetary Fund. Available online at: <http://www.imf.org/external/pubs/ft/fandd/1999/12/jha.htm> [last accessed on 1 November 2009].

³⁴ Townsend, J., Roderick, P. and Cooper, J. (1994). Cigarette smoking by socioeconomic group, sex, and age: Effects of price, income, and health publicity. *British Medical Journal* 309, 923-927 (8 October).

Other applications

There has been interest in trying to reduce illegal drug use by finding ways to increase its price, but these do not seem to have been successful because the nature of market responses of supply of an illegal product are not easy to control. (One argument sometimes advanced to legalise some drugs is that this would make it easier to regulate them and increase their price.)

Although price change mechanisms in a public health context are often compared to other interventions on an independent basis, a more realistic view would be to see them as part of a systemic view of behavioural influences. In some areas of addictions, such as illicit drugs, the attempts to raise price to reduce demand have had poor results, in smoking the results have been much better, while in alcohol efforts have been frustrated by supply chain and market effects.

3.3 Overview of the effectiveness of price measures and the factors moderating them

It seems that in both the transport and health sectors there is a common intuitive view that price measures are ineffective, but a substantial body of empirical and case-study evidence that price has a material effect on behaviour, more in the long run than the short run though the definition of 'short' and 'long' will vary according to the circumstances, the initiative, and the degree to which behaviour patterns are embedded in wider choices of life style. However, price effects are not all-powerful, being mediated by a number of different factors, of which analysts in both sectors tend to discuss four in particular.

Firstly, the elasticities, though certainly not zero, can be low enough that really quite large price increases are necessary to stimulate big changes in behaviour: this means that there is a constraint of public acceptability when making price increases to discourage unfavoured behaviour, and a constraint of quite large costs when using price decreases to encourage favoured behaviour.

Secondly, in each case there are commercial markets who themselves will respond to Government-initiated price signals by seeking to retain or increase their markets. This may include highly competitive price reductions to offset an increased tax (e.g. beer and petrol sold in supermarkets chains), lobbying, product differentiation, and substantial marketing/advertising.

Thirdly, there are potential illegal consumer responses (e.g. driving an uninsured car or using unlicensed fuel, smuggling products without paying duty, and - in the case of illegal drugs - bypassing formal price signals) which set a bound on what is practical.

Fourthly - and perhaps most important - analysts in both fields point to the influence of many wider social factors of which price is only one, and not necessarily the most important, including cultural values, social norms and expectations, status, and peer group pressure. In some circumstances these will appear to increase the effect of price, and in others to dampen it³⁵. In the same way, if there are other policies being implemented whose own effect is in the opposite direction to the intended behavioural effect (e.g. policies on parking or road capacity which encourage car use, or policies on alcohol regulation which increase the availability of alcohol) their effects may offset or overwhelm the price effect.

3.4 Other financial incentives to change behaviour

Financial incentives work on two dimensions. They could make a change to the market conditions and thus operate in the same way as prices to influence supply and demand; at the same time they may have a psychological effect on the individual and can be seen as a reward or positive reinforcement to encourage and maintain desirable behaviour.

³⁵ Or even reverse the price effect in special circumstances, when there is status conferred by the fact of using a highly priced product, e.g. sports cars, expensive wines, etc. This may only be a niche effect.

Transport

In the Netherlands there have recently been some trial schemes in which frequent drivers are offered financial incentives to reduce their use of specific sections of road earmarked for maintenance³⁶. The incentive was significant (several Euros a day) and resulted in about half the target population changing their behaviour by travelling to work less frequently during the incentive period, transferring to other modes, changing their route, or changing their time of travel; the split among these effects being very dependent on the specific local circumstances. There are Government intentions to expand the use of these methods for temporary periods.

Direct financial incentive paid to a driver as a result of driving in a safe manner is a popular concept amongst the public³⁷. In one sense no-claims bonuses on insurance may be interpreted in this way, though the perception is often that they are instruments intended to reduce claims, rather than to reduce accidents.

The advent of new technologies such as in-vehicle data recorders could increase the possibilities and drivers could be rewarded for driving within speed limits, at a good distance to other vehicles and for moderate rather than excessive acceleration and deceleration. Such technology is fairly popular amongst the public when it is used in conjunction with financial incentives and intriguingly is popular amongst drivers who drive in a deliberately high risk manner³⁸. Most popular is pay-out bonuses for achieving target good behaviours – possibly paid for by insurance companies³⁹. Norwich Union black box technology trial with younger drivers was seen as fairly successful but has recently been abandoned due to lack of interest from vehicle manufacturers and drivers.

Drivers who currently take the PassPlus course are offered a financial incentive by some insurance companies. The course is viewed popularly amongst a variety of younger drivers and has been evaluated favourably by those who have taken such a course⁴⁰. A recent survey carried out for the Driving Standards Agency showed that 93% of people who had taken the course felt more confident on the road, and 80% considered that the course had improved their driving skills⁴¹. Evaluation of the Pass Plus initiative in Fife⁴² in a simple before and after study found a reduction in blameworthy accidents from 69.3% (of all road accidents had by 17-20 year olds) prior to the Fife Pass Plus Initiative to 41.8% after its introduction. The Driving Standards Authority is currently investigating the feasibility of lifelong learning to encourage safer driving. One way of encouraging uptake of such learning could be achieved through rewards of cheaper insurance.

Financial savings have also been stressed as a supportive element in campaigns to adopt eco-friendly (which usually also means safer) styles of driving, e.g. avoiding sudden starts and stops, and maintaining optimal levels of speed. It has been suggested⁴³ that

³⁶ Bleimer, M., Dicke-Ogenia, M. and Ettema, D. (2009). Rewarding for avoiding the peak period: A synthesis of three studies in the Netherlands. *European Transport Conference 2009*, and forthcoming in *European Journal of Transport and Infrastructure Research*.

³⁷ Musselwhite, C.B.A., Hunter, A., Bhattachary, D., Susilo, Y., Fulcher, E. and Avineri, A. (under review at DfT prior to publication) *Understanding Public Attitudes to Road User Safety*. For Department for Transport

³⁸ Musselwhite, C.B.A. (2004). Technological humps and having the hump with technology. Paper presented at the *International Conference on Traffic & Transport Psychology*, Albert Hall, Nottingham, UK, 5th-9th September.

³⁹ Musselwhite, C.B.A., Hunter, A., Bhattachary, D., Susilo, Y., Fulcher, E. and Avineri, A., *op.cit.*

⁴⁰ *Ibid.*

⁴¹ RAC (2009). *Pass Plus: Improving Your Driving Further*. Available online at: <http://www.rac.co.uk/know-how/learning-to-drive/after-the-driving-test/pass-plus-improving-your-driving-further.htm> [last accessed on 1 October 2009].

⁴² Greer, J. (2002). Fife PassPlus initiative. Paper presented at the *67th Road Safety Congress: Safer Driving - the Road to Success*. 4th-6th March. Available online at: <http://www.rospa.com/roadsafety/conferences/congress2002/proceedings/greer.pdf> [last accessed on 1 October 2009].

⁴³ Musselwhite, C.B.A., Hunter, A., Bhattachary, D., Susilo, Y., Fulcher, E. and Avineri, A., *op.cit.*

there is little evidence that the price aspect is decisive, partly because drivers do not detect the effects on fuel consumption. This suggests that the financial incentive needs to be more clearly revealed by suitable information systems.

Public health

A recent review⁴⁴ identified a wide range of different uses of financial incentives to encourage healthy behaviours:

- (food) vouchers rewarding periods of smoking cessation amongst pregnant women and children;
- contribution towards healthcare costs for treatment adherence in managing chronic conditions;
- payments for regular negative laboratory test for sexually transmitted diseases;
- cash rewards to overweight residents for achieving weight loss targets;
- financial incentives to families for engaging in behaviours to improve health and educational attainments associated with child development; and
- promoting healthy eating through points earned by eating healthy school meals which are exchanged for farm animals, medical supplies, and classroom equipment for Save the Children projects abroad.

The review suggested that the short term effectiveness of financial incentives was strongest in drug misuse programmes but that in the long term this outcome was uncertain. Weight loss trials showed no or weak improvement from the use of incentives on weight loss at 12 or 18 months. Generally, smoking cessation trials did not show that financial incentives can lead to significant sustained quitting. However, one recent study provided evidence that incentives on smoking cessation led to higher quit rates at six and twelve months.

Other examples include the 'Quit and Win' (smoking cessation) campaign⁴⁵ involved rewarding individuals for giving-up smoking with prizes as part of a mass-media strategy. The intervention was found to be very much at the low end of the cost-effectiveness thresholds considered acceptable by NICE. Lottery prizes have been used to help improve vaccination uptake rates⁴⁶.

⁴⁴ Marteau, T.M., Ashcroft, R.E. and Oliver, A. (2009). Using financial incentives to achieve healthy behaviour. *British Medical Journal* 338 (April), 1415.

⁴⁵ www.quitandwin.net

⁴⁶ Kelly, M.P., McDaid, D., Ludbroo, A. and Powell, J. (2005). *Economic Appraisal of Public Health Interventions*. NHS, Health Development Agency.

4. Persuasion

'Soft' behavioural change interventions such as education, training and information provision, and mass-media persuasion (through advertising and the use of campaigns) have been successfully applied in a wide range of domains, among them consumer choice and marketing, public health, and transport (notably road safety behaviour, and more recently personalised travel advice and associated measures grouped as 'smarter choices'). While these approaches might not seem to have much in common, all of them are commonly perceived by public and government as 'soft' interventions that do not restrict or limit choices; instead, they encourage and persuade individuals to choose desired ways of action.

4.1 Driver training

About 750,000 people qualify for a full car driving licence each year, undertaking a programme of formal or informal training in order to prepare them for the driving test. By definition, this implies a major exercise of forming behaviour patterns, for a very large proportion of the population, and at an age (three-quarters of newly qualified drivers are under 25 years of age⁴⁷) when many decades of driving are likely to be ahead of them. The driving test, and the training preparing for it, have evolved over the years, with some tendency for criteria to become somewhat stricter as traffic conditions and vehicle performance present new challenges. There is a widespread feeling that many of the newly qualified drivers are still not adequately prepared for independent driving on the road⁴⁸. Recently, the theory test was introduced in the hope of improving hazard perception amongst learner drivers, and this has provided some experience of the effects of different sorts of training. One recurrent theme^{49 50 51} relates to the effects of engaging in group discussions in which interaction between road users and reflection on habitual and subconscious behaviour are highlighted. This approach confronts habitual behaviours by raising them to the conscious level, and highlights internal inconsistencies, emphasises norms, introduces emotive content and introduces a reflection on attitudes, values and beliefs. The underlying proposition is that drivers should be encouraged to reflect more on their driving behaviour, and discuss it in a social context, contrasting therefore with a tendency for frequently used skills to become nearly autonomic.

4.2 Information provision

Providing individuals with information about transport-related attributes such as travel time, travel costs or risks might be seen not only as a service provided to the public, but as an instrument to change travel behaviour and road safety behaviour. The presumption is that individuals, provided with travel information and road safety information, can make more fully informed choices which will be to their personal advantage and potentially that of the transport system as a whole. In the economic tradition, where the assumption of perfect information is a necessary part of rational decision-making, information systems are therefore a necessary part of choice. However, design of travel information systems has often ignored the psychological, ergonomic and cognitive

⁴⁷ Driving Standards Agency (DSA) (2008). *Learning to Drive Consultation*. Driving Standards Agency, Nottingham.

⁴⁸ Emmerson, K. (2008). *Learning to Drive: The Evidence*. Road Safety Research Report No. 87, Department for Transport, London.

⁴⁹ Dorn, L. and Brown, B. (2003). Making sense of invulnerability at work: A qualitative study of police drivers. *Safety Science* 41(10), 837-859.

⁵⁰ Fylan, F., Hempel, S., Grunfeld, B. Conner, M. and Lawton, R. (2006). *Effective Interventions for Speeding Motorists*. Road Safety Research Report No. 66, Department for Transport, London.

⁵¹ Musselwhite, C.B.A. (2004). *Driver Attitudes, Behaviour and Speed Management Strategies*. University of Southampton, PhD Thesis.

processes of retrieving and using information. Some perhaps unrealistic expectations⁵² of big effects from new information systems have remained unrealised: in practice, the detailed information tends to be sought *after* a decision to change behaviour (or to consider changing behaviour) for other reasons (thus information provision supports rather than stimulates behaviour change (consideration)). Many journeys are routine, familiar and (sufficiently) predictable and correspondingly there is not a demand for information use in relation to travel choice⁵³.

While societal awareness of environmental aspects of travel behaviour exists (i.e. the need to reduce carbon emissions), feedbacks to personal responsibilities are largely lacking⁵⁴. As seen in household energy-use studies^{55 56 57 58 59} direct feedback is likely to be important in terms of influencing behaviour: if individuals are unable to equate current actions with consequences, then changes may be less significant (e.g. the effect of direct feedback versus monthly bills). In a transport context for example, on-board tools could be required on vehicles that, like speedometers, give feedback to the driver on their travel behaviour and road safety behaviour. Toledo et al. (2008)⁶⁰ found that providing drivers with feedback on dangerous driving behaviour reduced the likelihood of crashes⁶¹.

Recent approaches to road user safety further suggest that providing extra information to the public may be a good way of communicating risk: e.g. there are proposals to publish statistics highlighting how dangerous certain roads are. Participants appear to welcome such information but state it is unlikely to change their behaviour⁶².

4.3 Advertising campaigns

Mass-media persuasion, i.e. deliberate efforts to influence the way people think or behave, has big and significant effects. Among campaign implementers in the advertising industry and political consultants, it has long been obvious that mass-media campaigns to promote commercial products and services have effects large enough for investments in campaigns to be profitable⁶³. There is an overwhelming body of empirical evidence to support the main belief in the advertising sector: (effective) advertising does lead to behavioural change. In the context of consumer behaviour, the effect of promotional activities is reported as having a large and significant effect on sales⁶⁴.

⁵² Chorus, C.G., Molin, E.J.E. and van Wee, B. (2006). Travel information as an instrument to change car-drivers' travel choices: A literature review. *European Journal of Transport and Infrastructure Research* 6(4), 335-364.

⁵³ Lyons, G., Avineri, E., Farag, S. and Harman, R. (2007). *Strategic Review of Travel Information Research*. Final report to the Department for Transport TDT/149 (R201), Sept 2007.

⁵⁴ Coulter, A., Clegg, S., Lyons, G., Chatterton, T. and Musselwhite, C. (2008). *Exploring Public Attitudes to Personal Carbon Dioxide Emission Information*. Final report, January. Department for Transport, London.

⁵⁵ Darby, S. (2006). *The Effectiveness of Feedback on Energy Consumption*. A review for DEFRA on the literature on metering, billing and direct displays. April 2006.

⁵⁶ Brandon, G. and Lewis, A. (1999). Reducing household energy consumption: A qualitative and quantitative field study. *Journal of Environmental Psychology* 19(1), 75-85.

⁵⁷ McCalley, L.T. and Midden, C.J.H. (2002). Energy conservation through product-integrated feedback: The roles of goal-setting and social orientation. *Journal of Economic Psychology* 23(5), 589-603.

⁵⁸ McClelland, L. and Cook, S.W. (1980). Promoting energy conservation in master-metered apartments through group financial incentives. *Journal of Applied Social Psychology* 10(1), 20-31.

⁵⁹ Staats, H., Harland, P. and Wilke, H. (2004). Effecting durable change - A team approach to improve environmental behavior in the household. *Environment and Behavior* 36(3), 341-367.

⁶⁰ Toledo, T., Musicant, O. and Lotan, T. (2008). In-vehicle data recorders for monitoring and feedback on drivers' behavior. *Transportation Research Part C* 16, 320-331.

⁶¹ The drivers all worked at one company, were non-professional drivers, and were unaware of the data-recording devices when the information was gathered. However, one could argue that once the drivers were made aware that their driving patterns were being recorded that they adjusted their driving.

⁶² Musselwhite, C.B.A., Hunter, A., Bhattachary, D., Susilo, Y., Fulcher, E. and Avineri, A., *op.cit.*

⁶³ Magne, H. (2004). Do campaigns really change behavior? New understanding of the behavioral effects of advertising, Political campaigns and health communication campaigns. *Nordicom Review* 25(1-2), 277-290.

⁶⁴ Jones, J.P. (2002). *The Ultimate Secrets of Advertising*. Sage, Thousand Oaks.

It is also argued, however, that most of the studied changes due to advertising are short-range, up to one year and it is suggested that we still see too many cases in which mass-media campaigns do not work properly, and that we do not have enough understanding of why this is the case⁶⁵. In some studies price reductions have been found to be 20 times more effective for increasing sales than is advertising⁶⁶.

Mass media campaigns, because of their wide reach, appeal, and cost-effectiveness, have been major tools in health promotion and disease prevention in the last four decades⁶⁷. Although they are considered to be powerful tools capable of promoting healthy social change, some had limited success in changing behaviour. A meta-analysis of 48 studies of the behavioural effect of mass-media health campaigns found that 9% more people performed the healthy behaviour after the campaign than before⁶⁸. In a more recent review of health communication campaigns and their impact on behaviour⁶⁹ it was found that at the United States, health communication campaigns that include use of the mass media and avoid coercion have an average effect size of about 5% points⁷⁰. The level of effectiveness of health campaigns depends in part on the specific behaviour that is promoted⁷¹: seatbelt campaigns (15%), dental care (13%), and adult alcohol reduction (11%) have had the greatest success rates, whereas youth drug and marijuana campaigns have had the least success (1%-2%). Topics that fall in between include family planning (6%), youth smoking prevention (6%), heart disease prevention (5%), sexual risk taking (4%), mammography screening (4%), adult smoking prevention (4%), and youth alcohol prevention and cessation (4%-7%), and tobacco prevention campaigns (4%).

There is mixed experience on effectiveness of campaigns in changing health behaviour. What is important to note is that 'success' of advertising campaigns is not a given. Campaigns involve a number of design considerations which allied to the context of the campaign will influence effectiveness. In their review of public health mass media campaigns, Randolph and Viswanath⁷² identify the following factors that contribute to the success of public health mass media campaigns:

- to influence the information environment, campaign messages should be simple and straightforward;
- creativity and placement of campaign messages, and reliance on professional communication services enhance the probability of campaign success;
- campaigns can be more successful when they are accompanied by concomitant structural changes that provide the opportunity structure for the target audience to act on the recommended messages.

In a transport context, advertising campaigns are commonly attached to specific initiatives (e.g. seat belts legislation and enforcement, or public transport service improvements). It is clear that there will always be a need for the transmission of

⁶⁵ Haug, M. (2003). *Do Campaigns Really Change Behavior? New Understanding of the Behavioral Effects of Advertising, Political Campaigns and Health Communication Campaigns*. Available online at: http://www.nordicom.gu.se/common/publ_pdf/157_277-290.pdf

⁶⁶ Tellis, G.J. (1994). Modeling the effectiveness of advertising in contemporary markets: Research findings and opportunities. In Stewart, D.W. (Ed.), *Attention, Attitude and Affect in Response to Advertising*. Lawrence Erlbaum, Hillsdale, New Jersey. pp. 55-65.

⁶⁷ Randolph, W. and Viswanath, K. (2004). Lessons learned from public health mass media campaigns: Marketing health in a crowded media world. *Annu. Rev. Public Health* 25, 419-437.

⁶⁸ Snyder, L.B. (2001). How effective are mediated health campaigns? In Rice, R.E. and Atkin, C.K. (Eds.), *Public Communication Campaigns*. Third Edition. Sage, Thousand Oaks. pp. 181-190.

⁶⁹ Snyder, L.B. (2007). Health communication campaigns and their impact on behavior. *Journal of Nutrition Education and Behavior* 39, 32-40.

⁷⁰ Thus, if 50% of people in an intervention community or group were doing the target health behaviour before the campaign, about 55% can be predicted to do the behaviour after the campaign.

⁷¹ Snyder, L.B. (2007), *ibid*.

⁷² Randolph, W. and Viswanath, K., *op.cit*.

information about any new circumstances to the public, and various forms of advertising will normally be used as a matter of course. A review of road safety campaigns⁷³ has suggested that campaigns that try to induce fear have little effect on driver attitudes and behaviour, partly because drivers, particularly the most risky road users, are able to distance themselves from the message through believing the campaign is targeted for those with less road user skill than themselves. It has been suggested that incurable optimism (where most drivers believe they are better than average) leads people to believe the message is not for them. Coupled with feelings of illusion of control, where drivers feel very much in control of their vehicle and their own safety, means the messages tend to be ignored⁷⁴.

Campaigns aimed at improving bicycle helmet use vary in their success, with the more successful campaigns targeting small groups⁷⁵. Less effect is seen of campaigns aimed to increase cycle helmet use on children in poorer communities^{76 77}.

FRANK, a cross-departmental awareness-raising campaign, providing drugs information and advice to teens and young adults, is seen as an example of successful campaign to change behaviour (drug use)⁷⁸. Much of *FRANK*'s local activity has been delivered through partnerships with stakeholders (such as teachers, youth and drugs workers). While the campaign is driven from the centre, the *FRANK* brand architecture and resources are freely shared with these local providers. Darnton⁷⁹ identified that the 11-18 audience could not be treated as a whole. Patterns of drug using in the 15 to 18 age range were shown to be very different from those of 11 to 14s; in the older group, drug using was a majority practice and could be regarded as recreational and rational. In the younger age group, even cannabis use was a minority practice, and drug use in general could be characterised as more experimental and unplanned. Results^{80 81} showed that *FRANK* has been successful in preventing drug use among the 11 to 14 age range.

'Are You Doing Your Bit? (AYDYB) was an environmental awareness campaign led by the DETR which aimed to explain the link between behaviour and climate change, and stimulate public awareness and action. The campaign encouraged small but important behavioural changes in everyday actions to benefit both individuals and the local and global environment⁸². The targeting of the campaign was very broad. Given the universal relevance of the message about the link between individual actions and climate change, the campaign strategy was to target "*essentially everyone*". However, in order to be more pragmatic, it was agreed that the focus should be on the 87% of the population who

⁷³ Fylan, F., Hempel, S., Grunfeld, B. Conner, M. and Lawton, R., *op.cit.*

⁷⁴ Silcock, D., Smith, K., Knox, D. and Beuret, K. (1999). *What Limits Speed? Factors that Affect how Fast we Drive*. AA Foundation for Road Research, Basingstoke.

⁷⁵ O'Brien, G., Rooney, F., Carey, C. and Fuller, R. (2002). Evaluation of the effectiveness of a dramatic presentation on attitudes to road safety. *Behavioural Research in Road Safety XII*, Department for Transport, London. pp. 195-207.

⁷⁵ Thomas, J., Kavanagh, J., Tucker, H., Burchett, H., Tripney, J. and Oakley, A. *op.cit.*

⁷⁶ Towner, E., Dowswell, T., Burkes, M., Dickinson, H., Towner, J. and Hayes, M. (2002). *Bicycle Helmets - A Review of Their Effectiveness: A Critical Review of the Literature*. Road Safety Research Report No.30. Department for Transport, London.

⁷⁶ Thomas, J., Kavanagh, J., Tucker, H., Burchett, H., Tripney, J. and Oakley, A. *op.cit.*

⁷⁷ Towner, E., Dowswell, T., Burkes, M., Dickinson, H., Towner, J. and Hayes, M., *op.cit.*

⁷⁸ *FRANK* (2007). *FRANK Review 2004-2006*, DH/Home Office/DfES, February 2007.

⁷⁹ Darnton, A. (2005). *Understanding Young People's Drug Use*. Andrew Darnton for *FRANK* and COI, July 2005.

⁸⁰ Synovate (2009). *FRANK Ad and Brand Tracking Wave 8 Debrief*, Synovate for *FRANK*/COI, May 2009.

⁸¹ NHS Information Centre (2007). *Smoking, Drinking and Drug Use among Young People in England in 2006 - Headline Figures*. NatCen and NFER for the Information Centre, March 2007.

⁸² DETR (2000). *Are You Doing Your Bit? Development of the UK's Campaign to Stimulate Public Action to Protect the Environment (March 1998-October 2000)*.

reported being 'concerned' about environmental issues, and in particular the 51% who were judged 'persuadable' (already acting but able to do more).

According to the DETR report of 2000, only between 15% and 43% of respondents said that they intended to undertake any one of the behaviours featured in the campaign over the next 12 months. The report concluded that "*declared personal motivation to act appeared less strong and there had only been small changes in consumer attitudes or behaviour*". The DETR 2000 evaluation draws out some key lessons, including that "*Advertising by itself is unlikely to be effective*", and that "*Infrastructure - e.g. public transport, recycling facilities - must be available*".

The FRANK and AYDYB campaigns (and other successful and less successful campaigns) provide some key lessons and success factors that are transferable to transport

- segmentation of the targeted population; addressing different segments with tailored messages to tackle different behaviours;
- meeting the needs of different audience groups through a single campaign (or brand) is difficult. In particular, the prevention messaging runs the risk of producing unintended consequences among different audiences;
- local activity can be best delivered through partnerships with local stakeholders.

The *EcoTeams* approach can be considered as the leading alternative to pro-environmental communications campaigns. It can be characterised as the inverse of the mass media campaign: it is small-scale, face to face, local, group-based and open-ended. In essence, it involves groups of householders coming together to discuss their resource use, and make changes to their behaviour which they monitor together. In total 3,602 UK households participated in EcoTeams from 2000 to 2008⁸³. The EcoTeams method has been subject to critical evaluation in a number of countries and shown to produce significant resource savings, which are sustained over time⁸⁴.

There is a degree of consensus among many evaluations of EcoTeams over the factors contributing to their success. In most instances, the aspects of the programme which have been found most effective can be fitted into De Young's three-part classification of the elements in successful programmes leading to sustained pro-environmental change^{85 86 87}, all three of them transferable to behavioural change interventions in travel behaviour and road safety contexts:

- a key to successful interventions is their focus on practical information and tacit know-how, rather than conceptual information;
- providing personal feedback though a main activity of ongoing measuring and monitoring. The act of measuring resource flows in turn makes invisible consumption visible, and allows participants to expose it to conscious scrutiny;
- supportive social element: making of plans in front of others has a pledge component which is seen as psychologically meaningful.

Regarding the last point, it is generally argued that alongside long-term changes in individual attitudes and lifestyles, enabling public involvement is crucial. In addition to attitudes towards the addressed behaviour, public attitudes towards the process of

⁸³ Nye, M. and Burgess, J. (2008). Making a difference? Evidence and explanations for durable proenvironmental behaviour change from Global Action Plan-UK's EcoTeam programme. *Environment and Planning A* [in press]

⁸⁴ GAP (2008). *EcoTeams Evaluation Report*. Global Action Plan, June 2008.

⁸⁵ DeYoung, R. (1996). Some psychological aspects of reduced consumption behavior. The role of intrinsic motivation and competence motivation. *Environment and Behavior* 28, 358-409.

⁸⁶ Staats, H., Harland, P. and Wilke, H. *op.cit.*

⁸⁷ Hobson, K. (2001). Sustainable lifestyles: Rethinking barriers and behaviour change, Chapter 11 in Cohen, M.J. and Murphy, J. (Eds.) *Exploring Sustainable Consumption: Environmental Policy and the Social Sciences*. Elsevier Science, Amsterdam.

intervention are also important. Involvement in the process itself, as illustrated by the EcoTeams approach, contributes to motivation and behavioural change. A participatory approach to problem solving, providing opportunities for understanding, exploration and participation, can be highly motivational and effective in encouraging behaviour change⁸⁸. It may be just as important from the point of view of the public to feel that the intervention was 'fairly' developed and approved by the public. The importance of public involvement is found in a wide range of evidence sources, mainly in the contexts of public health and sustainable behaviour^{89 90 91}.

4.4 "Smarter choices"

A collection of rather diverse measures including persuasive and information elements, but also backed up by some infrastructure and administrative measures, has been implemented in transport under the name 'Smarter Choices'. These include workplace and school travel plans, personalised travel planning, and general marketing campaigns. They are mostly local initiatives, with a very wide range of intensity of implementation and balance among the measures, and a correspondingly wide range of effectiveness. The largest review of the quantitative and policy evidence on this was carried out for the Department for Transport by Cairns et al (2004)⁹², making use of earlier studies, reviews, and new case studies. Their overview was that reductions in car use have frequently been observed, of the order of 5%-10% overall or 10%-20% for specific types of journeys, with some results up to about three times as big. They suggested that an intensive and prolonged application of these measures over whole cities or the country as a whole, could reduce traffic levels by the order of 11% average or over 20% in congested urban conditions.

These conclusions have been subject to discussion and some disagreement, focussing on three main areas of contention.

First, the projections from observed effects from case studies to national application depend crucially on the level of commitment and resources which are supposed realistic. In general (as one would expect) those projections which assume a lower level of commitment, project a lower impact. A further study of three 'Sustainable Travel Towns' (Peterborough, Worcester & Darlington) is now in its closing stages, intended to be an assessment of what happened as a result of a maximum level of implementation of the whole range of soft measures in the period 2004-2008, though in the event the initiatives were rather less comprehensive, mostly focussing on personalised travel advice, and in one case cycling, with only modest implementation of other initiatives (Hence the results will not fully resolve the question about impacts of 'full-scale' implementation). Initial results seem broadly in line with the 2004 expectations.

Secondly, the 2004 study had some strong caveats about the nature of interactions among different policies, which remain important and not fully resolved. Especially, benefits can be undermined if other policies undertaken simultaneously tend to increase, rather than reduce, traffic; the conclusion is strongly argued that the benefits of behavioural changes need to be 'locked in' by consistent action on prices, the amount of management of capacity, parking etc. Other unresolved questions about smarter choices

⁸⁸ Kaplan, S. (2000). Human nature and environmentally responsible behaviour. *Journal of Social Sciences* 56(3), 491-508; cited in nef (2005), *Extending the 'Rational Man' Model of Human Behaviour*. Briefing note for the Environment Agency.

⁸⁹ GAP. *op.cit.*

⁹⁰ Timletta, R.E. and Williams, I.D. (2008). Public participation and recycling performance in England: A comparison of tools for behaviour change. *Resources, Conservation and Recycling* 52(4), 622-634.

⁹¹ Kalnins, I. McQueen, D.V., Backett, K.C., Curtice, L. and Currie, L.E. (1992). Children, empowerment and health promotion: Some new directions in research and practice. *Health Promotion International* 7(1), 53-59.

⁹² Cairns, S., Sloman, L., Newson, C., Anable, J., Kirkride, A., Goodwin, P. (2004). *Smarter Choices - Changing the Way We Travel*. Report to Department for Transport. Available online at: <http://www.dft.gov.uk/pgr/sustainable/smarterchoices/ctwwt/> [last accessed on 20 November 2009].

include differential effects on different types of journeys, how long the behaviour changes last, and whether the effect of a full range of instruments together has a synergetic effect greater than the sum of each separately. This is discussed further in section 5.

Thirdly, there are issues about the quality of the evidence. In November 2009 the DfT published two reports^{93 94} on this question, which came to a general view that many of the specific studies it had examined were often unclear, not well specified, or failed to take into account many issues of policy interest. The reports did not systematically re-examine the actual content of the evidence, being more concerned with coverage and methodology, and therefore did not come to a different view from the 2004 report about the scale of effect observed or possible. They did make substantial recommendations about how the quality of the evidence could be improved.

⁹³ Independent Social Research (2009). *Impacts of Better Use Interventions: Review of the Evaluation Evidence Base*. DfT, London. Available online at:

<http://www.dft.gov.uk/pgr/evaluation/evaluationguidance/existingnetworks/betteruse.pdf>

⁹⁴ AECOM (2009). *Evaluation of Better Use Interventions: Evaluation Framework Report*. DfT, London Available online at:

<http://www.dft.gov.uk/pgr/evaluation/evaluationguidance/existingnetworks/frameworkreport.pdf>

5. The search for holistic or systems approaches

A recurrent theme in both transport and health discussions has been a feeling of dissatisfaction with the partiality of approaches which rely on only one of the approaches above, whether legal, economic, or information oriented, or focus on specific behaviours with no consideration of wider social questions. It is interesting to note that there has been a convergence to rather similar conclusions by analysts starting from different backgrounds, and correspondingly choosing different labels ('social marketing', 'integration', 'ecological approaches', 'systems dynamics', 'holistics', 'cultural capital') with some differences of emphasis but an almost identical emphasis on the importance of addressing many different levels of influence simultaneously.

Two strands of work are discussed here: the use of holistic approaches to obesity, smoking, transport planning and safety; and the development of behavioural economics which combines both economic and psychological aspects of behaviour.

5.1 Obesity

In 2005 the Department of Health commissioned Foresight, the UK Government's science-based futures think tank, then based in the DTI, to review the scientific and policy implications of population weight gain⁹⁵. The principal finding of Foresight is that obesity, conceived as a 'social' epidemic, cannot be prevented by addressing individual behaviour alone, but demands a societally-based understanding of its determinants and a social approach to its mitigation. A highly complex system map was devised where an individual interacts with social, cultural and economic influences, including food production technology, new food ingredients, new techniques in supply chain management, etc., which have together resulted in increased food portions and calorific content for often lower prices, enabled by falling energy costs, intensive farming practices, transportation over long distances, and social changes replacing traditional diets with meals delivered to the home, more eating out. This is all in the context of changes in work-life patterns (lengthening journeys to work, the cheapening of private motoring, less physically demanding patterns of work, etc) and changes in gender roles (increased working by women). Transport (of foods) and travel (to work, shops and school) thus emerge as significant elements in the pattern of causation of population weight gain, although the influences are not only distal but are diffuse.

This approach leads to initiatives such as a national programme of policy and action called *Healthy Weight: Healthy Lives*. One component part of this effort is the promotion of healthy towns, addressing issues of retail planning, use of open space, encouragement of active travel, promotion of active leisure and community engagement. What is clear is that although this is only initially a two-year programme, system change requires lengthy lead times. Just as the evolution of an 'obesogenic' environment occurred over numerous decades, it is reasoned that its reversal would also require an extended time frame, albeit where progress is measured through a variety of sustainable consumption and physical activity indicators supplemented by direct measurement of body weight.

5.2 Smoking

There is also evidence that a holistic approach to smoking cessation is more effective at promoting behaviour change than any single intervention. The World Health Organisation (WHO) recognised the value of taking a systems approach to behaviour change, particularly in relation to smoking cessation⁹⁶. This is one of the guiding principles behind the WHO Framework Convention on Tobacco Control (FCTC). It was adopted by the World Health Assembly on 2003 and entered into force on 2005. It has since become one of the

⁹⁵ Foresight (2007). *Tackling Obesities: Future Choices*. Government Office of Science, London.

⁹⁶ World Health Organization (2008). *Behaviour Change Strategies and Health: The Role of Health Systems*. Regional Committee for Europe, Fifty-eighth session. World Health Organization. Available online at: http://www.euro.who.int/document/rc58/rc58_edoc10.pdf [Last accessed on 30 September 2009].

most widely embraced treaties in UN history and 167 countries have ratified it⁹⁷. The FCTC encourages countries to adopt a range of evidence-based tobacco control interventions, with the aim of reducing the prevalence of smoking. The ethos is that by introducing a range of interventions, targeting a single behavioural-change goal, an environment is created whereby people are supported to make the healthier choice.

Evidence on the beneficial effect of using a holistic approach towards smoking cessation comes primarily from tobacco control efforts in Australia. Australia's comprehensive tobacco control policies include; high taxes on cigarettes; prominent health warnings on cigarette packs; a total advertising ban; national media campaigns; a focus on smoke-free homes; smoke-free legislation in public places; quitline services for those wishing to give up smoking; litigation by smokers and those affected by passive smoking against tobacco companies⁹⁸. Since enactment of the programmes, lung cancer incidence has fallen by 1.9% per year, while the percentage of people aged 16 and over smoking daily or occasionally fell from 20.1% in 2005 to 17.7% in 2006⁹⁹. California provides another example of the effect that a holistic approach can have on prevalence of smoking. It is estimated that the California Tobacco Control Program (CTCP), taking a similar approach to that seen in Australia, will have saved an additional 50,000 lives over the period from 1988-2010¹⁰⁰. Since the introduction of the CTCP, smoking prevalence in California has fallen from 22.7% in 1988 to 14% in 2005.

5.3 Transport planning

The holistic approaches to health described above are mirrored by several schools of thought in transport, notably the use of the phrase 'Integrated Transport Policy' whose meaning evolved from an initial emphasis on the relationships between agencies in the nationalised transport sector to a more recent emphasis on the relationship between public and private transport. One recurrent theme has been a now ubiquitous (and widely accepted) argument that past policies have caused a 'vicious circle' of increased car use, reduced public transport use, walking and cycling, in which land-use and infrastructure policies to accommodate those new patterns have then reinforced and accelerated them. By extension, the proposition is that the whole process can be reversed in the concept of 'virtuous circles' by a sufficiently consistent alternative policy¹⁰¹. A recent version is by Levett¹⁰² shown in figure 1, together with an application under the label 'cultural capital' cited by the Cabinet Office based on earlier work by DfT and DEFRA¹⁰³. In this context, another paper¹⁰⁴ on behaviour written by Goodwin in a parallel project gives particular attention to the implications for transport policy and project appraisal.

⁹⁷ World Health Organization (2009). *WHO Framework Convention on Tobacco Control*. Available online at: <http://www.who.int/fctc/en/> [last accessed on 30 September 2009].

⁹⁸ Chapman, S. (2003). Reducing tobacco consumption. *NSW Public Health Bulletin* 14(3), 46-48.

⁹⁹ World Health Organization. *op.cit.*

¹⁰⁰ Levy, D.T., Hyland, A., Higbee, C., Remer, L. and Compton, C. (2007). The role of public policies in reducing smoking prevalence in California: Results from the California Tobacco Policy Simulation Model. *Health Policy* 82(2), 167-185.

¹⁰¹ The origin of this concept is uncertain, but an early use of the phrase in this sense was by Stephen Plowden in the 1970s, and he may have invented it.

¹⁰² Levett, R. (2005). *Infrastructure: Prevention is better than Palliation*. Presentation to the TCPA Commission on England's Future. 18 March 2005. Available online at: http://www.hm-treasury.gov.uk/d/roger_levett-englands_future.pdf [last accessed on 6 October 2009].

¹⁰³ Cabinet Office Strategy Unit (2009). *An Analysis of Urban Transport*. Available online at: <http://www.cabinetoffice.gov.uk/media/308292/urbantransportanalysis.pdf>

¹⁰⁴ Goodwin, P. (2009). *Enhancing the Effectiveness of Transport Policy by Better Understanding of Travel Choices*. Centre for Transport & Society, UWE Bristol.

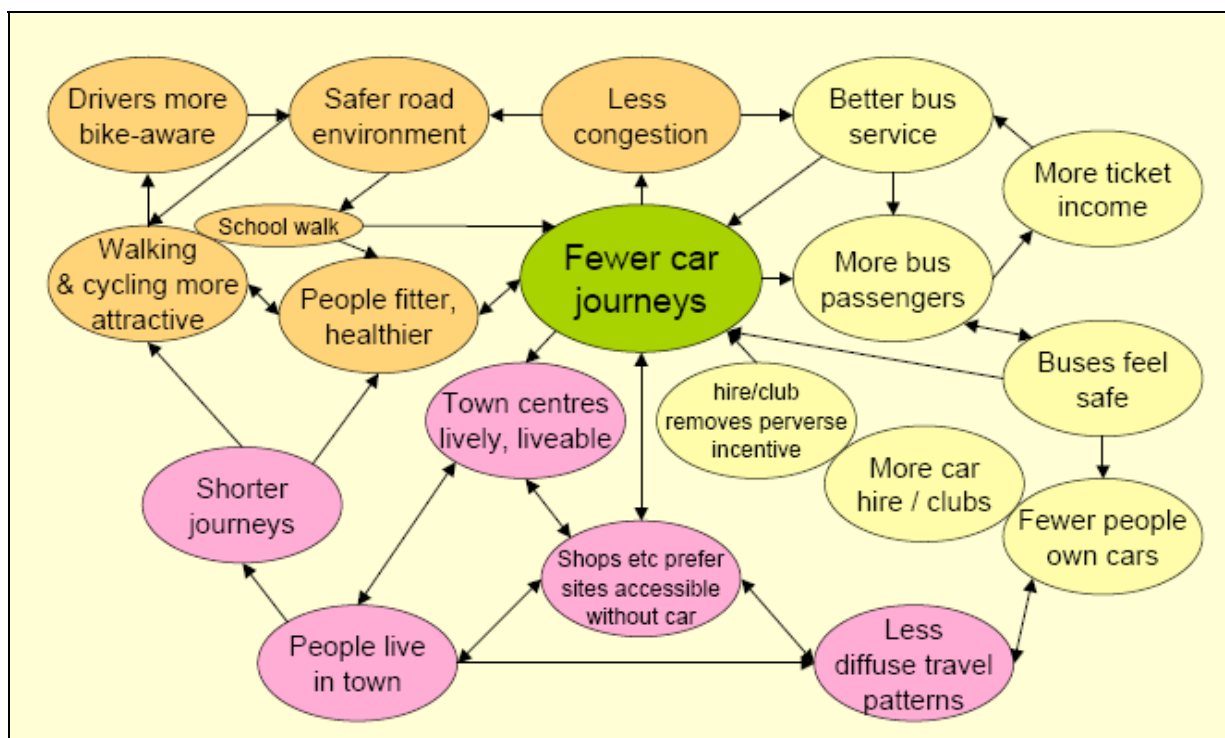


Figure 1 - Levett's Version of the Transport Virtuous Circle (Levett, 2005)

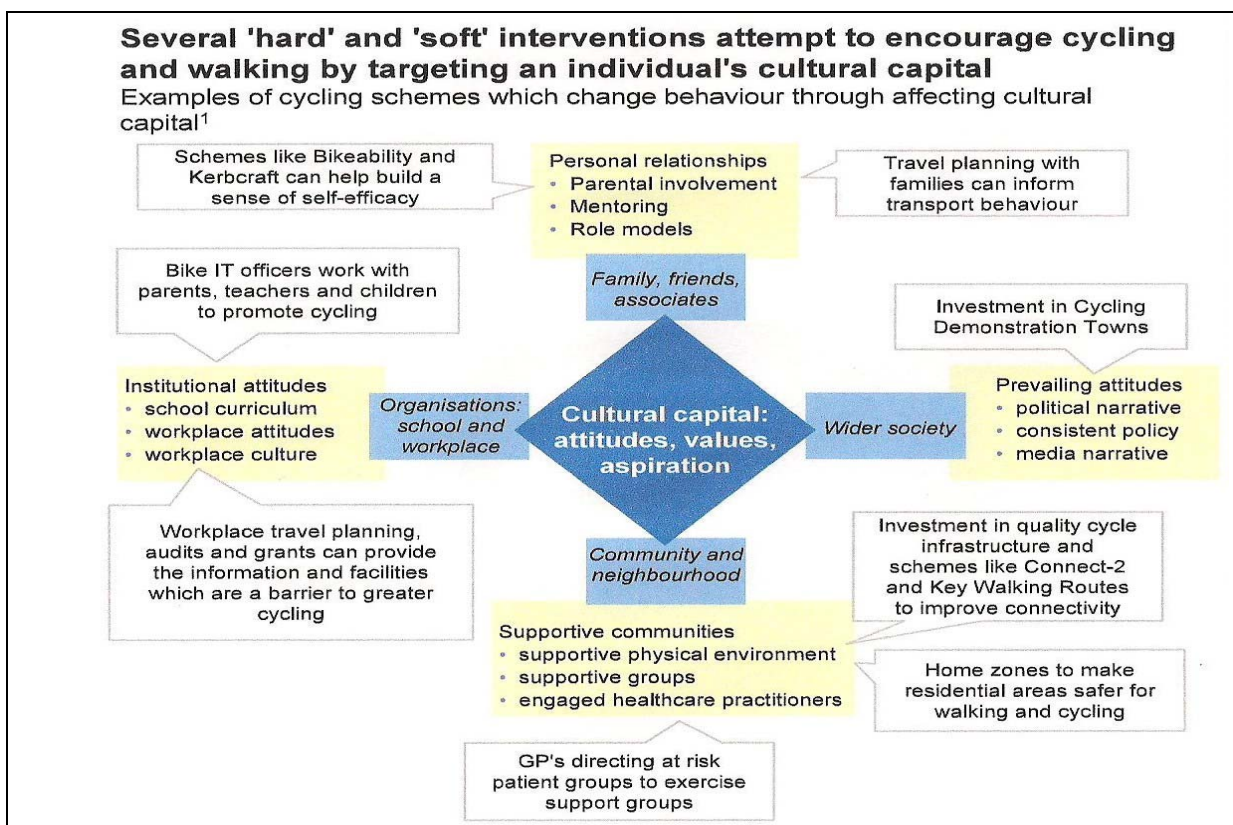


Figure 2 - Cabinet Office version of 'Cultural Capital' approach (Cabinet Office, 2009)

Similarly, Engwicht^{105 106} suggests that the dominance of the motor vehicle and the associated problems are part of a negatively perpetual system. He proposes that streets have been planned and developed in such a way that levels of uncertainty and intrigue have been reduced. This has been done to increase road user safety through enhancing predictability of the road environment, which largely benefits motorists. Hence, the predictable nature of a street means that vehicles are able to drive at a faster speed. This in turn means residents retreat back into their private residences, rather than venture onto the streets and in turn are more likely to use vehicles. In turn this means roads then have to be designed to accommodate such increases. He claims that the system must be addressed through better design of streets through increasing levels of intrigue and uncertainty for users. There is some reflection of this in the *Manual for Streets*¹⁰⁷ which offers new guidance for local authorities wanting to recreate streets taking into account the needs of all users and offers some similar suggestions. There is evidence to suggest that road user safety is not compromised and in some cases improves if the guidance from the *Manual for Streets* is introduced¹⁰⁸. Experience of similar initiatives in a number of European towns has grown for the last 30 years, and is much more widely recognised there than in the UK.

5.4 Road Safety

In road safety a different route to holistic approaches has been sought by an approach sometimes labelled as the '3 Es': engineering, education, enforcement (see figure 3).

Engineering tends to have been used when education and enforcement is not working alone. Hence, there are few, if any, engineering interventions aimed at improving the good level of compliance with the seat-belt law. However, engineering is used where poor compliance is shown, for example in the case of speeding with traffic calming and in-vehicle safety devices. So, there is at present a three-tier approach:

- Level 1: Education - provide knowledge to the public;
- Level 2: Enforce legislation - if public knowledge has not turned into behaviour and where non-compliance is dangerous;
- Level 3: Engineering - where education and enforcement has typically failed on their own.

Due to the importance of education, it is unsurprising to find it at the heart of the approach. However, it can sometimes get less attention when other levels take over. For example, where speed is sought to be controlled by engineering strategies such as traffic calming, there is not much education on traffic calming itself.

The use of three 'E's draws attention to an omission compared with the discussion on holistic approaches: behavioural change in the context of wider social and cultural influences is not addressed by the 3 E's approach. Individual road safety behaviour cannot be addressed alone, but demands a societally-based understanding of its determinants and a social approach to its mitigation. Therefore it is sometimes argued that this approach should have a fourth 'E' added, "environment", as a mnemonic to summarise the broader context of social and cultural influence.

¹⁰⁵ Engwicht, D. (1999). *Street Reclaiming : Creating Liveable Streets and Vibrant Communities*. Pluto Books.

¹⁰⁶ Engwicht, D. (2006). *Mental Speed Bumps: The Smarter Way to Tame the Traffic*. Envirobook Publishing.

¹⁰⁷ DCLG, WA, and DFT (2007). *Manual for Streets*. Available online at: <http://www.dft.gov.uk/pgr/sustainable/manforstreets/> [last accessed on 6 October 2009].

¹⁰⁸ York, I., Bradbiry, A., Reid, S., Ewings, T. and Paradise, R. (2007). *The Manual for Streets: Redefining Residential Street Design*. TRL Report No. 661. TRL, Crowthorne.

<h2 style="color: green;">The 3 E's</h2>	
<p>IMPROVING SAFETY ENGINEERING</p> <ul style="list-style-type: none"> • Safer car design and engineering <ul style="list-style-type: none"> – Anti-locking brakes – Traction control – More reliable engine, tyres and components – Air-bags – Side impact bars • Better infrastructure and engineering <ul style="list-style-type: none"> – Better road surfaces – Better signage – More forgiving – Traffic calming 	<p>EDUCATION</p> <ul style="list-style-type: none"> • Better education • Hazard perception test • Potential for a requirement for longer, more stringent, reflective learning process • Drink-driving campaigns • Clunk-click with Jimmy Saville <p>ENFORCEMENT</p> <ul style="list-style-type: none"> • Rules and regulations and enforcement • Seat-belts • Drink-driving • Speed cameras • Mobile phones

Figure 3 - The 3 E's in road safety - A holistic approach?

5.5 The promise of behavioural economics

The main modelling tools used for transport forecasting and appraisal stem from neoclassical economics in which individuals are assumed to make choices which are rational, consistent, perfectly informed and which maximise their economic utility by trading off between costs and benefits.

Research in behavioural sciences, especially psychology, indicates that individuals' choices in a wide range of contexts in fact deviate from the predictions of the simpler forms of economic theory. Some of these deviations are systematic, consistent, robust and largely predictable, but only by including wider considerations than are normally allowed for. Evidence on systematic deviations from rational models have emerged from studies on financial behaviour, consumer behaviour, health behaviour and more recently - travel behaviour¹⁰⁹.

Behavioural economics is an emerging body of work seeking to understand behaviour by incorporating insights from behavioural sciences into economics. The approach differs from conventional economics mainly by giving more weight to what are sometimes called 'irrational' motives and behaviours.

The robustness of the findings from behavioural economics led to a growing recognition that the model of 'unbounded' rationality is of limited value as a predictor of human behaviour in complex social situations. Moreover, the "*predicted irrationality*"¹¹⁰ of individuals could (and some argue should) play a role in the design of behavioural change interventions. In their recently published book Thaler & Sunstein¹¹¹ advocate the use of '*nudges*' to influence behavioural change. 'Nudges', small features designed in the environment of choice making, could help individuals to overcome cognitive biases, and to highlight the better choices for them - without restricting their freedom of choice.

Evidence and Examples

¹⁰⁹ Avineri, E. and Prashker, J.N. (2003). Sensitivity to uncertainty: The need for a paradigm shift. *Transportation Research Record* 1854, 90-98.

¹¹⁰ Ariely, D. (2008). *Predictably Irrational: The Hidden Forces the Shape our Decisions*. Harper-Collins, New York.

¹¹¹ Thaler, R. and Sunstein, C.R. (2008). *Nudge: Improving Decisions about Health, Wealth and Happiness*. Yale University Press, New Haven, CT.

Applying 'nudges' in a context of government policy is rather new concept; until now much of the evidence base supporting the 'nudge' approach is rather eclectic, including experimental observations and small scale interventions. The approach claims merit partly from the attractiveness of its insights, and partly from its ability to find some ideologically and politically 'easy' policy actions. Following are some examples of nudges applied to different contexts.

The power of Defaults: People are influenced by 'defaults' set to them by authorities. It is often impossible for private and public institutions to avoid picking some option as the default. Well-chosen default rules are examples of helpful "choice architecture." 'Nudges' were successfully applied in the US to increase savings. For example, the "Save More Tomorrow"¹¹² plan, which allows employees to commit themselves now to increasing their savings rates later, when they get raises, has been remarkably successful. Enrolling people automatically into savings plans, while allowing them to opt out, is an example of a successful nudge¹¹³. Organ donation policies that make use of opt-in defaults and presume consent are more successful than others¹¹⁴.

Framing and "Loss Aversion": People tend to feel and behave differently when information is presented (or 'framed') in terms of gains or losses. The emotion of loss is stronger than that of gain¹¹⁵. The framing of choice outcomes as gains or losses could be applied as a 'nudge' to encourage travellers towards a specific choice¹¹⁶.

Salience: Without feedback, a behavioural change is less likely. Where individuals do not associate their behaviour with the relevant costs and this slows down the process of behavioural change. Direct feedback on energy consumption (e.g. meter-reading; interactive feedback via a PC) was found to have an impact ranged from 5% to a 15% reduction in energy use¹¹⁷. Many drivers have already experienced nudges; the high-pitch sound alert when driving over the speed limit or when leaving a lane serves as a nudge to provide the driver feedback.

People are motivated to 'do the right thing': the assumption made in classical economics that individuals act exclusively in their own self-interest, is increasingly challenged by behavioural economics. In many cases people are naturally motivated to 'do the right thing'; they exhibit pro-environmental, pro-social, and even altruistic behaviours. Many "soft" measures have a strong social dimension, and their degree of effectiveness might well be influenced by the extent to which people can interact with one another and feel motivated to make pro-social travel choices.

Financial (dis)incentives might send the wrong message. The use of financial incentives to motivate behavioural change is advocated by economists. However, recent findings from behavioural economics suggest otherwise. For example, introducing a penalty for parents who are late picking up their children from nursery increased the frequency of late arrivals¹¹⁸. Generally, studies showed that when prices are not mentioned people apply social norms to determine their choices and effort¹¹⁹. Financial incentives can crowd out feelings of civic responsibility and may actually discourage the kinds of behaviours needed to solve collective social problems such as climate change¹²⁰.

¹¹² Thaler, R.H. and Benartzi, S. (2000). *Save More Tomorrow: Using Behavioral Economics to Increase Employee Saving*. Mimeo, University of Chicago.

¹¹³ Madrian, B. and Shea, D. (2001). The power of suggestion: Inertia in 401(k) participation and saving behaviour. *Quarterly Journal of Economics* 116, 1149-1525.

¹¹⁴ Thaler, R. and Sunstein, C.R., *op.cit.*, pp. 178-179.

¹¹⁵ Kahneman, D. and Tversky, A. (1979). Prospect Theory: An analysis of decision under risk. *Econometrica* 47(2), 263-291.

¹¹⁶ Avineri, E. (2009). Applying prospect theory in the design of behavioural change initiatives. *Under Review*.

¹¹⁷ Darby, S. (2006). *The Effectiveness of Feedback on Energy Consumption*. A review for DEFRA on the literature on metering, billing and direct displays.

¹¹⁸ Gneezy, U. and Rustichini, A. (2000). A fine is a price. *Journal of Legal Studies* 29(1), 1-18.

¹¹⁹ Heymen, J. and Ariely, D. (2004). Effort for payment: A tale of two markets. *Psychological Science* 15(11), 787-793.

¹²⁰ Frey, B. (1997). A constitution of knaves crowds out civic virtues. *Economic Journal* 107, 1043-1053.

By the same token, making 'good' transport behaviour (in the contexts of travel behaviour and road safety behaviour) a matter for financial reward can discourage it. For example, penalties on illegal parking might be seen as a probabilistic price.

Grass roots: Individuals are influenced by 'significant others', people in their social networks, people who have geographical and social proximity (neighbours, work colleagues, class colleagues) and sometimes even by strangers with whom they share social identity. For example, energy bills that provide information on how energy efficient their neighbours are encouraged them to use less energy¹²¹. Many of the behavioural insights emphasized in behavioural economics confirm the importance of self-regulatory mechanisms rather than traditional top-down command-and-control regulation. The small-scale group-based approach applied in the EcoTeams case study provided supportive social context that is accounted as one of its major success factors. Workplace and school travel plans also operate within a community which is limited in size and may encourage pro-social behaviour using 'bottom-up' approaches.

Can transport policies nudge people to change their behaviour?

Brain scientists and cognitive psychologists have discovered that the brain functions as if it had two systems of decision making. One is very fast and automatic, while the other one is reflective system.

Thaler & Sunstein suggest that through 'choice architecture', and the incorporation of nudges into the choice environment, policy makers can devise interventions that help the automatic system make better decisions, so the reflective system doesn't have to do so much work. Nudges can help individuals to overcome cognitive biases, to highlight the better choices for them, and to increase the effect of behavioural change - without restricting choices. They may also be less controversial and cheaper than larger scale interventions of the sort discussed above.

One of the limitations of the 'nudge' strategy is that being designed to influence individuals' behaviour through intuitive and impulsive processes of the automatic system they do not address the fundamental problem of behavioural change. Nudges work best on unintentional/automatic behaviours within a controlled context, however they do not lead directly to a real change to the individual's knowledge, attitudes or values, and they are not designed to change the decision making process in the reflective system. It is therefore difficult to maintain and achieve long-term and sustainable behavioural change. Moreover, it is not possible to control the overall context in which nudge initiatives are introduced - and behavioural change achieved by designed nudges might be offset by unintended effects.

Applications of the nudge approach to transport have not been tested in a large scale or systematically analysed in transport contexts. Therefore their effectiveness remains an open question. However, we note that some of the instruments used as a matter of course in road design, to influence driving behaviour, have been standard practice for many years, and include the use of gateways, sightlines, coloured or textured road surfaces. These can be interpreted as a form of nudge in traffic calming applications, affecting perceived speed and safety rather than actual conditions. One of Thaler & Sunstein's (2008) examples is a transport one, familiar in the UK though in their case described as an innovation in Chicago, where white stripes are painted on the road, at first evenly spaced and then getting closer together as the driver approaches an intersection. This gives the sensation that driving speed is increasing, signalling them to slow down¹²².

It seems almost self-evident that an approach which recognises non-economic as well as economic motivations for behaviour must be able to give better insights into how

¹²¹ Schultz, P.W., Nolan, J.M., Cialdini, R.B., Goldstein, N.J. and Griskevicius, V. (2007). The constructive, destructive and reconstructive power of social norms. *Psychological Science* 18, 429-434.

¹²² Various versions of this approach had been in use on UK Motorways since early 20th century.

change works; policy interventions can therefore be more successful as well as less intrusive. Nudge approaches are advocated as a cheap and uncontroversial alternative to more challenging public initiatives, however advantages sometimes claimed are almost certainly overstated; we judge it unlikely that there is a large latent body of easy, cheap, hardly noticed initiatives that will have big effects without the need to consider more substantial intervention. The real promise seems rather to help to design the bigger initiatives better, that is to add 'nudges' to improve or speed up the effects rather than as a replacement for other interventions.

6. Conclusions

The methodology we adopted for this short study was to bring together two groups of specialists who had not previously worked together, and had only limited knowledge of each others' areas of work. It was notable that there were a number of quite close parallels in the experience of the health and transport sectors. The editors judge that the following generalisations apply to both.

First, there are some key problems that have been getting worse over quite a long period, with at least some unfavourable trends which have negative effects on the quality of life and efficient use of social resources. These are not adequately solved simply by expanding the provision of services such as roads or hospitals. Therefore there is a firmly based acceptance that to some extent it is necessary to change the direction of the trends and that means considering the behaviours that people adopt. The word 'dependence' is used in both sectors, albeit recognising that alcohol use and car use are not exactly comparable with each other. There is recognition that such trends are the produce of economic, social and cultural influences, not a simple matter of 'choice'.

Secondly, there are at least some examples where the direction of the trend has been reversed: road accidents, and smoking, show unambiguous improvements.

Thirdly, there are many other cases where significant effects have been produced. The scale of the change varies (and is mostly considered 'not enough') but it does seem established that the behaviour of individuals does change, substantially, and is amenable to well designed influence which is clearly defined, goes with the grain of experience, sensitive to time scales, and has genuine and demonstrable advantages.

Fourthly, it is clear that it would be wrong to try to detect any sort of universal ranking such that 'law and enforcement' or 'economic influences' or 'persuasion' will always be the preferred approach. There are sufficient examples where each has worked, or each has been inadequate, to dismiss a form of preference of this sort. This seems also consistent with the observation that human behaviour cannot be easily simplified into one model or theory that will always work: sometimes attitude change precedes behaviour change, and sometimes it follows it; sometimes price incentives work simply and well and economic rationality is a sufficient explanation, but sometimes social and cultural influences are much more important. Indeed, the behavioural assumptions and models in the basis of many interventions provide useful understanding of behavioural change - but their applications are not always transferable outside the specific behaviours and contexts they address. The selection of the appropriate rationale and instrument will also be specific to the time and context: what is thought to be politically unacceptable at one time may become politically required at another. It follows that it would be desirable if there were clear guidance about which instruments would be the most appropriate in different circumstances, but to be realistic the role of ad-hoc experience is probably more important; identifying the similarities and the parallels between targeted behaviours, targeted populations, and the stage in the behavioural change process in which instruments have been implemented. Developing and maintaining an easily accessible knowledge base with a good level of detail would help, as would more systematic training programmes with an emphasis on sharing experience.

Fifthly, there is an almost exact parallel between discussions in the two sectors about the need to combine interventions of many different types, pulling consistently in

the same direction - and also recognising that there may be commercial or other influences whose effect is to offset or reverse the intervention. This suggests that DfT (and other government authorities) has an important role to play in ensuring that the targeted behaviour will be addressed by a set of measures that address the different determinants of behaviour relevant in the context (e.g., awareness, attitudes, economic values) and in ensuring they are all pulling in the same direction. Moreover, identifying the parallels between travel behaviour and road-safety behaviour, and how behavioural change initiatives have been or could be applied in both domains, could motivate the design of successful measures that target the same population, or tackle behaviours that have similarities between them, and help to shape interventions in transport behaviour that are based on a more holistic approach. Recognising the linkage and continuity between different Government behavioural change initiatives in travel behaviour, road safety behaviour as well as non-transport behaviours (health, climate change, crime, etc.) might help in locking in the benefits of some of the successful measures, and in enhancing and expanding some of the behavioural change that already has been achieved in one context to a transport context. Since most interventions are comprised from several measures that work in parallel to change behaviour of the targeted population, it is advised that the monitoring and evaluation of the effects should as far as possible address the success of each measure over time as well as the success of the intervention as a whole, albeit remembering that this is inherently difficult in conditions where synergy exists. It is advised that collection and reporting on evidence of the success and effectiveness of measures should be done continuously and systematically. This might help in identifying the more effective measures and help in the shaping of other interventions. This leads to the suggestion that new forms of recording and monitoring progress should be developed, possibly as a key role of Government in an overall coordination role. For example, 'action plans' should detail all the interventions in progress that might influence a particular behaviour (including those that, adopted for other reasons, might push it in an unintended direction) so that there would be early warning of signs of successes that can be reinforced or failures that need to be corrected.

Sixthly, there is now a larger body of case experience than seems well known or understood to any particular individual or agency, and hence dissemination of knowledge about effects is itself an important task.

It is right to acknowledge that there are some unresolved issues. One of these is that even when legislation, enforcement, economic interventions, persuasion and nudges do result in a change in behaviour, they might not necessarily be long-lasting unless there are also real 'internal' changes to the individual's knowledge, values or attitudes. That is one reason why experience of using measures such as education, advertising campaigns and provision of information which may change attitudes and social norms are also important.

Finally we note the importance of heterogeneity: people are different from each other, and they are all complex though the complexities themselves are different. Interventions must look quite closely at the specifics of different people, for whom messages and services will need to be different.

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