



Behavioural economics and its implications for transport

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ABSTRACT

Increasing attention is being paid to behavioural economics in the social sciences and in public policy. We attempt to gather up the effects based on previous reviews of the literature and show the implications for transport and energy consumption. We show that there are several behavioural aspects of incentives on individual behaviour. We also show that there are a number of contextual factors on individual behaviour, such as messengers, norms, defaults, salience, priming, affect, commitment, and ego. We show the implications of this research for experimentation, and the measurement of wellbeing. In particular, we argue that transport research should use field experiments to carefully demonstrate causality in the evaluation of interventions.

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1. Introduction

Behavioural economics has become increasingly popular over the last decade. Many popular books, such as *Nudge* (Thaler and Sunstein, 2008), *Predictably Irrational* (Ariely, 2008), *Influence* (Cialdini, 2007), *Yes!* (Goldstein et al., 2007), *Priceless* (Poundstone, 2010), and *Thinking, Fast and Slow* (Kahneman, 2011) have become international best sellers. Moreover, in the public policy arena, behavioural economics is starting to become a foundation for policy-making in the UK (Dolan et al., 2010). In the US, Cass Sunstein (co-author of *Nudge*) is currently Administrator of the White House Office of Information and Regulatory Affairs in the Obama administration. Behavioural economics is also playing a major part in development policy (Karlan and Appel, 2011), financial policy (Thaler, 1993; Elliott et al., 2010), and in microeconomics more generally (see DellaVigna, 2009).

The literature in behavioural economics is expanding rapidly. We seek to gather up these studies in ways that resonate with those interested in transport behaviours, and attempt to document some of the work that is directly relevant to transport and climate change mitigation. We gather these up into a framework called MINDSPACE, which is a mnemonic for the contextual factors that impact on behaviour (i.e. messenger, incentives, norms, defaults, salience, priming, affect, commitment, and ego). We are interested in understanding the influences on behaviour rather than behaviour per se, so we focus on evidence from field experiments (mainly natural ones), where the causal effects on behaviour can be robustly assessed and has both very good internal and external validity. We also discuss some of the welfare implications from this

research, especially with respect to how we assess whether a person's life is going better or worse as a result of a change in behaviour (using subjective wellbeing).

The importance of changing individual transport behaviour cannot be underestimated from the point of view from climate change. The problem, however, is that there is a market failure in transport that warrants policymakers attempting to change behaviour. The market failure results from two main reasons. First, the price of energy is not as high as it should be since the externalities from carbon are not currently accounted for in the price of fuel. If the cost of the externality were addressed by a carbon tax or a cap-and-trade system, individuals would be incentivised to consume less energy.

Second, there are transaction costs and information barriers that prohibit people from behaving in a more rational way. An example is provided by Larrick and Soll (2008), named the 'MPG illusion'. They found that people systematically misunderstood miles per gallon (MPG) as a measure of fuel efficiency. People rely on linear reasoning about MPG, which leads them to undervalue small improvements on inefficient vehicles. Changing the standard to gallons per mile would allow consumers to understand exactly how much petrol they are using on a given car trip or in a given year and, with additional information, how much carbon they are releasing. This example demonstrates that information on its own is sometimes not enough. Understanding the link between behavioural economics and transport has not been fully developed, although there have been some attempts to link some behavioural work with climate change (e.g. Brekke and Johansson-Stenman, 2008). We acknowledge that we are purely interested in focusing on individual behaviour in this paper, while many of the papers in this special edition focus on higher levels of aggregate behaviour (for instance see Geels, forthcoming).

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The field of behavioural economics and science is becoming very large so in this paper we will attempt to summarise the main avenues from the literature, and relate to how they might impact on behaviours and policies relating to climate change. We will stress how this research area relies on robust and clear empirical methodology to actually understand what causes a change in human behaviour. So this will focus on understanding how field experiments can help advance the research in this regard. We will then move onto how to capture the welfare consequences from a change in behaviour, since traditional welfare analysis in economics being based mainly around people's preferences as a measure of their wellbeing. Given that behavioural economics has shown that people do not always have consistent preferences, we will state how people's experiences can be used to complement this measure of wellbeing. Using people's experiences, known as subjective wellbeing (SWB), allows us to measure how life is going for someone as they experience it. These three areas (impact of contextual factors on behaviour, field experiments, and subjective wellbeing) link up for form the current literature in behavioural economics and should and can be applied directly to transport studies and issues around climate change and other human issues.

So in the next section we analyse the main avenues of changing behaviour from studies that have empirically attempted to demonstrate behaviour change (using MINDSPACE). In Section 3 we demonstrate how greater research is needed using experimentation to demonstrate causality in transport research. Section 4 highlights the further need of incorporating measures of subjective wellbeing with data on transport behaviours. We will focus on SWB since it is a method that can assess people's wellbeing without relying on people having consistent preferences. We will at all times relate to transport and climate change mitigation, but it is important to acknowledge at the outset that most areas of behavioural economics have not directly considered transport or climate change mitigation or adaptation.

2. The background to behavioural economics

2.1. Some issues with incentives

The foundations of behavioural economics can be attributed to Simon (1955) and Kahneman and Tversky (1979). Their framework was based on observations that people did not always have consistent choices. A summary of their work can be found in many of the standard textbooks in behavioural economics, such as Kahneman and Tversky (2002), Camerer et al. (2003) and DellaVigna (2009). The main effects of incentives on behaviour can be summarised by seven different effects. We find that people:

1. Really dislike losses.
2. Focus on changes.
3. Overweigh small chances.
4. Think in discrete bundles.
5. Value right now very highly and inconsistently.
6. Care about other people.
7. Can be negatively impacted by incentives.

2.1.1. Disliking losses

Losses loom larger than gains – losing £10 causes more pain than finding £10 causes pleasure (Kahneman and Tversky, 1979). In a study of incentives in health, participants were asked to deposit money into an account, which was returned to them (with a supplement) if they met weight loss targets (Volpp et al., 2008). This proved to be an effective intervention and shows how powerful the framing of losses might actually be for transport. Such positive impacts are also found on productivity using bonus frames

(Hossain and List, 2009). Waygood and Avineri (2011) show that such loss aversion is important to perceptions about transport and safety, although changing perceptions does not necessarily mean changing behaviour. So it could be that people are more sensitive to losing 10 min on a travel journey than gaining 10 min on a travel journey, and the same applies to paying for travel.

2.1.2. Focus on changes

Reference points matter in people's preferences. For example, Camerer et al. (1997) found that New York taxi drivers make labour supply decisions "one day at a time", setting daily income targets and quitting working once they reach that target. It would be more efficient for them to work more on good days and quit early on bad ones. Avineri (2006) argues that reference points could be very important in modelling and predicting behaviour in transport networks (also see Avineri and Choris, 2010; Li and Hensher, 2011). Although determining the selection of the reference point is currently not very clear in many studies, and can be endogenous within and across individuals. So the reference points that people choose are not always salient to the researcher or are not elicited, so we have very little information on the actual reference points chosen. Reference points can also change over time for the same individual.

2.1.3. Overweigh small chances

There is now ample evidence that people overweight low probabilities (Tversky and Kahneman, 1992; Gonzalez and Wu, 1999), and this explains the widespread desire to gamble on low-probability events (e.g. lottery tickets) and to insure against low-probability catastrophes. Johnson et al. (1993) showed that consumers' decisions about insurance are impacted by distortions in their perceptions of risk and by alternative framing of premiums and benefits. In particular, they made health insurance more attractive by making the cause of hospitalisation more specific and available. When subjects were first asked how much they would pay for insurance against any disease and then any accident (thus isolating vivid causes), the price reported was more than twice that reported (how much they would pay for insurance) for protection for any reason. Given that different transport modes involve different risks of morbidity and mortality, and that people do not consistently understand these risks (Dolan et al., 2008a), further work is needed to understand such overweighing of small probabilities.

2.1.4. Think in discrete bundles

We think of money as sitting in different "mental accounts" – salary, savings, expenses, etc. – and we are reluctant to move money between such accounts (Thaler, 1999). This means that policies may encourage people to save or spend money by explicitly 'labelling' accounts for them, but still leaving freedom to choose how the money is used. Mental accounting means that identical incentives vary in their impact according to the context: people are willing to take a trip to save £5 off a £15 radio, but not to save £5 off a refrigerator costing £210 (Thaler, 1985).

Barr (2004) describes the Puerto Rican Banco Popular's Acceso Popular account, which has a \$1 monthly fee, no minimum balance, free ATM transactions, and free electronic and telephone bill payment. To encourage savings, Acceso Popular has a savings account into which small sums (initially, \$5 per month) are automatically transferred from the Acceso Popular transaction account. The savings account pays modest interest. Funds may only be withdrawn by going to the bank and account holders must pay a fee to see a bank teller more than once a month to discourage withdrawals. Banco Popular opened nearly 60,000 such accounts in 2001, with half of those activating the savings 'mental' account in their accounts. Mental accounting could be important for

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