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Behavioural economics, travel behaviour and environmental-transport policy

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ABSTRACT

The transport sector creates much environmental pressure. Many current policies aimed at reducing this pressure are not fully effective because the behavioural aspects of travellers are insufficiently recognised. Insights from behavioural economics can contribute to a better understanding of travel behaviour and choices, and the impact of these on policies. Nevertheless, few studies have examined this issue. We review these and provide a broader, more encompassing perspective on environmental policy focused on transport, and taking into account bounded rationality as well as social preferences.

Introduction

Key challenges in attaining sustainable urban travel behaviour include physical-infrastructural, technological and behavioural issues. There is an ever growing number of studies noting that a transition to sustainable mobility is unlikely if technological improvements and changes in the built environment are not combined with behavioural change (Avineri, 2012; Metcalfe and Dolan, in press; Steg and Vlek, 2009). Many studies have tackled these issues focusing on particular policy strategies (e.g., physical planning and infrastructure supply, pollution standards, pricing mechanisms and information provision), but have in most cases assumed representative, rational agents. However, behaviour of travellers is heterogeneous while their preferences are inconsistent (Anable, 2005; Barr et al., 2011). Moreover, socioeconomic factors are insufficient to explain observed differences in behaviour.

Transport reality is often best described by behavioural approaches. They have already received some attention in recent studies on travel behaviour. Two themes of behavioural economics are encountered in travel studies. One is bounded rationality, addressed mainly by applying Prospect Theory to travel time uncertainty and interpretations of expected travel time, which is relevant to valuation exercises in project appraisal, notably understanding WTP/WTA differences in estimating the value of time savings (Avineri and Bovy, 2008; Batley, 2007; van de Kaa, 2005, 2006; Schwanen and Ettema, 2009). Several empirical studies aim to improve demand management by using real-time information about travellers in transport networks (Avineri and Prashker, 2003; van de Kaa, 2008; Nakayama and Kitamura, 2000). This is of importance to re-distribute traffic and reduce congestion, which affects local air quality. Most of these studies adopt an experimental

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approach within controlled settings so that the effects of targeted factors can be analysed in isolation. Insights are then used to improve demand modelling.

A special issue within this theme of bounded rationality of travellers is that of habitual behaviour (Bamberg et al., 2003; Bamberg and Schmidt, 2003; Gardner, 2009; Klöckner and Matthies, 2004; Thøgersen, 2006; Verplanken et al., 1998). Habits reflect time-inconsistent preferences that lead to seeking immediate rewards. Most daily travel choices are largely habitual and automatic, involving low information processing (Verplanken et al., 1997). Habitual travel behaviour violates rational choice principles through the absence of a process of cognitive deliberation – involving preference formation, deliberate information processing and preference-based choice (Gärling et al., 2001).

The second theme is social preferences, which include altruism, fairness, norms, reputation and status seeking concerns. Social preferences have received most attention in studies explaining modal choice (Abrahamse et al., 2009; Anable and Gatersleben, 2005; Johansson-Stenman and Martinsson, 2006; Sohn and Yun, 2009). There is a long history of applying social psychology to travel studies dealing with the feelings of moral obligation, perceived social pressure and control beliefs.

In parallel, behavioural economics has recently seen much application to environmental economics. This has given rise to studies of sustainable consumption, voluntary cooperation in public goods like the conservation of natural resources or recycling, environmental valuation, and the implications of these for environmental and climate policy (for surveys, see Brown and Hagen, 2010; Gsottbauer and van den Bergh, 2011; Jackson, 2005; Shogren and Taylor, 2008; and Venkatachalam, 2008). These studies support the idea that explicitly accounting for behavioural biases due to both bounded rationality and social preferences, increases the understanding of complex environmentally-relevant behaviour, and so provides an improved basis for environmental policy design.

The present study reviews empirical evidence on behavioural biases in travel choices (long- and short-term choices) and their implications for environmental-transport policy. Van de Kaa (2008) and Li and Hensher (2011) offer a review of applications of Prospect Theory to transport policy, while Avineri (2012) and Metcalfe and Dolan (in press) offer broader surveys of the implications of bounded rationality and social preferences for travel behaviour and policy. However, none of these studies deals in detail with environmental policy issues related to transport, which is the focus of our review.

The remainder of this article is structured as follows. Section 'Behavioural economics and transport' offers a literature review of insights from behavioural economics that are applicable to travel behaviour. Section 'Lessons for environmental-transport policy' discusses policy implications and provides guidelines for environmental-transport policy design. Section 'Conclusions' concludes the study.

Behavioural economics and transport

Behavioural economics

Behavioural economics merges the fields of economics and psychology to provide a better understanding of choice behaviour (Camerer, 1999; McFadden, 1999; Rabin, 1998). Realistic behaviour of individuals is often not well captured in traditional models of economic policy.

When choices are complex and involve probabilistic outcomes, individuals tend to use heuristics, establish false associations, or incur logical leaps due to mental shortcuts and calculation mistakes. These deviations from rational agent behaviour are due to imperfect information and individuals' limited computational abilities. On the other hand, the way in which alternatives are presented (i.e. *framed*) influences choices, as individuals tend to exhibit choice persistence or inertia, so as to avoid possible losses, and make conservative choices when outcomes are framed as gains and risky choices when outcomes are framed as losses. These biases are a consequence of the asymmetric valuation of gains and losses, loss aversion, and probabilities being weighted non-linearly. Hyperbolic discounting (i.e. overvaluation of the present over the future), myopic behaviour, self-control problems and habit formation are due to immediate rewards being more heavily weighted than future gains, thus denoting time-inconsistent preferences. Finally, individuals show limited self-interest (e.g., altruism and fairness) and inter-dependency of choices due to social and self-identity concerns.

These biases create inconsistencies in behaviour that are generally classified under two broad categories, namely bounded rationality, and social or other-regarding preferences (Gsottbauer and van den Bergh, 2011). Table 1 offers a summary of some of the various behavioural anomalies and systematic biases relevant to the transportation context.

Systematic behavioural biases have implications for policy design. Indeed, several authors have translated insights of behavioural economics into general policy rules. Notable examples of this are NUDGE (Thaler and Sunstein, 2008) – a mnemonic for i**N**centives, **U**nderstand people's heuristics, use **D**efaults, **G**ive feedback information, and **E**xpect errors of judgement –, the seven principles from the NEF report (Dawnay and Shah, 2005) – use of normative incentives, commitments, defaults, framing and heuristics, while taking into account habits and routines –, and MINDSPACE (Metcalfe and Dolan, in press) – a **M**nemonic for **I**ncentives, **N**orms, **D**efaults, **S**alience, **P**riming, **A**ffect, **C**ommitment, and appeal to **E**go –, the latter being focused on travel behaviour and transport policy. A difference between this study and Metcalfe and Dolan (in press) is that we provide a more complete review of the set of travel choices (short- and long-term choices) and associated insights from behavioural economics, which result in lessons for environmental-transport policy.