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Insights on disruptions as opportunities for transport policy change

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Abstract

Policy change is characterised as being slow and incremental over long time periods. In discussing a radical shift to a low carbon economy, many researchers identify a need for a more significant and rapid change to transport policy and travel patterns. However, it is not clear what is meant by rapid policy change and what conditions might be needed to support its delivery.

Our contention in this paper is that notions of habit and stability dominate thinking about transport trends and the policy responses to them. We limit variability in our data collection and seek to design policies and transport systems that broadly support the continuation of existing practices. This framing of the policy context limits the scale of change deemed plausible and the scope of activities and actions that could be used to effect it.

This paper identifies evidence from two sources to support the contention that more radical policy change is possible. First, there is a substantial and on-going churn in household travel behaviour which, harnessed properly over the medium term, could provide the raw material for steering behaviour change. Secondly, there is a growing evidence base analysing significant events at local, regional and national level which highlight how travellers can adapt to major change to network conditions, service availability and social norms. Taken together, we contend that the population is far more adaptable to major change than the policy process currently assumes.

Disruptions and the responses to them provide a window on the range of adaptations that are possible (and, given that we can actually observe people

carrying them out, could be more widely acceptable) given the current configuration of the transport system. In other words, if we conceptualise the system as one in which disruptions are commonplace, then different policy choices become tractable. Policy change itself can also be seen as a positive disruption, which could open up a raft of new opportunities to align policy implementation with the capacity for change. However, when set against the current framing of stability and habit, disruption can also be a major political embarrassment. We conclude that rather than being inherently problematic, the disruption is in fact an opportunity through which to construct a different approach to transport policy that might enable rather than frustrate significant, low carbon change.

Keywords

Transport, policy, change, disruption

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‘Disruption’: an opportunity for transport policy change?

1. Introduction

Policy change is generally characterized as being slow and incremental over long time periods (Hall, 1993; Howlett and Cashmore, 2009). This is often said to be especially true for transport, given a variety of factors from the scale and stability of major transport flows, the fixed nature of transport infrastructure in space and the long planning horizons of major investments, to the often entrenched public- and political attitudes to the very notion of behaviour change and the extent to which it is legitimate for the state to intervene in individual decision making (Dudley and Richardson, 2000; Banister *et al*, 2007; Ison *et al*, 2011; Docherty & Shaw, 2011).

What is meant by the term ‘policy’ itself needs clear definition at the outset if discussions on key outcomes such as the rate of change and overcoming barriers to change are to be successfully identified and addressed, yet such definitions remain loose in the field of transport research. Howlett and Cashmore (2009) build on Hall’s 1993 paper on conceptualising policy change to identify three component parts that define the ‘ends’ or ‘aims’ of policy:

1. Overarching policy goals (e.g. economic growth, environmental protection)
2. Formal policy objectives (e.g. cutting congestion or reducing energy use)
3. Specific settings (e.g. 10% reduction in delay in city X or on mode Y)

These elements are complemented by a further three system components that represent the means or the tools to achieve these policy aims:

1. Instrument logic and implementation norms (e.g. welfare maximising)
2. Mechanisms and Instruments (e.g. congestion charging, vehicle taxation)
3. Calibrations of instruments (e.g. time of day structures for charging)

Furthermore, ‘radical’ policy change of the scale and scope that delivers substantive and genuine realignment of policy with respect to critical issues such as, for example, travel behaviour, network operations and/or the financial support for mobility systems, can be conceptualised as encompassing change across all of the above dimensions. Given the complexity of these interdependencies, it is unsurprising that respositioning transport policy towards challenging objectives that cut across these domains – such as decarbonisation – is regarded as something of a ‘wicked problem’ (Rittel and Webber, 1973).

Marsden *et al* (2012) apply this framework to explore the extent to which the deepening understanding of climate change and the implications of overarching targets of up to 80% reductions in CO_2 emissions by 2050 has affected policy change in the transport sector. They conclude that whilst the overarching policy goals have been amended and carbon reduction added as a clear macro-objective, there has been little progress in any of the other dimensions. This contrasts with the research base, which clearly identifies the need for transport policy to set out and follow unambiguous pathways to deliver real change in our transport and mobility systems if the required radical shift to a low carbon economy is to be achieved (Hickman et al., 2012; Anable and Shaw, 2007; Hickman and Banister, 2007; Tight et al., 2007 and Chapman, 2007). Although the measures that will need to be taken – shifting the share of mobility provision to more energy efficient transport modes, improving the efficiency of vehicles and changing socio-economic behaviours so that there is a real reduction in the need to travel in the first place – are well theorised (see, for example, Dalkmann *et al*, 2010), the actual policy steps that will be required to implement these changes are not defined at all well.

The difficulty in agreeing clear policy pathways outside of a modelling exercise is because, as Eddington commented, the engineering of real change in transport requires an enormously “sophisticated policy mix” (Eddington, 2006) in terms of changed regulation, pricing, land use zoning, new business practices and so on.

There are many hands involved in the policy implementation process and many agendas at work. Worse, in the context of carbon reduction policy, the nature and pace of technological change is also highly uncertain, with, for example, the widespread adoption of 'ecocars' (Banister, 2000) still some way off despite their longstanding promise (see also Geels *et al*, 2011). The flip side to this is that the degree of behavioural adaptation required is also uncertain and, therefore, unconvincing as a likely solution to problem in itself. This conclusion also conveniently matches current policy logics, which suggest that behaviour change should largely be tackled by addressing information gaps and psychological cues at the margins through incentives and targeted marketing (see Shove, 2010 for a critique).

Our contention in this paper is that the lack of progress towards actually implementing meaningful policy change is, in part, because notions of habit and stability dominate thinking about transport trends and the policy responses to them. We explain away or limit variability in the data we collect, and seek to design policies and transport systems that broadly support the continuation of existing practices. This framing of the policy context limits the scale of change deemed plausible (the policy setting) and the scope of activities (logics and instrumental norms) and actions that could be used to effect it (the instruments and calibrations). There is a long-standing and growing body of evidence on the churn of household travel patterns, which offers at least the potential to build a more dynamic view of the potential for behaviour change around.

Notwithstanding the slow pace of formal policy development, examples of substantive and significant change in collective transport behaviours can already be found if we look for them. Planned policy interventions such as congestion charging (Leape, 2006 and Eliasson et al., 2009) and the London Olympics (TfL, 2012) produce substantial behaviour change. Other unplanned events such as infrastructure closures, strikes and significant weather events also have a significant temporary and sometimes longer-lasting impact on travel behaviour

(van Exel and Rietveld, 2001; Zhu and Levinson, 2010; Guiver and Jain, 2011). Not all of these changes are sustained or indeed consistent with a low carbon future, but they do provide evidence of real adaptability to major changes in the transport and wider socio-technical systems around which daily life revolves. This paper therefore argues that individuals, firms and the wider economy have adjusted to many of these incidents without the kind of negative externalities and even crisis conditions feared by a transport policy paradigm centred on slow incremental change within a resilient neo-liberal paradigm of socio-economic organisation (Schwanen *et* al, 2011; Zachmann *et al*, 2012). Harnessing such alternative understandings could unlock a reframing of the problem of reducing travel demand and allow new policy solutions to emerge.

The paper begins by placing a discussion of policy change in the transport sector in a broader context. It then explores the types of data used in transport and some key concepts and evidence surrounding stability, habit and churn in household behaviour. Three examples of evidence from larger scale 'disruptive events' are examined in order to consider the behavioural adaptation resulting from significant changes within and external to the transport sector. Our discussion poses two critical questions: first, whether we could usefully consider the notions of disruption and adaptability as more appropriate concepts for planning for transport than those of habit and stability; and second, whether the idea of disruption and disruptive events can be embedded in policy to such an extent that they can be used as proactive policy tools to achieve a significant shift in travel behaviour towards lower carbon modes and practices. Such an approach would be undoubtedly radical, changing the goals of transport policy very significantly, but could potentially open new 'windows of opportunity' for successive waves of policy change such that challenging objectives, including the decarbonisation of our transport and mobility systems, might be achieved in practice.

2. Why is transport (policy) change 'difficult'?

Transport sits at the interface of a number of important public policy issues. It contributes to economic growth and provides opportunities to enhance social welfare and wellbeing (Docherty and Mackie, 2010; Headicar, 2009). Despite the significant social progress that has accompanied growing car use, its negative impacts are increasingly the focus of policy making (Black, 2005). Congestion in our major cities, on key national infrastructure and at international connections is seen to hamper prospects for economic growth (Eddington, 2006). Declining public transport services in many urban and rural areas contributes to the problems of social exclusion (Lucas, 2004), and poor quality urban realm can lead to unsafe environments and neighbourhood decline, which undermine attempts to regenerate sustainable local economies based on more active forms of travel (Logan and Molotch, 2007; Hass-Klau, 1993). These benefits and costs are increasingly well understood and underpin the debates on contemporary transport policy. Many of them are also highly visible to the public in terms of the impacts on their everyday lives, but in spite of this, they have not galvanised a radical shift in transport policy (Docherty and Shaw, 2011).

A variety of explanations for this lack of policy action have been put forward, reflecting a range of both administrative and political factors that together combine to form the set of 'governance realisms' that Docherty and Shaw (2011) identify as the principal constraints on action. On the administrative side, there is a large body of theoretical and empirical work identifying ingrained institutional bias towards incremental, marginal change – which directly stymies innovation in terms of the development and implementation of radical policy instruments – and which remains commonplace across many domains of public policy making (see, for example, Bang, 2010; Nohrstedt and Weible, 2010; Weaver, 2010). There are important professional and cultural factors at play here, primarily the long-established professional 'habitus' (Bourdieu, 1990) of many public officials, which is based on a well-developed institutional worldview celebrating intellectual scepticism and risk-aversion, and which treats calls from technically-informed

actors for quick and profound changes in policy direction with the utmost suspicion if not outright contempt (see, for example, Chapman and O'Toole, 2010; Vandenabeele and Horton, 2008 and Maddock, 2002 on the British Civil Service; Levy (2006) on managerial cultures in the European Commission; Gervais, 2006, Offner (2008) and Hondeghem and Vandenabeele (2005) on the interplay of management cultures and policy development processes in France and the Low Countries).

Added to this tension between specialist and generalist actors – which, it should be remembered, is often deliberately engineered into governance systems as a 'check and balance' on the potential for radical action – are the political realities of the difficulty in convincing sceptical electorates that their actions are part of the problem, let alone deserving of the efforts of government to change them. Some commentators argue that the most significant problem is the sheer length of planning cycle for the significant transport investments – the 'carrots' of new public transport infrastructure, improved walking and cycling opportunities and so on – that are required to entice individuals to make their transport habits and practices towards more sustainable (Banister *et al*, 2007; Banister, 2004, 2003; Cullingworth, 1997). But although this may be true, perhaps more important is the fact that there is very little appetite to apply anything that might be considered as a 'stick', both because of the perceived political risks of such actions, but also because even the most radical politicians are faced with a bureaucracy that urges (extreme) caution whenever substantial moves away from established arrangements are proposed (Horton, 2006; Pierre, 2000; Rhodes, 1996).

Only in a very few cases – Ken Livingstone's introduction of Congestion Charging whilst London Mayor perhaps being the best known (Leape, 2006), although others such as New York Traffic Commissioner Janette Sadik-Khan's remodelling of key Manhattan streets are also gaining attention – does sufficiently driven and charismatic leadership exist in a sympathetic, flexible and dynamic enough institutional context for real policy innovation to survive from

formulation to implementation (Mackinnon *et al*, 2008). Much more commonplace is the kind of policy retreat exemplified by the reaction to the UK fuel tax protests of 2000: such is the nervousness associated with even modest public dissent to challenging policy interventions that faced with protest, the whole of government convulses to the extent that policy narratives are suddenly frozen: as the former UK Commission for Integrated Transport Chairman David Begg put it, "the fuel duty protest… is still burnt on the memory of people like Gordon Brown… you cannot have a dispassionate conversation with the (former) Prime Minister on road pricing, congestion charging, the fuel duty escalator, without memories of that 2000 protest" (BBC, 2010, unpaginated).

This is not to say that policy change *never* happens, but rather that the systemic conceptualisation of change is predicated on the achievement of regular second order changes to the types of policy instruments used and to how they are calibrated. More radical first order change, which alters the framing of the problem according to new and emerging knowledge of its wider context, and potentially the institutional environment in which alternative policies might be delivered, is much rarer. In their review of the UK's experience, Dudley and Richardson (2000) identified only four such moments of change in the transport sector over a period of four decades. These were: the infamous Beeching rail review of the 1960s (itself the culmination of a process of rationalisation that had been underway since the turn of the 20th century); the rise in power and subsequent loss of hegemony of the road building lobby in the 1990s in response to rising construction costs, growing environmental protests and the emergence of significant research evidence on the phenomenon of 'induced traffic'; and rail privatisation. Drawing on Kingdon's (1985) work, they suggest that only a coming together of critical problems, credible policy streams and committed personalities produces the catalytic environment necessary for genuine change to happen. Despite the many calls for radical action to tackle the climate change issues, Marsden et al. (2012) identified that even climate change is being absorbed into the contested field of transport policy as a process of second order change.

3. Habits, Churn and the Data We Collect

The institutional hurdles to be overcome if radical policy shifts are to be realised are quite formidable. But even if the administrative systems and the political discourse were to shift sufficiently that the conditions for radical policy change did present themselves, the conventional assumption is that individuals and the socio-technical systems of which they are part lack the adaptive capability to respond as quickly and deeply as policy imperatives demand (Wood et al., 2005). This is reflected in policy documents such as the UK Local Transport White Paper:

> "Behaviour is usually determined by a number of inter-connecting factors, including structural, attitudinal and habitual factors"... "For many people car use becomes a matter of habit, the "default" mode" (DfT, 2011, p34, p89).

This perspective arises because the dominant paradigm in the analysis of travel behaviours, and even the framing of the 'transport problem' in general, is to adopt the starting point that individual actions are habitual, and thus robust and generally resilient to change.

Schwanen et al. (2012) review the latest evidence on habit from across a range of theoretical perspectives from economics to philosophy. The dominant framing of behaviour change in transport comes from social psychology. Behaviour, it is suggested, becomes automated when deliberation-based decision making proves satisfactory and the search for alternatives less necessary (Ibid., Verplanken 2006 and Gärling et al., 2001). Whilst this provides an explanation of how choices are necessarily simplified to reduce decision-making complexity it also offers a route in to changing habits as external stimuli could, for example, lead to a need to consciously re-evaluate behaviour. Evidence of the extent to which contemporary transport policies are embedded in this paradigm is abundant, from the strategic policy focus on small percentage changes in modal

share to the ‘alternative’ and currently somewhat fashionable notion that it is possible to persuade people to make ‘Smarter Choices’, if significant time, effort and money is spent in revealing the range of options facing people in their individual trip making so that habits can be broken and different choices made (Cairns et al., 2008).

There is a growing evidence base of the importance of the significant and on-going changes in personal, household and familial circumstances, which provide an opportunity to defrost, break or consciously re-evaluate habits (Schwanen et al., 2012; Verplanken et al., 2008). Goodwin (2008) refers to this as churn, the natural re-evaluation of travel choices as personal circumstances change; Thompson et al. (2011) refer to these as ‘moments of change’ and Beige and Axhausen (2012) as ‘turning points’. Such changes could be voluntary such as a planned house move (Stanbridge et al. 2004) or taking up a new job (Pazy et al., 1996), or be involuntary such as being made redundant, long-term illness or bereavement. Goodwin (1989) estimated that in the Netherlands during the late 1980s that over a period of 5 or 6 years 95% of the population would change one aspect of their life-cycle, status, income or car ownership level. Transport for London examined the behaviour of 1200 participants from its initial sample of almost 7000 from the 2011 *London Travel Diary Survey*. It found that half of the sample had experienced one major lifestyle change in the 12 months between surveys and that of these people, one half had experienced more than one major change (SDG, 2012). The amount of churn is therefore significant at the aggregate level. Dargay and Hanley (2003) analysed the *British Household Panel Survey* and found that over a nine-year period, more than 50% of commuters change their main mode at least once. Of those who both move house and change employer during two consecutive years, 45% also changed mode. Scheiner and Holz-Rau (2013) in a cohort study using the German Mobility Panel survey found that “behind the aggregate stability in travel mode use over time there is much change ‘under the surface’, induced by life course changes, individual and household sociodemographic, and spatial context”

(p167) but are not as definitive as to the impacts of specific events on mode choice.

It is also important to consider the extent to which the data that is typically collected on travel behaviour shape our thinking about stability and habit. In aggregate, travel patterns appear stable. The notion of traffic existing in some form of equilibrium (static or dynamic) has been the subject of much research on flow within networks (e.g. Watling et al., 2012). Any study of travel patterns is likely to identify the same key trends shown in Figure 1. Weekday travel patterns are typically structured with a strong morning peak and a longer but slightly less marked evening peak period. This captures the underlying demand for travel to employment and education which, despite structural economic changes, remains rooted in a 9 to 5 working day for many.

FIGURE 1 HERE

The rules traditionally set for the gathering of data have sought to avoid periods that are 'non-typical'. This means excluding periods with significant road works, surveying outside school holidays and avoiding weekends and Fridays, which are different to other working days (GMTU, 2009). Taking these assumptions alone means that around 200 days a year are 'non-typical'. Of those that remain, many are impacted by other incidents or factors such as adverse weather. Watling et al.'s (2012) experience of attempting to validate a route choice model in York exemplifies some of the difficulties in obtaining sufficient numbers of repeatable days of data. In addition, there is evidence that within the apparently stable patterns of traffic are quite significant variations in travel. Bonsall et al.'s (1984) study of travel time variability on routes commuting into Leeds in the morning peak showed that only around 50% of traffic reappears from day to day. Kitamura et al. (2006) explore departure time change for the morning commute and find that whilst variation exists in the time and location constraint for the commute destination, there is much greater variation between individuals and within

individuals on departure time choice, suggesting opportunities to change commute trip behaviour.

Aggregate level data focuses more on the flows in the network than the details of the users of the network. Schlich and Axhausen (2003) note that “intrapersonal variability (different behaviour of one person from day to day) has played a minor role in travel behaviour research in comparison with research on interpersonal variability (differences in the behaviour of different persons)” (p14). They found in their six week longitudinal travel diary study that travel patterns follow some form of rhythm that is more evident when looked at over a two week period or longer. The more variables of travel behaviour that were included in their analysis, the less repeatable daily trip making patterns appeared. Hanson and Huff (1988) also identified different dimensions of variability (daily, predictable longer-term cyclical variability, one-off events and longer-term structural change). Yet, most of the data collected to inform travel behaviour models is cross-sectional snapshot data, although participants are often asked to reflect on previous choices and to imagine future choices (see for example Kerr et al., 2010; Susilo at al., 2012 and Farag and Lyons, 2012).

We do not suggest here that the changes that occur as a result of the natural churn in lifestage and household circumstances are necessarily consistent with lower carbon choices. Evidence to date would point to the contrary. However, it is clearly true that there is a natural propensity to change our travel patterns over the medium term that has been under-recognised in our research methods and which provides an opportunity for planned behaviour change. From a policy perspective, the key point is that, if travel patterns are stable and the underlying behaviours that form those patterns are stable, then the framing of travel behaviour as habitual and difficult to change holds significant attraction. But if, instead the macro-environment is subject to substantial change or if there is significant on-going change to the systems of provision or to the circumstances of individuals and families acting within this, then churn becomes and opportunity

and a resource for enabling otherwise difficult change to occur. We now present some evidence that such an alternative, more dynamic view of the mobility system – in which disruption is acknowledged as a key influence on travel choices – holds considerable analytical value.

4. Disruptive Events

There is a small but growing literature of the study of behaviour of travellers under disruption (van Exel and Rietveld, 2001; Cairns et al., 2002; Chatterjee and Lyons, 2002; van Exel and Rietveld, 2009; Quarmby et al., 2010; Zhu and Levinson, 2010; Birtchnell and Büscher, 2011 and Guiver, 2011, 2012). The classification of disruptive events is difficult but for the purposes of this paper we consider this to be events which impact on the supply of transport (either infrastructure or services) or the cost of using transport or some combination. The events can either be externally generated (such as flooding) or planned (such as major sporting events (see TfL, 2012 for discussion of the London Olympics) and have a significant impact on groups of or the entire population of travellers in an area above and beyond that which would be experienced through the day to day variability in travel patterns.

Such events are interesting to study not because they necessarily provide any particular policy solutions in themselves but because they make visible the assumptions around which travel patterns are based. They can lead to innovation in the short run and provide a window on new patterns of behaviour that could be adopted. Following on the previous discussion about habit and behaviour change, Schwanen et al. (2012), drawing on the writings of Ravaisson and Dewey, suggest that to fully understand habit it is necessary to understand not only the actions of the individual but the broader social system within which the decision is being made. Disruptive events we would argue bump the social system into a new place (Wilson, 1976), albeit mostly for a short period. There may be important lessons about more radical forms of social adaptation for transport that

emerge. To explore this further we provide some vignettes of evidence from three different types of event in this section:

- A fuel shortage which was unplanned and affected an entire country
- A major storm and flooding event, concentrating on effects in a major city
- A significant transport policy intervention which changed the relationship between supply and demand

4.1 Fuel Shortage

In September 2000, as a result of farmers and hauliers blockading oil refineries in a protest against the UK government's annual fuel tax escalator policy and the rising price of petrol and diesel, there was a national shortage of fuel, a disruption to the normal expectations of supply. It was not clear how long the dispute would continue and this led to a wholesale re-evaluation of the nature and necessity of many journeys (Chatterjee and Lyons, 2002). A sample of 1600 mail back questionnaire surveys provides the most in-depth understanding of how people adapted (Ibid.), with Chatterjee and Lyons finding that "12 to 16% of car users made fewer trips for commuting, business and grocery shopping and 51% of people made fewer trips for other travel" (p136). There was more car sharing and joining together of trips. 25% of respondents made no change to travel purposes whereas 42% made at least two changes (Ibid.). Whilst some had previous experience of a change in travel mode or the decision to work at home, this was true for less than 19% of respondents, and therefore many new travel behaviours emerged (Chatterjee and Lyons, 2002).

There were also some important changes to the social context in which 'normal' activities were conducted as reported in Marsden and Beecroft (2002). For example, the way people shopped changed, with evidence of grocery shopping becoming more localised and a decline in supermarket trips. The main national telecoms provider reported a 33% increase in phone traffic and a surge in internet usage as well as bookings for teleconferencing facilities. More professional and managerial grade staff were able to work from home and

organisations adapted their working practices through increased flexi-time or the approval of ad-hoc teleworking. Summarising the apparent changes in behaviour prompted by the crisis, Chatterjee and Lyons (2002) concluded that such events can “not only reveal insight in behaviour but can trigger change” (p156).

4.2 Storm and Flooding Event

Kaufman et al. (2012) describe the impacts on the transportation system and travel behaviour of New Yorkers in the run up to and aftermath of Hurricane Sandy. The storm had a very significant impact on the availability of both the transport network and energy supplies within the city, which produced a range of institutional and individual responses of relevance. During the storm itself the whole transport system was effectively closed but it is the period that followed that is of most interest to our framing of the potential of disruptive events to influence behaviour, when water- and wind damage closed seven river tunnels and many commuter rail lines. Although the road network fared better, several routes were affected and remained closed for long periods.

A variety of innovative responses were demonstrated to try and reduce the impact of the closures on the travelling public. Reduced rail-based public transport options placed very substantial pressure on the road network with significantly extended journey times to/from some areas. Kaufmann et al. (2012) provide a timeline of the recovery process with some of the most important elements identified below. The bus system was able to re-establish itself first followed by some ferry services. Free public transport fares were offered on the buses (and subsequently with the subway as it partially re-opened) although the buses were caught in heavy traffic and long queues were prevalent. Bus bridges were then established with bus only lanes on major bridge crossings and HOV3+ lanes were enforced to try and encourage ride sharing and reduce traffic volumes. Fuel rationing was put in place at gas stations in some areas as the distribution network had been adversely affected. These policies were deemed to be acceptable and were welcomed where in typical circumstances they clearly

would not be; the environment changed social norms which in turn unlocked new policy responses. New forms of working were established which included an enhanced level of employers permitting and/or encouraging working from home (increasing from 2% to 22% in a survey of 315 commuters). Further innovation occurred where local businesses made available spare desks for people to work at. Enhanced levels of walking and cycling were also reported (in the short term).

4.3 Transport Policy Intervention

Transport policy interventions themselves, of course, be conceptualised as disruptions. Policies are designed to make some or all of the target audience (population, businesses, third sector or governmental organisations) change some aspect of the way they do things. They can therefore be viewed as permanent or semi-permanent disruptions to the orderly course of events. The Stockholm congestion charging trial provides an interesting window on this kind of change process. The charge was implemented for a six month period and then lifted whilst the referendum on its continuation was held. During the period of the trial, Eliasson et al. (2009) reported a reduction in traffic levels of typically between 21% and 23%. This compares with predictions form model based simulations in advance of the trial of between 10 and 15%. The larger reductions "seemed unreasonable at the time, even to the modellers themselves" (Ibid., p242). During the period between the trial ending and the system being made permanent, around 9% of the traffic which had previously used the area before the six month trial did not return (Ibid.). It is suggested that the travellers either sought other destinations, other ways of fulfilling the same journeys or have re-evaluated these journeys altogether, although the evidence base remains patchy. Whilst paying for travel into major city centres is not yet commonplace, there is evidence from London and Stockholm that it quickly becomes accepted as a fact of life (Leape, 2006; Börjesson et al., 2010).

The outcomes from these three quite different types of events share something in common: that the users of the system have been faced with a major system wide

disruptive change. This has led to a range of behavioural adaptations and, importantly, innovations. In general these innovations have been to sustain participation in core activities whilst changing the level or type of mobility that supports those activities. The very nature of the activities may also be affected. We contend that such events demonstrate that, whilst nobody welcomes a disruption to their pattern of living, they can and will adapt in the short and long-run in ways which go beyond the typical retiming and rerouting options that transport planners work with. They demand a broader conceptualisation of travel behaviour change and reinforce the calls from many domains of social science research for context to be applied to technical assumptions.

5. Discussion

At the start of the paper, we posed the question as to whether we could usefully consider the notions of disruption and adaptability as more appropriate concepts for planning for transport than those of habit and stability. Certainly our findings remind us that there is real raw material for policy change to be found in the fluctuations and churn of daily life. The limited extent to which stability can really be assumed becomes apparent as soon as the debate is broadened out beyond the convenient but rather misleading assumption that *transport* policy is the primary lever of change affecting travel behaviour. It is commonplace to assert that the demand for transport is derived from the need to access employment, food and other essentials, health and education, visiting friends and family and leisure activities and so on. But there is remarkably little analysis of the ways in which changes – either engineered by deliberate policy interventions or those reflecting more general societal shifts – in work, education and so on – exert a profound impact on how much we travel. Important examples include the creation of a whole new category of journey – 'The School Run' – following the 'Parental Choice' reforms in education in the 1980s, and the idea that a combination of demographic shifts, the explosion of demand for mobile computing using public-transport friendly devices such as smart phones and tablets might alter the kinds of journeys we make and the modes we use to make them (Goodwin, 2012).

Although rather obvious, the macro-environment is a significant influence on travel yet one that is often remarkably underplayed in policy debates. The global financial crisis and ensuing structural economic changes have influenced employment levels, the size of the public sector, working hours and wage rates (the list is not exhaustive), all of which can be held to have a major impact on travel. Austerity is reducing the demand for car ownership and use in ways which most mainstream *transport* policy approaches would not have considered practicable or achievable.[1] Similarly, changes to the global price of oil have increased fuel prices at the pumps to levels which would not be politically feasible through taxation yet which far exceed those levels which last created public outcry in the UK in 2000 (Harman, 2002).

Our contention is therefore that this focus on the scale and stability of habitual transport choices is only a partial, if politically appealing, framing of the transport problem. There is a significant amount of change to travel behaviour derived from both exogenous (e.g. employment, life stage, environmental) and endogenous (e.g. transport network, supply and price) factors to be capitalised upon. Within a conceptual framing that focuses upon the need for stability, moments of disruption and disruptive life events are problematic, creating conflicts with promises of smooth flow and repeatable journey times. In reality this review highlights the importance of considering more than just the resilience of our infrastructures and our ability to return to current operating conditions. It suggests the need to explore a new paradigm, one which brings together adaptation to changes in the macro environment, the socio-technical systems of provision and the rhythms and choices of individuals, families, communities and companies. Responses to unplanned major disruptions, however chaotic, show the potential for innovation and for new states to be imagined. Responses to planned major

[1] Figures from the UK Department for Transport show a fall of overall road traffic levels of 3.5% or 10.9 billion kilometres between 2007 and 2010. See also Goodwin (2011).

disruptions show that significant shifts in behaviour can be managed and are not as painful or problematic to travellers as is often feared.

Reflecting back on Howlett and Cashmore's framework, there is a very strong instrument logic around how travel behaviour is understood and what tools are available for change. Whilst this channels the types of interventions we then see in transport policy (e.g. personalised travel planning and 'smarter choices'), it also feeds back up to the (lack of) ambition in setting of policy aims and ends in the first place. If change is conceived as only possible at the margins, then it is axiomatic that it is politically acceptable to plan only for marginal change. And so the structures and processes that deliver incremental policy change are reproduced as a result. Faced with this logic, which seems deeply embedded in numerous governmental systems that champion risk-averse, incremental policy 'solutions', we argue that the discussion above on the reality of disruption and the alternative analytical viewpoints it opens up might have far reaching consequences for the ambition and policy pathways that are adopted to reach the low carbon futures which are imagined and desired.

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