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## **Car Possession as Problematic for Urban Travel Markets**

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# **CAR POSSESSION AS PROBLEMATIC FOR URBAN TRAVEL MARKETS**

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## **ABSTRACT**

The way cars are possessed has not had the close attention it deserves. The primary way of gaining access to cars has been assumed to be via owning one. Possession has thus been taken for granted, preventing us from seeing it as possibly problematic. However, the link between car use and car possession is eroding, in both practice and in theory. High mobility had been widely assumed to require a car but it has recently become possible to envisage excellent mobility through an integrated package of services and modes, including convenient access to cars, without needing to possess one. This reveals possession (and its sharp contrast with being car-free) as a source of ‘rigidities’ that inhibit active choice making in travel. Previous work is drawn upon in order to explain the main sources of these possession-related rigidities, which are grouped into two categories: reversible effects (‘stickiness’) and difficult-to-reverse effects (‘invasiveness’). The paper thus builds a case for seeing car possession, the way it works, and its contrast with non-possession, as problematic for travel markets and for TDM policy. Possession-related effects are shown to be more wide-ranging and interesting than is generally appreciated. Cars themselves are not seen as the problem so much as the ways in which we possess them. This focus on possession-related rigidities opens a possible policy agenda, focused on reducing such rigidities (or, equivalently, making our relationships with cars more ‘provisional’). There has been a widespread taboo against devoting policy attention to car ownership but the policy possibilities here address both sides of the car possession divide and go well beyond merely constraining possession.

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## **A CLOSER LOOK AT CAR POSSESSION**

Traffic growth has been called the ‘800 pound gorilla at the cocktail party’ that no-one wants to confront (Adams, 2004). However, this paper argues that Travel Demand Management (TDM) has been neglecting something more subtle, the nature of car possession, as a source of effects that feed the traffic growth beast.

Having a car is of course commonplace. Yet the way cars are possessed has not had the close attention it deserves, among the various factors implicated in the over-use of private motor vehicles (mainly cars). Possessing a car obviously enables its use but arguably such use tends to be excessive and to be rather difficult to inhibit with policy tools. This has not so much been ignored as generally taken for granted. If the primary way of gaining access to cars is assumed to be via owning one, then it is difficult to make sense of a claim that having a car is associated with its excessive use. We have implicitly tended to assume that people with a car will have an abundance of convenient access to the mobility that it offers, while also assuming that people without cars face a much less comprehensive set of mobility choices, with inconvenient gaps. Some policy commentators have seen car ownership as problematic but, with these assumptions, action on such a diagnosis would seem draconian.

This has been changing however. Various innovations and investigations are weakening the perceived link between car use and car possession and enhancing the prospects for developing an attractive and comprehensive alternative to having a car (OECD, 1997). Examples include car-sharing (and the product-to-service idea generally), integration of public transport, integrated mobility packages, car-free housing, parking unbundling, new pricing technologies and recent social psychological research on travel behaviour, including routine behaviours and commitments to mobility tools.

I will argue that these are helping to reveal possession (and its sharp contrast with being car-free) as a source of trip-market ‘rigidities’. The term, rigidities, is used to refer to the inhibition of active choice-making in travel behaviour. Such rigidities would tend to reduce the power of TDM efforts that seek to change such behaviour. Various such effects have been noted in the literature but have not been drawn together into a single framework, as is done here. This focus on ‘possession-related rigidities’ opens a possible policy agenda, focused on reducing such rigidities. Note that this would not necessarily require reduced possession (although that might be one approach). A simple but general way to describe such a policy agenda is that it would try to make our relationships with cars more ‘provisional’. A one-word name might thus be ‘provisionalisation’.

The use of the term, ‘possession’ in this paper, instead of ownership, may seem unusual but is a deliberate choice. A number of the mechanisms discussed below apply not just to vehicles that are owned by their users, but also to vehicles held under long-term leases, to ‘company cars’ owned by an employer or to cars on long-term loans from family or friends. Some may

also question the lack of attention to motorcycles here. However, for various reasons many of the effects examined here seem to apply more forcefully to cars.

## **CAR POSSESSION AND ‘RIGIDITIES’**

This section will explain in more detail what I mean by ‘possession-related rigidities’ in transport trips markets. The central theme is that, in various ways, the possession (or not) of vehicles inhibits or constrains subsequent travel choice-making. For people with cars, several mechanisms (discussed below) tend to entrench overuse and result in an inappropriate vehicle being used for many trips. This is not to say that car owners always use their cars exclusively. TDM efforts do have some impact on such use. Clearly, many people with cars do use other modes as well (Stradling, 2002). However, they do so at much lower rates than would be the case without possession-related rigidities. Conversely, mobility in the absence of one’s own car can face limitations. This is partly because access to cars, which are difficult to replace for certain trips, tends to be inconvenient without owning one. This encourages acquisition even by those who anticipate only modest use. In fact, although car possession is a key factor leading to more car use than desirable, it also means that each vehicle spends most (perhaps 95 percent) of the time waiting to be used (OECD, 1997; Shoup, 2005).

### **Rigidities unveiled with reference to a hypothetical ideal**

The wealth of mobility associated with car ownership is usually contrasted (explicitly or implicitly) with the mobility poverty of those without cars, arising especially from their poor access to cars and because the set of alternatives is usually incomplete and poorly-integrated. People without cars are often characterised as ‘captive’ to non-car options, particularly public transport. With such assumptions, pondering the impact of possession on usage does not take us far. If taken seriously at all, it might simply prompt restrictions on vehicle possession. This has indeed been Singapore’s response but tends to be rejected elsewhere for being blunt, poorly-targeted and politically unpalatable.

In contrast, richer thinking on the effects of car possession is unveiled by comparing it with another alternative, namely excellent comprehensive mobility, including access to cars, without possessing one. A number of authors have envisioned such an ideal, including ambitious, scaled-up carsharing (Adams, 1997; Monheim, 2003; Topp, 2006; Bradshaw, 2007). Fortunately, it has become easier to imagine this recently with ambitious efforts in central and northern Europe to link car-sharing with quality public transport (Huwer, 2004). Some, such as Hannover, have created integrated mobility packages for people without cars, combining integrated public transport with taxi, car-sharing, car-rental, bicycle services and deliveries. Please note that an idealised vision of such mobility packages is used here as an aid to thought and not as a specific recommendation. This allows us to question our assumption that attractive mobility requires car possession. It helps bring to light various

ways in which car possession reduces subsequent active choices. The argument does not necessarily require this ideal to be completely realised in the real world.

The two sub-sections below will draw on previous research and recent innovations in order to explain the travel-market rigidities associated with possession. Two kinds of possession-related rigidities are distinguished. The first group are immediate and relatively reversible effects of possession on travel choice-making. These are referred to here as 'stickiness'. A second category involves less direct, difficult-to-reverse effects, which are labelled here as 'invasiveness'.

### **Short-run reversible rigidities: the 'stickiness' of possessed cars**

The first category of possession-related 'rigidities' involves direct and reversible effects on trip making, encouraging overuse relative to the idealised benchmark mentioned above. I will refer to these as 'stickiness'. They are reversible in the sense that, if the vehicle is no longer possessed their impact quickly evaporates. As with stickiness in physics, the attractive force leaves no lasting mark once the connection is broken.

*Waiting service.* The simplest element of stickiness is the sheer convenience of having one's car on hand, whether at home or wherever it has taken you. This 'waiting service' is nevertheless often overlooked (Prettenthaler and Steininger, 1999). It is something which fee-for-service access to cars cannot easily match. The reassurance of having one's car on hand thus probably plays a role in the propensity to use it for more trips than really appropriate (Stradling, 2002). On the other hand, confidence in such constant availability may sometimes prove unrealistic, since cars can fail to start or be stolen.

*Emotional attachments.* Even more familiar is the notion that people become emotionally attached to their belongings. Cars in particular seem to prompt such bonding, and this may reduce owners' inclination to leave them behind. The endowment effect has been much studied recently. However, car owners' attachments appear to go well beyond this. This may arise in part from the way owners (or even long-term possessors) of a car treat it as 'mobile territory', invoking territorial behaviour (Diekstra and Kroon, 2003). Many cars also play a role in social signalling, including being used as positional goods, which may also drive a trend for over-powered vehicles (Litman, 2007; Verhoef and van Wee, 2000). Vasconcellos (1997) argues that in developing cities cars are key social markers of being middle class. Cars may also be used to flag personal values. Such social signalling probably fuels car possession. If it also fuels excessive usage, this is probably more compelling with a car of one's own than with access to cars on a fee-for-service basis.

*Routine travel behaviour.* The habitual nature of routine travel choices has become a focus of TDM-related research (Gärling and Axhausen, 2003). It is plausible that, because of the cognitive burden of choices, a lack of motivation to change one's choice and uncertainties

associated with change, most people stick with tried-and-tested travel routines (Harms, 2003). Such impacts of past behaviour seem strongest for car owners (Thøgersen, 2006). Information problems and uncertainty over alternatives are also especially relevant to people with cars, many of whom rarely need or seek information on alternatives (Harms, 2003). This provides one rationale for the rise of individual marketing for travel behaviour change (Brög et al., 2002).

*Commitment.* As Simma and Axhausen (2003) note, people commit themselves to particular travel behaviours through the ownership of mobility tools such as cars and season tickets to public transport. They achieve a low marginal cost for each trip in exchange for a significant up-front cost. It is clear that a decision to acquire a motor vehicle rationally implies an intention or ‘commitment’ to subsequently use it a certain amount. There is a strong link (albeit not one-to-one) between total traffic and the number of cars. Few cars are bought in order to be little used (Gilbert, 2000).

*Cost structure (fixed cost) effects.* The cost structures of privately-owned vehicles are of course heavy with fixed costs. It is widely understood that this strengthens the commitment mentioned above and lessens the impact on demand of any variable costs (Vuchic, 1999). Bundled parking and season parking discounts also increase commitment by reducing variable costs relative to fixed costs. Fixed costs may seem an inevitable consequence of ownership. However, ‘variabilisation’ is a policy agenda aimed at addressing this by shifting unnecessarily fixed costs into the variable category (Ubbels et al. 2002; Barter 2005). Furthermore, accessing cars on a fee-for-service basis, or what Bradshaw (2007) calls MASC (for ‘metered access to shared cars), can be seen as almost total variabilisation, since the cost structures for taxis, rental cars, and carsharing are dominated by time and distance-based fees. Likewise for our idealised benchmark mobility package.

*‘Comprehensiveness’.* The possession of a car also inhibits active mode choices because it tends to be a mobility tool with unrivalled comprehensiveness. Even when one’s car might not be the optimal mode according to various criteria, it is an excellent second-best option for a very wide range of trips. As noted earlier, the set of options available to people without cars is usually incomplete and poorly-integrated. Access to cars is often limited or unreliable if you do not have your own. Certain kinds of trips are problematic (including for example, the safe carrying of small children or taking pets without breaking regulations). The notion of ‘gaps’ in transport options (see for example, Bouladon, 1967, cited by Dimitriou, 1990) is relevant here. Even well-integrated, quality public transport can only do so much. Bicycles (and other small ‘personal mobility devices’) are important in filling some such needs, but other gaps cannot easily be addressed without convenient access to cars. This is the ‘famine’ part of what Bradshaw (2007) calls the ‘feast or famine proposition of the one-car-one-person model’. The value placed on such comprehensiveness is also reflected in vehicle choices. To serve multiple purposes privately-possessed cars must be overly large and high-powered for most of their actual use (Bradshaw, 2007).

The sharp contrast in the comprehensiveness of mobility tools available to those with and those without cars makes car possession more compelling than it could be. Frustration over the inconvenience of even a small fraction of trips may prompt a strong desire to acquire a car. This helps drive the acquisition of cars, further impoverishing the range of options for those remaining without one. This has longer-term implications, which brings us to a second category of possession-related 'rigidities'.

### **Less reversible rigidities: the 'invasiveness' of possessed cars**

In contrast with the above impacts of car possession on travel choice, there are effects which persist even in the subsequent absence of the car. I term these 'invasiveness' and they tend to lock in the overuse of cars (relative to the idealised alternative mentioned earlier) and also make continued possession more compelling. Invasiveness involves the reshaping of the context for daily travel choices at various levels, from individuals and households to wider social scales, such as neighbourhoods, metropolitan urban structures and large technological systems. A great deal of literature has documented such effects but generally without focusing attention on the role of possession. The word invasiveness alludes to an analogy with invasive species. Possessed cars, as comprehensive 'generalists', disrupt the niches of other modes and carve an ever larger role for themselves (see Stradling, 2002 for a similar analogy).

*Metropolitan 'automobile dependence' and lock-in by large technological systems.* The most widely discussed aspects of the invasiveness of privately-possessed cars operate on large systems. Automobile dependence in the built environment is a prominent example (Newman and Kenworthy, 1999: 60). Congestion and parking problems provide a 'push' for dispersal of destinations, decreasing densities and difficult-to-reverse road and parking investments. The comprehensive mobility offered by possessed cars provides a 'pull' for such spreading out. These trends make car alternatives less viable and cars more indispensable. High car use becomes entrenched, or 'locked in', in other ways too, through the reshaping of numerous institutions, practices, norms and large technological systems (Unruh 2000). Mechanisms for such path dependence include club, fleet and network effects (Dupuy, 1999). The more numerous and heavily-used cars become and the larger the network of car-related infrastructure and services, the more valuable cars become (except where congestion costs dominate). Private possession seems likely to amplify such processes.

*Car dependence at individual or household levels.* Invasiveness can also be seen at finer scales. Dargay (2001) observed hysteresis in the relationship between motorisation and income, noting that cars are seen as a luxury before being possessed but as a necessity afterwards. Others have found individual car dependence to deepen with time. Even in the least car-oriented rich city in the world, Hong Kong, usage per year and viewing the car as a necessity both increased with the number of years since becoming a car owner (Cullinane and Cullinane, 2003). Comprehensiveness plays a role here perhaps. Cars acquired with certain

purposes in mind may gradually expand into more and more mobility roles. Influences on having a single car may differ qualitatively from those on acquisition of subsequent cars in a household, with the latter more volatile and strongly influenced by quality of alternatives (Goodwin, 1993; Karlaftis and Golias, 2002).

*Pivotal choices and life events.* Some of the mechanisms for such hysteresis may involve the large-scale changes mentioned above but this is unlikely in Hong Kong. So entrenchment of cars must also operate through processes at household scale. One example is likely to be the poorly understood interactions between car possession and pivotal life choices, such as housing location (Bamberg, 2006; Harms, 2003). For example, car possession choices, housing location and decisions on jobs may all interact to entrench car dependence for a person or household.

*Possession and resentment of TDM.* Much of the complex politics of TDM is beyond my scope here. However, stickiness and invasiveness may imply that having one's own car would have a profound influence on attitudes to TDM policy. For car owners, car use comes to seem a necessity, associated with a sense of entitlement, and prompting resentment of any policies aimed at reducing it. This suggests that those accessing cars on a fee-for-service basis would tend to display less resistance to usage-focused TDM measures.

## **IMPLICATIONS OF A FOCUS ON POSSESSION-RELATED RIGIDITIES?**

This paper has reviewed a range of previous work, building a case for seeing car possession, the way it works, and its contrast with non-possession, as problematic for travel markets and for TDM policy. This exploration suggested that these possession-related effects are more wide-ranging and interesting than is generally appreciated. It has always been obvious that car ownership and motorisation help drive traffic growth but the effects discussed here are arguably more subtle and worthy of policy interest than has usually been acknowledged. The policy possibilities go well beyond constraining car possession. This may help to overcome a widespread taboo against devoting policy attention to car ownership or possession.

The focus here has been on understanding these issues in a qualitative way. Others have sought to quantify some of these effects and more such work will be needed to provide convincing evidence of their importance. The potential policy opportunities in aiming to reduce 'possession-related rigidities' also need further investigation. This section will briefly highlight some policy horizons and research issues that may flow from these ideas.

I should first clarify the scope of this paper by mentioning some things that are not being implied here. For example, I am not saying that possession of cars and possession-related rigidities are the only factors in the over-use of cars. There are clearly others that have little to do with possession. Furthermore, I am not suggesting that a focus on 'provisionalisation' and possession-related rigidities would overturn established approaches to TDM. Rather, it should



complement existing efforts. If taken seriously, it might help refocus interest on a number of possession-related issues that have been neglected. The framework presented here may also be helpful in providing a vocabulary for highlighting these concerns and revealing connections among them.

Framing possession-related rigidities as a problem begs the question of what policies could ease them in various contexts. Many of the policies mentioned will be familiar but the rationale may not be. Note that although the ideas presented here have been inspired largely by innovations in high-income European cities the policy horizons mentioned below may have much wider relevance.

Seeking a shift away from car possession is one obvious response, and would be the only way to address aspects of stickiness and invasiveness that are an inherent consequence of private car possession. However, this is often considered a poorly targeted goal and the policy instruments available have been blunt. In fact, an awareness of possession effects should increase our suspicion of blunt instruments such as fixed purchase or ownership taxes which can worsen commitment to car use, as in Singapore (Barter, 2005). Efforts might instead be focused on improving the experience of being car-free (see below), on easing the process of shedding cars from a household and on enhancing the extent to which reducing car possession can be translated into money savings.

Some possession-related rigidities can be eased without reducing possession, since many such rigidities are probably worse than they need to be. Much of the cost of having a car is usually fixed but some costs, such as insurance and ownership taxes, need not be fixed. Parking cash-outs can wean motorists from 'free' parking privileges by enabling them to save money by not driving, as would discouraging season parking. Other parking policy reforms suggested by Shoup (2005) are also relevant here. Easing attachment to one's car might also involve making it easier to lend, possibly as a 'cash car' into a pool of carshare vehicles (Monheim, 2003). Resisting the invasiveness of possessed cars may be more difficult than addressing stickiness. One possibility might be to use the tools of individual marketing to help people avoid life choices that inadvertently entrench their own car dependence. Market-oriented parking policy has a role here too, as do many familiar 'smart growth' efforts.

Making it more attractive to not have a car (or to have fewer per household) would also be a key policy agenda if possession-related rigidities were taken seriously. Competing with the comprehensiveness of privately-possessed cars is central here, including filling mobility gaps for the car-free. Ways to improve the comprehensiveness of alternatives include better integration of public transport systems and creating integrated 'mobility packages'. Ready access to cars on a fee-for-service basis is likely to be a key element. Bradshaw (2007) sees a massive scaling up of carsharing as a central part of addressing the problems caused by car ownership. Taxis might suddenly seem more important, as would bicycles and other personal mobility devices. We might even consider somehow directly rewarding car-free households

in recognition of their role in keeping alternatives to the private car viable, especially outside peak periods.

The focus on possession here may draw attention to a number of relatively neglected research issues. It is difficult to speculate on research horizons, but examples may include: more work on commitment, cost structures, variabilisation and routine travel behaviour; further research into pivotal choices linked with car possession; more interest in car-free households; investigations of positive externalities generated by car-free households; and more attention to gaps in non-car-owner's mobility and the notion of comprehensiveness.

## **CONCLUSION**

The approach presented in this paper highlights ways in which our practice of possessing cars can be seen as problematic for travel markets and urban transport policy. Cars themselves are not seen as the problem so much as the ways in which we possess them. The approach is distinct from, but complements, other perspectives on cars and traffic problems such as the failure to internalise externalities, imbalanced infrastructure priorities, automobile dependence entrenched in large systems, etc. I have suggested that reducing possession-related rigidities, and thus making car access more provisional, may offer a useful focus for TDM policy.

I emphasised that the direct restraint of private vehicle ownership is likely to be a minor element of such an agenda, which instead seems to open a multi-dimensional set of policy possibilities, with efforts directed to both sides of the car possession divide. It prompts exploration of ways to transform both possession and non-possession as social and economic practices. It may open opportunities to achieve better functioning transport markets and enhance the effectiveness of other TDM tools, while subtly reducing the political barriers to them.

## **REFERENCES**

- Adams, J. (2004) 'Darling, meet the 800 pound gorilla!' *Local Transport Today*, 26 August 2004.
- Adams, J. (1997) Alternative policies for reducing dependence on the car, in R. Tolley (ed.), *The Greening of Urban Transport: Planning for Walking and Cycling in Western Cities*. John Wiley & Sons, London, 239-250.
- Bamberg, S. (2006). Is a residential relocation a good opportunity to change peoples' travel behavior? Results from a theory-driven intervention study, *Environment & Behavior*, **38** (6), 820-840.

- Barter, P. A. (2005). A vehicle quota integrated with road usage pricing: a mechanism to ease the phase-out of high fixed vehicle taxes in Singapore, *Transport Policy*, **12** (6), 525-536.
- Bradshaw, C. (2007). How Carsharing Can Reduce the 'Drive to Drive' and Improve Walkability. Presented at the Walk21 8th Annual International Conference on Walking and Liveable Communities, Toronto, Canada 1-4 October 2007.
- Bouladon, G. (1967). The Transport Gaps. *Science Journal*, April, Associated Life Press, Ltd, London. (cited by Dimitriou, 1990)
- Brög, W., E. Erl and N. Mense (2002). Individualised Marketing: Changing Travel Behaviour for a Better Environment, Paper presented to OECD Workshop: Environmentally Sustainable Transport, Berlin, 5-6 December 2002.
- Cullinane, S. and K. Cullinane (2003). Car dependence in a public transport dominated city: evidence from Hong Kong, *Transportation Research D: Transport and Environment*, **8**, 129-138.
- Dargay, J.M. (2001). The effect of income on car ownership: evidence of asymmetry, *Transportation Research A*, **35**, 9, 807-821.
- Diekstra, R. and M. Kroon (2003). Cars and behaviour: psychological barriers to car restraint and sustainable urban transport, in Tolley, R. (ed.) *Sustainable Transport: Planning for walking and cycling in urban environments*. Woodhead Publishing, Cambridge.
- Dimitriou, H. T. (1990). Towards a Developmental Approach to Urban Transport Planning. In: *Transport Planning for Third World Cities* (H.T. Dimitriou and Banjo, G.A., eds.), pp. 379-419. Routledge, London and New York.
- Dupuy, G. (1999). From the "Magic Circle" to "Automobile Dependence": Measurements and Political Implications, *Transport Policy*, **6** (1), 1-17.
- Gärling, T. and K. W. Axhausen (2003). Introduction: Habitual travel choice, *Transportation*, **30**, 1-11.
- Gilbert, R. (2000). Sustainable Mobility in the City, Keynote paper to URBAN 21, Global Conference on the Urban Future (<http://www.urban21.de>). Available at <http://www.cstctd.org/CSTadobefiles/sustainablemobility.pdf>
- Goodwin, P. B. (1993). Car ownership and public transport use: Revisiting the interaction, *Transportation*, **20** (1), 21-33.
- Harms, S. (2003). From routine choice to rational decision making between mobility alternatives, Paper to STRC 3rd Swiss Transport Research Conference, Monte Verità/Ascona, March 19-21, 2003.
- Huwer, U. (2004). Public transport and car-sharing – benefits and effects of combined services, *Transport Policy*, **11**, 77-87.
- Karlaftis, M., Golias, J. (2002). Automobile ownership, households without automobiles, and urban traffic parameters: Are they related? *Transportation research record*, **1792**, 29-35.
- Litman, T. (2007). Mobility As A Positional Good: Implications for Transport Policy and Planning, Working Paper, Victoria Transport Policy Institute). Available at <http://www.vtpi.org/prestige.pdf>.

- Monheim, R. (2003). Visions for city traffic and mobility, in Tolley, R. (ed.) *Sustainable Transport: Planning for walking and cycling in urban environments*. Woodhead Publishing, Cambridge, 84-96.
- Morris, D. (2005). Car-free Development: the Potential for Community Travel Plans UTSG, Bristol, U.K., January 2005.
- Newman, P. W. G. and Kenworthy, J. R. (1999). *Sustainability and Cities: Overcoming Automobile Dependence*, Island Press, Washington D.C.
- OECD (1997). Sustainable consumption and individual travel behavior: Report of the OECD Policy Meeting. Paris, 9-10 January 1997. OCDE/GD(97)144OECD. Organization for Economic Co-Operation and Development, Paris.
- Prettenthaler, F. E. and K. W. Steininger (1999). From ownership to service use lifestyle: the potential of car sharing, *Ecological Economics*, **28**, 443–453
- Scheurer, J. (2001). *Urban Ecology, Innovations in Housing Policy and the Future of Cities: Towards Sustainability in Neighbourhood Communities*. Unpublished PhD Thesis, Murdoch University
- Shoup, D. (2005). *The High Cost of Free Parking*. Planners Press, Chicago.
- Simma, A. and K.W. Axhausen (2003). Commitments and modal usage – Analysis of German and Dutch panels, *Transportation Research Record*, **1854**, 22-31.
- Stradling, Stephen (2002). ‘Persuading People Out of Their Cars’, Napier University Professorial Lecture, 27 March 2002.
- Thogersen, J. (2006). Understanding repetitive travel mode choices in a stable context: a panel study approach, *Transportation Research A*, **40** (8): 621-638.
- Topp, H. H. (2006). Trends, innovative course settings and levers for mobility & transport: Seen from the year 2030, *World Transport Policy & Practice*, **13** (1), 18-30.
- Ubbels B., P. Rietveld and P. Peeters (2002). Environmental effects of a kilometre charge in road transport: an investigation for the Netherlands, *Transportation Research D*, **7** (4): 255-264.
- Unruh, G. C. (2000) Understanding carbon lock-in. *Energy Policy*, **28**, 817-830.
- Vasconcellos, E. A. (1997) The making of the middle-class city: Transportation policy in Sao Paulo. *Environment and Planning A*, **29**, 2, 293-310.
- Verhoef, E.T. and G.P. van Wee (2000). Car ownership and status: implications for fuel efficiency policies from the viewpoint of theories of happiness and welfare economics, *European Journal of Transport and Infrastructure Research*, **0** (0), 41-56.