'Complacent Car Addicts' or 'Aspiring Environmentalists'?

Identifying travel behaviour segments using attitude theory

Dr Jillian Anable

The Centre for Transport Policy, The Robert Gordon University

Schoolhill, Aberdeen, AB10 1FR, UK

e-mail: j.anable@rgu.ac.uk

fax: 01224 263129

'Complacent Car Addicts' or 'Aspiring Environmentalists'?

Identifying travel behaviour segments using attitude theory

Abstract

Using an expanded version of a psychological theory of attitude-behaviour relations, namely the Theory of Planned Behaviour (TPB), scores on factor analysed multi-dimensional attitude statements were used to segment a population of day trip travellers into potential 'mode switchers' using cluster analysis. Six distinct psychographic groups were extracted, each with varying degrees of mode switching potential. Each group represents a unique combination of preferences, worldviews and attitudes, indicating that different groups need to be serviced in different ways to optimise the chance of influencing mode choice behaviour. Socio-demographic factors had little bearing on the travel profiles of the segments, suggesting that attitudes largely cut across personal characteristics. The evidence clearly shows that the same behaviour can take place for different reasons and that the same attitudes can lead to different behaviours. The paper asserts that commonly used a-priori classifications used to segment populations based on demographic variables or simple behavioural measures may oversimplify the structure of the market. Cluster analysis is rarely used in studies of travel behaviour but this study demonstrates its utility in providing a way of extracting naturally occurring, relatively homogenous and meaningful groups to be used in designing targeted hard and 'soft' transport policies.

Keywords

Mode Choice; Market Segmentation; Cluster analysis; Attitudes; Theory of Planned Behaviour

1. Introduction

It is widely recognised that attempts to address unsustainable patterns of travel involve a detailed understanding of travel behaviour and the reasons for choosing one mode of transport over another. The arguments for car use, including convenience, speed, comfort and individual freedom, are well known. It is also becoming increasingly recognised that rational, instrumental arguments are insufficient to explain why measures to restrict car use generate strong emotions and negative reactance to change. Increasingly, psychological factors including perceptions, identity, social norms and habit are being used to understand travel mode choice (Forward, 1994; Verplanken et al., 1994; Tertoolen et al., 1998; Stradling et al., 1999; Bamberg and Schmidt, 2001; Steg et al., 2001).

What is often overlooked in travel research methodology and policy interventions, however, is that the combination of instrumental, situational and psychological factors affecting travel choice will differ in distinct ways for distinct groups of people. Whilst increasingly sophisticated travel behaviour research and analysis is affording a greater understanding of mode choice, the sample populations examined are rarely grouped according to their motivations, psychological make-up or world-views. Where segmentation takes place, it is invariably based on *a-priori* socio-demographic classifications, not on the basis of more complex, statistically derived clusters of characteristics.

This contrasts with the study of consumer behaviour and marketing where it is standard practice to distinguish homogenous groups of customers who can be targeted

in the same manner because they have similar needs and preferences (Wedel and Kamakura, 2002). Market research survey methods start from the premise that there is little point in addressing the *average* consumer, or in this context, the average level of car dependence or attitudes to certain policies. Instead, different people must be treated in different ways because they are motivated by different factors and are affected in different ways by policy.

The goal of the research summarised in this paper was to examine how travellers can be meaningfully grouped in a psychological sense and how these groups compare to empirical observations of travel behaviour. The results of a mail-back questionnaire survey of 666 visitors to National Trust properties in the NW of the UK are presented. The study utilised both empirically and theoretically derived psychological variables and statistical market segmentation techniques to identify groups of travellers with their own motivations and preferences as regards travel choices.

The paper will begin by discussing the three different strands of the literature brought together in the research, namely the travel behaviour literature on the factors influencing mode choice, the social psychology literature on behavioural choice and the marketing literature on segmentation. Secondly, the methodology used to collect psychometric data on a sample population of visitors to leisure destinations is outlined, as is the use of factor and cluster analysis to derive the segments. Thirdly, these segments are profiled and examined as to how they differ with respect to their current travel behaviour and mode choice intentions. The implications for those responsible for the design of mobility management policy are discussed.

2. Previous Research

2.2 Travel behaviour and social psychology

Whilst there is very little literature attempting to define distinct mobility segments in a systematic and psychologically meaningful sense, there is no shortage of studies attempting to identify the typical characteristics of those people who are interested in travel behaviour change (RAC, 1995; Steg and Vlek, 1996; Stokes, 1996; Curtis and Headicar, 1997; Taylor and Brook, 1998; Wardman et al., 2001). More recently, the question of susceptibility to switch mode has begun to raise issues of the nature and source of car dependent attitudes and thus spawned a number of studies which have applied psychology to the study of mode choice (Forward, 1994; Tertoolen et al., 1998; Stradling et al., 1999; Bamberg and Schmidt, 2001; Steg et al., 2001). Such conceptualisations are helpful to facilitate an understanding of the nature of the attachment to the car and the extent to which individuals perceive particular barriers to change.

Typically, these studies attempt to apply unifying concepts of attitude and the consideration of more 'elusive' sets of constructs for the analysis of car ownership and use. For example, recent studies reveal that symbolic-affective motives (e.g., pleasure and social comparisons) are as relevant as traditional instrument-reasoned motives (e.g. time and cost) for using a car (Steg et al., 2001). Similarly, Gatersleben and Uzzell (2003) suggest that, in some cases, affective motives might be more important for travel mode choice than cognitive evaluations. Gärling (1998) has attempted to find a relationship between utility maximised in choices and psychologically meaningful motivational concepts such as happiness and moral

obligation. Stradling et al. (2000) concluded that travel decisions are driven by the interaction of 'opportunity', 'obligation' and 'inclination'.

Many studies have used established psychological theories of attitude-behaviour relations such as the Theory of Planned Behaviour (Ajzen, 1991) to predict mode choice. These studies have generally concluded that the choice of travel mode is largely a reasoned decision related particularly to attitudes and perceived barriers to behaviour (Bamberg and Schmidt, 1998; Forward, 1998). However, other studies suggest that much of people's daily travel mode choices are habitual and not always preceded by the deliberation of alternatives. These authors suggest that the addition of an independent measure of habit will improve the predictive capability of attitude-behaviour studies (Verplanken, et al., 1994; Gärling et al., 2000; Bamberg, S., Ajzen, and Schmidt, 2003).

Studies on the acceptability of various transport policy measures have revealed that people are more likely to accept positive (pull) measures than negative (push) measures (Steg and Vlek, 1997; Schade and Schlag, 2002). Transport-related problems are often interpreted by psychologists as 'commons dilemmas' (e.g., Van Vugt et al., 1995; Steg and Vlek, 1996). The commons dilemma denotes a conflict between (short term) individual interests and (long term) collective interests. These studies show that in addition to various cognitive beliefs, important factors that influence people's car use include feelings of responsibility, perceived effectiveness, personal norms, social value orientation and trust in the co-operative behaviour of others. In addition, studies have shown that environmental attitudes or ecological norms are positively related to people's willingness to reduce car use or to support car

travel reduction measures (Steg and Vlek, 1997; mNilsson and Küller, 2000), although other findings dispute the universal importance of such variables (Golob and Hensher, 1998).

2.2 Market Segmentation

Essentially, segmentation, from both a marketing and a research perspective, is simply the act of defining meaningful sub-groups of individuals or objects (Hair et al. 1998; Wedel and Kamakura, 1998). At its core it is about reducing the number of entities being dealt with into a manageable number of groups that are mutually exclusive and share well defined characteristics. Once groups are identified, it is possible to make predictions about their responses to various situations, marketing strategies and types of policy, to allow more creative and better-targeted policies to emerge.

Although the objectives of segmentation go largely undisputed, the variety of methods used to achieve it means that, in reality, the term 'segmentation' encompasses a variety of approaches (see Wedel and Kamakura (1998) for a review). Essentially, these approaches can be split into (i) *a-priori*, whereby groups are selected from a population in advance based on known characteristics and declared as 'segments' (e.g. socio-demographic characteristics or frequency of car use) and (ii) post-hoc, whereby empirical investigation using some form of multivariate statistical analysis is used to identify segments (Green and Krieger, 1995). In this latter approach, respondents are clustered according to their similarity on multivariate profiles on any number of combinations of variables. These may include various mixtures of, for example, attitudinal, behavioural or personality characteristics. Most importantly, beyond the initial choice of base variables, the segments are determined by the data, not the

researcher, and the number of clusters and their relative size is not known until the process has been completed.

The *a-priori* approach has been used almost exclusively in travel behaviour research. In essence, segmentation schemes traditionally used in transport planning are most often based on pre-defined key socio-demographic variables such as income, gender and car ownership, or behavioural characteristics such as frequency of use of a mode (e.g. 'high user 'versus 'low user'). After they have been defined, predictive methods such as regression analysis are often used to describe the relationships between segment membership and sets of independent variables. However, socio-demographic variables are not exclusively used as the basis for defining distinct segments. Davies et al. (1997) used the idea of target groups to identify groups of cyclists based on attitudes to this mode of travel. This study identified a typology of cyclists ('fair weather'; 'lifestyle'; 'practical' and 'idealist') and concluded that segmenting on the basis of attitudes enables preconceptions of image, status and constraints to be identified in each group. Jensen (1999) used qualitative data from in-depth interviews to identify six mobility types. These included three car-driving segments ('passionate', 'everyday' and 'leisure time car drivers') and three cycling or public transport segments ('users of the heart', 'users of convenience' and 'users of necessity'). Jensen points out that the identification of these segments offers various starting points for policy. Pas and Huber (1992) demonstrated the usefulness of market segmentation analysis for transport services by identifying a number of potential segments with similar attitudes towards the attributes of each transport mode. This research pointed to the complexity of the travel market and the practical

advantages of delineating segments of the population according to the benefits they desire and expect from using various modes of transport.

These 'segmentation' studies share some of the same objectives of the research which forms the subject of this paper in that they attempt to identify those who are most likely to change behaviour. However, these studies differ from the current research in that they do not use systematic statistical segmentation techniques using attitudinal and psychographic variables that have been theoretically derived. There is even less evidence of this in the published literature, although Redmond (2000) compared cluster analysis solutions derived either from lifestyle or personality variables measured using attitude scales and confirmed using factor analysis. Both sets of variables were found to offer different but equally useful insights into travel behaviour, particularly orientations towards the intrinsic value of travel itself. Similarly, Götz (2003) uses the concept of 'mobility styles' by adapting methods used in attitudinal and lifestyle research. He defines five segments ('the traditional domestic'; 'reckless car fans'; 'the status oriented automobilists'; 'the traditional nature lovers'; 'the ecologically resolute'). Götz claims that environmental effects such as CO_2 emissions can be calculated according to specific target groups.

This paper questions the adequacy of univariate segmentation methods to comprehensively address the variations in preference and motivations found among the travelling population. It is argued that *a-priori* defined groups typically used in travel behaviour research are not necessarily homogenous and false assumptions of homogeneity can lead to bias in interpretation and explanation of behavioural tendencies. In searching through the population for measures which will distinguish

between 'high users' or 'low users', 'intenders' from 'non-intenders', 'high income' groups from 'low income' groups and so on, the researcher is essentially considering the *averaged* responses of what may be highly divergent groups (Hensher, 1976). Without recognising heterogeneity and distinguishing disparate segments, the resulting models may entirely miss some important relationships because they are finding average coefficients that balance out to statistical insignificance across the whole sample (Redmond 2000). In the extreme cases, when one segment of the target group (e.g. bus users) is above average on a particular attribute and another segment is below average, merging the two segments into one target group can make this group appear to be no different from the remainder of the population on this attribute. This can lead to a set of attributes such as, for example, environmental concern, being identified as insignificantly related to behaviour, whereas, in reality, for a certain sub-group, environmental concern may be substantially related to the actions of these individuals.

This paper argues, therefore, that in order to understand the nature of influences on mode choice, analytical procedures are required that *simultaneously* and *systematically* deal with *combinations* of large numbers of explanatory variables across *a-priori* classifications. Respondents may or may not use alternative modes for any number of reasons. A realistic analysis, therefore, recognises both the multiplicity of factors, including psychological variables, and the fact that combinations of factors are different for different people. This necessitates the use of theoretically derived psychometric measurement and *post –hoc* analytical methods that allow the data to 'speak for itself' by generating natural associations of people in the sample using a multivariate statistical technique, such as cluster analysis.

3 Methodology

3.1 Study context

This study focuses on day trip travel to leisure attractions, although the principles and methods adopted are equally applicable to all sectors of travel demand. This paper presents the results of a mail-back questionnaire survey and segmentation of 666 visitors to National Trust properties in the northwest of the UK.

The National Trust is a major conservation heritage organisation attracting around 12 million visitors a year and has been confronting the dual dilemma of promoting public access whilst preserving landscapes and buildings. As a result, attempts have been made to reduce the proportion of visitors arriving at its properties by car. However, the Trust falls victim to the more general lack of understanding of car dependent attitudes and the specific need to have a detailed grasp of the motivations, constraints and attitudes of its own visitors (Anable, 2002a). The objectives of the study were to use theoretically robust psychological and attitudinal variables to identify the characteristics of groups of National Trust visitors with varying propensity to use alternatives to the car and thus to identify the most effective solutions in a variety of situations.

3.2 Questionnaire development

The questionnaire was constructed largely using multiple overlapping attitude statements[1] hypothesised to pertain to each of the components in a conceptual model.

---

[1] All using 5 point likert scales to express level of agreement with each statement

This model was informed by focus groups conducted with National Trust visitors and by a thorough examination of the travel behaviour and social psychology literature on behavioural choice. In particular, one of the most influential theories on the causal link between attitudes and behaviour, the Theory of Planned Behaviour (TPB) (Ajzen, 1991) was adopted and expanded.

According to the TPB, human behaviour is guided by (i) *behavioural beliefs* about the likely outcomes of behaviour and the evaluations of these outcomes. These produce a favourable or unfavourable attitude toward the behaviour; (ii) *normative beliefs* about the expectations of others and motivation to comply with these expectations. These result in perceived social pressure or social norm; and (iii) *control beliefs* about the presence of factors that may facilitate or impede performance. These give rise to perceived behavioural control (PBC).

The literature, however, identifies inadequacies in this theory for complex behaviours such as travel behaviour. As a result, additional factors were added where these were identified in the literature or from the focus groups as being relevant to an investigation of mode choice. These additional factors can be summarised as follows:

1.   *Moral norm*: a feeling of personal obligation or commitment to contribute to the preservation of the environment. It supports those who claim that concern for the environment is related to moral thinking (Stern and Dietz, 1994) and has been proven to contribute extra explanatory power over and above the TPB constructs (Harland et al., 1999).

2.   *Environmental attitudes, worldview and knowledge*: it can be expected that moral norms develop from environmental concern and knowledge (ibid).

3.   *Efficacy:* perceived belief about what can be achieved, for example, with respect to ecological behaviour. This is an element of perceived control (Axelrod and Lehman, 1993).

4.   *Identity (behavioural norm)*: several authors have shown that behavioural norm – a construct that refers to perceptions of other's behaviour – provides a more adequate account than subjective norm of the social pressures impacting on behaviour (Forward, 1994).

5.   *Habit*: when behaviour is habitual, behavioural responses are activated automatically and actions can be instigated without the mediation of attitudes or intentions (Verplanken et al., 1994). According to the TPB, past behaviour does relate to intentions for future use but the effect is indirect and is mediated by attitudes and subjective norms. However, a number of studies have found that habits correlate more strongly with intention and behaviour than with other variables in the TPB (Aarts and Dijksterhuis, 2000; Gärling et al., 1998, Forward, 1994 and 1998).

The result was 105 attitude statements in total hypothesised as pertaining to the constructs identified. In addition, a further 25 statements measured 'life values' (using the Rokeach's value survey (Rokeach, 1968)) and 9 measuring attitudes to actual or potential National Trust transport policy options. Outcome beliefs were measured on a two-part scale eliciting how important and how each mode rates on 22 affective (e.g. excitement) and instrumental (e.g. value for money) outcomes of travelling on a day trip for leisure. Car ownership and travel behaviour was measured using a combination of observed behaviour on the survey day and self-reports of the frequency of use of modes for (i) all journey purposes combined, (ii) day trip travel and (iii) work travel.

3.3 Sample Population

The questionnaire was administered after approaching visitors with a short intercept survey at two National Trust properties near Manchester in northwest England. Almost 100% of those approached stopped for the intercept survey (N=1222), and 78% agreed to take the questionnaire home with them. Of those that agreed to take the lengthier questionnaire home with them (it took an average of 45 minutes to complete), 69% (N=666) returned a usable survey. The final total (666) represents an overall response rate from the first point of contact of 55%. One of the properties (Dunham Massey) was chosen due to its exemplary transport links, being both on a National Cycle Route and having its own hourly shuttle bus service to the local railway station, with connecting services to the Manchester metro network. The second property, Quarry Bank Mill, is served by a public bus route and attracts more families with children and 'one –off' visitors than Dunham Massey. The aim was to attract a good diversity in the range of attitudes and behaviours in order to draw conclusions about all the relationships between the constructs. This involved ensuring that bus users and cyclists were captured in adequate numbers, even though they may be over represented with respect to the actual visitor population.

3.4 Statistical Analysis

Before the segmentation analysis was undertaken, factor analysis was used to identify the smallest number of sets of highly correlated variables and to create a set of factors to be treated as uncorrelated variables in further analysis. In total, 105 attitudinal statements were subjected to principal components analysis with Varimax rotation. 19 factors were generated representing constructs including moral norms, general

attitudes towards the car, environmental beliefs, social (combined with behavioural) norms and perceived behavioural control. In addition, constructs pertaining to psychological attachment to the car akin to 'habit' were identified. 17 of these factors were found to have sufficient internal reliability (Cronbach's Alpha > 0.65) to be subsequently used in the cluster analysis to find naturally occurring homogenous attitudinal groups of visitors. Table 1 displays these 17 factors with the defining (highest loading) attitude statement;

**** Insert Table 1 about here ****

The variables produced by the factor analysis were entered into a cluster analysis procedure. The goal of cluster analysis is to identify homogenous groups of clusters of cases. It does this by maximising the distance between groups whilst simultaneously minimising the distance within a group. This involved using a two stage approach utilising an agglomerative procedure (Ward method) to identify structure in the data and generate cluster centres, and using these as a starting point for a more robust non-hierarchical (K-means) cluster procedure. Stopping rules, cross validation procedures and subjective criteria identified as appropriate from the literature were used to choose the correct number of clusters (Hair et al., 1998; Mitchell, 1993 and see Anable, 2002b for further explanation).

Because lack of access to a car is an objective constraint which limits mode choice, combining people with and without a choice may have overridden the power of attitudes to form clusters and explain behaviour. In the questionnaire, some attitude statements pertained only to those claiming to have access to a car for the majority of

leisure day trips, thus generating a large amount of missing data on these variables from those without access to a car. As a result, two groups were initially formed *a-priori* on the basis of those who did and did not have regular access to a car as a driver or passenger. Each group was subject to cluster analysis separately to see whether differences in behaviour, interpretable in terms of attitudes, resulted among groups with the same choice sets determined by access to a car (notwithstanding other restrictions on access not controlled for at this stage).

Once the cluster solution was chosen, the segments were profiled with respect to their attitudes and values and then compared for significant differences in socio demographic characteristics and current travel preferences and future intentions. Conclusions were made as to the consequences of such a typology for the design and promotion of demand management initiatives.

4. Results

4.1 Psychographic profiles of the segments

The cluster analysis concluded that six relatively stable groups could be identified in total: four car-owning and 2 non car-owning. By virtue of the clustering procedure and its use of latent variables created by the factor analysis, each of these clusters has a unique psychographic profile. After some time was spent on profiling, each segment was given a name to represent its characteristics. These labels are revealed in Table 2 together with the relative sizes of the clusters[2].

---

[2] These percentages are specific to this sample only and subject to some disproportionality given the purposive sampling adopted.

The first step in profiling is to examine all the cluster means for the variables used in the profiling. Table 2 displays mean factor scores for each of the segments identified. Factor scores are standardised variables with a mean of zero and a variance of 1 across the sample. These values represent composite ratings on those attitudes that carry essentially the same information in a more compact form (Hair et al., 1998). Each original attitude statement was scaled from 1 to 5 with higher scores pertaining to more favourable views of the environment or 'anti' car / pro-public transport sentiments, and the factor scores follow this pattern. It is also important to know which means are significantly different from each other. This is shown in superscript. All mean differences are significant at $p < 0.05$.

*** Insert Table 2 about here ***

In summary, the population falls into 6 distinct groups with respect to their scores on various components of the TPB and additional factors such as environmental concern, participation in pro-environmental behaviour and moral obligation. The four car-owning segments display significant differences in the extent to which they exhibit psychological attachment to the car, feel responsible for the environmental effects of their car use and perceive behavioural control over using alternatives to the car. The largest segment in this sample, the *Malcontented Motorists*, for example, perceive a high number of constraints to the use of public transport despite feeling increasingly frustrated and unhappy with car travel and believing that they have a moral responsibility to change behaviour. The *Complacent Car Addicts* on the other hand admit that the use of alternative modes is possible, but do not feel any moral imperative or other incentive to alter their car use. The *Aspiring Environmentalists*

have already substantially reduced their car use largely for environmental and health reasons but appreciate the practical advantages of car travel and are thus reluctant to give up ownership entirely. The *Die Hard Drivers* are fond of cars and car travel, believe in the right to drive cheaply and freely and have negative feelings towards all other travel modes.

The two non-car owning segments are also differentiated by these variables, although it is clear that 'actual control' factors in the form of age and income have a role in the profile of these groups. Nevertheless, there is evidence to suggest that the *Car-less Crusaders* have sacrificed car ownership for environmental reasons and have positive evaluations of all other modes. The *Reluctant Riders*, on the other hand, are involuntary users of public transport due to health or financial reasons. They would prefer to travel by car and either aspire to owning a car in the future or accept lifts by car when possible.

Table 3 displays a brief description of the segments based on these factor scores.

*** Insert Table 3 about here ***

4.2 Socio-demographic Characteristics

Traditionally in market research and in the investigation of travel behaviour, socio-demographic characteristics have been relied upon as correlates with behaviour. Similarly, attitudes, preferences and beliefs have been found to be dependent on such characteristics as gender and age (Golob and Hensher, 1998). Therefore, it is necessary to investigate the demographic composition of the segments in order to

prove or disprove the hypothesis that any changes in attitudes and differences in travel behaviour could simply be attributed to personal characteristics. The analysis concluded that this was not the case.

Overall, there are very few statistically significant differences with respect to socio-demographic indicators between the four regular car access segments (Table 4). This demonstrates that attitudes and opinions largely cut uniformly across demographic characteristics. Education appears to be the only demographic variable to distinguish the groups. The *Aspiring Environmentalists* comprise the most highly educated segment and the *Complacent Car Addicts* are the least educated of the car-owner groups, possibly contributing to their differences in environmental concern and moral norm. However, the *Car-less Crusaders* and the *Reluctant Riders* are notably different from the other four groups on many characteristics, although not so much from each other. The non-car owning groups tend to be older, particularly the *Reluctant Riders*, and consequently comprise more retired members and have fewer children at home. It must be noted that age, income and socio-economic status vary less within this specific sample of respondents than among the general population. As such, it is not wholly surprising that income etc does not vary significantly among the groups. Nevertheless, any differences that do exist within the sample do not appear to be reflected in the cluster solution apart from between the car-owner and non car-owner groups. This suggests that personal characteristics are not an important determinant of attitudes or any differences in behaviour found between segments of equivalent vehicle availability.

*** Insert Table 4 about here ***

4.3 Travel behaviour and future mode choice intentions

A main objective of the segmentation analysis is to not only identify the salient features of each cluster with respect to the variables used to create them, but to assess whether these attitudinal groupings have any predictive value with respect to travel behaviour i.e. can they predict the likely propensity to use alternatives to the car for day trip travel? The aim is to discover whether the population falls into distinct segments according to their predisposition to use alternatives to the car for general and/ or leisure travel. However, our understanding of the modal choice process will be illuminated even if two or more behavioural segments exhibit similar current travel behaviour profiles as the analysis will determine whether they differ instead with respect to their motivations and constraints acting on this behaviour i.e. to determine whether *the same choices are made for different reasons*. This is a main advantage of segmenting a sample on the basis of attitudes and values rather than by travel behaviour.

The outline statistics in Table 5 illustrate that the attitudinal clusters correspond to distinct behavioural groups with respect to behaviour and intention to use alternatives to the car for both general and day trip travel. Travel 'behaviour' was measured in several ways (both self reported (for 'day-trips', for work and frequency of mode used for all purposes combined) and revealed (mode used to travel to the National Trust property on the survey day)). A selection of these are reported in Table 5.

Two segments, the *Die Hard Drivers* and the *Complacent Car Addicts* exhibit very high car dependence and low intention to use alternative modes. The two non car-

owning segments, as would be expected, show the opposite trends. However, most interesting from the point of view of mobility management and influencing current trends are the *Malcontented Motorists* who currently exhibit high car use but also demonstrate a relatively high intention to change. Moreover, as discussed below, these behavioural trends can be explained with respect to the components of the conceptual model used. Hence, not only does this approach identify target markets, but it also provides detailed diagnostic information about each segment that is useful in designing services and promotional strategies to induce this mode switching behaviour. As a general rule, stronger intentions to use an alternative mode for day trip travel are related to: more favourable attitudes towards alternative modes, less psychological attachment to the car, stronger moral norms and greater perceived control. This is consistent with the TPB and expectancy value framework used for this study.

*** Insert Table 5 about here ***

Figure 1 plots each cluster's average score for the self-reported past use of non-car modes against their average score for intention to use non-car modes for a leisure day trip in the following 12 months. As such, the segments are placed in a line progressing from least likely (*Die Hard Drivers*) to most likely (*Car-less Crusaders*) to use alternatives for day trip travel. All groups have a tendency to indicate a slightly greater intention to use an alternative than is reflected in self-reports of past travel behaviour[3]. However, for some, the gap is slightly greater than others. For the *Malcontented Motorists*, for example, this 'gap' reflects their frustration with their

---

[3] This is in part due to the different levels of specificity on which intention and behaviour was measured. Intention was not a measure of frequency whereas behaviour was.

current dependence on the car coinciding with a strong desire to change their behaviour.

5. Discussion

5.1 Theoretical Implications

The TPB encourages the identification of constraints on intentions and behaviour through the measurement of perceived behavioural control (PBC). This construct proved to be especially useful in the analysis. Without incorporating PBC, many of the groups would appear to behave inconsistently with respect to their attitudes. Inconsistency between attitudes and behaviour is a conclusion that plagues many attitude studies in travel behaviour research. It is clear that perceived behavioural control may account for some of this inconsistency in many cases. For example, the *Malcontented Motorists* and the *Complacent Car Addicts* exhibit relatively similar patters of current behaviour. However, their attitudes, particularly with respect to environmental concern and moral obligations are very different, as are their intentions to use alternative modes in the future. The *Malcontented Motorists* exhibit negative feelings towards car travel and thus appear to act in contravention of their attitudes. However, in this case, the *Malcontented Motorists'* belief that there are too many obstacles to travelling by alternative modes (i.e. low perceptions of control) serve to moderate their behaviour *vis a vis* their attitudes. On the other hand, the *Complacent Car Addicts* are more affected by a lack of moral responsibility and awareness of any need to change their behaviour than by a belief that switching mode would be especially difficult. Hence the current travel choices made by these two groups are very similar, but their attitudes, motivations and future intentions are significantly

different. These examples illustrate the value of segmentation on attitudes rather than on behavioural measures.

The *Aspiring Environmentalists* and the *Car-less Crusaders*, on the other hand, share many of the same norms and attitudes regarding alternative modes, but their behaviour is markedly different. This indicates that favourable evaluations of alternative modes and positive attitudes to the environment do not in themselves bring about favourable intentions/behaviour. Instead, these beliefs need to be combined with strong control beliefs in order to translate these convictions into behaviour. The *Car-less Crusaders* have such strong control beliefs. In addition, the *Die Hard Drivers* display such negative attitudes towards alternatives to the car so that even if they possessed strong perceptions of control, intentions to use these alternatives would still be low. However, the high use of alternatives by the *Reluctant Riders* appears to be determined more by actual constraints on car ownership and use than by either positive evaluations of these alternatives or strong perceptions of control.

On the face of it, this may appear consistent with other findings which claim that information about the negative environmental effects of the car raises public awareness but is usually insufficient to change behaviour (Tertoolen et al., 1998). Nevertheless, in this analysis, environmental concern combined with a sense of moral obligation has helped to account for some of the variance in attitudes, intentions and behaviour. This is particularly evident with the *Car-less Crusaders*, whose convictions *and* intentions are much more favourable than their non car-owning counterpart. It is also evident with the *Aspiring Environmentalists* whose environmental concern and sense of responsibility is significantly greater than that of

the other car owner groups and whose behaviour reflects this. Although not sufficient on their own, the inclusion of measures of environmental concern and moral norm provide additional beliefs that can be targeted in order to change behaviour. By extending the TPB and measuring explanatory factors within an interrelated framework, understanding is improved about the factors underlying the decision to perform or not perform a given behaviour. Altogether this understanding enhances the probability that mode choice behaviour can be modified.

The factor analysis also produced independent measures of psychological 'attachment to the car for leisure' and a more general measure of 'car dependency', each capturing the degree of embeddedness of the behaviour and the degree to which an individual is consciously involved in the mode choice decision. Both these constructs played pivotal roles in the profiling of the car-access segments and, most significantly, discriminated between those with or without a propensity to reduce car use. For some car drivers (the *Complacent Car Addicts* particularly), a major reason for not using alternative modes was not the disadvantages or even perceived difficulties of using these alternatives, but the dominance of the car culture and an overall psychological attachment and dependency on the car. Hence measures of psychological attachment which incorporate a notion of 'habit' or non deliberative decision making may encapsulate a disposition towards travel not covered by more 'conventional' measures of preference or attitude. These measures of psychological attachment appear to transcend other constructs in the model and reduce the need to assume the rational decision making and systematic evaluation of alternatives that is inherent in the TPB or expectancy value type approach.

In conclusion, it is clear is that the behavioural intentions of these segments are interpretable in terms of the dimensions of the conceptual model and the TPB. This theoretical underpinning has shed invaluable insights on the reasons why the same choices can be made for different reasons and why the same favourable evaluations of alternative transport modes can lead to variations in actual behaviour. Most importantly, it has been shown that measurement of 'psychological attachment' to the car akin to an independent measure of 'habit' is an important discriminator between groups with different mode choice behaviours. Hence the research indicates that travel mode choice requires a unique, expanded version of the TPB incorporating notions of moral norm and psychological attachment to the car to improve its explanatory utility in this context. Altogether, the case for segmentation on the basis of combinations of different types of attitudes as opposed to behaviour has been made.

5.2 Insights for Policy

So far it has been established that the clusters formed on the basis of underlying psychological constructs correspond to groups of people with different mode choice intentions and behaviours. Although it has been beyond the scope of this paper to outline in detail the unique combination of variables which define each segment, this approach has the potential to enable a detailed interpretation of the ways in which each group thinks and processes information about the choice of travel mode (see Anable, 2002b). The utility of this approach has been assessed by identifying the most significant constructs, or combinations of constructs, that are important for understanding the propensity to use green modes.

The real value of segmentation, however, lies in its ability to be translated into achievable strategies by using the information to guide decisions. Table 6 consolidates the segmentation evidence in order to illustrate the potential to identify and target the most effective interventions. The table defines each segment in terms of its 'potential switchability', and identifies some factors which may be considered indicative of susceptibility to reduce car use or of the main obstacles to change. In addition, it suggests the most likely 'next best' choice for each segment if it were to opt to travel on a day trip without the car.

*** Insert Table 6 about here ***

Table 6 implies that efforts to encourage the use of alternatives are best concentrated on and specifically tailored towards those segments with the greatest potential to increase their frequency of use. For example, if the National Trust's objective is to stimulate behavioural change as opposed to merely attract more individuals from the non car-access segments, Table 6 suggests that it would not be worth trying to encourage those people who do not currently use alternatives at all and have no intention of using them. Instead, it may be more productive to (i) encourage those who already use alternative modes a little already to use them a little more (the *Aspiring Environmentalists*), or (ii) to encourage those who express a willingness to reduce car travel to begin to experiment with alternative modes (the *Malcontented Motorists*). In the light of the figures for intention and past behaviour (included in Table 6), this amounts to an incremental strategy. However, even small incremental gains can have a significant effect on the total numbers using alternative travel modes and may help to sustain a change in beliefs, attitudes and future intentions.

As Table 6 illustrates, the attitudinal segments help us to identify the factors underlying a decision to perform or not to perform a given behaviour. They essentially provide an indication of how hard people are willing to try to leave the car at home for day trip travel and under what circumstances. Most significantly, each of the six groups identified represented a unique combination of each type of belief, proving that different groups need to be served in different ways to optimise the chance of realising changes in behaviour. The evidence clearly shows *that the same behaviour can take place for different reasons* and that the same attitudes (eg positive attitudes to the environment) can lead to different behaviour (eg a reduction or no reduction in car use).

Table 6 identifies the constructs most resistant to change in each group and those most likely to be threatened when people are asked to change behaviour. This information allows alternative transport services to be presented in contrasting ways so as to emphasise the individuality of the users, avoid stereotypes and therefore address the widest possible audience without relying on the 'average', hit or miss mass marketing approach. This understanding also means that messages can be designed to avoid counterproductive reactions and to achieve a higher degree of acceptance for mobility management policies. Table 6 comprises a framework that could be used to define such promotional campaigns.

Table 6 suggests, for example, that the Malcontented Motorists should respond to promotional messages which remind them of the frustrations encountered with current levels of congestion together with messages which reinforce their moral imperatives

and the potential relaxing qualities of public transport. The Aspiring Environmetalists should require less persuasion to use alternatives, including the bicycle, as long as this group is kept informed of the opportunities available to them. More research is required to understand the most effective types of information for these groups.

Hence, the segmentation approach illustrates that policy interventions need to be responsive to the different motivations and constraints of the subgroups. However, such responses may be less about 'harder' infrastructural changes and more about 'softer' interventions which set out to give better travel information and opportunities with an emphasis on management and marketing activities (Sloman, 2003; Cairns et al. 2004). The ascendance of 'soft factor' interventions on the transport policy agenda will benefit from methodologies that enable individual's perceptions of the benefits derived from travelling on various travel modes to be understood and influenced in a targeted way. Marketing and soft factor interventions can influence an individual's perceptions of the benefits derived from travelling on a particular mode and reinforce favourable attitudes already held. Moreover, psychographic segmentation not only identifies target markets, but also provides detailed diagnostic information that is useful in understanding the unique antecedents that drive each segment's behaviour.

7. Acknowledgements

8. References

Aarts, H. and Dijksterhuis, A., 2000. Habits as Knowledge Structures: Automaticity in goal-directed behaviour. Journal of Personality and Social Psychology 78 (1), 53-63.

Ajzen, I., 1991. The Theory of Planned Behaviour. Organisational Behaviour and Human Decision Processes 50, 179-211.

Anable, J., 2002a. Picnics, Pets and Pleasant Places: the distinguishing characteristics of leisure travel demand. In Black, W.R. and Nijkamp, P. (Eds.), Social Change and Sustainable Transport. Indiana University Press, Bloomington.

Anable, J. 2002b. Mobility Management in the Leisure Sector: The Application of Psychological Theory and Behavioural Segmentation. Unpublished PhD Thesis, The Centre for Environmental Technology, Imperial College, London.

Axelrod, L. J. and Lehman, D. R., 1993. Responding to environmental concerns: what factors guide individual action? Journal of Environmental Psychology 13, 149-159.

Bamberg, S. and Schmidt, P., 2001. Theory-driven evaluation of an intervention to reduce the private car-use. Journal of Applied Social Psychology 31 (6), 1300-1329.

Bamberg, S., Ajzen, I., and Schmidt, P., 2003. Choice of travel mode in the theory of planned behavior: The roles of past behavior, habit, and reasoned action. Basic and Applied Social Psychology 25, 175-188.

Bamberg, S. and Schmidt, P., 1998. Changing travel mode choice as rational choice: results from a longitudinal intervention study. Rationality and Society 10, 223-252.

Cairns, S; Sloman, L; Newson, C; Anable' J; Kirkbride' A and Goodwin' P (2004) Smarter Choices – Changing the way we travel report for the UK Department for Transport July 2004

Curtis, C. and Headicar, P., 1997. Targeting travel awareness campaigns. Transport Policy 4 (1), 57-65.

Davies, D. G.; Halliday, M. E.; Mayes, M. and Pockock, R. C., 1997. Attitudes to cycling - a qualitative study and conceptual framework. Transport Research Laboratory ref. 266.

Forward, S. E., 1994. Theoretical Models of Attitudes and the Prediction of Driver's Behaviour. Uppsala Psychological Reports 343, Uppsala University, Sweden.

Forward, S. E., 1998. Behavioural Factors Affecting Modal Choice: ADONIS. Swedish National Road and Transport Research Institute, Sweden.

Gärling, T., 1998. Behavioural assumptions overlooked in travel choice modelling. In Ortuzar, J. de D. and Willumsen, L. G., (Eds.), Modelling Transport (2nd Edition) Wiley, Chichester.

Gärling, T.; Boe, O. and Fujii, S., 2000. Empirical tests of a model of automobile choice incorporating attitude, habit and script. Paper presented at 9th International Association of Travel Behaviour Research tri-annual conference, Gold Coast, Australia, June.

Garling, T.; Gillholm, R. and Garling, A., 1998. Reintroducing attitude theory in travel behaviour research. The validity of and interactive interview procedure to predict car use. Transportation 25, 129-146.

Gatersleben, B.. and Uzzell, D., 2003. The journey to work: exploring commuter mood among driver, cyclists, walkers and users of public transport. in *Environmental Psychology in the UK* (proceedings of the EPUK conference, June 2003, Aberdeen)

Golob, T. F. and Hensher, D.A., 1998. Greenhouse gas emissions and Australian commuters' attitudes and behaviour concerning abatement policies and personal involvement. Transportation Research D 3 (1), 1-18.

Götz, K., 2003. A research concept for mobility styles. Paper presented at 10th International Association of Travel Behaviour Research tri-annual conference, Lucerne 10-15 August.

Green, P. E. and Krieger, A. M., 1995. Alternative approaches to cluster based market segmentation. Journal of the Market Research Society 37 (3), 221-239.

Hair, J.; Anderson, R.; Tatham, R. and Black, W., 1998. Multivariate Data Analysis (5th Edition). Prentice Hall, New Jersey.

Harland, S. and Wilke, H. A. M., 1999. Explaining pro-environmental intentions and behaviour by personal norms and the theory of planned behaviour. Journal of Applied Social Psychology 29, 2505-2528.

Hensher, D. A., 1976. Market segmentation as a mechanism in allowing for variability of traveller behaviour. Transportation 5, 257-284.

Jensen, M., 1999. Passion and heart in transport - a sociological analysis on transport behaviour. Transport Policy 6, 19-33.

Mitchell, V. W., 1993. Using factor, cluster and discriminant analysis to identify psycholographic segments. Marketing Working Paper No. 9308, Manchester School of Management.

Nilsson, M. and Kueller, R., 2000. Travel behaviour and environmental concern. Transportation Research D 5, 211-234.

Pas, E. and Huber, J. C., 1992. Market segmentation analysis of potential rail travellers. Transportation 19, 177-196.

RAC (Ed. Goodwin, P. B. et al.), 1995. Car Dependence. A report for the RAC foundation for motoring and the environment. ESRC Transport Studies Unit, University of Oxford.

Redmond, L., 2000. Identifying and analysing travel-related attitudinal, personality and lifestyle clusters in the San Francisco Bay Area. MSc thesis published as report no. UCD-ITS-RR-OO-8 Institute of Transport Studies, University of California, Davis.

Rokeach, M., 1968. The role of values in public opinion research. Public Opinion Quarterly XXXII Winter 1968-1969, 547-559.

Schade, J. and Schlag, B., 2003. Acceptability of urban pricing strategies. Transportation Research Part F, 45-61.

Sloman, L., 2003. Less Traffic Where People Live. Transport 2000, London.

Steg, L.; Vlek, C.; and Slotegraaf, G., 2001. Instrumental-reasoned and symbolic-affective motives for using a motor car. Transport Research Part F 4, 151-169.

Steg, L., and Vlek, C., 1996. Car use as a social dilemma: conditions for behavioural change in reducing the use of motor vehicles. Paper presented to annual PTRC European Transport Conference.

Steg, L. and Vlek, C., 1997. The role of problem awareness in willingness-to-change car use and in evaluating relevant policy measures. In Rothengatter, T. and Carbonell, V.E. (Eds.), Traffic and Transport Psychology: theory and application proceedings of the 1996 International Conference on Traffic and Transport Psychology. Elsevier Science, Netherlands, 465-475.

Stokes, G., 1996. Getting commuters onto public transport - a survey in Merseyside. Paper presented to annual PTRC European Transport Conference.

Stradling, S. G.; Meadows, M. L. and Beatty, S., 2000. Helping drivers out of their cars: integrating transport policy and social psychology for sustainable change. Transport Policy 7, 207-215.

Stradling, S.; Meadows, M. L. and Beatty, S., 1999. Factors Affecting Car Use Choices. Transport Research Institute, Napier University, Edinburgh.

Tertoolen, R.; van Kreveld, D. and Verstraten, B., 1998. Psychological resistance against attempts to reduce private car use. Transportation Research A 32 (3), 171-181.

van Vugt, M.; Meertens, R. M. and van Lange, P. A. M., 1995. Car versus public transportation? The role of social value orientations in a real life social dilemma. Journal of Applied Social Psychology 25, 258-278.

Verplanken, B.; Aarts, H.; van Knippenberg, A. and Knippenberg, C., 1994. Attitude versus general habit: Antecedents of travel mode choice. Journal of Applied Social Psychology 24, 285-300.

Wardman, M.; Hine, J. and Stradling, S., 2001. Interchange and Travel Choice (Volumes 1 and 2). Scottish Executive Central Research Unit.

Wedel, M. and Kamakura, W. A. (Eds.), 1998. Market Segmentation: Conceptual and Methodological Foundations. Kluwer Academic Publishers.

Fig. 1: Past Behaviour vs. Intended use of alternatives for at least one day trip in the next 12 months

Past Behaviour vs Intended use of alternatives for at least one day trip in the next 12 months

Y-axis: Intention to use alternatives s in the future (1(definitely not) - 5(definitely))

X-axis: Frequency of leisure day trips undertaken by alternatives in the past (1(never) - 5 (always))

- Car-Less Crusaders
- Reluctant Riders
- Aspiring Environmentalists
- Malcontented Motorists
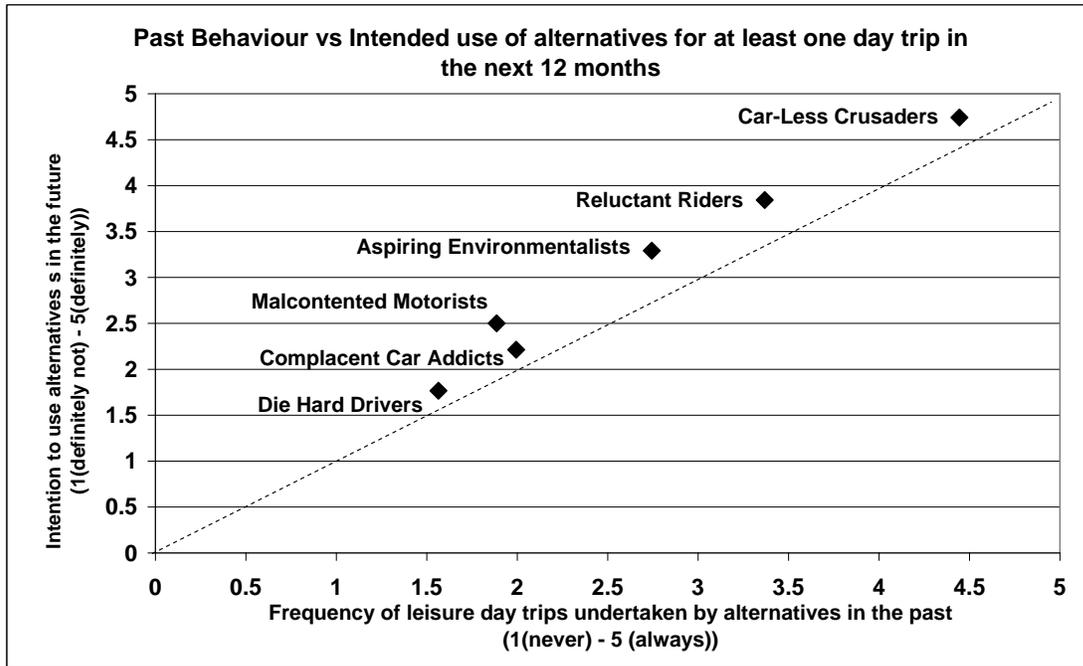- Complacent Car Addicts
- Die Hard Drivers

Table 1: Summary of the factor analysis

FACTOR	Example attitude statement (variable loading most highly on the factor)	No. of variables loading on factor	Cronbach's Alpha (α)
MORALS: Moral responsibility to use the car less	*I am trying to use the car less for environmental reasons*	6	0.82
ATTACH: Attachment to the car for leisure	*Unless I can get to a leisure destination by car, I would not go at all*	6	0.86
CARDEP: General car dependence	*If for some reason you could not longer use a car, would you find it really inconvenient ... more or less every day ... never?*	4	0.78
CONGEST: Effect of congestion on day trips	*Congestion is affecting where I choose to go on a day trip*	4	0.76
ENJOY: Enjoyment of driving	*I like travelling in a car*	2	0.67
EFFICACY: Belief in making a difference	*Reducing my car use will not make a difference to congestion problems because most other people will not reduce theirs*	2	0.66
PBC: Perceived behavioural control	*There are many problems and difficulties with using public transport*	7	0.82
SACRIFIC: Willingness to pay	*How willing are you to pay higher taxes on car use of you knew the revenue would be used to improve public transport?*	4	0.79
EXTRNL: Negative effects of car use	*How important is it to reduce exhaust fumes from traffic in towns and cities?*	4	0.76
SNORMS: Social Norms	*The more other people use public transport, the more I will*	5	0.75
PROCAR: Belief in freedom to use the car	*How important is it to build more roads to reduce congestion?*	5	0.72

CYCLING: Attitudes to cycling	*Most people who are important to me do not think I should cycle*	2	0.65
GREENID: Green identity	*Being environmentally responsible is important to me as a person*	7	0.83
NATURE: Romantic view of nature	*The balance of nature is very delicate and easy to upset by human activities*	5	0.75
EGOIST: Anthropocentric view of nature	*Environmental threats such as global warming and deforestation have been over exaggerated*	4	0.65
ECOPURC: 'Green' purchasing	*How often do you buy organic food?*	4	0.78
ACTIVIST: 'Green' activism	*How often do you attend meetings organised by an environmental group or charity?*	2	0.65

Table 2: Mean factor scores on variables used to derive the clusters and sig. differences

	CAR OWNING				NON CAR OWNING	
	1. Malcontented Motorists 30%	2. *Complacent Car Addicts* 26%	3. Die Hard Drivers 19%	4. Aspiring Env'talists 18%	5. *Car-less Crusaders* 4%	6. *Reluctant Riders* 3%
Attitudes Towards Car Use						
Moral responsibility to use the car less	0.44 [2,3,4]	-0.55 [1,4]	-0.60 [1,4]	0.77 [1,2,3]	N/a	N/a
Attachment to the car for leisure	0.05 [3,4]	0.19 [3,4]	-0.88 [1,2,4]	0.60 [1,2,3]	N/a	N/a
General car-dependency	-0.30 [2,4]	0.03 [1,3,4]	-0.44 [2,4]	0.60 [1,2,3]	N/a	N/a
Affects of congestion on travel	0.34 [2,3,4]	-0.23 [1]	-0.18 [1]	-0.01 [1]	N/a	N/a
Enjoyment of travelling by car	-0.05 [3,4]	0.01 [3,4]	-0.77 [1,2,4]	0.79 [1,2,3]	N/a	N/a
Efficacy of reducing travel behaviour	-0.15 [4]	-0.21 [4]	-0.33 [4]	0.81 [1,2,3]	N/a	N/a
Attitudes Towards Alternatives to the Car						
Perceived Behavioural Control	-0.38 [2,3,4,5]	0.27 [1,3,4,5]	-0.73 [1,2,4,5,6]	0.60 [1,2,3,5]	1.77 [1,2,3,4,6]	0.27 [3,5]
Willingness to sacrifice for the env.	0.16 [2,3,4]	-0.43 [1,4,5]	-0.47 [1,4,5]	0.75 [1,2,3,6]	0.38 [2,3]	-0.13 [4]
Concern for negative effects of car use	0.34 [2,4]	-0.59 [1,3,4,5,6]	0.20 [2]	-0.03 [1,2]	0.07 [2]	0.39 [2]
Social + personal normative beliefs	0.21 [2,3]	-0.06 [1,3,4]	-0.69 [1,2,4,5,6]	0.35 [2,3]	0.48 [3]	0.12 [3]
Attitude towards road building	0.20 [2,3]	-0.34 [1,4,5]	-0.29 [1,4,5]	0.38 [2,3]	0.57 [2,3]	0.19
Attitudes towards cycling	-0.02 [4]	-0.03 [4]	-0.19 [4]	0.42 [1,2,3,6]	0.17	-0.59 [4]
Attitudes Towards the Environment						
'Green' identity	0.14 [2,3,4,5]	-0.65 [1,4,5]	-0.35 [1,4,5]	0.89 [1,2,3,6]	1.01 [1,2,3,6]	-0.07 [4,5]
Romantic views of nature	0.50 [2,3,4,5]	-0.54 [1,3,4,6]	-0.01 [1,2]	-0.09 [1,2,6]	-0.28 [1,2]	0.66 [2,4,5]
Anthropocentric view of nature	0.06 [2,4]	-0.27 [1,4]	-0.07 [4]	0.40 [1,2,3]	0.06	-0.20
'Green' Behaviour						
'Green' purchasing	0.28 [2,3]	-0.66 [1,3,4,5]	-0.02 [1,2,4]	0.42 [2,3]	0.55 [2]	-0.29
Political activity	-0.03 [2,4]	-0.36 [1,4,5]	-0.22 [4,5]	0.75 [1,2,3,6]	0.60 [2,3]	-0.27 [4]

Items in superscript indicate which means are significantly different from each other (ANOVA post hoc analysis (Scheffe test) searching for differences among all combinations of groups)

Table 3: Segment Profiles

---

1. Malcontented Motorists (30%)

- High moral responsibility to reduce car use
- Above average willingness to sacrifice for the environment
- Feelings of guilt when the car is used unnecessarily
- Fairly high participation in pro-environmental behaviours, though less than groups (4) and (5)
- They need persuasion that reducing their own car use will make much difference, as they believe other people will not reduce theirs (efficacy)
- Frustrated with congestion but on balance enjoy car travel
- Express a desire to use alternative modes but they perceive far higher difficulties than all the other groups except group (3), who do not claim to want to reduce car use anyway

This suggests that although they could be willing to reduce car use for altruistic motives and to avoid congestion, they are held back by weak perceptions of behavioural control

---

2. Complacent Car Addicts (26%)

- Do not see many problems with using car use, nor the point of reducing it
- Not attempting to limit car use for environmental or any other reasons
- Low participation in other pro-environmental behaviours
- Below average levels of education
- Their rejection of alternative modes is less likely than group (3) to stem from a particular love of car travel (or a strong dislike of alternatives) - instead, stems from complacency and indifference.
- Distinguished from groups (1) and (3) on perceived behavioural control as they *less* constraints in terms of time, information acquisition and carrying luggage - accordingly, they are less likely to believe that their lifestyle cannot be adjusted to living without the car.

This suggests the obstacles to using alternatives to the car are less related to PBC than a lack of awareness of the environmental implications of behaviour and a moral imperative to change

---

3. Die Hard Drivers (19%)

- Lowest desire to reduce car use
- Highest psychological car dependency
- Claim to be more concerned about the negative effects of car use and value nature more for its own sake
- But unwilling to sacrifice for the sake of the environment
- Feel strongly about an individual's right to use a car
- Particularly enjoy car travel and believe that all their car use is necessary
- Perceive the highest number of obstacles preventing the use of alternatives, particularly time constraints

This suggests a strong resilience to reducing car use as moral and social norms, attitudes and PBC are not in favour of forming intentions to change.

---

4. Aspiring Environmentalists (18%)

- Feel the most responsible for environmental problems
- Pro-environmental behaviour is seen as important and worthwhile

- The negative effects of car use enter into the decision making process
- Don't enjoy travelling by car
- Youngest of all the segments
- Although just under half still admit they would find it difficult to give up the car altogether, this is significantly less than groups 1-3.
- The majority (though less than groups 1-3) still judge public transport to be problematic.
- Compared to group (5) it is clear that they feel more restricted by time constraints and other obstacles

This suggests a practical approach to car use. Both moral norms and attitudes contribute to a high propensity to use alternatives. Perceived constraints limit choice, but these may be less 'perceived' and more 'real' than other groups

5. Car-less Crusaders (4%)

- Statistically this group match (4) on most measures to do with the environment although they have more romantic views towards the value of nature.
- Significantly stronger perception of behavioural control than all the other groups
- Some indication that individuals in this group are slightly more influenced by personal and social norms

The analysis suggests that this group's tendency to favour alternative modes may be due to a high sense of environmental awareness and concern and fewer perceptions of the difficulties with these modes.

6. Reluctant Riders (3%)

- Not particularly motivated by environmental issues
- Despite moderately high concern for the negative effects of car use, they are more reluctant to sacrifice for the sake of the environment
- Participate in fewer 'green' activities than groups (1), (4) and (5)
- Less content with the use of alternatives that the other non-car owner group
- Although time constraints are not a particular problem, a high number perceive many problems with using public transport - they are the same as (2), though less than (1) and (4) in this respect.

This suggests that this group use alternatives less voluntarily than (5) as they are not motivated by altruistic motives and perceive many constraints with their use. Their older age profile and lower income point to 'actual' constraints on behaviour

Table 4: Personal characteristics of each segment

		1. Malcont- ented Motorists	2. Complac- ent Car Addicts	3. Die Hard Drivers	4. Aspiring Env'talist	5. Car-less Crusaders	6. Reluctant Riders	*Sample Ave.*
Gender (females)		55%	41%	56%	50%	59%	84%	*50%*
Age	< 34 yrs	16%	17%	14%	21%	8%	0%	*16%*
	> 65 yrs	17%	8%	19%	12%	35%	63%	*17%*
Employment	FT + PT	64%	63%	62%	70%	39%	21%	*62%*
	Retired	28%	23%	29%	18%	50%	68%	*28%*
Income	< £10k	8%	3%	6%	7%	20%	47%	*8%*
	> £40k	35%	40%	27%	37%	24%	6%	*33%*
Education	NONE	6%	6%	9%	1%	7%	32%	*7%*
	>Degree	53%	48%	53%	69%	37%	32%	*49%*
With kids still at home		30%	31%	35%	35%	4%	5%	*30%*
Single adult household		9%	9%	7%	15%	37%	42%	*12%*
Duel income household		53%	48%	58%	44%	17%	11%	*48%*

Table 5: Selected indicators of travel behaviour and intention per cluster

	1. Malcontented Motorists	2. Complacent Car Addicts	3. Die Hard Drivers	4. Aspiring Env'talists	5. Car-less Crusaders	6. Reluctant Riders
RESOURCES						
Drivers Licence	96.5%	93.7%	95.2%	88.0%	40.7%	52.6%
Vehicle Availability[1]	0.87	0.83	0.88	0.77	0.29	0.42
SELF-REPORTED TRAVEL BEHAVIOUR[2]						
Ave. % trips by car	65%	66%	74%	42%	8%	25%
Ave miles travelled (drivers only)	8911	9247	10477	6902	2107	5625
% using alternatives for day trips ('always' or 'a lot of the time')	2.0%	4.0%	0.8%	18.8%	85.2%	52.3%
OBSERVED BEHAVIOUR						
% using alternatives on survey day	3.2%	4.8%	0%	12%	100%	46.2%
INTENTION						
% intend to use alternatives for a day trip in next 12 mnths	18.0%	12.0%	7.3%	50.0%	100%	72.2%

[1] The Vehicle availability measure indicates the degree of car availability per car driver. It is constructed by dividing the number of vehicles per household by the number of adults with a drivers licence in the household.

[1] Although strictly speaking this measure refers to past behaviour, it is known that modal choice is relatively stable over time and reports of past behaviour can therefore serve as indicators of likely future behaviour.

Table 6: Potential interventions to influence each segment's modal split

	Intention / Behaviour[2]	DRIVERS to use alternatives	CONSTRAINTS on using alternatives	POTENTIAL SWITCHABILITY	POLICY OPTIONS	NEXT BEST MODE
Malcontented Motorists	18% / 2%	*Congestion (negative attitudes towards the car) *Moral obligation to use the car less *Positive qualities of PT	*Perceived control *Psychological attachment to the car *Weak perception of efficacy of individual actions	MODERATE	Promotional messages which reinforce: *Moral obligation and positive qualities of PT (e.g scenery, novelty) *Negative aspects of the car (congestion, stress)	Public Transport
Complacent Car Addicts	12%/ 4%	*Positive qualities of PT *Some indifference to the car	*Psychological attachment to the car *Lack of moral imperative *Lack of information about the costs of car use	LOW	*Education into negative effects of car use and the monetary costs of car use *Promotion of positive qualities of PT (value for money, relaxation)	Public Transport Bike
Die Hard Drivers	7%/ 1%	None	*Weak perceived control *Lack of moral imperative *Strong behavioural and social norms (belief in 'trend setting' and poor image of bus users) *Strong car attachment *Unfavourable attitude towards all alternatives	VERY LOW	*Weaken stereotypical images of PT users *Hard push measures (non fiscal)	None

Aspiring Environment-alists	50%/ 19%	*High moral norm *Strong perceptions of efficacy *Positive attitude towards PT *Some negative views of car *Slightly favourable norms *Wants to set an example to others	*Strong perceived control *Attachment to practical benefits of car use *Actual control (lack of opportunity to use alternatives in some cases) *Lack of knowledge of where alternatives exist	HIGH	*Promote positive aspects of alternatives (fitness, adventure, fun for children) *Reinforcement of environmental message *Promote the difference that individual actions can make *Provide alternatives to the car *Information on alternatives will be used	Public Transport Bike
Car-less Crusaders	100%/ 85%	*High moral norm *Strong perceptions of efficacy *Strong perceptions of control *Positive behavioural and subjective norms *Positive attitude towards pt *Dislike of the car	*Actual Control (lack of alternatives and some age/ fitness problems re. cycling)	VERY HIGH	*Provide alternatives to the car *Information on alternatives will be used *Reinforcement of environmental message *Reinforcement of positive aspects of PT and bike (fun, relaxing etc)	Public Transport Bike
Reluctant Riders	72%/ 52%	*Lack of car ownership (actual control) *Moderate moral obligation to use the car less *Some positive views on public transport	* Weak perceptions of control *Fondness of car travel	VERY HIGH	*Promote positive attributes of PT and coach travel (scenery, sociability, relaxation) *Provide information on alternatives	Coach Public Transport