PERCEIVED BEHAVIOURAL CONTROL AND THE ROLE OF INFORMATION ON CLIMATE CHANGE IN INCREASING SUSTAINABLE TRAVEL

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Abstract

This paper investigates the extent to which information on climate change can influence travel behaviour. Travel behaviour on the aggregate level is unsustainable; in light of increasing awareness on climate change, the need to substantially reduce emissions from the transport sector is growing. The status of travel behaviour has grown both in terms of its potential to fill the gaps left by technological and political progress as well as the potential longevity and transferability of its impacts to coerce the sustainability of other aspects of human behaviour. The role of information on climate change is analysed and its impact on influencing travel behaviour is investigated particularly when considering perceived behavioural controls.
Analysis of results from questionnaires and focus groups shows climate change is viewed as too impersonal, immeasurable and un-mitigable, whilst individuals consider their potential to change too insignificant and futile in terms of impacts and adequacy. While motivation for sustainable travel behaviour is high, perceived ability to do so is consequently low.
This paper concludes by considering how information on climate change can be used to increase perceived ability to change. Information on (i) the availability of alternative travel options, (ii) seemingly effortless behavioural changes and (iii) environmental benefits of change as a by-product, not a driver, have significant potential in bridging the gaps left by technology and policy, towards achieving more widespread sustainable travel.

1. Introduction

The urgency of climate change is continuously reiterated worldwide; the little doubt remaining over the impact of humans on the growth in Greenhouse Gas (GHG) and particularly Carbon Dioxide (CO_2) levels has been devalued (IPCC 2007a). Possible consequences to the global economy, should further action to reduce emissions of GHGs be delayed, would be catastrophic (Stern, 2006). The prospect of irreversible climate change is already present and widespread fears of reaching a tipping point of 'no return' are increasing.

The transport sector is a key player in economic growth, nevertheless it has detrimental effects on the environment and human health. Transport is responsible for a quarter of global GHG emissions and is the only major sector with growing GHG emissions (Woodcote *et al.* 2007). On the aggregate level understanding of the role of transport in exacerbating climate change exists, while existing targets cover all aspects of reductions of GHG emissions from the transport sector, there is a gap between expectations and deliverance of these policies (Stead & Banister, 2001). Emissions thresholds have been set but few have actually been achieved, possibly because anticipated levels of public awareness (and consequential behavioural responses) have been misunderstood or overrated (Nicholson-Cole, 2005). Although awareness of climate change and about the exacerbating role of transport are high, evidence suggests that the public

are unaware of the full impacts of their personal travel and consequently are not inclined to change this (Richardson *et al.*, 2007).

This paper therefore seeks to examine this issue by reporting on a study which investigated awareness and concern for climate change, the relative potential that such concern has within travel behavioural decision making and the role of information on climate change in increasing this. Analysis of questionnaire survey results and focus group discussions from a wide socio-economic and geographic population in Hampshire was carried out to:

(i) Establish and track progress of public awareness of and concern about climate change;
(ii) Establish levels of public awareness of the role of personal transport in climate change;
(iv) Identify perceived barriers to travel behaviour change;
(v) Establish whether information on climate change can drive sustainable travel behaviour.

2. Towards sustainable travel

2.1. The growing threat of climate change
Climate change has been recognized as a global issue with impacts of an international and long lasting nature. Global temperatures could increase by between 1.1°C and 6.4°C, precipitation patterns are expected to become more intense and sea levels could rise by 0.18 to 0.59m (IPCC 2007b). In the United Kingdom alone, temperatures could increase by 2°C to 3.5°C by the 2080s and increase annually by 0.1°C to 0.5°C. UK winter precipitation will rise by 10-35% whereas summer precipitation will drop by 35-50% (UKCIP 2002).

Climate change is both international in terms of its causes and for its solutions. 2°C above pre-industrial levels has become the temperature threshold to which climate change is deemed manageable and acceptable (EC, 2007a). The European Commission has advised a 30% reduction (compared to 1990 levels) in global GHG emissions by developed countries by 2020 in order to achieve this; by 2050 this reduction must be maintained at 50% below 1990 levels equating to a 60-80% reduction for developed countries over the same period (EC, 2007a).

2.2. The role of transport
The transport sector contributes to 23% of the world's CO_2 emissions which have been growing since 1990 (IPCC 2007c). Emissions from road transport contribute to the marked increase in emissions within the EU, USA, China and worldwide (EEA 2008). Although CO_2 emissions in the EU have declined by 7.9% since 1990, globally they are still rising; energy demand from the EU transport sector have increased by 26% highlighting a lack of adequate policies to maintain a reduction in emissions in line with those from other sectors (EEA 2008). Per capita emissions are also rising and with the predicted explosion in population growth anticipated by the year 2050 (UN, 2009), these figures are expected to grow exacerbating climate change further.

Using data from DfT/NTS (2006), DfT (2007), DfT/ONS (2008), DEFRA (2008) and DEFRA/DECC (2009) estimations of passenger emissions per mode in a variety of base units were obtained. Table 1 highlights the significance of the share of emissions from air and car travel, but when considering trip length and trip frequency per passenger, the contribution of each mode varies considerably. This highlights the complexity of estimating modal CO_2 emissions, which is likely to increase when considering the perceptions of ordinary people.

Mitigation strategies must be implemented rapidly and effectively to reduce CO_2 levels to between 445ppm and 535ppm amounting to a cost equivalent to 3% of the World's GDP (Stern, 2006). The EU's 2°C temperature target is accompanied by an emissions reduction target of 8% below 1990 levels by 2008-2012 (EC, 2007b). The UK is committed to reduce its emissions by 12.5%, and has set a national reduction target of 20% by 2010 and 60% by 2050 (Environmental Audit Committee, 2006). The UK is on track to meet its Kyoto target overall, emissions are reducing in each sector apart from those from transport which continue to grow. In order to

reduce transport emissions, considerable changes are needed to increase a sustainable approach to energy consumption.

Mode	Km / person (2006) [1]	kgCO$_2$ / person / km (2008) [3]	Average kgCO$_2$/ person/mode (2006/08)	Average trip length (km) in 2006 [1]	Number trips / person 2008[1]
Car (average petrol-diesel)	9165.7	0.201	1842.30	13.91	658
Bus / Coach	577.9	0.068	39.30	9.47	66
Motorcycle	54.74	0.116	6.35	18.19	3
Train (national)	871.01	0.057	49.65	38.74	24
Air UK Domestic [2]	154.56	0.171	26.43	54.58	3
Air International [2]	3734.3	0.105	392.10	3795	1

Table 1. Annual CO$_2$ passenger emissions per person per km and per person per mode.

2.3. Bridging the gap between expectations and deliverance: the role of behaviour change
Governments can improve the sustainability of the transport sector and reduce its CO$_2$ emissions by addressing supply and demand, the International Energy Agency states four measures to achieve this: (i) reducing the growth of activity, (ii) making transport structure more efficient, (iii) reducing the energy intensity of transport (improving vehicle technology, addressing traffic related issues), and (iv) reducing the CO$_2$ content of fuels (IEA, 2002). With increasing car ownership, falling car occupancy, increased average trip length, and a shift away from public transport use, vehicle fleets are growing worldwide and achievements in energy efficiency have been smaller than expected (DfT, 2009). With high car production (Society of Motor Manufacturers and Traders, 2009) the need for reduced private travel is growing.

Hard measures such as technological and political approaches are not sufficient to achieve reductions in GHG emissions – soft measures are also needed to reduce car usage and dependency (OECD, 2004). Behavioural changes are necessary simultaneously, but crucially the intended behaviour and the target population must be identified prior to implementing behavioural change initiatives (FUTERRA, 2009) which are based on the acceptance of climate change as well as ways to address it (Weggemans, 2004). Acceptance of planning practices, legislative, technological and fiscal measures is dependent on consumer preferences (Rienstra & Vleugel, 1995), yet combining political, legislative, technological and behavioural measures is necessary (OECD, 2004).

3. Attitudes towards sustainable travel and barriers to behaviour change

3.1 Public awareness and attitudes towards climate change and the role of transport
Overall awareness of climate change in the UK is high, however, due to the damaging impacts of climate change projected to occur in areas outside the UK and within the next century, it is often perceived as too difficult to relate to both in terms of space and time (Nicholson-Cole, 2005). Concern and urgency towards climate change is influenced by the certainty and reliability of the knowledge acquired by each individual as well as by personal experience, values and contextual factors (Lorenzoni *et al.*, 2007) and other issues (such as the current economic situation) perceived as more pressing tend to take precedence over climate change (Poortinga & Pidgeon, 2003). Confusion regarding climate change is often the result of poor understanding of the causes, impacts or science itself (King *et al.,* 2009). This often prompts a lack of personal connection to climate change which inhibits individuals from relating to climate change on a

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[1] Data from Tables 1.3 of DfT/ONS (2008) and 3.2 of DfT/NTS (2006) respectively and constitute data from 2006.
[2] From Table 10.10 of DfT (2007): 227,7 billion passenger km for international flights; 9,4 billion passenger kms for domestic flights; divided by UK population estimate (ONS, 2008). Average trip length for Air UK Domestic travel from DfT/ONS (2008). Average Trip length for International flights calculated using average value of long haul (6482km) and short haul (1108km) from Aviation Annex, Paragraph 10 (DEFRA, 2008).
[3] From DEFRA / DECC (2009)

personal level, and as a result a sense of distancing and diminished responsibility emerges (Lorenzoni and Pidgeon 2006). The provision of scientific information will not suffice in influencing behaviour change as these are subject to public interpretation (Sturgis and Allum, 2004) and change does not occur. In light of the urgency in addressing climate change and the role transport plays, perceptions of climate change need to be re-tuned to increase sustainable travel.

Lorenzoni *et al*. (2007) found that perceived behavioural controls were responsible for the lack of behavioural actions. Even individuals directly affected by climate-related events (i.e. intense flooding) did not change their behaviour. Stradling *et al*. (2008) demonstrate that car drivers show more concern for climate change than non-drivers and acknowledge that changes in behaviour would be beneficial, implying a positive response from consumers towards the reduction in car use; yet people continue to travel further and for longer (DfT, 2009). In addition, Norton & Leaman (2004) revealed that people without children were more likely to consider climate change as a serious issue than those without. Although awareness and concern for climate change is high, personally experiencing the impacts of an environmentally-related disaster, acknowledging one's individual impact, or considering the impacts of climate change on one's children will not lead to change in behaviour, whether as a precautionary or reactionary measure.

Misperceptions often lead to a coping mechanism based on denial in order to reduce feelings of guilt and '*to justify inaction in response to the uncomfortable implications of climate change mitigation for high consuming lifestyles*' (Lorenzoni *et al.,* 2007, p453). Salience of climate change, or being able to visualise its scope, is a significant indicator of perceptions of climate change and may help reduce self-denial to a level that can produce behaviour change (Lorenzoni *et al*., 2007). The inability to conceive of the impacts of climate change personally and on others as well as envision the link between personal activities (i.e. energy consumption) as a source of climate change strongly influence the perception that barriers to behaviour exist.

3.2. Perceived behavioural control

A common framework used to investigate the impact of attitudes and intentions on behaviour as well as perceived barriers to change is the Theory of Planned Behaviour (TPB) which states that behaviours depend on attitudes, intentions, social norms and behavioural control: perceived and actual (Ajzen, 1991). *Perceived* behavioural control is the perceived feasibility of performing a behaviour and relates to the resources and opportunities available to an individual which increases the likelihood of carrying out that behaviour; *actual* behavioural control relates to a particular behaviour being carried out (Dijst *et al*., 2008). According to TPB, combining perceived behavioural control with behavioural intention (in this context: sustainable travel behaviour) can be used directly as a tool to predict behaviour (Ajzen, 1991). The importance therefore of perceived behavioural controls contributes to the formation of the intended behaviour. Reducing these controls should consequently increase the likelihood of the intended behaviour occurring (Dijst *et al*., 2008).

According to the TPB, beliefs formed from knowledge and the acquisition of information are principle determinants of actual behaviour (Ajzen, 1991). Information can help determine the value of beliefs but consequently alone, is not sufficient in changing actual behaviour (Anable *et al*., 2006). Information source, type, format, language, deliverance and interpretation all come into play in assimilating and receiving any type of information and so all aspects within this cycle of delivery must be addressed.

The TPB is often used in field of travel demand as it: (i) acknowledges the role of beliefs and emotions in a travel decision; (ii) distinguishes between different types of beliefs; (iii) helps understand the reasons why correlations between attitude and behaviour may be vague; (iv) highlights how attitudes may be based on incorrect beliefs and lead to unsustainable behaviours; and (v) highlights the importance of social norms (Armitage & Conner, 2001). The theory however is subject to criticism: firstly that it lacks the inclusion of the social content of decision

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making (i.e. social norms); secondly that travel is often considered to be habitual and therefore not included in rational choice; and thirdly that the model is rigid and at times incapable of considering other factors that may influence attitudes and behaviour (Aarts & Dijksterhuis, 2000). It also lacks variables corresponding to the influence of habit which play a significant part in behaviour (Lorenzoni *et al*., 2007) however, as highlighted above, perceived behavioural controls are also a strong determinant of behaviour and, within the scope of this paper, central to identify niches where sustainable travel behaviour changes may be achieved.

4. Research methodology

A three-phase approach was adopted to create both a baseline reference and enable progress on public awareness and attitudes to be measured. Phase 1 consisted of a 1st postal questionnaire sent to 4,992 households selected at random in the electoral wards in the county of Hampshire, UK in May 2007; Phase 2 consisted of a postal questionnaire sent to people recruited from the 1st questionnaire between February and October 2008, and Phase 3 consisted of 5 focus groups held in September 2009. The Hampshire Electoral Register was obtained from each Local Authority in Hampshire and used as the sample frame. Issues with response rates and bias can mean obtaining a representative sample may not always be guaranteed (Picardo, 2006), so to reduce low response rates, a pre-paid envelope was provided for the return of completed questionnaires and entrance into a prize draw to win a shopping voucher was guaranteed on return of the second questionnaire. Both questionnaires consisted of variables to determine socio-demographic information as well as:

    (i) Awareness, concern and attitudes of climate change;
    (ii) Knowledge of personal impacts of travel and how to change;
    (iii) Perceived usefulness of travel behaviour change;
    (iv) Perceived ability and willingness to change;
    (v) The role of information on climate change in encouraging sustainable travel.

903 responses were received for the first questionnaire: 18% response rate which is within the expected range for such a questionnaire (Lorenzoni *et al*., 2007). The sample obtained was found to be representative of the UK population in terms of demographic and socio-economic characteristics as well as in terms of transport use and availability of public/private transport options (DfT/ONS 2008). While postal questionnaires are subject to self-selection bias with individuals of extreme views on climate change eager to express themselves, this was addressed by comparing responses obtained with similar studies (Lorenzoni *et al.,* 2007; Anable *et* al., 2006). 43.6% of respondents agreed to take part in the 2nd questionnaire leading to 397 being sent out during Phase 2, 56.9% of which were received completed. The focus groups in Phase 3 took place at the University of Southampton with respondents who had volunteered to take part. Groups consisted of 6-18 participants, with a total of 50; food and travel reimbursements were offered as an incentive. Data obtained was coded and input into a statistical analysis software package (SPSS); a series of tests were then carried out to evaluate the significance of results and identify existing trends.

5. Results and discussion

5.1. Awareness and concern

It is vital to gain an understanding of people's perceptions and knowledge of climate change if CO_2 reduction targets are to be met and sustainable behaviour improved (Lorenzoni *et al*., 2007). Previous studies identify different segments of public perceptions to climate change, but the degree of concern expressed is often found not to be reflected by corresponding lifestyle choices implying the existence of an attitude-behaviour gap (Lorenzoni & Langford, 2005). However, exposure to climate change information has grown considerably in the last 4-5 years (Boykoff and Mansfield, 2009) and it is therefore necessary to re-examine existing attitudes and concern to gauge whether significant changes have occurred. Analysis of questionnaire responses confirms a high level of general awareness (99.4% have heard about climate

change), but when it comes to the impact of humans on climate change, a correlation was found. Respondents where asked about their belief of the human contribution of climate change:

'In your opinion do human activities contribute to climate change?'
(Yes; No; I don't know).

Results show that the sample population is divided into three Awareness groups: 84.3% believe in human-induced climate change ('Human' group), 8.2% are unsure of human contributions ('Unsure' group), and 7.5% believe climate change is not anthropogenic ('Non-Human' group).

While a large proportion of people believe in human-induced (anthropogenic) climate change, those who are Unsure or those who do not believe there is a link to human activities, may present characteristics which could facilitate an increase in awareness and thereby help shift the views of those who are sceptical about the origins of climate change. Identifying these characteristics is therefore crucial, as a shift in behaviour may consequently be achieved solely by increasing awareness of those unsure (or denying) anthropogenic climate change and allowing them to manifest their views in altering their behaviour.

Among all demographic variables (gender, income, profession, etc..) a Chi-Squared Test and Binary Logistic Regression modelling the probability of these age groups belonging to awareness groups highlighted a trend with age only (p=0.029) with three age groups identified: young (less than 25 years old), middle aged (25-54 years old) and older (over 55 years old) people (Figure 1). Other demographic variables therefore could not help explain possible reasons for awareness of climate change. 89.1% of middle aged respondents were found to belong to the 'Humans' group compared to 79.5% of older and 80.6% of younger respondents. This indicates that people aged less than 25 and over 55 years old are *less* likely to believe that climate change is anthropogenic.
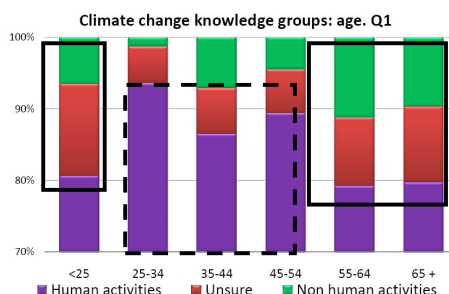

Figure 1. Frequencies of age categories according to awareness groups.

Within the general population, individuals who travel the most are aged between 21 and 69 (DfT, 2009), implying that those within the sample in the 25-54 age group fall into a category of heavy travellers. This inconsistency between awareness and behaviour prompted further investigation into whether a lack of climate change concern influenced this. No significant correlation was found between concern and demographic variables, however it was found to correlate with awareness (p<0.0005). As an individual's concern for climate change increases, so did the likelihood that that particular individual belongs to the 'Human' group and vice versa with the 'Non-Human' group, the latter therefore fits well into the TPB. Discussions from focus groups revealed that various aspects of climate change are understood by the general public reflecting the plethora of information received. An array of attitudes arise which often do not relate to personal levels of responsibility or of ability to change.

5.2. Attitudes towards personal travel and perceived ability to change
Awareness and concern within the sample are high and responses from the focus groups showed that across these three awareness groups, regardless of the perceived cause of climate change a sense of responsibility exists:

'*I don't think it matters whether it is a natural thing or it is a fact of life, the only thing humans can do about it is moderate their behaviour.*'   (Participant 2)

Travel behaviour however remains unsustainable; this may be linked to a perceived diminished responsibility (Stoll-Kleeman *et al.*, 2001). Reasons were investigated further through the analogy of attitudes towards personal travel centred around four areas:

(i)   Awareness of personal impacts;
(ii)   Perceived ability to change travel behaviour;
(iii)   Perception on the usefulness of travel behaviour change;
(iv)   Willingness to change.

No consistent result was found when exploring these individually so a cluster analysis was carried out identifying two distinct clusters (Figure 2). Each was found to vary according to awareness and level of concern. 100% of respondents in Cluster 1 (C1) are in the 'Humans' group, 97.1% are concerned about climate change and the majority (65.2%) are aged 25-54; 80.2% of people in Cluster 2 (C2) are in the 'Humans' group (7.3% 'Unsure' and 12.5% 'Non-Human'), 53.6% are aged 25-54 and 69.1% express concern.
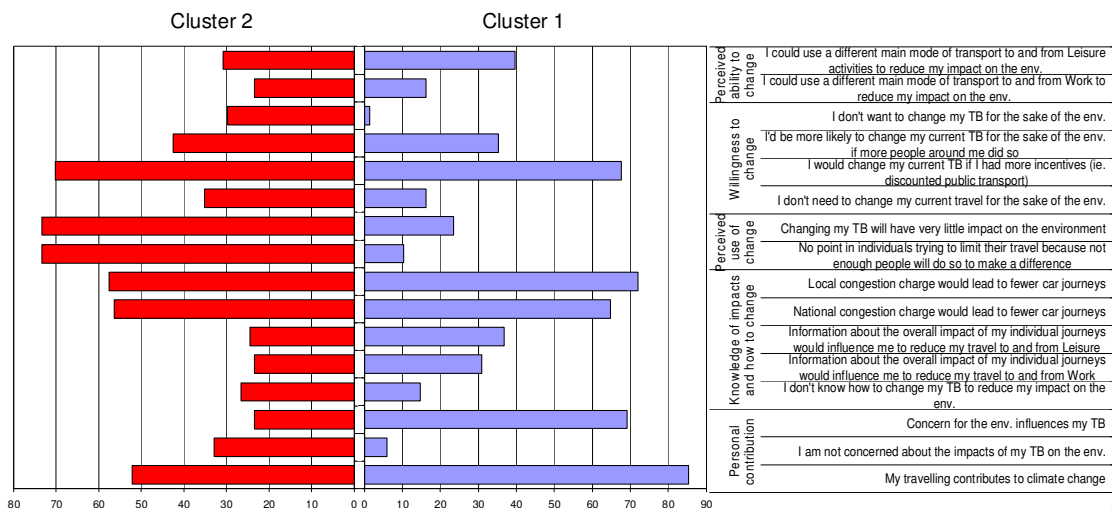

Figure 2. Clusters of attitudes towards personal travel and perceived ability to change.

Both clusters show similarities in terms of perceived ability to change but express a need for incentives for this (i.e. knowledge that peers are actively changing too). C1 and C2 vary in terms of their awareness and acceptance of personal impacts, the stated influence of concern on personal behaviour, willingness to change and the perceived urgency of change. Interestingly, perceptions on the impacts of information on individual journeys and the use this would have in influencing sustainable travel are similar across both clusters, albeit relatively low (25-35% agreement).

Ability to change travel behaviour exists across both clusters but work-related travel is subject to higher resistance implying the existence of habit-related barriers to change. The most significant difference between each cluster is perceived usefulness of change where C1 shows a higher acknowledgement of the environmental benefit of personal behaviour changes than C2. The latter has a high proportion of individuals from 'Unsure' and 'Non-Human' awareness groups and the age spread across each cluster suggests that lower awareness and being less than 25 or over 55 leads to a lower level of perceived usefulness of change.

5.3. Barriers to behaviour change

Misperceptions of modal emissions

How individuals perceive the impact of their personal travel can decipher the level of personal responsibility and thereby detect the nature of certain (perceived) behavioural barriers. Perceptions on the impact of each travel mode were evaluated:

'*Please rank from 1 to 5 how much you think each of the following contributes to climate change per person. (1 being contributing the least and 5 contributing the most'*
(Train; Car; Bus/Coach; Aircraft; Motorcycle)

Perceived (average) rankings obtained where compared to actual rankings of each mode according to Table 1 (Figure 3). This data was examined according to different Awareness groups as opposed to the Clusters as only the former revealed a correlation (p<0.05).
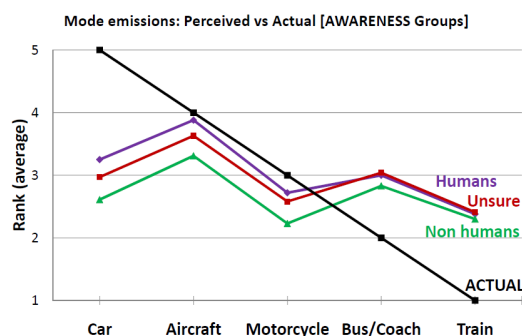

Figure 3. Perceived versus actual modal emissions according to Awareness group.

Car and aircraft emissions are heavily underestimated by all Awareness groups and lower awareness of the causes of climate change was found to lead to this misperception of modal emissions and therefore a likely cause of the attitude that any change will not have a significant impact on the environment. Results show that public perception of modal emissions is subject to confusion and how individual travellers perceive the impacts of their personal emissions influences their awareness on the causes of climate change. When asked about factors influencing mode choice, the environmental impact of transport was considered the least important after convenience, travel time, cost and comfort; the environment is thereby seldom considered when choosing a mode. This could be attributed to the previously detected underestimation of the magnitude of car emissions or the lack of consideration of the reduction of emissions as the number of passengers increases (i.e. car occupancy versus trains). This highlights the need for clear information on the environmental impacts of cars to increase precise knowledge and reduce confusion.

Preference for measure perceived as cheapest and causing minimal disruption

In terms of how to address the sustainability of travel, respondents were asked to rank several measures according to how much they believed these would be effective (Figure 4):

'*How effective do you think the following would be to make your travel behaviour more environmentally friendly?'*
(Technological vehicle advances; Technological information advances; behaviour change; taxes & charges; legislation; carbon offsetting)

Behaviour change was ranked the second most efficient measure (behind vehicular technological advances) to increase environmentally friendly travel across both clusters highlighting the recognition of the potential of behaviour change. Individuals rely primarily on technology to take increase sustainable travel; the recognition that behaviours also play a crucial part reinforces existing levels of willingness to change.

C2 members considered carbon offsetting as more efficient than taxes or charges to address unsustainable travel reinforcing the Low-Cost Hypothesis which states people will only make behavioural changes for environmental reasons if these are at a minimum cost and cause least inconvenience (Diekmann & Preisendörfer, 2003).
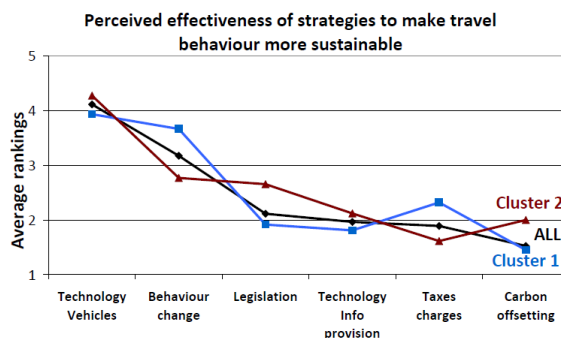

Figure 4. Perceived effectiveness of measures to increase travel behaviour sustainability.

The perceived lack of ability to change one's travel behaviour driven by finance and convenience. This results in self-justification to increase sustainable behaviour in other areas of one's daily life such as recycling or domestic energy efficiency. The environment is therefore not a driver for behaviour change but can be perceived as a positive side-effect which subsequently leads to a sense of environmental pride resulting in more sustainable behaviour elsewhere.

> '*It's justifying it to yourself. Thinking I need to travel so many miles to work but if I do those other things, that'll balance it out*' (Participant 1)

> '*Making an option that's cheaper and more convenient, but if there's an environmental benefit as well that makes them feel good about it then I think they will do that. Probably one of the reasons recycling has been so successful is because it's been straightforward for people, it's been managed in a way that they can deal with and they had to do something very difficult.*' (Participant 3)

No suitable alternative or information on alternative
Alternative modes of transport are perceived as inadequate to meet daily travel needs in terms of efficiency, punctuality, safety, convenience, cost-efficiency, accessibility, comfort and flexibility. The car is perceived as a mode satisfying these and providing independence, climate change is not a strong enough driver to alter this.

> '*The car is a wonderful invention, the freedom to see things and go places, you can take your whole family.*' (Participant 4)

> '*Buses (...) if they arrived on time at the next stop to allow you perhaps to make the next connection to go somewhere else, instead of 10mins after and making you sit at the bus stop for an hour waiting for the next connection...*' (Participant 5)

In spite of the perceived inability to give up the use of the car and the inadequacy of alternative modes of transport confirming results from Hares *et al*. (2009), the ability to see a return of the financial penalties attributed to car use (fuel tax, congestion and parking charges) into the public transport is not only considered a major a significant encouragement to modal changes, but would enable further public acceptance of financial measures and environmental obligations.

> '*Governments make so much money off the motorist but we don't seem to be seeing any improvement in the buses and trains and the integration of transport*' (Participant 5)

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5.4. Using information on climate change to maintain sustainable travel behaviour
Understanding perceived behavioural controls is a necessary tool in influencing behaviour (see Section 3.2) and results from this study have shown that barriers to behaviour change dominate the lack of sustainable travel behaviour. The importance of knowledge acquisition and the part played by information is unquestionable. However the high levels of awareness and concern for climate change reflect the success of the abundance of information available but are not translated to sustainable travel behaviour (DfT, 2009). The nature of information provided needs to be re-examined, results from focus groups demonstrate that the volume of information is problematic and that it needs to be re-tuned to enable switches to sustainable travel behaviour.

> '*It's shown on TV as well, but you have to be careful of overkill, people get fed up and then it becomes meaningless.*'   (Participant 6)

> '*I don't think there's any shortage of information on climate change, it's on TV every night, you can't watch the news without there being at least one story on it. It's out there and people know it yet people are still getting into their cars and driving (...).*' (Participant 3)

Information must be relevant, concise and related to costs in line with the Low-Cost Hypothesis, emphasising individuals' needs to see the benefits of behaviour change in terms of financial and convenience gains, with incentives to encourage behaviour change being a strong motivator.

> '*For travel, if you actually told me how much that share of pollution was costing me X amount of pounds, I would start thinking more. It's when value of money comes into the equation, that's when you start thinking about it.*'   (Participant 7)

> '*It's an information thing isn't it? (…) I think the one thing you can do to influence people's travel behaviour is money: make it simple, straightforward and cheap for people to do the alternative.*'   (Participant 3)

> '*(…)In other words, you encourage people to do it rather than this thing where people feel they're being picked on. It should be the other way, there should be some encouragement and incentive to do it.*'   (Participant 1)

The perceived usefulness of changing behaviour is consequently catered for and the environmental benefits are translated into a 'feel good' sensation. Using a system which produces minor levels of guilt to induce shifts away from habit can be achieved by informing on the ease and benefits of behaviour changes.

> '*It's one thing to say it but it's another thing to actually do it. It's a very hard thing to do, to make any significant changes to your life.*'   (Participant 8)

> '*We need to relate it to things people understand. Cost is the major driver. If someone told me that by not doing this journey you've saved two feet of the ice caps, it's going to make me think I'm not going to do that.*' (Participant 9)

Using specific objectives, adapting them to specific audiences, and applying specific methods to deliver information which addresses the above issues will ensure individuals' needs are met. Providing adequate information will reduce the constrictiveness of perceived behavioural control and contribute to environmental awareness able to induce sustainable travel behaviour.

6. Conclusions
This paper has shown that in spite of a high degree of awareness and concern among individuals sampled, travel behaviour lacks in sustainability. Age was found to be the only significant demographic variable influencing this with people aged less than 25 and over 55

years old more likely to express uncertainty and denial on the anthropogenic nature of climate change. Concern for climate change was found to increase with increasing awareness of the causes of climate change implying that a lack of personal relation to the issue was linked to the attribution of the causes.

Awareness of poor sustainable travel behaviour was also high and perceptions of altering this were categorised into two clusters which varied according to awareness of the causes of climate change. The first consisted entirely of human-induced climate change believers characterised by a high feeling of environmental responsibility, obligation and willingness to change. The second cluster contained a mix of individuals believing, doubting and refuting the anthropogenic nature of climate change stating current behaviour patterns were limited and expressing low comprehension of the environmental benefits of changing resulting in low willingness to change.

Barriers to behaviour change were found to be related to habit, misperceptions of modal emissions, perceptions of environmental impacts of travel, cost, convenience and lack of incentives to change. It was found that, although recognition of the need to travel sustainably exists, the lack of willingness to change travel behaviour translated into other sustainable behaviour mainly on the domestic level as a way of compensating for this perceived inability. Necessary incentives required to change travel behaviour were found to be related primarily with costs highlighting the financial benefits of switching to sustainable travel behaviour as well as the convenience and ease of doing this whilst causing minimal disruption to current lifestyles.

In order to alleviate the constrictive nature of these perceived behavioural barriers, information was found to be an invaluable tool in delivering a message promoting travel behaviour change showing the environmental impacts of changing and to promote a sense of environmental pride. The need for an information package ensuring transparency of financial penalties and how these are returned into areas such as public transport was particularly highlighted. The ease and benefits associated with changing travel behaviour was a strong necessity suggesting that climate change information is more likely to deliver behaviour change if used as a positive bi-product of voluntary behaviour than as a driver.

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