

Barriers perceived to engaging with climate change among the UK public and their policy implications

Irene Lorenzoni^{a,b,*}, Sophie Nicholson-Cole^b, Lorraine Whitmarsh^b

^a*School of Environmental Sciences, University of East Anglia, Norwich, NR4 7TJ, UK*

^b*Tyndall Centre for Climate Change Research, School of Environmental Sciences, University of East Anglia, Norwich, NR4 7TJ, UK*

Received 25 August 2006; received in revised form 12 January 2007; accepted 17 January 2007

Abstract

This paper reports on the barriers that members of the UK public perceive to engaging with climate change. It draws upon three mixed-method studies, with an emphasis on the qualitative data which offer an in-depth insight into how people make sense of climate change. The paper defines engagement as an individual's *state*, comprising three elements: cognitive, affective and behavioural. A number of common barriers emerge from the three studies, which operate broadly at 'individual' and 'social' levels. These major constraints to individual engagement with climate change have implications for achieving significant reductions in greenhouse gases in the UK. We argue that targeted and tailored information provision should be supported by wider structural change to enable citizens and communities to reduce their carbon dependency. Policy implications for effective engagement are discussed.

© 2007 Elsevier Ltd. All rights reserved.

Keywords: Climate change; Engagement; Barriers; Public perceptions; Mitigation; Behaviour

1. Introduction

With entry into force of the Kyoto Protocol, climate change is receiving wide recognition from the international community. The weight of scientific evidence points to a significant human contribution towards changing the world's climate (IPCC, 2001, 2007). Impacts on human and natural systems will be severe and potentially irreparable unless mitigative action is taken to stabilise atmospheric greenhouse gas concentrations (Schellnhuber et al., 2006).

The UK government has taken a lead in focusing political and economic attention on the state of the climate, in particular during its presidency of the European Union in 2005 and the G8. The UK is currently on target to achieving the 12.5% reduction in levels of six main greenhouse gases by 2010, relative to 1990 levels, as set by the Kyoto Protocol. This is primarily due to changes in

energy supply mix, increasing the use of gas compared to oil and coal (known as the 'dash for gas') since the late 1980s. Most other EU member states, however, are likely to fall short of their targets (Institute for Public Policy Research, 2005). The UK has also widely publicised its target to reduce national carbon dioxide emissions from 1990 levels by 20% by 2010 and its aspiration of 60% cuts by 2050 (DTI, 2003). The UK government recently announced, however, that it would not be able to meet its 20% target (DEFRA, 2006a), as recent carbon dioxide emissions have risen (DEFRA, 2006b). This has implications in the long run for achieving the 60% target and suggests a need to reduce emissions across all sectors. Climate change as a 'wicked' issue (see, for example, Lorenzoni et al., 2006) and one which is linked fundamentally to energy consumption, implies a need for a radical change in values, behaviour and institutions towards a paradigm of lower consumption. Indeed, the basis underlying the UK Government's 60% carbon dioxide emissions reduction aspiration is the need for widespread social change, including by individuals.

Based on governmental data (DTI, 2002) on sectoral energy consumption, Hillman (2004, p. 33–4) estimates the

*Corresponding author. School of Environmental Sciences, University of East Anglia, Norwich, NR4 7TJ, UK. Tel.: +44 1603 593173; fax: +44 1603 591327.

E-mail address: I.Lorenzoni@uea.ac.uk (I. Lorenzoni).

proportion of energy consumption by individuals—including for domestic use and personal transport—at 51% of total UK energy use. The limited attention given to behavioural change in the UK's climate change policies (DoE, 1994; DETR, 2000; HM Government, 2006) focuses on *voluntary* reduction of energy use by individuals, encouraged through provision of information and economic incentives and subsidies. To date, however, this approach seems to have had little or no impact on individual behaviour. In the UK, energy demand is in fact rising in domestic and transport sectors, with 79 million tonnes of carbon dioxide equivalent (MtCO₂eq) emitted by the residential sector in 1990 versus 83 MtCO₂eq of 2005. Similarly, calculations show road transport contributed 120 MtCO₂eq in 2005, 109 MtCO₂eq in 1990 (DEFRA, 2006b). This emphasis on voluntary measures reflects the general reluctance by governments to regulate individual and industry behaviour in relation to environmental issues, and the work towards 'removing red tape' (The Cabinet Office, 2006; Hinchliffe, 1996). This reticence stems from fear of electoral protest,¹ close relationship with industry (e.g. Gow, 2006), a focus on economic growth, and the short-term priorities of government which are linked to its limited period in office.

There is a wealth of literature concerning public perceptions of climate change, demonstrating a wide general awareness of the issue. For example, only 1% of the English public have not heard of either 'climate change', 'global warming' or the 'greenhouse effect'; indeed, most people say they know the main causes of climate change and are concerned about it (DEFRA, 2002). However, in the context of other issues, even many environmental issues, climate change takes a low priority (e.g. Poortinga and Pidgeon, 2003). Furthermore, only a minority of the public take measures to reduce their energy consumption (e.g. DEFRA, 2002; Norton and Leaman, 2004).

Building on this literature, this paper explores the constraints that individual members of the UK public perceive to mitigating climate change, including changing their own behaviour. It also addresses some of the reasons underlying these perceived constraints and discusses policy implications for encouraging engagement. In order to do this, the paper draws in particular upon findings of three recent mixed-method studies conducted in the UK on public perceptions and responses to climate change.

2. Background and context

There is increasing concern in the UK with public "engagement" as a means for involving the public in decision-making about science issues (Whitmarsh et al., 2005; House of Lords Select Committee on Science and Technology, 2000). Efforts have traditionally concentrated

on the provision of scientifically sound information as a means to educate the public, change behaviour and gain support for policy (Eden, 1996). However, researchers in sociology of scientific knowledge (Sturgis and Allum, 2004; Irwin and Wynne, 1996) have argued for the inadequacy of this "deficit model"; rather, they demonstrate that interpretations of science by the public are mediated by societal values, personal experience, and other contextual factors. Recent research and practical initiatives have attempted to develop methods and approaches for enabling dialogue with the public and stakeholder engagement (Davies et al., 2003). These approaches elicit the views of citizens at a given point in time or at regular intervals and enable them to deliberate over an issue, but are generally less concerned about changes in individuals' lifestyles or perspectives beyond the dialogue process (e.g. Horlick-Jones et al., 2004; Kasemir et al., 2003b).

In developing sustainable solutions to climate change, enabling long-term changes in individual attitudes and lifestyles is as crucial as public involvement in the democratic process. The term "engagement" in this paper it is taken to mean a personal *state* of connection with the issue of climate change, in contrast to engagement solely as a *process* of public participation in policy making.² A state of engagement is understood here as concurrently comprising cognitive, affective and behavioural aspects. In other words, it is not enough for people to know about climate change in order to be engaged; they also need to care about it, be motivated and able to take action. Although energy conservation can be enacted without an understanding of climate change (e.g., if financially motivated) (Stern, 2000), mitigation policies risk being ineffective or rejected by a public lacking an understanding of the issue. The three facets of engagement are not related in a linear fashion, rather they comprise complex behavioural ecologies (e.g. Guagnano et al., 1995). For instance, behaviour change can precede cognitive or affective change (e.g. Bem, 1967). In turn, cognitive, affective and behavioural aspects of engagement are in large part a product of social and institutional contexts. The risk and environmental psychology literatures highlight the range of influences—including past behaviour, knowledge, experiences, feelings, social networks, institutional trust, demographic background—on individual attitudes and behaviour towards environmental issues (Blake, 2001; Kollmuss and Agyeman, 2002). Attempts have been made to model these various influences (cf. Stamm et al., 2000; Ajzen, 1991). For example, the Theory of Planned Behaviour, which postulates that beliefs (about the behaviour in question, subjective norms and perceived behavioural control) determine intention to act

²In making this distinction, we are not claiming that the two types of engagement are unrelated; indeed, the degree of personal engagement will undoubtedly influence an individual's participation in an engagement process. While we recognise the importance of debate around the issue of climate change for a healthy democratic society, this paper defines engagement as support for climate change mitigation and reducing carbon dependency.

¹As demonstrated by the protests in 2000 over increases in fuel duty, which led to government withdrawing the yearly fuel duty escalator.

and consequent behaviour, has been used to predict environmental behaviour (Hines et al., 1986–87). However, this theory has been critiqued on the grounds that it presents an overly individualistic and rational perspective of behaviour, and more contextual models have been proposed (e.g. Guagnano et al., 1995). For example, Bamberg and Schmidt (2003) and Verplanken et al. (1997) demonstrate that car use is often determined by habit, rather than conscious decision-making. In a review of the literature, Stern (2000) highlights that contextual forces, personal capabilities and habits, in addition to attitudinal factors, influence behaviours. These complex dimensions of engagement are little understood in the context of climate change.

To what extent can we say there is already public engagement with climate change? The literature on public understanding of climate change indicates widespread awareness of the issue and a general concern, but limited behavioural response.

Firstly, there is near universal awareness of climate change in England (DEFRA, 2002). However, self-reported knowledge is more patchy: 59% of the British public say they know ‘a fair amount’ or ‘a great deal’ about climate change (Norton and Leaman, 2004), whereas only a quarter maintain they are ‘well informed’ (Hargreaves et al., 2003). This reflects similar findings in the USA. Kempton (1997) for instance found that US citizens’ general awareness does not correspond to a detailed understanding of causes, consequences and solutions of climate change. A more recent British survey (Poortinga et al., 2006), however, found that people are generally able to identify both anthropogenic and natural influences on the climate. Studies suggest that whilst most people accept that individuals are having some influence on the climate, some of the more specific details are misunderstood. For instance, there is still widespread association of the hole in the ozone layer with climate change (Hargreaves et al., 2003; DEFRA, 2002; Kirby, 2003; Poortinga et al., 2006). It is important to note that findings are subject to the elicitation methods used; when respondents are not provided with a checklist of causes, their understanding tends to be lower (e.g. Read et al., 1994; Norton and Leaman, 2004).

Secondly, concern about climate change has increased over the past two decades (Thompson and Rayner, 1998; DEFRA, 2002), and especially since 2003 (GlobeScan, 2006). Whilst people associate climate change with negative feelings and maintain that they are very concerned (Poortinga and Pidgeon, 2003; OST and MORI, 2004), the issue is not one of the public’s main environmental concerns. For example, in England disposal of hazardous wastes, livestock methods/BSE, water and air pollution, loss of plants/animals in the UK, tropical forest destruction and ozone depletion are rated more concerning than climate change (DEFRA, 2002). Furthermore, health, security and other social issues are more important than environmental issues for the public (e.g. Norton and

Leaman, 2004; Poortinga and Pidgeon, 2003; MORI, 2005; Bord et al., 2000).

The low ranking of climate change reflects a widespread perception amongst the public that the issue is generally perceived to be removed in space and time. Whilst it is considered socially relevant, most individuals do not feel it poses a prominent personal threat (Lorenzoni and Pidgeon, 2006). In the UK, 52% of people believe that climate change will have ‘little’ or ‘no effect’ on them personally (BBC, 2004, see also; Poortinga and Pidgeon, 2003; Hillman, 1998). The Energy Savings Trust (2004) found that 85% of UK residents believe the effects of climate change will not be seen for decades.

Thirdly, in relation to behavioural change, the literature focuses predominantly on energy reduction actions irrespective of the motives underlying these. For example, of the minority of people who conserve energy, most do so for financial and health reasons rather than for environmental ones (DEFRA, 2002). Few studies in either Europe or the US address individuals’ willingness to alter behaviours in relation to climate change (Bord et al., 2000; O’Connor et al., 1999; Stoll-Kleemann et al., 2001; O’Connor et al., 2002; BBC, 2004). Only one study has examined people’s actual actions, and found recycling to be a more common mitigative response than energy reduction (Whitmarsh, submitted). Among actions people are willing to undertake, recycling and energy conservation in the home are the most frequently mentioned, while there is resistance to changing travel habits. In relation to energy policies, incentives and technological solutions receive more support than taxes or higher bills (Shackley et al., 2004; Kasemir et al., 2003a; O’Connor et al., 1999).

So why is there limited public engagement with climate change? The disparity between public awareness and concern about climate change on the one hand, and the limited behavioural response on the other is consistent with the widely-reported ‘value-action’ or ‘attitude-behaviour’ gap (e.g. Blake, 1999; Kollmuss and Agyeman, 2002; Eiser, 1994; Ungar, 1994). The public understanding of climate change literature indicates that individuals perceive a wide variety of barriers to engaging with climate change. However, there are only a few examples in the literature which explicitly address these barriers. Stoll-Kleemann et al. (2001) discuss the psychological barriers of dissonance and denial to behavioural change in light of alternative energy futures. In addition to these, the perceptions literature also suggests that there are other barriers, including social and institutional (Blake, 1999). Social identity has been shown to be an important influence on people’s energy use (Layton et al., 1993; Steg et al., 2001), which implicitly highlights the difficulty in changing consumption behaviours. The 2004 BBC poll (BBC, 2004) found that only just over half of the British population believed that changing their own behaviour would have an impact on climate change. Furthermore, Darier and Schule (1999) found through qualitative work that many people in the UK want Government to

impose regulations to make them act, because they consider only collective action to be effective in response to climate change (see also Hinchliffe, 1996). This may reflect a more profound disenfranchisement and lack of trust among the British public that has been observed elsewhere in relation to other environmental and political issues (e.g. Blake, 2001). This range of barriers are also encompassed in Tanner's (1999) ipsative theory of behaviour which identifies internal and external conditions as potential constraints to pro-environmental action.

Building upon this emerging evidence, this paper draws on three recent UK studies to provide a more in-depth and comprehensive analysis of the range of perceived barriers to UK public engagement with climate change. We classify these barriers at two distinct, but interrelated, levels: individual and social. We argue that the existence of widespread and ingrained social barriers poses particular challenges for climate change mitigation efforts, and undermines reliance on voluntary action by individuals. The following section outlines the three studies. Their findings are reviewed in Section 4 and discussed in Section 5 with some reference to implications for policy.

3. Methods

The three studies undertaken in the UK over the last 5 years make use of mixed methodologies, involving both qualitative and quantitative approaches. This, we have found, allows a certain degree of triangulation of the findings and underlines their complementarity. The three studies provide a more qualitative and analytical approach to investigating the UK public's engagement with climate change: previous UK research in this area has tended to employ large-scale quantitative survey methods. While the latter provide a useful overview of the extent to which the public agrees or disagrees with predefined statements, they are not as appropriate as qualitative research methods to explore the reasons *why* opinions are held or *how* they are influenced (see, for instance, Ungar, 1994). In relation to climate change, there is a need for in-depth research that examines inconsistencies and ambiguities in beliefs, values and actions. For example, how do people reconcile their awareness and concern about climate change with lifestyle choices and pressures? How do they perceive and deal with uncertainty about climate change? These questions are important for informing policy and are best addressed through qualitative research methods. Although none of the studies explicitly aimed to research barriers to engagement, all three found that the existence, dynamics and effects of various barriers were significant elements of people's responses to climate change. Despite the different aims and methods of our studies, our findings were broadly consistent and supportive of other literature. We therefore feel that it is appropriate to integrate the findings of our studies in order to illustrate the barriers to engagement with climate change amongst the UK public. Table 1 compares the main methods used in the three studies.

Table 1
Methods employed in the three UK studies

Study/Methods	Survey	Semi-structured interviews	Focus group discussions	Q-methodology
(1) Norwich study (Ns)		x	x	x
(2) South of England study (SEs)	x ^a	x		
(3) Norwich and Rome study (N&Rs)	x ^a		x	

^aThese surveys contained both qualitative and quantitative questions.

3.1. Norwich study

This study involved research carried out in Norwich, UK (2000–2004). It investigated the relationship between visual representations of climate change and people's perceptions of the issue, paying particular attention to people's senses of issue salience and senses of personal efficacy in relation to the imagery. The research methodology comprised three stages. Firstly, semi-structured interviews explored 30 people's perceptions of climate change and their associated mental imagery. Secondly, Q-methodology was employed with the same participants to explore the link between climate change imagery and people's perceptions more directly (for more information about Q-methodology, see Robbins and Krueger, 2000; McKeown and Thomas, 1988; Brown, 1980). The method aimed to elicit shared attitude structures particularly concerning the perceived salience and personal efficacy dimensions of climate change in relation to a set of images representing different aspects of the issue. Thirdly, three focus groups were held, once again with the same participants. Their aim was to build on the prior findings and explore these in more detail, acting as a method of triangulation and further data interpretation. The focus groups enabled participants to discuss and elaborate on the research findings in a social context (see Nicholson-Cole, 2004, 2005, submitted for more in-depth accounts of this research).

3.2. South of England study

This study examined perceptions of, and behavioural response to, climate change and flooding in the South of England (Whitmarsh, 2005, submitted, in press). Data collection for this study comprised two stages. The first phase involved a series of semi-structured qualitative interviews ($N = 24$) conducted during 2003. In addition to providing valuable information in its own right, the qualitative interviews also acted as a basis for the subsequent quantitative phase by determining the content and wording of the postal survey. Interviewees were recruited from two areas in the South of England: Somerset

and Hampshire.³ Subsequently, a major postal survey was conducted to gather quantitative data, as well as additional qualitative data, from a representative sample of Hampshire residents. The questionnaire comprised 8 pages of questions on perceptions of, and behavioural response to, climate change as well as other environmental concerns and relevant experiences. In total, 1771 questionnaires were distributed during September and October 2003 across 6 wards using stratified random sampling. The survey achieved a response rate of 33% ($N = 589$). The sampled wards reflect a range of different socio-economic groups and settlement size (i.e. inner-city, sub-urban and rural). Comparison with census data and use of weighting procedures indicate that the sample can be considered representative.

3.3. Norwich and Rome study

Undertaken between 1999 and 2003, this study used quantitative surveys and focus groups to explore perceptions of climate change among citizens in Norwich (UK) and in Rome (Italy) (Lorenzoni, 2003, submitted). In this paper, findings only pertaining to the Norwich participants are reported. The aim of this work was to explore commonalities and differences among laypeople in countries, which historically have had a very different approach to, and leadership on, environmental issues including climate change. The same methods and materials (subject to translation and localisation) were employed in both case studies to allow comparability. Questionnaires containing 36 quantitative and qualitative questions were administered to students and adults in Norwich and Rome (students $N = 65$ and $N = 82$ respectively; adults $N = 135$ and $N = 206$ respectively). Adult respondents were asked to participate in follow-up focus groups. A principal components analysis applied to questionnaire responses allowed the classification of individuals' views on climate change into four typological groups, defined according to their beliefs about human influence on the climate and the importance of climate change. Group discussions were held with each typological group to investigate individuals' understanding of the notion that longer-term climates may be amenable to human choice, through exposure to socio-economic and climate scenarios.

4. Results: perceived barriers to engagement

Consistent with the wider literature, findings from our studies suggest widespread awareness and concern about climate change. However, this often does not translate into personal engagement as we have defined it above, namely

³Since one of the aims of the main research project (see Whitmarsh, 2005) was to explore the role of flooding experience in response to climate change, these sites were selected due to their recent history of severe flooding, and because of the willingness of local flood victims to participate in the research.

in terms of cognition, affect and behaviour. Indeed, many of our participants agreed that people have personal, social and/or moral responsibilities to address climate change, but often identified reasons for not taking action. The three studies highlight a number of possible reasons for this disparity between simply a general concern and a more substantial level of engagement with climate change. In this section, we elaborate on the barriers or constraints that our participants perceived to engaging with climate change more fully.

Table 2 presents a synthesis of the constraints that participants mentioned during our studies. We have categorised these into two main areas—individual and social—which reflect the levels at which the barriers are perceived. Within these main categories, we outline the main barriers mentioned by our participants, resulting from the review and amalgamation of the findings from the three studies. Our observations indicated that different barriers often overlap or work in conjunction to exacerbate the constraints to engagement. For instance, the perceived unavailability of efficient and accessible public transport, in addition to the convenience and habitual use of a car, are cited by people as reasons for continuing to use this form of transport. Furthermore, not all barriers were mentioned by all participants; different barriers are experienced by different groups of people. The Table includes specific examples from our studies in the form of quotes taken from the qualitative data. It also refers to, where relevant, supportive quantitative data. Individual barriers include: lack of knowledge; uncertainty and scepticism; distrust in information sources; externalising responsibility and blame; reliance on technology; climate change perceived as a distant threat; importance of other priorities; reluctance to change lifestyles; fatalism; and helplessness. Social barriers are subdivided into: lack of action by governments, business and industry; 'free rider effect'; pressure of social norms and expectations; and lack of enabling initiatives.

5. Discussion

In our studies, we observed that some respondents were conscious of and articulate about the reasons underlying their lack of engagement. However, in many cases, the roots of this disengagement are more implicit and can be inferred from participants' discourses and informed by the wider literature. The following sub-sections provide some exploration and analysis of the barriers detailed in Table 2 to determine how they limit engagement. We broadly analyse these barriers in terms of individual and wider social levels. The degree of people's engagement relates to their individual underlying knowledge, values, experiences and lifestyles; and these in turn are affected by the wider social landscape. The various barriers that function to limit cognitive, affective and behavioural elements of engagement can therefore be interpreted either as principally personal or social. This is consistent with Tanner's (1999)

Table 2
Barriers to engagement with climate change

Perceived Barriers	Qualitative and quantitative examples
INDIVIDUAL	
<p>Lack of knowledge About the causes, consequences, potential solutions Includes: Confusion; lack of experience, understanding and awareness; lack of information. Not topical</p>	<p>“I have no idea what the causes are [of climate change]. It's definitely something to do with ozone and CFC's but I wouldn't be able to explain it to you. I think something that people do would affect it, but I don't know how that works. You just hear that something is bad because it does this, but nobody tells you how. I don't know what you do about it.” (Ns) <i>In response to open-ended survey question: ‘What do you know about climate change/ global warming?’ 17.1% of the sample said they don't know much/anything; and a further 12% did not answer the question (SEs). In Norwich, just over half (56.3%) of adult respondents to the survey felt they had “enough information about climate change to have an opinion about it” (20% didn't and 23.7% didn't know) (N&Rs).</i></p>
<p>Uncertainty and scepticism About the causes of climate change, seriousness, necessity and effectiveness of actions (international to individual levels). Scientific controversy</p>	<p>“I would be doing more things to prevent this, and I would be speaking more about it [climate change] if I could get some clarity on it. The cause and effect of it all.” (Ns) “Any slight change in the weather seems to be attributed to sort of global warming, which I'm a bit sceptical about.” (SEs) <i>Of the survey respondents, 35.1% agreed with the statement “There is too much conflicting evidence about climate change to know whether it is actually happening”. 24.7% agreed with the statement “The evidence for climate change is unreliable”. 23.3% agreed with the statement “It is too early to say whether climate change is really a problem” (SEs).</i></p>
<p>Distrust in information sources Such as the media Related to exaggeration and sensationalism, bias and contradictory framings</p>	<p>“I think a lot of national press and stuff, there is a lot of sort of scare-mongering that goes on, and you know, yeah, undoubtedly humans sort of adding to the speed with which climate change will occur, but then equally, climate change will occur naturally, you know, regardless of whether you know we're here or not, really, it's a natural phenomenon” (SEs) “I don't think people can trust what they're viewing. I am not convinced that the arguments that are being put forward are not the vested interests of whichever group: the environmentalists with doom and gloom, impending disaster or industrialists pointing out that's it's really not too bad and increased carbon dioxide can make the plants grow better” (N&Rs) <i>Of the survey respondents, 49% agreed with the statement “The media is often too alarmist about issues like climate change” (SEs).</i></p>
<p>Externalising responsibility and blame On the causes and solutions, e.g. governments and industry should take the lead</p>	<p>“Things like motor racing, and all these pleasure sports that involve the burning of some kind of a fuel [...] They've got to be adding infinite more than just the basic person potooling to and from the shops in their car, they must be” (SEs) <i>Of the survey respondents, 52.9% agreed with the statement “Pollution from industry is the main cause of climate change”. 35.1% agreed with the statement “The United States should take most of the blame for climate change” (SEs).</i></p>
<p>Technology will save us</p>	<p>“I'm not really that concerned [about climate change] because it's just the way the world goes. And we are living here so we have just got to accept it. I think if it does get incredibly hot or something, you always will survive because technology now can cope with that sort of thing.” (Ns)</p>
<p>Climate change is a distant threat In space: it's affecting other countries and people. In time: it's a future problem and I can't imagine it.</p>	<p>“This [climate change] is a threat that is 50, 100, 200 years away possibly. We could all be dead anyway, and it'll be completely different by then. So if you take action now I mean, it might be helpful, and you're going to have a few people out there who believe strongly about this. But the majority of people aren't going to be bothered about it, until it's clear and immediate. It's a long way off before it gets worse.” (SNC) “And you hear about the sort of ice flows melting, or whatever and it's just, they're such a distance.” (Ns) <i>Only 44% of survey respondents agreed that they “are being affected, or will be affected, personally by climate change” (SEs). When asked who would be affected by the negative effects of climate change, Norwich respondents mentioned “everyone, all” (24.4%), the Third World (16.3%), the poor (15.6%), low-lying and coastal communities (7.4%) (N&Rs).</i></p>
<p>Other things are more important Includes: Attention to more immediate priorities, e.g. family and finances, other (local) environmental issues.</p>	<p>“For the majority of people, the effects are going to be fairly modest, as they are now, just very incremental... Most of us are probably pre-occupied with other issues.” (SEs) <i>Climate change was ranked 7th out of 13 environmental issues for concern. Of the survey respondents, 19.9% were concerned (compared to 45% concerned about traffic/congestion) (SEs). Climate change was rated on average the 8th most important environmental issue (out of 12) in personal life for Norwich respondents; however, it was 4th (out of 12 environmental issues) in importance for global society (N&Rs).</i></p>
<p>Reluctance to change lifestyles Related to: Threat of mitigation to standard of living. Inconvenience, cost (monetary and time)</p>	<p>“I probably could [do something about climate change], but then it doesn't fit in with my life. It's inconvenient, which is awful really. The fact that, you know, here's me complaining about it but if it's inconvenient then I don't do it really.” (Ns) <i>The most common open-ended answers from the Norwich respondents who explained why they had not or were not willing to change their behaviour to reduce their personal contribution to climate change were: lack of suitable alternatives (13.3%), prices high enough already/not fair (10.4%) and need to keep present lifestyle (6.7%) (48% response rate to this question) (N&Rs).</i></p>
<p>Fatalism It's too late to do anything We can't do anything It's a waste of time</p>	<p>“I think it's inevitable. Even if we change it's [climate change] still going to happen. Because the damage has been done...you know, I don't think we can stop it even if we wanted to. We could maybe slow it down. But I don't think we will.” (Ns) “I get the impression that we're trying to improve things but that we've been a little bit too arrogant and left it too late to try and do things” (SEs)</p>
<p>“Drop in the ocean” feeling Individual helplessness due to the global scale of the problem</p>	<p>“I'm impotent in a way because America didn't sign up to the Kyoto agreement” (SEs) “I have a sense of helplessness sometimes when I hear the facts and think what can do? And all I can do is very small.” (N&Rs)</p>

Table 2 (continued)

Perceived Barriers	Qualitative and quantitative examples
SOCIAL	
<i>Lack of political action</i> By local, national and international government(s) Distrust in governments to take responsibility and for their actions to be meaningful	<p>“I think if America flippin’ well got real, putting it politely. I’m absolutely disgusted with them. [...] Other countries are suffering as a result of their selfishness. So I would definitely like to see America get on the band wagon.” (Ns)</p> <p>“I mean eighty per cent will tell you that Blair [the UK’s Prime Minister] is not doing the right thing at the moment, so I mean what chance do we have with global warming?” (SEs)</p> <p>“Politicians really should be doing something about it and not waiting until it’s too late. It’s not a vote winner, that’s the main thing. It’s like telling people not to use their cars; that’s not a good thing to do. [...] How to get re-elected, that’s of more concern to them.” (N&Rs)</p> <p><i>Of the survey respondents, 68.5% agreed with the statement “The government is not doing enough to tackle climate change” (SEs).</i></p>
<i>Lack of action by business and industry</i> Includes: “Fat cat” syndrome; they will not act on their own accord; their actions are to be distrusted	<p>“Power stations are probably doing a pretty good job, industry does a fantastic job of polluting the world” (SEs)</p> <p>“We’ve got to start giving people choices. Because it’s not humans that ruin this planet. The majority of humans you meet just want a decent deal for their families and themselves. They don’t want to pollute everything. It’s *greed*, company greed that has damned this planet.” (N&Rs)</p> <p><i>Of the survey respondents, 86.5% agreed with the statement “Industry and business should be doing more to tackle climate change” (SEs).</i></p> <p><i>In Norwich, business and industry were trusted the least (on average 1.4 on a 3-point scale: 1 = no responsibility to 3 = high responsibility) in making any changes needed to lessen the impacts of climate change (N&Rs).</i></p>
<i>Worry about free-rider effect</i> Refraining from taking interest or action because no-one else is (at individual to international scales)	<p>“I am one person and you think, well why am I going to change my lifestyle if all these other people aren’t? It’s human nature.” (Ns)</p> <p>“We know the Americans are going to be very last to do it [take action on climate change], but they probably don’t have the power any more than we do [...] If they [China] decided one way or the other [...] they are going to have far more effect than the rest of us all put together.” (N&Rs)</p> <p><i>Of the survey respondents, 80.9% agreed with the statement “People should be made to reduce their energy consumption if it reduces climate change”. 72% agreement with the statement “Radical changes to society are needed to tackle climate change”. 68.9% agreement with the statement “People are too selfish to do anything about climate change” (SEs).</i></p>
<i>Social norms and expectations</i> Expectation to consume Green living seen as undesirable (‘weird’, ‘hippy’)	<p>“Cars aren’t the big polluting evil that bike-riding hippies say they are.” (SEs)</p> <p>“I don’t want to but I could give up my car. As a society we all need re-educating. Having a car is a convenience engrained in our perception of liberties. It’s all right to have a car, full stop.” (N&Rs)</p> <p><i>Of the survey respondents, 54.7% agreed with the statement “Having a car is part of having a good lifestyle” (SEs).</i></p>
<i>Lack of enabling initiatives</i> Facilities are costly, inconvenient, sparse, not viable. Locked-in to current patterns by existing infrastructure and economy	<p>“Give me something to make a difference and I will do it. [...] If you want me to do something about it everyday, give me a tool so that I can.” (Ns)</p> <p>“It’s all very well saying: “get rid of your cars and don’t use them” but you’ve got to have another alternative way of getting about. It’s got to be more attractive.” (N&Rs)</p> <p><i>Of the survey respondents, 89% agreed with the statement “The government should provide incentives for people to look after the environment”. Only 19% of survey respondents rated the quality of public transport in their local area as ‘good’ or ‘excellent’ (SEs).</i></p>

Note: Ns (Norwich study); SEs (South of England study); N&Rs (Norwich and Rome study).

distinction between internal and external constraints on environmental action, and mirrors wider debates on the dichotomy in social science of the relative salience of agency and structure in determining action (Giddens, 1984; Blake, 1999). Our interpretation endeavours to explore the key barriers and make policy-relevant suggestions at both of these levels.

5.1. Individual

One of the most easily identifiable barriers to engagement is a lack of basic knowledge about causes, impacts and solutions to climate change. While there is information available (to those who wish to seek it), it is not necessarily taken up or translated into knowledge or action, for various reasons, including:

- Lack of knowledge about where to find information.
- Lack of desire to seek information.

- Perceived information over-load.
- Confusion about conflicting information or partial evidence.
- Perceived lack of locally-relevant information, for example about impacts or solutions.
- Format of information is not accessible to non-experts.
- Source of information is not credible or trustworthy, particularly the mass media.
- Confusion about links between environmental issues and their respective solutions.
- Information conflicts with values or experience and is therefore ignored.

Our studies show there are divergent ways of understanding climate change that draw on broader discourses than simply scientific knowledge (Darier and Schule, 1999). Although at first glance, lay interpretations of climate change may denote ‘confusion’, they are valid ways of seeing the world. This is reflected by a more holistic

perspective, in which climate change is brought under an umbrella of environmental issues without being seen as distinct (e.g. Bulkeley, 2000). For example, in all three of our studies, participants often mentioned ozone depletion in their discussions about climate change; and many mentioned recycling as a solution (cf. Bickerstaff et al., 2004; Lowe et al., 2005).

A lack of knowledge may contribute to a sense of uncertainty about climate change. We observed amongst our participants a general difficulty interpreting scientific uncertainty and complexity⁴ (whereas scientists are trained to recognise that uncertainty is an integral element of the process of discovery and debate). Many of our participants were ambivalent about the reality and severity of climate change because they felt scientific evidence was unreliable, incomplete, conflicting; and because they were aware of political and societal controversy and inaction over climate change. These are exacerbated by media portrayal of climate change, which tends to highlight scientific and political disagreement (Carvalho and Burgess, 2005; Ereaut and Segnit, 2006). The lack of constant attention paid to climate change by the media was also cited by participants as a reason for uncertainty about the presence and seriousness of the issue, and in some cases as an explicit reason for unwillingness to engage (see also Hargreaves et al., 2003).

One response to uncertainty amongst our respondents was scepticism about the reality of climate change, the human influence on the climate, the necessity and the effects of mitigation actions (Lorenzoni, submitted). This mindset can in turn influence how future information is perceived and interpreted. For example, if it conflicts with values and experience it will tend to be ignored (Festinger, 1957). Our observations also indicate scepticism can arise from a particular (e.g., fatalistic) worldview or lack of clear political engagement in the issue (Stoll-Kleemann et al., 2001; Hinchliffe, 1996). Fatalism itself was also observed in participants' reactions as a barrier to engagement. For example, some participants felt that the problem had gone too far already and was irreversible by human action, therefore not warranting any engagement.

Another barrier exposed in our studies was distrust in information sources, in particular mass media and industry. Media were perceived as biased, exaggerated and inconsistent in their coverage of issues like climate change, and much of the information produced by industry considered "greenwash" and marketing ploys. Some participants also pointed to bias in information from environmental pressure groups, which in turn led some individuals to distance themselves from it. Other research has similarly shown that public perceptions of the credibility of information on climate change are influenced by its source, among the most trustworthy being university

scientists and social networks (Poortinga and Pidgeon, 2003; cf. MORI, 2005).

Of the many participants who still felt that something could be done about climate change, many located responsibility for causing and mitigating climate change with others (individuals, governments, business, industry and other countries) or looked to technological solutions to "save us". Shifting the blame and denying personal responsibility was found to be a major barrier to engagement in all three studies, supporting the findings of Stoll-Kleemann et al. (2001) and Blake (1999). Some individuals were particularly likely to deny personal responsibility. For instance, in the South of England Study, non-voters were significantly less likely to be taking action out of concern for climate change and more likely to state that there is no point in taking individual action because no-one else is.

Overall, for most of our participants climate change was perceived to be distant in space and time which reflects the findings of other public perceptions studies (e.g. Bord et al., 1998; Norton and Leaman, 2004; DEFRA, 2002; Lorenzoni and Pidgeon, 2006; Leiserowitz, 2005). The examples and imagery of climate change described by participants mostly related to people in other locations or in the future. Environmental concerns tend to focus on the local with tangible impacts (Poortinga and Pidgeon, 2003; Macnaghten, 2003). However, only a small minority of our respondents, even flood victims, tended to frame change in terms of their local surroundings. Some respondents also explicitly recognised the difficulty of visualising the consequences of their current activities (e.g. energy use) and linking them to future climate change. There is an evolutionary tendency for people to pay attention to immediate and personally relevant issues (Moser and Dilling, 2004; Wilson, 2002). A recent internet survey, with mainly US respondents, found that most people equate 'the future' with 10 years from now, and that images of the future become unclear when considering 15–20 years from now (Tonn et al., 2006). This may explain some of individuals' difficulties of relating to long-term and global issues like climate change and a tendency to focus on what are considered more immediate priorities (cf. Poortinga and Pidgeon, 2003, 2004). This future blindness is reflected in the environmental economics literature dealing with time discounting (Arrow, 1996; Kunreuther et al., 1998), for example, and has implications for policy-making on climate change.

Local environmental issues are not only more visible to the individual, but present more opportunities for effective individual action than climate change. The majority of individuals consulted in our studies accepted that individuals play a role in causing climate change and that they should be involved in action to mitigate it. On the whole, however, they felt that individual action would have little effect in comparison to other, larger scale emitters. Participants generally argued that it was not worthwhile taking action at this individual level given its limited

⁴Related to this, it has been observed that people's engagement in science is also due to their self-confidence in interpreting scientific information (Michael, 1996).

efficacy (Stern and Kirkpatrick, 1977; Eden, 1993). They certainly saw climate change as a collective problem to be tackled at a collective level.

A significant barrier perceived to taking action on climate change concerned the prospect of having to change one's lifestyle. This was because many participants considered that this would only be achievable with great discomfort and sacrifice of standards of living and social image. Participants tended to be reluctant to consider changing many of their routines and habits, and to consider alternative options, even when these may be overall more individually and environmentally beneficial (Jackson, 2005).

5.2. Social

Perceptions of limited political action by local, national, international governments were found to be a significant barrier to engagement amongst many of our participants. In particular, many referred to the lack of commitment to mitigate greenhouse gas emissions by the USA and lack of evidence of substantial action by the British government. Our observation is that this resonates with a deeper, more widespread distrust in government and politicians in the UK (Worcester, 2001). Similarly, our participants cited lack of action by business and industry as a barrier to their personal engagement. These are commonly and culturally identified as scapegoats for environmental degradation (Harvey, 1996; Douglas, 1992). Inaction by others in society was also mentioned by respondents in all three studies. Participants were reluctant to change their behaviour when they felt others would not follow suit i.e. problem of free riding; and problem of tragedy of the commons (Hardin, 1968). This was often linked to an expectation that people tend to prioritise personal and financial concerns over environmental issues. The social and political distrust embedded in these three barriers contributes to doubting self-efficacy and externalising responsibility for mitigation efforts, extending from the individual level to the international. Participants maintained that if proposed actions were equitable and fair, their uptake would be much more widespread (Darier and Schule, 1999).

Participants, even when willing to take action, often maintained that their behaviour was constrained by the lack of enabling infrastructures and mechanisms. For instance, they pointed to a lack of affordable and reliable public transport in their locality, higher prices of environmentally-friendly goods, design of the built environment encouraging car use, lack of disincentives to pollute (e.g., higher car tax for bigger cars), and so on.

Another form of constraint explicitly identified by many participants was social norms and expectations requiring carbon-dependent lifestyles. Socially-acceptable ways of behaving—for example, driving to work, frequent long-haul holidays and weekend breaks, leaving appliances on and the weekly supermarket shop—in turn become ingrained as

unconscious habitual behaviours, making them unquestioned and thus more intractable (Jackson, 2005). Ownership and consumption, for example of cars and electronic goods, are important status symbols in our society and people feel they are expected to achieve this (Steg et al., 2001; Urry, 1999). Some of the literature argues that once people become accustomed to a particular standard of living, their perceptions of needs and expectations change. Their revised expectations are perpetuated in discourses about quality of life, and once absorbed into daily routine become interpreted as “needs” rather than “wants” (Steg and Sievers, 2000; Shove, 2003; O’Riordan, 1976). For example, participants talked about “needing” a car to get to work, do the shopping, take children to school and so on, without considering that there might be alternatives.

The interdependency between physical infrastructures and social institutions contributes to creating a lock-in which restricts radical innovation (Jackson, 2005; Geels, 2005) and reinforces environmentally-detrimental behaviours (e.g. Hobson, 2003). For example, desires for consumption and links to status and cultural values are perpetuated in current western society by marketing mechanisms. To different degrees, participants acknowledged this situation and called for changes in society towards more environmental and community-based values. In the Norwich and Rome study one participant referred to the current situation as a “strangle-hold”.

5.3. Commonality and divergence in perceived barriers

Many of the barriers discussed could be interpreted as mechanisms of denial to cope with an internal discrepancy at an individual level between the demands to engage with climate change and actual personal engagement (Stoll-Kleemann et al., 2001). This relates to the theory of cognitive dissonance (Festinger, 1957) and the literature on self-deception (e.g. Goleman, 1997). Individuals may use strategies of denial to assuage their guilt in the knowledge that their actions adversely affect the climate, and to justify inaction in response to the uncomfortable implications of climate change mitigation for high consuming lifestyles (Hillman, 2004, see also, Cohen, 2001). Denial may also be an emotion focused coping mechanism (Lazarus and Folkman, 1984) for the anxiety brought about by contemplating the threats posed by climate change. Examples of these mechanisms include:

- denying personal contribution to climate change and personal responsibility,
- blaming others (‘the USA isn’t doing anything so why should I?’),
- pointing to government inaction,
- claiming ignorance,
- arguing that climate change will happen anyway,
- having faith in technological solutions,
- being too busy to change one’s behaviour (‘life is too short to worry about this’),

- finding that other issues are of greater importance,
- claiming there are no alternatives to current behaviours.

There is further commonality between individuals in terms of shared social norms and cultural worldviews, which inevitably enact a powerful influence on people's beliefs and values, and on the common discourses used by participants in our studies. For example, the south of England study found different associations with, and responses to, the term “global warming” vs. “climate change”; the former was more widely known, evoked more concern, and was considered more amenable to human influence by respondents than the latter (Whitmarsh, *in press*).

A number of these barriers have been identified by individuals in relation to other environmental issues, for example lack of knowledge (Kollmuss and Agyeman, 2002); displacement of blame (Blake, 1999; Evans et al., 1988; Douglas, 1992; Hinchliffe, 1996; Kurz et al., 2005); inaction by politicians, industry and wider society (Dawes, 1980); and practical or structural impediments (Blake, 1999; Stern, 2000; Burgess et al., 2003; Schultz et al., 1995). Some of the responses we elicited may be common discursive strategies mobilised to justify a personal position of disengagement with respect to environmental issues. Indeed, this is consistent with the public's tendency to conceptually integrate climate change with other environmental issues (e.g. Bord et al., 1998), noted earlier. On the other hand, several of the barriers identified at the individual level are unique to climate change because of its defining characteristics as complex, long-term, distant, and ‘hidden’ in familiar and natural processes of weather fluctuations (Ungar, 2000; Moser and Dilling, 2004). Above all, as an issue linked fundamentally to energy consumption, climate change uniquely challenges virtually every aspect of modern lifestyles and the prevailing paradigm to consume freely. In this respect it is unlike other global environmental issues, such as ozone depletion and acid rain, which have demanded technological innovation and regulation but required little public engagement. **Climate change also differs from resource depletion: although the latter demands some public involvement in waste reduction strategies, this is a more limited range of activities compared to those involving energy use. Participants' resistance to change, and the degree of cognitive dissonance they experience, are therefore likely to be far greater for climate change than for other environmental issues.**

There are also differences among individuals in terms of personal beliefs, knowledge, values, experience, social networks and demographic background which can lead to different perceptions of climate change and barriers to engagement. For example, the Norwich Study found that deprived groups tend to experience greater financial constraints, compounded by feelings of social alienation. In other words, the public is heterogeneous and there is a diversity of conceptualisations of climate change (e.g.

Kempton, 1997; Futerra, 2005; Leiserowitz, 2005; c.f. Wynne, 1991). Consequently, to increase information accessibility and uptake, its provision (in terms of content, format and source) should be tailored to reflect this diversity by building upon, and working alongside, existing beliefs and cultural discourses. This constructivist approach is consistent with theories of individual learning (Piaget, 1970).

5.4. Policy implications for engagement

The findings indicate a need for a comprehensive range of policy solutions to foster engagement amongst the public because of the diversity of barriers identified and the various levels at which they operate. We also recognise that developing sustainable solutions to climate change involves all societal stakeholders, including government, commerce and industry, interest groups and the wider public. We suggest that there are two implications of this. Firstly, that some strategies for engagement are more conducive for policy intervention, which tends to operate on short timescales. Secondly, attempts to engage publics will be more effective if they are part of, and seen to be part of, a coherent and consistent response to climate change. Based on our work, we suggest the following policy responses to the barriers outlined above in order to foster cognitive, affective and behavioural aspects of engagement.

Firstly, there is a need for basic information provision to overcome lack of knowledge about climate change and its implications for individuals. For those willing to mitigate climate change, this will encourage them to channel their energies into appropriate activities (Kempton, 1997; Stamm et al., 2000; Bostrom et al., 1994). This information needs to be communicated through channels perceived to be credible—this will depend on the audience (Moser and Dilling, 2004; Moser, 2006)—and in a manner that is transparent (House of Lords Select Committee on Science and Technology, 2000). Communication on climate change needs to be sustained on a regular basis, irrespective of media cycles of attention, to keep the issue prominent in people's minds (Moser and Dilling, 2004). This could include adapting marketing techniques to create awareness, acceptance and norms in respect of climate change action among social groups and their networks. This kind of ‘social marketing’ (which often includes gaining explicit personal commitment to take action) has been used to encourage other kinds of pro-environmental behaviour, such as water efficiency (McKenzie-Mohr, 2000). To a limited extent, this is being applied to engage the public and other societal stakeholders with climate change: for example, the Energy Saving Trust use media campaigns and market segmentation to target and tailor information to different household types.⁵ These informational approaches can act to explain the reasons for the introduction of climate change policies in order to increase the

⁵The Energy Savings Trust: <http://www.est.org.uk>.

acceptability and transparency of any related regulatory and fiscal measures. Furthermore, information needs to be provided in context, according to its consistency with mainstream scientific opinion and in relation to previous findings (Corbett and Durfee, 2004; Social Issues Research Centre, 2001). At the same time, there is a role for science education (formal and professional) to promote understanding of the scientific process, including the inherent uncertainty. Bibbings (2004b) also suggests a role for media awareness education, specifically developing skills to think critically about media content and advertising. Our participants strongly supported the need for educating younger generations on environmental action.

Information should also be communicated in a meaningful way, linking to people's concerns and interests (Nicholson-Cole, submitted). In terms of mitigation, a constructive way of doing this may be to relate climate change to local environmental issues and personal concerns, emphasising the additional benefits to reducing emissions, such as saving money, improved air quality, quieter streets and personal fitness. Another way to make the causes of climate change more tangible and the climate change solutions more personally-relevant is to provide information at the point of energy use, reinforcing the connection between personal action and impact on the climate. A review by Boardman and Darby (2000), for example, indicated that providing immediate feedback on energy use, through household energy meters, can effectively reduce people's consumption. In this respect, communication can be effective in stimulating affective and behavioural, as well as cognitive, aspects of engagement.

Secondly, the economic, social and structural barriers discussed above clearly illustrate that information and knowledge about climate change, and even the motivation to act, are important for engagement but not sufficient. There is a need for supportive institutions and infrastructure (e.g., affordable and efficient public transport) to enable action at an individual level. Interventions can be designed to interrupt habitual behaviours and to encourage consideration of alternatives (e.g., free bus tickets, congestion charging, bike-to-work breakfasts). Sustained support (e.g. household interventions, Staats et al., 2004) and positive reinforcement (in terms of public recognition, social interaction, material rewards) can in turn encourage effective behaviours to be maintained. A sense of collective efficacy can also be engendered through community initiatives and encouragement (Sustainable Consumption Roundtable, 2006; Stamm et al., 2000); for example, the energy saving equivalent of "best kept town" award. Community and business champions, such as Eco-Team households (Global Action Plan, 2004) or sustainability officers in the public sector, can highlight good practice and play a role in fostering action within a social context. Demonstration projects of low-emission technologies, decentralisation of energy systems, including micro-generation, and carbon neutral or low carbon buildings can

also show people what is achievable (e.g. Centre for Alternative Technologies in Wales, UK; annual Housing Design Awards⁶ sponsored by the UK government).

For many people, this may not be enough and a stronger regulatory and fiscal framework may be needed to activate mitigative responses to climate change. We recognise that there are different responses amongst the public to climate change: while some may take up calls for voluntary action, others will be unprepared to make any changes without external pressure. In current society, regulation is necessary to drive fairer, collective solutions to climate change and highlight the seriousness of climate change and the necessity to act. However, research has shown that regulation and economic measures do not necessarily change values underpinning behaviour. Long-term and deeply-rooted social change for sustainability can be promoted gradually through education creating community values and environmental citizenship (Dobson, 2003), in combination with a framework of incentives.

A further implication of our studies is that societal perspectives of climate change need to be integrated within the policy process on an on-going basis, to explore the understanding of climate change by heterogeneous publics through time and shape policies accordingly. Public involvement in the policy process may go some way to overcoming the political distrust evident in our studies, provided this is part of a more open and consistent approach to addressing climate change by government.

There are signs that the UK government is considering the range of barriers perceived by the public, and is starting to address some of these. The recent review of the Climate Change Programme (HM Government, 2006) introduced additional measures to reduce the nation's greenhouse gas emissions across all sectors. Those relating to domestic and transport sectors focus on economic, technological and informational measures to induce voluntary energy savings amongst the public, in the short to medium term. The Programme is linked to a Climate Change Communications Initiative (DEFRA, 2005) which funds schemes at the community level to raise public awareness about, and change attitudes towards, climate change. The underlying rationale of the Initiative is that information and changing attitudes may result in behavioural change, but we have already argued that this often not the case. In fact while the Programme provides a number of measures geared towards incremental change, it gives little attention to the wider structural conditions and social norms that tend to perpetuate the status quo (i.e. increasing energy demand). Only recently the UK Government announced its interest in a measure which could be considered an example of structural mitigation policy, namely the allocation of personal carbon allowances as a means to reduce emissions at the individual level (DEFRA, 2006c). This is a promising—although administratively complex but

⁶Low-emission housing competition: <http://www.designforhomes.org/hda/> (accessed 20 July 2006).

potentially equitable—approach to ensuring that all citizens participate in mitigation (Ekins and Dresner, 2004). As we have argued, effective climate change management requires a longer-term perspective and systemic change. While the UK government's leadership in climate change mitigation is to be applauded, it is inevitably constrained by the short-term and disjointed nature of its current policy-making framework (Clayton et al., 2006). To this effect there may be lessons for initiating alternative governance structures from The Netherlands where a 'transitions group' within government is facilitating radical long-term reduction in energy consumption (Rotmans and Kemp, 2003), where the aim is to drive society towards embracing a sustainable and long-lasting low-carbon future.

6. Conclusions

We have argued that public engagement with climate change is important in order to achieve the UK Government's 60% carbon dioxide emissions reduction target and effectively mitigate climate change. This implies a need for a radical change in values, behaviour and institutions towards a paradigm of lower consumption involving genuine political and widespread social commitment, including at the individual level.

We have here defined public engagement as an individual state of involvement in climate change at cognitive, affective and behavioural levels. **Three recent mixed-method studies in the UK have identified a range of common barriers to engagement operating at both individual and wider social scales, reflecting findings in the wider literature. Although public awareness and concern about climate change may have increased since the studies were undertaken, the barriers identified are likely to subsist as they have only marginally been addressed by government.** Indeed, evidence from other research discussed here suggests many of these barriers have been—and continue to be—impediments to more sustainable lifestyles in general. These barriers pose constraints on the achievement of the policy aspirations, and call into question the current emphasis on voluntary measures within the UK's Climate Change Programme. This paper has highlighted the need for both targeted and tailored information provision, supported by enabling and equitable structural conditions, to foster public engagement. Ultimately, there is a need for UK policies and governance structures to initiate a systemic shift to a low consumption paradigm in order to move people out of their comfort zone of carbon-intensive living. Such a shift would have additional benefits, including fostering social justice and well-being, aside from climate change mitigation.

The definition of engagement provided in this paper and the insights into what constrains it can be used as a basis of further research. Indicators could be derived to provide criteria for the evaluation of future engagement initiatives.

Acknowledgements

The Norwich study was funded by the Economic and Social Research Council (ESRC). The Norwich and Rome study was supported by the ESRC and the Natural and Environment Research Council. The South of England study was funded by a Research Studentship award from the University of Bath. We would like to acknowledge the equal contribution from all the authors to this paper. Thanks go to Tim O'Riordan and Jacky Pett for valuable comments on earlier drafts of this paper. The views expressed are the authors' alone who take responsibility for this version.

References

- Ajzen, I., 1991. The theory of planned behaviour. *Organizational Behavior and Human Decision Processes* 50, 179–211.
- Arrow, K., 1996. Integrated assessment. In: Bruce, J.P., Lee, H., Haites, E.F. (Eds.), *Climate Change 1995: Economic and Cross-Cutting Issues in the Contribution of Working Group III to the Second Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge University Press, Cambridge, UK.
- Bamberg, S., Schmidt, P., 2003. Incentives, morality, or habit? Predicting students' car use for university routes with the models of Ajzen, Schwartz, and Triandis. *Environment and Behavior* 35, 264–285.
- BBC, 2004. Poll for Climate Change Special. <<http://news.bbc.co.uk/1/hi/sci/tech/3934363.stm> and http://news.bbc.co.uk/nol/shared/bsp/hi/pdfs/28_07_04_climatepoll.pdf> (accessed 30 June 2006).
- Bem, D., 1967. Self-perception: an alternative interpretation of cognitive dissonance phenomena. *Psychological Review* 74, 183–200.
- Bibbings, J., 2004b. *A High Price to Pay?* Welsh Consumer Council, Cardiff.
- Bickerstaff, K., Simmons, P., Pidgeon, N.F., 2004. Public perceptions of risk, science and governance: main findings of a qualitative study of five risk cases. Unpublished working paper, Centre for Environmental Risk, University of East Anglia, Norwich, UK.
- Blake, J., 1999. Overcoming the 'Value-Action Gap' in environmental policy: tensions between national policy and local experience. *Local Environment* 4, 257–278.
- Blake, D.E., 2001. Contextual effects on environmental attitudes and behaviour. *Environment and Behaviour* 33, 708–725.
- Boardman, B., Darby, A., 2000. *Effective Advice: energy efficiency and the disadvantaged*. Environmental Change Institute Research Report 24, University of Oxford, Oxford.
- Bord, R.J., Fisher, A., O'Connor, R.E., 1998. Public perceptions of global warming: United States and international perspectives. *Climate Research* 11, 75–84.
- Bord, R.J., O'Connor, R.E., Fisher, A., 2000. In what sense does the public need to understand global climate change? *Public Understanding of Science* 9, 205–218.
- Bostrom, A., Morgan, M.G., Fischhoff, B., Read, D., 1994. What do people know about global climate change? 1. Mental Models. *Risk Analysis* 14, 959–970.
- Brown, S.R., 1980. *Political Subjectivity*. Yale University Press, New Haven.
- Bulkeley, H., 2000. Common knowledge? Public understanding of climate change in Newcastle, Australia. *Public Understanding of Science* 9, 313–333.
- Burgess, J., Bedford, T., Hobson, K., Davis, G., Harrison, C., 2003. (Un)sustainable consumption. In: Berkhout, F., MLa., I.S. (Eds.), *Negotiating Environmental Change. New Perspectives from Social Science*. Edward Elgar Publishing Ltd., Cheltenham, pp. 191–261.
- Carvalho, A., Burgess, J., 2005. Cultural circuits of climate change in UK broadsheet newspapers, 1985–2003. *Risk Analysis* 25, 1457–1469.

- Clayton, H., Pidgeon, N., Whitby, M., 2006. Is cross-party consensus on climate change possible—or desirable? Report of first inquiry 2006. Parliamentary Climate Change Group, House of Commons, London.
- Cohen, S., 2001. States of Denial: Knowing about Atrocities and Suffering. Polity, Cambridge.
- Corbett, J.B., Durfee, J.L., 2004. Testing public (un)certainty of science: media representations of global warming. *Science Communication* 26, 129–151.
- Darier, E., Schule, R., 1999. ‘Think globally, act locally’? Climate change and public participation in Manchester and Frankfurt. *Local Environment* 4, 317–329.
- Davies, G., Burgess, J., Eames, M., Mayer, S., Staley, K., Stirling, A. and Williamson, S., 2003. Deliberative Mapping: Appraising Options for Addressing the Kidney Gap. The Wellcome Trust/UCL/SPRU/PSI.
- Dawes, R.M., 1980. Social dilemmas. *Annual Review of Psychology* 31, 169–193.
- DEFRA, 2002. Survey of public attitudes to quality of life and to the environment: 2001. Department for Environment, Food and Rural Affairs, London.
- DEFRA, 2005. Our Climate Challenge—The UK Climate Change Communications Initiative. <<http://www.climatechallenge.gov.uk>> (accessed 30 May 2006).
- DEFRA, 2006a. Climate Change: The UK Programme 2006. HMSO, London.
- DEFRA, 2006b. UK emissions of greenhouse gases <<http://www.defra.gov.uk/environment/statistics/globatmos/gagccukem.htm#gatb3>> (accessed 28 February 2007).
- DEFRA, 2006c. Press release: Government to consider personal carbon allowances. <<http://www.defra.gov.uk/news/latest/2006/climate-0719.htm>> (accessed 19 July 2006).
- DETR, 2000. Climate Change: The UK Programme. HMSO, London.
- Dobson, A., 2003. Environment and Citizenship. Oxford University Press, Oxford.
- DoE, 1994. Climate Change: The UK Programme. HMSO, London.
- Douglas, M., 1992. Risk and Blame: Essays in Cultural Theory. Routledge, London.
- DTI, 2002. Energy Consumption in the United Kingdom. Department for Trade and Industry, London. <<http://www.dti.gov.uk/files/file11250.pdf>> (accessed 30 May 2006).
- DTI, 2003. Energy White Paper: Our energy future—creating a low carbon economy. Department of Trade and Industry, London.
- Eden, S.E., 1993. Individual environmental responsibility and its role in public environmentalism. *Environment and Planning A* 25, 1743–1758.
- Eden, S.E., 1996. Public participation in environmental policy: considering scientific, counter-scientific and non-scientific contributions. *Public Understanding of Science* 5, 183–203.
- Eiser, J.R., 1994. Attitudes, Chaos and the Connectionist Mind. Blackwell, Oxford.
- Ekins, P., Dresner, S., 2004. Green taxes and Charges. Reducing their Impact on Low-Income Households. Joseph Rowntree Foundation, York.
- Energy Savings Trust, 2004. “The Day After Tomorrow” is happening today—but 9 out of 10 people in UK don’t believe it! (Press Release, 25 May 2004). <http://www.est.org.uk/myhome/newscentre/pressreleasesarchive/index.cfm?mode=view&press_id=116> (accessed 4 April 2006).
- Ereaut, G., Segnit, N., 2006. Warm Words. How are we Telling the Climate Story and How Can we Tell it Better? IPPR, London.
- Evans, G.W., Colome, S.D., Shearer, D.F., 1988. Psychological reactions to air pollution. *Environmental Research* 45, 1–15.
- Festinger, L., 1957. A Theory of Cognitive Dissonance. Stanford University Press, Stanford, CA, USA.
- Futerra, 2005. Rules of the game: principles of climate change communication. Futerra, London. <<http://www.defra.gov.uk/environment/climatechange/pubs/pdf/cce-rulesofthegame.pdf>> (accessed 20 July 2006).
- Geels, F.W., 2005. Technological Transitions and System Innovations: A Co-evolutionary and Socio-Technical Analysis. Edward Elgar, Cheltenham.
- Giddens, A., 1984. The Constitution of Society: Outline of a Theory of Structuration. University of California Press, Berkeley.
- Global Action Plan, 2004. Eco Teams. <http://www.globalactionplan.org.uk/index.cfm?TERTIARY_ID=0&PRIMARY_ID=31&SECONDARY_ID=38> (accessed 14 April 2006).
- GlobeScan, 2006. 2006 GlobeScan Corporate Social Responsibility Monitor. 30-Country Poll Finds Worldwide Consensus that Climate Change is a Serious Problem. <<http://www.worldpublicopinion.org/pipa/articles/btenvironmentra/187.php?nid=&id=&pnt=187>> (accessed 20 July 2006).
- Goleman, D., 1997. Vital Lies, Simple Truths: The Psychology of Self-Deception. Bloomsbury, London.
- Gow, D., 2006. Britain set for spat with EC over carbon dioxide emissions. <<http://business.guardian.co.uk/story/0,1709089,00.html>> (accessed 31 July 2006).
- Guagnano, G.A., Stern, P.C., Dietz, T., 1995. Influences on attitude behavior relationships: a natural experiment with curbside recycling. *Environment and Behavior* 27, 699–718.
- Hardin, G., 1968. The tragedy of the commons. *Science* 162, 1243–1248.
- Hargreaves, I., Lewis, J., Speers, T., 2003. Towards a Better Map: Science, the Public and the Media. Economic and Social Research Council, London.
- Harvey, D., 1996. Justice, Nature and the Geography of Difference. Blackwell, Malden, MA.
- Hillman, M., 1998. Carbon budget watchers. *Town and Country Planning* 67, 305.
- Hillman, M., 2004. How we Can Save the Planet. Penguin, London.
- Hinchliffe, S., 1996. Helping the earth begins at home: the social construction of socio-environmental responsibilities. *Global Environmental Change* 6, 53–62.
- Hines, J., Hungerford, H., Tomera, A., 1986–87. Analysis and synthesis of research on responsible environmental behavior: a meta-analysis. *Journal of Environmental Education* 18, 1–8.
- HM Government, 2006. Climate Change: The UK Programme 2006. HMSO, London.
- Hobson, K., 2003. Thinking habits into action: the role of knowledge and process in questioning household consumption practices. *Local Environment* 8, 95–112.
- Horlick-Jones, T., Walls, J., Rowe, G., Pidgeon, N., Poortinga, W., O’Riordan, 2004. A Deliberative Future? An Independent Evaluation of the GM Nation? Public Debate about the Possible Commercialisation of Transgenic Crops in Britain, 2003. Understanding Risk Working Paper 04-02, Center for Environmental Risk, School of Environmental Sciences, University of East Anglia, Norwich.
- House of Lords Select Committee on Science and Technology, 2000. Science and Society: Third Report of the Session 1999–2000. HMSO, London. <<http://www.publications.parliament.uk/pa/ld199900/ldselect/ldscitech/38/3802.htm>> (accessed 30 May 2006).
- Institute for Public Policy Research, 2005. Two thirds of EU countries set to miss Kyoto commitments. <<http://www.ippr.org.uk/pressreleases/?id=1863>> (accessed 6 July 2006).
- IPCC, 2001. Climate Change 2001: Synthesis Report. Summary for Policymakers. Intergovernmental Panel on Climate Change, Geneva.
- IPCC, 2007. The Physical Science Basis. Summary for Policymakers. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Geneva.
- Irwin, A., Wynne, B. (Eds.), 1996. Misunderstanding science? The Public Reconstruction of Science and Technology. Cambridge University Press, Cambridge.
- Jackson, T., 2005. Motivating Sustainable Consumption: a review of evidence on consumer behaviour and behavioural change. Centre for Environmental Strategy, University of Surrey, Guildford <<http://sd-research.org.uk/documents/MotivatingSCfinal.pdf>>.
- Kasemir, B., Dahinden, U., Swartling, A.G., Schibli, D., Schule, R., Tabara, D., Jaeger, C.C., 2003a. Collage processes and citizens’ visions for the future. In: Kasemir, B., Jager, J., Jaeger, C.C., Gardner, M.T. (Eds.), Public Participation in Sustainability Science: A handbook. Cambridge University Press, Cambridge, pp. 81–104.

- Kasemir, B., Jager, J., Jaeger, C.C., Gardner, M.T. (Eds.), 2003b. *Public Participation in Sustainability Science: A handbook*. Cambridge University Press, Cambridge.
- Kempton, W., 1997. How the public views climate change. *Environment* 39, 12–21.
- Kirby, D.A., 2003. Scientists on the set: science consultants and the communication of science in visual fiction. *Public Understanding of Science* 12, 261–278.
- Kollmuss, A., Agyeman, J., 2002. Mind the gap: why do people act environmentally and what are the barriers to pro-environmental behavior. *Environmental Education Research* 8, 239–260.
- Kunreuther, H., Onculer, A., Slovic, P., 1998. Time insensitivity for protective investments. *Journal of Risk and Uncertainty* 16, 279–299.
- Kurz, T., Donaghue, N., Rapley, M., Walker, I., 2005. The ways that people talk about natural resources: Discursive strategies as barriers to environmentally sustainable practices. *British Journal of Social Psychology* 44, 603–620.
- Layton, D., Jenkins, E., Macgill, S., Davey, A., 1993. *Inarticulate Science? Studies in Education Ltd.*, Drifffield, Yorks.
- Lazarus, R., Folkman, S., 1984. *Stress, Appraisal and Coping*. Springer, New York.
- Leiserowitz, A.A., 2005. American risk perceptions: is climate change dangerous? *Risk Analysis* 25, 1433–1456.
- Lorenzoni, I., 2003. *Present Choices, Future Climates: a cross-cultural study of perceptions in Italy and in the UK*. Unpublished PhD thesis. School of Environmental Sciences, University of East Anglia Norwich.
- Lorenzoni, I., submitted. Believing is seeing: laypeople's views of future climate and socio-economic changes through scenarios at two locations, in England and in Italy. *Public Understanding of Science*, submitted for publication.
- Lorenzoni, I., Pidgeon, N., 2006. Public views on climate change: European and USA perspectives. *Climatic Change* 77 (1-2), 73–95.
- Lorenzoni, I., Jones, M., Turmpenny, J., 2006. Climate change, human genetics and post-normality in the UK. *Futures* 39, 65–82.
- Lowe, T., Brown, K., Dessai, S., Doria, M.d.F., Haynes, K., Vincent, K., 2005. Does tomorrow ever come? Disaster narrative and public perceptions of climate change. Tyndall Centre for Climate Change Research, Working Paper 72, University of East Anglia, Norwich, UK.
- Macnaghten, P., 2003. Embodying the environment in everyday life practices. *The Sociological Review* 51, 63–84.
- McKenzie-Mohr, D., 2000. Promoting sustainable behaviour: an introduction to community-based social marketing. *Journal of Social Issues* 56, 543–554.
- McKeown, B., Thomas, D., 1988. *Q Methodology*. Sage, Newbury Park.
- Michael, M., 1996. *Constructing Identities*. Sage Publications, London.
- MORI, 2005. *Science in Society: Findings from Qualitative and Quantitative Research*. MORI, London.
- Moser, S.C., 2006. Talk of the city: engaging urbanites on climate change. *Environmental Research Letters* 1, 1–10.
- Moser, S.C., Dilling, L., 2004. Making climate hot: communicating the urgency and challenge of global climate change. *Environment* 46, 32–46.
- Nicholson-Cole, S.A., 2004. *Imag(in)ing climate change: Exploring people's visual imagery, issue salience and personal efficacy*. Unpublished PhD thesis. School of Environmental Sciences, University of East Anglia, Norwich.
- Nicholson-Cole, S.A., 2005. Representing climate change futures: a critique on the use of images for visual communication. *Computers, Environment and Urban Systems* 29, 255–273.
- Nicholson-Cole, S.A., submitted. Climate change: visual communication for public engagement. *Public Understanding of Science*, submitted for publication.
- Norton, A., Leaman, J., 2004. *The Day After Tomorrow: Public Opinion on Climate Change*. MORI Social Research Institute, London.
- O'Connor, R.E., Bord, R.J., Fisher, A., 1999. Risk Perceptions, General Environmental Beliefs, and Willingness to Address Climate Change. *Risk Analysis* 19, 461–471.
- O'Connor, R.E., Bord, R.J., Yarnal, B., Wiefek, N., 2002. Who wants to reduce greenhouse gas emissions? *Social Science Quarterly* 83, 1–17.
- O'Riordan, T., 1976. *Environmentalism*. Pion, London.
- OST and MORI, 2004. *Science in Society—Findings from Qualitative and Quantitative Research*. Conducted for the Office of Science and Technology, Department of Trade and Industry by MORI Social Research Institute, London.
- Piaget, J., 1970. Piaget's theory. In: Mussen, P.H. (Ed.), *Manual of Child Psychology*. Wiley, London.
- Poortinga, W., Pidgeon, N., 2003. *Public Perceptions of Risk, Science and Governance: Main Findings of a British Survey of Five Risk Cases*. University of East Anglia and MORI, Norwich.
- Poortinga, W., Pidgeon, N.F., 2004. *Public Perceptions of Genetically Modified Food and Crops, and the GM Nation? Public Debate on the Commercialisation of Agricultural Biotechnology in the UK: Main findings of a British Survey*. Centre for Environmental Risk, Norwich.
- Poortinga, W., Pidgeon, N., Lorenzoni, I., 2006. *Public Perceptions of Nuclear Power, Climate Change and Energy Options in Britain: Summary Findings of a Survey Conducted during October and November 2005*. Understanding Risk Working Paper 06-02. School of Environmental Sciences, University of East Anglia, Norwich, UK.
- Read, D., Bostrom, A., Morgan, M.G., Fischhoff, B., Smuts, T., 1994. What do people know about global climate change? 2. Survey studies of educated laypeople. *Risk Analysis* 14, 971–982.
- Robbins, P., Krueger, R., 2000. Beyond bias? The promise and limits of Q method in human geography. *Professional Geographer* 52, 636–648.
- Rotmans, J., Kemp, R., 2003. *Managing societal transitions: dilemmas and uncertainties: the Dutch energy case-study*. OECD Workshop on the Benefits of Climate Policy: Improving Information for Policy Makers. Working Party on Global and Structural Policies, OECD, Paris.
- Schellnhuber, H.J., Cramer, W., Nakicenovic, N., Wigley, T., Yohe, G. (Eds.), 2006. *Avoiding Dangerous Climate Change*. Cambridge University Press, Cambridge.
- Schultz, P.W., Oskamp, S., Mainieri, T., 1995. Who recycles and when: a review of personal and situational factors. *Journal of Environmental Psychology* 15, 105–121.
- Shackley, S., McLachlan, C., Gough, C., 2004. *The public perceptions of carbon capture and storage*. Tyndall Centre for Climate Change Research, Working Paper 44, UMIST, Manchester.
- Shove, E., 2003. *Comfort, Cleanliness and Convenience: The Social Organization of Normality*. Berg, Oxford.
- Social Issues Research Centre, R. S., Royal Institution of Great Britain, 2001. *Guidelines on Science and Health Communication*. Social Issues Research Centre, Oxford.
- Staats, H., Harland, P., Wilke, H.A.M., 2004. Effecting durable change: a team approach to improve environmental behaviour in the household. *Environment and Behavior* 36, 341–367.
- Stamm, K.R., Clark, F., Eblacas, P.R., 2000. Mass communication and public understanding of environmental problems: the case of global warming. *Public Understanding of Science* 9, 219–237.
- Steg, L., Sievers, I., 2000. Cultural theory and individual perceptions of environmental risks. *Environment and Behavior* 32, 250–269.
- Steg, L., Vlek, C., Slotegraaf, G., 2001. Instrumental-reasoned and symbolic-affective motives for using a motor car. *Transportation Research Part F: Traffic Psychology and Behaviour* 4, 151–169.
- Stern, P., 2000. Toward a coherent theory of environmentally significant behavior. *Journal of Social Issues* 56, 407–424.
- Stern, P., Kirkpatrick, E.M., 1977. Energy behaviour: conservation without coercion. *Environment* 19, 10–15.
- Stoll-Kleemann, S., O'Riordan, T., Jaeger, C.C., 2001. The psychology of denial concerning climate mitigation measures: evidence from Swiss focus groups. *Global Environmental Change* 11, 107–117.
- Sturgis, P., Allum, N., 2004. Science in society: re-evaluating the deficit model of public attitudes. *Public Understanding of Science* 13, 55–74.

- Sustainable Consumption Roundtable, 2006. *I Will if You Will: Towards Sustainable Consumption*. Sustainable Development Commission and the National Consumer Council.
- Tanner, C., 1999. Constraints on environmental behaviour. *Journal of Environmental Psychology* 19, 145–157.
- The Cabinet Office, 2006. *The Better Regulation Executive*. <<http://www.cabinetoffice.gov.uk/regulation/>> (accessed 20 July 2006).
- Thompson, M., Rayner, S., 1998. Cultural discourses. In: Rayner, S., Malone, E.L. (Eds.), *Human Choice and Climate Change*, Vol. 1: The societal framework. Battelle Press, Columbus, OH, pp. 265–344.
- Tonn, B., Hemrick, A., Conrad, F., 2006. Cognitive representations of the future: survey results. *Futures* 38, 810–829.
- Ungar, S., 1994. Apples and oranges: probing the attitude-behaviour relationship for the environment. *Canadian Review of Sociology and Anthropology* 31, 288–304.
- Ungar, S., 2000. Knowledge, ignorance and the popular culture: climate change versus the ozone hole. *Public Understanding of Science* 9, 297–312.
- Urry, J., 1999. *Automobility, Car Culture and Weightless Travel: A discussion paper*. Department of Sociology, Lancaster University, Lancaster, UK <<http://www.lancs.ac.uk/fss/sociology/papers/urry-automobility.pdf>> (accessed 26 February 2007).
- Verplanken, B., Aarts, H., van Knippenberg, A., 1997. Habit, information acquisition and the process of making travel mode choices. *European Journal of Social Psychology* 27, 539–560.
- Whitmarsh, L., 2005. *A study of public understanding of and response to climate change in the South of England*. Unpublished doctoral thesis, Department of Psychology, University of Bath, Bath, UK.
- Whitmarsh, L., submitted. Behavioural responses to climate change: Asymmetry of intentions and impacts. *Journal of Environmental Psychology*, submitted for publication.
- Whitmarsh, L., in press. What's in a name? Commonalities and differences in public understanding of “climate change” and “global warming”. *Public Understanding of Science*.
- Whitmarsh, L., Kean, S., Russell, C., Peacock, M., Haste, H., 2005. *Connecting Science: what we know and what we don't know about science in society*. British Association for the Advancement of Science, London.
- Wilson, E.O., 2002. *The Future of Life*. Little Brown.
- Worcester, R.M., 2001. Science and society: what scientists and the public can learn from each other. In: *Proceedings of the Royal Institution*, Oxford, OUP.
- Wynne, B., 1991. Knowledges in context. *Science, Technology and Human Values* 16, 111–121.