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How the public engages with global warming: A social representations approach

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Abstract
The present study utilises social representations theory to explore common sense conceptualisations of global warming risk using an in-depth, qualitative methodology. Fifty-six members of a British, London-based 2008 public were initially asked to draw or write four spontaneous "first thoughts or feelings" about global warming. These were then explored via an open-ended, exploratory interview. The analysis revealed that first thoughts, either drawn or written, often mirrored the images used by the British press to depict global warming visually. Thus in terms of media framings, it was their visual rather than their textual content that was spontaneously available for their audiences. Furthermore, an in-depth exploration of interview data revealed that global warming was structured around three themata: self/other, natural/unnatural and certainty/uncertainty, reflecting the complex and often contradictory nature of common sense thinking in relation to risk issues.

Keywords
free associations, global warming, social representations theory, thematic analysis

1. Introduction

This paper utilises social representations theory, a social scientific theory of how publics engage with risk and, in particular, a useful alternative to (and inherent critique of) the deficit model. The focus on the themata aspect of this theory offers major opportunities for those seeking to understand latent content, or latent drivers of public thinking. Thus the approach has utility well beyond the confines of social representations theory.

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"There is strong evidence that the warming of the Earth over the last half-century has been caused largely by human activity, such as the burning of fossil fuels" (Royal Society, 2010: 1). Substantial reduction in greenhouse gas emissions is required if targets are to be met and the public will play a crucial role in this regard. Countless decisions, ranging from energy use at home and on the road, to consumer choices of products and services will cumulatively have enormous consequences for the amount of fossil fuel burned and greenhouse gases emitted.

Given the public dimension of global warming, social scientists have become increasingly interested in public engagement with this issue. Various theoretical and methodological approaches have been applied to understand how publics interact with global warming and what drives their representations of the risk (see Breakwell, 2010 for a review). This paper will use social representations theory (Moscovici, 1976, 2008), as a "weak" social-constructionist approach (Lupton, 1999), to explore how a London-based British public engages with global warming. This approach acknowledges a realist base to the danger posed by global warming but sees people's elaboration of it as socially constructed.

This framework aims to map how a complex and evolving scientific phenomenon is "unpacked" by the lay person and the focus is on moving the area away from reliance on the risk deficit model. The alternative chosen, social representations theory, explores how common sense thinking about unfamiliar information develops. The theory is not concerned with whether people think in the "right" or "wrong" way, but rather aims to understand the latent drivers of public thinking about global warming, how this thinking evolves and its consequences.

From risk perception to social representation

Social representations theory is concerned with how people make sense of unfamiliar information. Members of the public are often bombarded with messages about unfamiliar and potentially threatening phenomena. To cope with the potential stress that this new material presents, it is forged into something more familiar in the representation that is constructed to comprehend it. Whereas sociological theories have explored contextual factors associated with the emergence of contemporary risk issues (e.g. Beck's Risk Society thesis (Beck, 1992)), social representations theory concentrates on the social psychological processes involved in the construction of everyday knowledge of risk and the common sense thinking that results.

According to the approach, people's social representations of a risk draw heavily on factors beyond cognitivist information processing (Joffe, 2003). Rather than treating individuals as hedonic calculators reliant on heuristics or cognitive biases (Lupton, 1999), the theory posits that people use a range of symbols, metaphors and iconic images that circulate in their socio-cultural context to inform their apprehension of unfamiliar risk issues. Visual images, in particular, provide an important element.

The role of the visual: Making the abstract concrete

Meanings of unfamiliar and threatening phenomena can be communicated through images (de Rosa and Farr, 2001) and several studies have viewed images as the "expressive vehicle" for common sense thinking (Devine-Wright and Devine-Wright, 2009; Uzzell and Blud, 1993; Wagner and Kronberger, 2001). Visual images have the ability to convey powerful emotions, which rapidly trigger collective meaning-making regarding threatening and unfamiliar events (Joffe, 2008; Mamali, 2006; Sen and Wagner, 2005).

Visual information is particularly salient for global warming since it can render the issue concrete. As global warming is seen to have an invisible cause and distant impact (Moser, 2010), visualisation has become a key vehicle of communication. Before reviewing the literature on this, it is important to operationalise what is meant by the visual. O'Neill and Nicholson-Cole (2009) identify two dimensions of global warming imagery – external images communicated via the media and internal associations, or visual imaginations people have with the issue.

The visualisation of global warming in the media has become a key way that news and other information outlets can capture public attention (Bronnimann, 2002; Doyle, 2007; Manzo, 2010). Smith and Joffe (2009) identified the range of images broadsheet and tabloid newspapers use to visually communicate global warming to the British public. This coverage was dominated by melting ice caps, stranded polar bears and flooded landscapes. These combined to depict the reality of the threat. Images of people affected by global warming and graphical representations of its anthropogenic cause were also salient in the newspapers. Compared to the textual aspects of the articles, imagery concretises the risk by providing viewers with tangible examples that act as visual "proof" that global warming is occurring.

The second dimension refers to the spontaneous associations, or mental imagery, people have when visualising global warming. Early studies explored the mental models individuals hold when imagining the global warming issue: images of the ozone hole were particularly prevalent (Bostrom et al., 1994; Kempton, 1991; Read et al., 1994). More recent risk perception research has used word association techniques to identify the images and underlying feelings people spontaneously associate with global warming and climate change. Leiserowitz (2005, 2006) found associations with melting ice, generic references to rising temperatures and impacts on non-human nature were images Americans were most likely to associate with global warming, whereas Lorenzoni et al. (2006) found a British sample were more likely to associate climate change with weather.

Other studies explore the role played by imagery in public engagement with global warming more qualitatively. Nicholson-Cole (2005) used a semi-structured interview methodology to explore how different social groups in Norwich used visual imagery to engage with climate change and found that people often visualised negative impacts and their thinking was driven by a combination of exposure to media information and personal experience. Others have explored climate change iconography as a public engagement device. O'Neill and Hulme (2009) used a handful of pre-selected expert and non-expert "iconic" representations of global warming and explored the interplay between these icons and the lay public viewing them.

Although research has begun to identify the range of visual associations people have regarding global warming, less is known about how people combine the visual with their existing repertoires of everyday knowledge and mass media textual information to inform their common sense of global warming.

Representing global warming: A social representations approach

This paper uses social representations theory to offer a novel lens through which to investigate how the public engages with global warming. A key way in which the theory can augment public engagement studies is by casting light on the processes by which unfamiliarity is transformed into everyday common sense. Anchoring and objectification are vital in this regard. Anchoring classifies and names foreign and threatening phenomena in terms that resonate with those attempting to understand the phenomena. Classically, AIDS became "plague" when first assimilated into common sense. This located the new phenomenon as being in line with a history of mass, deadly illnesses. Working in tandem with anchoring, objectification transforms the new phenomenon into

concrete existence by way of more tangible images, concepts and symbols. Images of dying gay men, for example, concretised AIDS in its early years, fixing it in the public imagination as "gay plague" (Joffe, 1995).

In a more innovative use of the theory, this paper will also present social representations from a dialogical perspective focussing on the important role dichotomies can play in structuring common sense thinking. Although previous work has identified the role played by binary oppositions for social classification (see Needham, 1973 for work on left/right symbolic classification), Moscovici applied the dialogical concept of themata (or thema, its singular) to understand the structure and formation of social representations (Moscovici, 1993; Moscovici and Vignaux, 2000).

Markova, in particular, has developed this concept and argues that as a theory of social knowledge, social representations theory is inherently dialogical. Themata, which are mutually interdependent oppositions or dialogical antinomies, structure how people view the world (Markova, 2003). Furthermore, the manifestations of themata are evident in the processes of anchoring and objectification (Liu, 2004). A representation of AIDS as "gay plague," for example, is driven by the antinomies of "dirt/cleanliness," "morality/immorality" and "life/death" (Markova, 2003). These core, often latent structures shape the content of the more explicit representation that is formed.

The current investigation utilises social representations theory to explore the following research questions:

- How is global warming represented by members of the British public?
- What constitutes and shapes their "common sense" of global warming?

2. Method

Participants

A purposive sample of 56 participants was recruited using a London-based recruitment agency and all interviews were conducted between April and June 2008. All participants were British and lived in the London area and equal numbers of younger, older, male, female, broadsheet and tabloid newspaper readers were sampled. The age range was 50 to 75 for the "older" group, with a mean age of 57 years (SD = 6 years) and 20 to 49 for the "younger" group, with a mean age of 32 years (SD = 7 years). The group also had a wide educational range and ethnic composition (Table 1).

Procedure

Participants were contacted by the recruitment agency and invited to participate. Before completing the interview, all participants were provided with an information sheet that outlined the nature of the study as a research project to understand public responses to an environmental issue. They were told that the interview would be transcribed and the tapes erased. The interview was conducted once a consent form had been signed.

Free association task

Firstly a free association task was given. For this participants were provided with an A4 piece of paper containing a grid of four blank boxes. The instruction above the grid informed participants to "write or draw the different words and images you associate with global warming." Participants were invited not to give more than one thought or image per box. This procedure (Joffe, 2011a) is

Table 1. Participant demographics.

	N	Valid percentage
Education (highest level reached)		
Postgraduate degree	7	13
Degree/professional equivalent	20	36
A level	14	25
O level/GCSE	12	21
Vocational qualification	3	5
Ethnicity		
White – British	36	64
White – Irish	5	9
White – Other	4	7
Black – British (Caribbean)	8	14
Mixed (White & Black Caribbean/African)	3	6

advantageous for eliciting spontaneous associations by providing a naturalistic guide for interviewees to order and phrase their own thinking. The chains of association are important in uncovering the roots of people's feelings regarding the issue (see Hollway and Jefferson, 2008).

Although all four associations form this "chain," comparable studies examining associations with global warming and climate change (Leiserowitz, 2005; Lorenzoni et al., 2006) place particular emphasis on the first image provided for ranking the spontaneous and context-free associations people have. Thus a content analysis was conducted on the four images/words respondents provided, with separate analyses of the first and subsequent associations.

Semi-structured interviews

During the interview participants were asked to elaborate on the content of each box. In order to begin the interview a typical first question was "can you talk me through what you have drawn/written in box 1?" Once the participant had elaborated on the first free association, the process was continued until the content of all boxes had been addressed. A small set of questions was also asked of participants who did not elaborate on these areas during the interview process, e.g. "could you tell me what you think contributes to global warming?" Each interview lasted approximately 30 to 45 minutes. Upon completion participants were debriefed about the nature of the study and thanked for their participation.

Coding was approached from two different positions once the data had been collected: deductive and inductive. This process provides a rigour to the initial classification of material but is flexible enough for more grounded codes to develop naturalistically.

The initial, deductive classification was based on the global warming policy framework outlined in Intergovernmental Panel on Climate Change (IPCC) assessment reports. Reflecting such reports, the information could be broadly coded as Cause, Impact or Solution. Finer distinctions were then made to differentiate these high level codes, again based on the content of the IPCC assessment reports. Cause was subdivided into Human and non Human, Impact into Physical, Human and Biodiversity, and Solution into Technological, Political and Economic.

In order to explore the content of each of these categories, inductive codes were then developed. Less restrictive than deductive coding, this facilitates identification of unexpected themes.

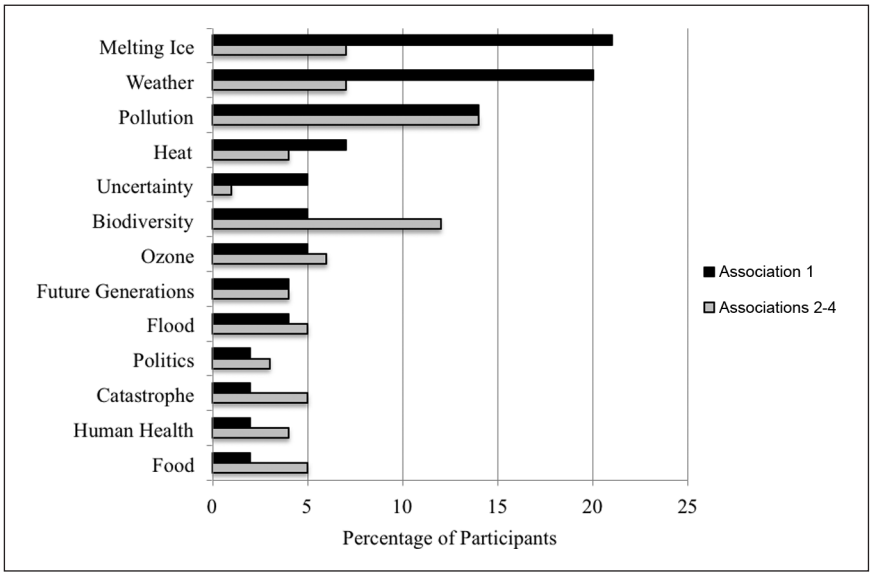

Figure 1. Percentage of free associations.

Acceptable reliability of the coding frame was established. A second coder was trained by the first coder and double coded 10% of interview transcripts. Both coders agreed on the code given to an excerpt in 79% of cases. Discrepancies were resolved following discussion between coders.

Finally, a thematic analysis was conducted to explore patterns found within the interview data. Thematic analysis provides a systematic way of observing both manifest and underlying meaning within a source of data. It captures the nuances people bring to their representations of risks. In particular, a thematic analysis is able to explore how associations are connected and how they structure common sense thinking (Joffe, 2011a). A more complex picture of people's lines of (often contradictory, ambivalent and complicated) thinking is accessed, than the truncated first association/s.[1] All coding and analysis of interview transcripts utilised the qualitative computer package Atlas ti.

3. Results

Free associations

Free associations, and particularly first free associations, map an initial and spontaneous level of engagement with the global warming issue. Results illustrate that 93% of first free associations and 76% of all other free associations (associations 2, 3 and 4) can be classified into 13 distinct codes. Furthermore the majority of free associations can also be grouped into two broad thematic areas – impacts and causes of global warming. The graph shown in Figure 1 illustrates these results.[2]

Impacts of global warming account for 67% of first free associations and 53% of all subsequent free associations. As illustrated in Figure 1, 21% of respondents provide an association with **"melting ice"** for their first association. More specifically, associations with "melting ice" include

"melting ice caps," "polar regions melting" and "melting icebergs." This category accounts for the largest proportion of first free associations and 7% of all other free associations. The second most salient first free association category individuals used to engage with global warming is **"weather."** Twenty per cent of respondents provide a "weather" association for their first free association. In particular, "changing weather," "extreme weather" and "unpredictable weather" are examples of phrases individuals used to typify this code. Thus "melting ice" and "weather" are the key free associations evoked by the term "global warming" for this sample.

While "melting ice" and "weather" are impacts, **"pollution,"** representing causes of global warming, is the third most salient first free association and accounts for 14% of first free associations and 14% of all other free associations. "Pollution" includes "carbon dioxide emissions" and "car and/or airplane pollution."

Other associations members of the public have with global warming, of which many are impact based, include associations with hotter temperatures, species extinction, flooding, famine and dangers for future generations. Several of these associations were more salient as 2nd, 3rd or 4th free associations than as first free associations. Finally, a handful of participants provided free associations of a hole in the ozone layer.

Discussion of free associations. When asked to freely associate to "global warming," people think/feel in terms of impact and, to a lesser degree, causes. Thus solutions to global warming are not at the forefront of the landscape of lay thinking concerning global warming. The prevalence of associations with physical manifestations of a warmer world, including impacts associated with melting ice and weather corroborates other North American and British findings using similar free association methodologies (Leiserowitz, 2005; Lorenzoni et al., 2006). In the present study, over 40% of first free associations depict melting ice or strange weather impacts. This mirrors how newspapers visually represent the threat. Smith and Joffe (2009) found that photographs of retreating glaciers, melting polar ice caps and flooded landscapes featured most prominently in the newspaper visual representations analysed.

Anthropogenic causes of global warming are also mentioned in the "pollution" category. Despite carbon dioxide and other greenhouse gases involved in global warming processes being largely invisible and outside most people's direct experience, polluting smokestacks and car exhaust pipes are tangible visual and concrete icons people can easily identify and relate to the global warming issue (Nicholson-Cole, 2005; O'Neill and Nicholson-Cole, 2009).

Although results of the free association task have been provided, it was conducted primarily as a device to initiate further, naturalistic chains of thought and feeling regarding the person's pathways of thinking and feeling in relation to global warming.

Interview themata

The interview process flowed directly from these initial associations. The following section will outline the core themata that underpin the most prevalent themes that manifest in the interviews. Although these themata are non- or unconscious they reveal the dialogical, and deep rooted nature of British "common sense" regarding global warming. This thinking is structured by pragmatic manifestations of the representation made familiar via processes of anchoring and objectification. Three dyads are identified, which form the basis for how members of a London-based British public engage with the issue. The following section will outline the content of these themata, and their manifestations.

Thema 1: Self/other. The most prevalent themes in the interview data are underpinned by a self/other dyad. This is manifest in the majority of the sample's common sense thinking in a variety of different ways. At one level, the respondents see the "other" as the perpetrator of global warming. Although many recognise the role their own activities play in anthropogenic global warming, and indeed, a handful of respondents feel guilty about driving their cars to work and flying abroad on holiday, it is other, larger and more polluting societies that are represented as causing the most serious global warming impacts, as illustrated in the following quote:

> I understand that the developing countries, you know, China, a lot of Asia and including India, [are] the ones currently to blame, as well as the US, for their emission levels, and I also understand that they've been kind of let off slightly, let off their duty to bring it down at the moment because they're a developing country and everyone else, all the developed countries have sort of had their bit … and I think in the States, they know damn well what's going on, and they are one of the main perpetrators of the high carbon emissions, and I don't know if they're doing enough. (female, younger, broadsheet reader)

This excerpt also reveals blame of other nations for global warming. Feelings of anger and frustration are often directed towards the United States, which is singled out as one of the main perpetrators of more serious global warming. Former President George Bush is regularly mentioned for his Administration's antagonistic attitude towards the climate and is used as a symbol towards which people direct feelings of anger. Respondents also blame China and India for causing global warming although there is ambivalence associated with this view. Respondents see it as only fair that Chinese and Indian economies are given the same freedom to develop on a mass scale as was accorded to the West during its Industrial Revolution.

The use of "other" is also revealed in common sense thinking in relation to physical manifestations of global warming. An "othering" of the most serious impacts distances the threat by locating it "out there." The following quote demonstrates this:

> So yeah, it's [global warming] a very big problem, but I don't think people take it seriously because it's not a thing that affects you here and now and I think people often react slowly or badly to things that seem very distant, so if we say the amount of sun, the rays that are affecting places in Africa, so that now there's periods of prolonged droughts; being here in London I think oh that's really terrible, but it is what it is, because it doesn't affect us in that way. (female, younger, broadsheet reader)

Serious manifestations of global warming are situated elsewhere and are generally associated with "warming" and how hotter temperatures are already affecting other places. Impacts associated with "melting ice," in particular, as well as intense heat and extreme flooding are most commonly mentioned. An association of intense "heat" is typically linked with drought and subsequent famine. Global warming is seen to exacerbate problems in regions that are already struggling with malnutrition and extreme weather conditions. One respondent talks about "fried Africa" in his representation of how global warming is likely to affect this region of the world.

In addition, extreme flooding is directly linked with images of warming. In particular, interviewees often incorporate flooding into their descriptions of polar melting. For many, flooding is a logical consequence of melting ice. As temperatures increase and icebergs melt, global sea levels will rise. Associated with this, many speak about flooding in generic terms, identifying low-lying countries and geographical regions susceptible to rising sea levels. Although flooding affects local, British populations, people regarded as "other" are considered more vulnerable to the effects of

global warming and it is other countries with less economic advantage that are represented as being hardest hit. Differences in development, therefore, are seen to accentuate particular global warming impacts.

By contrast to representations of the "other," the "self" is manifest through descriptions of action/inaction and how respondents feel they can/can't make a difference. In particular, the discourse around recycling and recycling habits creates a strong engagement (and occasionally, disengagement) with the idea that the impacts of global warming can be alleviated. For some, this is an activity represented as having a direct impact on the environment, as the following excerpt shows:

> Everyone I know is fanatical about recycling: it's something that once you start you can see the difference. It's your own tiny little contribution, so I think people in general are worried enough or you get a little thrill or a little buzz out of doing the odd little tiny bit. (female, older, broadsheet reader)

As greenhouse gas emissions are represented as threatening to destroy the environment, recycling is seen as a way to alleviate this threat in a gradual, ongoing way. A visual connection is made with the recycling "bin" and recycling is seen as an activity that can be carried out by anyone. Not only do people get "a little thrill or a little buzz" by placing objects into the recycling bin, it is an action that helps people visualise their own contribution.

However, for others, the discourse around recycling is more ambivalent. Several respondents point to the need for many more people to recycle for the effects to be felt as the following quote illustrates:

> Just take recycling … not everyone recycles, so the effects aren't really going to be what they should be. Everybody has to do it for the effects to work, for there to be an effect. (female, younger, broadsheet reader)

This sentiment is associated with feelings of helplessness for a handful of respondents. People can feel good by "doing their bit" but without everyone "chipping in" people feel powerless about what they can do to help at an individual level. A sense of frustration is also associated with recycling and a few respondents speak about recycling bins being situated in inconvenient locations. Several respondents compare their own experiences with those of citizens in what are seen to be "good recycling" countries. One respondent, for example, talks about "bottles for cash" incentive schemes in Germany and asks "if they can do it why can't we?"

Discussion of self/other thema. The antinomy of self versus other plays a core role in everyday conceptualisations of global warming. At one level, the self is regarded as the solution, whereas the other is seen as the perpetrator. The United States, India and China, for example, are routinely identified as the "chief polluters," as the cause of global warming by this British sample. A "not me," the "other" is to blame response can explain this process of attribution. Joffe (1999) outlines a theory to describe how societies respond to risk in times of crisis. When anxieties are high, outgroups shift from being seen as mildly threatening to being a "purveyor of chaos" (Joffe, 1999: 23). Groups latently protect their individual members and it is through denigration of the "other" that this occurs. Representations are formed that link deviant practices to the other. This theory has been used to account for societal responses to a broad range of emerging infectious diseases (Joffe, 2011b).

This can be contrasted to the role played by the self, which is commonly expressed through recycling. For some, conceptualisations of recycling tap a deep emotional identification people have with doing something good for the environment. People talk about getting a sense of satisfaction from recycling and the recycling bin symbolises a desire to do one's own bit to solve the global warming challenge. However, for others, recycling and the recycling bin symbolise a sense of inaction and feelings of helplessness and frustration in relation to solving such a large issue on an individual level. Both of these discourses also speak to the role played by symbols in social representation formation. They generate and maintain appropriate emotional sentiments to deal with unfamiliar and threatening phenomena (Verkuyten, 1995).

The "other" is also used with reference to physical manifestations of global warming affecting other parts of the world, ranging from melting ice caps to floods. This element of the representation appears likely to be fed by the mass media – visual imagery in the media in particular. However, the key issue is how the public draws on such images in engaging with the risk. It is now well established that the media–mind relationship is not that of a "hypodermic" model (Kitzinger, 2006) and individuals are not passive receivers of information. Media content is actively processed and influenced by the range of meanings individuals bring to their engagement.

At one level, visual images familiarise individuals with the more remote impacts of global warming. People regularly referred to "melting ice" imagery mirroring the ubiquity of this content in British newspapers (see Smith and Joffe, 2009). People appear to take up these images in an unmediated way, not deconstructing content in a manner that they might a textual or verbal story (Joffe, 2008). Textual articles, for example, often debate the anthropogenic basis of global warming and construct the issue as controversial by purposefully injecting scientific disagreement into reporting. No comparable "debate" is possible regarding visuals, which often act to verify the authenticity or "truth value" of an event (Graber, 1996; Joffe, 2008).

The vividness of visual imagery, in particular, can be argued to influence the availability of information in memory. Bradley et al. (1992), and more recently Bywaters, Andrade and Turpin (2004), found that arousing and extremely valenced images are more memorable than neutral pictures, possibly because they undergo greater elaboration at an encoding stage. Although it is debatable as to whether images of crumbling icebergs are arousing, they are visually striking and newspapers use them to sensationalise the gravity of the issue in the hope of attracting attention.

Visual images of global warming, however, can also objectify this threat as distant. Sensationalist imagery, in particular, can help garner a degree of detachment for many individuals. Visually depicting impacts located "out there" creates a psychological barrier of distance (O'Neill and Nicholson-Cole, 2009) and distancing the self from what are seen as alarming and catastrophic impacts may be a way of coping with them. This supports Wagner, Kronberger and Seifert (2002) who argue that social representation is a mechanism of collective symbolic coping. Furthermore, this finding also speaks to an inverse distance effect, identified by Uzzell (2000), who argues that perceived severity of environmental issues increases with distance. That is, environmental issues are regarded as more serious at a global level than at a local level.

Thema 2: Natural/unnatural. A natural/unnatural dyad plays the second most prominent role in the representation of global warming. The difference between what is expected from nature and what is actually experienced is manifest through a "contravention of the natural" dialogue. A core aspect of the talk on this topic is mention of strange and bizarre weather. In particular, over two thirds of the participants associate global warming with a change in British weather and an unnatural blurring of the seasons, as the following quote illustrates:

> It's affecting our weather conditions so we're getting either very peculiar seasons and either extreme heat or very cold winters or the opposite way round, we could get very mild winters and very peculiar summers like we had last year. (male, younger, tabloid reader)

The notion of the strangeness and unpredictability of current British weather is particularly salient and weather patterns are described as differing from what is expected. There are no longer four distinct seasons. Winter is warmer and summer is wetter than people remember. Tangible examples are often provided to "flesh out" what a contravention of the natural means to people. Respondents often juxtapose what they see in nature, with personal experience of how seasons develop. One respondent, for example, talks about tulips poking through a snow covered lawn, whereas another reflects on experiencing hot days in December and snowy days in April. These, and other associations, give this aspect of the representation a distinct tangibility, which neatly captures the sense of strangeness with which respondents represent global warming.

Related to this, there is a nostalgic recollection of how the weather used to be. Detailed descriptions reflect on what life used to be like when the weather was "normal" and seasons were predictable. Happy memories link particular behaviours and activities to certain times of the year. One respondent, for example, talks about how cold winters used to be and uses symbols of a "proper" winter including a "coal fire" to contextualise the changes experienced. Another respondent reminisces about the great British summer and uses memories of a "worn out" and dry "pitch" at the Wimbledon tennis championships to symbolise how hot and dry summers used to be. For this respondent, summer months are no longer enjoyable without long periods of hot and sunny weather.

Reflecting changes in weather, many interviewees also talk about flooding. Older respondents in particular, often speak about their own current experience of flooding being different from what they remember. One respondent, who has lived in London all her life, talks about a recent episode of flash flooding and speaks of "swimming" roads unlike anything she'd seen before. Others talk about inconvenient consequences with "trains being cancelled" and people having to "abandon their [travel] plans." Like other changes in weather, increased periods of flooding are viewed as atypical and unnatural in relation to how British weather should be.

Common sense thinking about atypical British weather also takes people down different emotive pathways. Compared to feelings of nostalgia in relation to past experiences with "normal" weather, emotions are also associated with unnatural change and what this might mean for the future. Several respondents reflect on the positive aspects that warmer weather would contribute to the UK. As a country notorious for its bad weather, the possibility of a more Mediterranean climate is an attractive and happy prospect. However, many respondents also recognise that although warmer temperatures might bring a welcome local change, these benefits are not necessarily felt everywhere. One respondent, for example, mentions that although global warming might be nice for England, it would be a "worry for the world." Others, particularly interviewees with children, also speak about feeling worried, anxious or fearful in relation to what state the world will be in when their children and grandchildren are older. Associated with this is a desire to leave the world in a better state for future generations, or, at the very least, in as good a state as was inherited by them.

Discussion of the natural/unnatural thema. A core element of the social representation of global warming revolves around the unfamiliarity and unpredictability of nature juxtaposed with how nature is expected to behave. Respondents use recollections of past experience of weather to construct an idea regarding the strange and unseasonal weather phenomena currently experienced. Nostalgic childhood memories are often used to depict what the weather used to be like. This

constructs a representation of idealised weather, based on romanticised recollections of the past and speaks to an important function of nostalgia: it helps people deal with threats (Sedikides, Wildschut and Baden, 2004). It could be argued that such reminiscence is indicative of a generic mechanism used by individuals to familiarise themselves, if not cope, with the uncertainty presented by recent increases of what are construed as strange weather phenomena.

Thema 3: Certainty/uncertainty. A final thema structuring a social representation of global warming revolves around certainty versus uncertainty. Although most respondents express a sense of certainty that anthropogenic activity plays a key role in global warming, approximately a quarter also identify an inherent level of debate associated with unravelling the anthropogenic versus natural components of global warming, as the following quote illustrates:

> Now as to what causes global warming, that's another issue altogether – how much is manmade and how much is natural that is a different debate. (male, older, broadsheet reader)

Despite the majority of people ascribing to the general belief that "something is going on," there is a strong element of uncertainty evident in conceptualisations of global warming's cause. Respondents blame contradictory media coverage for this uncertainty. One respondent, for example, speaks about feelings of disempowerment after reading conflicting news articles. With contradictory sources of information highlighting both apocalyptic and more natural scenarios, individuals find it difficult to arrive at an informed decision about global warming.

In response to this, interviewees call for better quality media information, specifically regarding the science of global warming and what they, at an everyday level, can do to help. People feel that if they can understand the science and have a detailed appreciation of what causes global warming, perhaps they will have a better grasp of what activities they can engage in to make a difference.

A final element of this thema is the role played by the ozone hole. In particular, the ozone hole is a symbol of certainty in the face of the invisibility of global warming. When speaking about global warming, two thirds of respondents talk of the destruction of the ozone layer as a possible cause. Specifically, the role that aerosols and other CFCs play in the destruction of the ozone hole is frequently mentioned. The significance of a hole in the ozone layer is also spoken about widely in relation to specific health risks. As many individuals associate global warming with a rise in temperature, the risks of sunburn and skin cancer are seen to be exacerbated by an ozone hole.

Discussion of certainty/uncertainty thema. The final thema structuring "common sense" pertaining to global warming hinges around the opposition between certainty and uncertainty. Despite the emergence of a scientific consensus concerning the anthropogenic basis of climate change in recent years (IPCC, 2007; Royal Society, 2010), climate science and the notion of using climate models and forecasting techniques to predict future climate is an inherently uncertain enterprise. Such uncertainty is brought into the public sphere via the mass media, as the email scandal surrounding the "Climategate" affair identified (Hickman and Randerson, 2009; Leiserowitz et al., in press). Although interviews for the current investigation were conducted before this, such events bring to light the challenge faced by the media and the public in making sense of uncertainty. Furthermore, interviewees regularly voice their desire for better quality media information about the causes of global warming in particular. Although research identifies the fallacies of a simplistic deficit model of public engagement (see Moser, 2010), people do have a desire to learn about the science of climate change.

Social representations theory asserts that people rely upon familiar, everyday experience to make sense of unfamiliar and uncertain information. Such sense making is evident in the present investigation. Interviewees often speak about the ozone hole and the role it plays in the global warming process. This indicates how people anchor current threats into a pre-conceptualised way of seeing the world. Other studies have documented the ozone hole as a familiar "mental model" individuals use to conceptualise the dynamics of climate change as it is the closest model available for people to grasp the processes involved (Bostrom et al., 1994; Kempton, 1991).

While it may seem curious that people use something abstract and ostensibly invisible to concretise global warming, Ungar (2000) argues that a range of "bridging metaphors," popularised via Hollywood films and other cultural motifs, helps crystallise a public understanding of the ozone hole. As it has become so entrenched in the public mindset, it acts as a tangible and concrete anchor that members of the public can use to familiarise themselves with global warming. The uncertainty surrounding the scientific basis of climate change is juxtaposed with the certainty associated with the representation of the ozone hole.

4. Concluding discussion

This paper has explored how strategically sampled members of a British, London-based public engage with global warming risk. In particular, it has identified the dyadic nature of a global warming social representation (Markova, 2003; Moscovici and Vignaux, 2000). Sense making in relation to global warming is structured around three dyadic oppositions, whose pragmatic manifestations flesh out the content of the representation via the processes of anchoring and objectification. A "self/other" dyad is anchored to an "us" vs. "them" opposition, which is objectified via visual images and concrete symbols including polluting smokestacks, melting glaciers and the recycling bin. A natural/unnatural dyad anchors global warming to a nostalgic past experience of "normal" weather fleshed out using a range of reminisced symbols (e.g. tulips poking out of the snow) to objectify this change. Finally, a certainty/uncertainty dyad is anchored using the ozone hole and made concrete via an association to increased sunburn and skin cancer.

Like Nicholson-Cole's (2005) study, this study speaks to the dominance of visual impacts associated with global warming and the important interplay between media coverage and personal experience. In particular, the combination of systematic analysis of the visuals in the newspapers (reported in Smith and Joffe, 2009) and the associations offered by their readerships provides strong evidence of the resonance of one in the other. Although various depictions of global warming are readily available in the mass media, it is visual material that has the greater impact on public engagement. While the global warming visual environment runs well beyond newspaper imagery, the different visual depictions tend to mirror one another.

However, it is how people combine media information with existing repertoires of everyday knowledge that informs common sense thinking. In particular, this study has explored the dyadic nature of the global warming social representation. Thema, at a latent level, structure many of the conversations and communications people have about this issue. People think in terms of antinomies and weigh up, and vacillate between, different positions when trying to make sense of global warming. This helps meet an important function of social representations, namely communication, as it is only through communication that a novel object can be said to have a social reality. However, in order to communicate, individuals need to have an opinion and "be in the know" (Moscovici, 2008). If social representations are dialogical, as Markova argues, people need to be versed in the basic antinomies that underpin a global warming dialogue. The ability for people to oscillate between different positions is likely to afford them the best chance of making themselves heard.

The use of the "other" in the present investigation also serves another important function of social representations, namely identity protection. Joffe (2003) argues that social representations are used to defend against threats. An "othering" of more serious manifestations of global warming's impact, for example, protects against a feeling of being threatened. Blaming others for causing global warming bolsters people's shared identity as a solution to the problem.

This investigation also extends findings from more quantitative and questionnaire-based studies. Through forced response formats, questionnaires often provide only a limited inroad into naturalistic pathways of thought and feeling. Public response to risk is complex and often contradictory; it is difficult to map when using standardised scales and survey items (Joffe, 2003). In the present investigation, common sense thinking about the ozone hole and recycling, for example, only became salient as chains of association through the interview procedure. They were largely absent as free associations, which are what several other studies have relied on exclusively. This more qualitative inroad has identified three primary axes around which people vacillate when contemplating global warming: Is it un/natural? Will it affect the self? Is there enough certainty to establish that it is definitely happening and caused by human action?

Additionally, this study speaks to the role emotions can play in common sense thinking and their importance for making the issue recognisable and comprehensible. Along with basic emotions such as fear, worry, anger and guilt evident in conceptualisations of global warming, this study reveals the importance of more complex emotions people use to familiarise themselves with the issue. Resonating with Hoijer (2010) nostalgia, in particular, was identified as a key emotional anchor evoked in response to threats to traditional ways of life.

More theoretically, this investigation offers researchers a different direction for exploration of public engagement with risk. In contrast to more traditional risk perception approaches, social representations theory recognises the importance of frames of reference and local knowledge in how a risk is conceptualised. Its ability to "stand back" and explore how people make sense of unfamiliar phenomena is a key strength. In doing so, a considerably more complex picture of engagement emerges. It is not manacled to a theoretical tradition that relies on heuristics and biases to understand how people process unfamiliar scientific information (Bauer and Gaskell, 2008).

Despite its utility, the approach has its critics. Several comment that the theory is too broad and too vague to constitute a suitable framework for explaining lay thinking (Fife-Schaw, 1997; Potter and Wetherall, 1987). Moscovici refutes such critiques and argues that understanding social phenomena involves complex processes, which cannot be reduced to linear models (Moscovici and Markova, 2000). Social representations theory does not aim to predict causal, linear relations. Human thinking is complex and requires a theoretical approach that captures the subtlety and nuance of common sense (Joffe, 2003).

In sum, this paper explored a London-based public's "common sense" of global warming. Social representations theory was used to discover how members of this group represent global warming and uncover the latent drivers that constitute and shape their common sense. This has implications for those trying to understand and potentially change the discourse underpinning the issue. A novel free association methodology revealed which associations were most accessible for respondents and these resonated with visual media representations of the issue. Further in-depth thematic analysis identified three underlying themata that drive these associations. Access to this latent element of public thinking not only reveals a shared, deeper structure in how people engage with global warming, it demonstrates how nuanced and symbolic public engagement with a risk can be.

Notes

1. The authors note the availability of other forms of analysis that could have been used, most notably Correspondence Analysis, but argue that given the study's goal – to explore the latent elements of common sense thinking – a thematic analysis including themata analysis was most appropriate.
2. Frequencies of free associations can be seen in Table 2 in the Appendix (see online Appendix at http://pus.sagepub.com).

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