

Is this climate porn?

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affect our perceptions and behaviour?



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Abstract/Summary

There is growing concern that the social construction of the issue of climate change and its amplification by normative communication channels may be acting to distance or even remove much of the lay public from a point at which they feel they can take action. This paper discusses the extent to which such representations are imbued by the public psyche and, importantly, the extent to which such messages are likely to effect behavioural change. Evidence is presented from a controlled experiment which explores whether a filmic experience may promote a greater individual reaction to the potential dangers from climate change than simply reading a compendium of scientific information detailing the causes and potential effects of human induced climate change. Results suggest that although the public harbours deep concerns about the effect climate change is having or may have, there is a disconnect between this and the actual sacrifices we are willing to make. Popular reporting of climate change in the style of environmental 'science fiction' appears not to be a catalyst for change; rather it creates a nagging concern, the solution to which is felt to be beyond the reach of the ordinary person.

1.0 Introduction

We are all familiar with the alarming way in which climate change can be reported by certain media, environmental groups and popular and political figures. The apparent urgency of the problem is manna for journalistic prose, a soapbox for political rhetoric and a socially desirable rallying call for any, if not all, global citizens. As a result, climate change represents for many a specter of dread and fear over potentially catastrophic scenarios which threaten to lead us into economic, social and environmental ruin. However, recent research and commentary (e.g. BBC, 2006; Lowe *et al.*, 2006) has begun to examine the utility of this often default approach; questioning whether the alarmists' rationale for overselling the problem in order to raise awareness may lead to reactions which are out of tune with the science and reality of climate change. Bold warnings lead to even bolder measures; if society is to survive it must act – rapidly and radically – by mitigating climate change and preparing itself for the onset of massive global change. However, whilst these kinds of messages (which have recently been dubbed 'climate porn' (Ereaut and Segnit, 2006)), can instigate a range of negative effects, from fatalism and apathy to rejection and anger (Rogers, 1983), it must be considered that they can also instigate strong feelings that something must be done. Precaution and forward thinking, the gifts of human wisdom, are helpful in forewarning society that it is headed for a fall. In an age in which many media see themselves as performing a social duty; *“using issues to inform the public of the dangers inherent in thinking along conformist lines, or illuminating the perils awaiting society if it persists along a certain political, moral, social or economic course”* (Griffiths and Brake, 2003, p.8), to what extent does the narrative of fear provide warnings for modern society, now at odds with its religious or mythical past? Does the story of global catastrophe, as Griffiths and Brake (2003) suggest, enable the audience to examine a difficult social and environmental problem from an informed yet quasi-fictional perspective?

The acceptability of various approaches towards climate change has become increasingly polarized in recent times, as mutual accusations of downplaying or exaggerated risk, sensationalism, “bad” science, inciting public hysteria, and even conspiracy abound (Weingart *et al.*, 2000); “...*scientists politicised the issue, politicians reduced scientific complexities and uncertainties and the media ignored the uncertainties and instead outlined a sequence of events that would lead to catastrophe*” (p.280). Individuals that reject climate change, either on grounds of poor science, over-hyped reporting or message rejection through defensive processes (i.e. ‘catastrophic change is beyond my control...there is nothing I can do’) do not see precautionary changes to the status quo as necessary or indeed acceptable. However, their views are often challenged by an overwrought and alarmist group who’s stance of urgency and need for rapid change is a likely catalyst for attack from skeptics and ‘naysayers’ (Leiserowitz, in prep.).

Indeed, it appears that the public and political face of climate change may prove ultimately to be its Achilles heel as, in many cases, popular claims and media ‘spin’ amplify the science beyond proportion. We cannot predict with any great accuracy how, when or to what extent rapid, catastrophic, or runaway climate change will occur. The predictions are made nonetheless. At the same time, science, whose post-normal legitimacy relies upon public endorsement, appears to be falling foul of the clamour for greater urgency and more competitive results as climate scientists stand accused of publishing exaggerated predictions in order to attract public attention, thereby assuring research funding (Weingart *et al.*, 2000). For example, a report published in Nature (Stainforth *et al.*, 2005) detailing the effect that doubling the amount of carbon dioxide (CO₂) in the atmosphere would have on temperature, suggested that, overall, this would lead to an increase of about 3⁰C. However, a small percentage of the models showed very high levels of warming - the highest of which was 11⁰C. The consequent press release (NERC press release, 2006) only mentioned the significance of the 11⁰C results, a fact which led to hard-hitting and disturbing headlines,

from "Global warming is twice as bad as previously thought" to "Screensaver weather trial predicts 10⁰C rise in British temperatures" (BBC, 2006). Thus, the vast uncertainties associated with climate modelling necessitate a wide range of possibilities, the extremities of which produce fertile ground for sensational reporting. Whilst this 'creaming' of scientific results for attention-grabbing headlines is a boon for interest groups, sceptics and politicians alike, our understanding of its effect upon the lay observer is lacking due to the absence of any kind of systematic investigation.

1.1 Contemporary representations of climate change risk

When judged against the extensive body of social psychological research which examines the persuasiveness of any communication (Breakwell, 2000), popular portrayal of climate change ticks many of the boxes. Breakwell (2000) suggests that to maximise impact, risk communications must have a content which triggers attention, is unambiguous, definitive and easily interpretable. Thus, contemporary representations appear well suited perhaps not to educate the public but more to tap into the accessible parts of psychological function¹. However, at the same time, such approaches fall short of being a conventional risk communication tool by frequently departing from the realms of reality and failing to offer audiences a basic understanding of causes and measures for mitigation. Recent research into the '*linguistic repertoires*' used in popular media coverage and communication campaigns (Ereaut and Segnit, 2006) identifies (among others) a language of 'alarmism' incorporating urgent tones and cinematic codes with "*...images and ways of speaking that are familiar from horror and disaster films...[employing]...a quasi religious register of doom, death, judgement, heaven and hell...using words such as 'catastrophe, 'chaos' and 'havoc'...*" (p13).

¹ As an example of the long-term influence of motion pictures upon public risk perceptions, Steven Spielberg's blockbuster film version of Peter Benchley's novel, 'Jaws', can be seen as the simple but enduring reason for our false sense of the risk toward sharks.

In contrast (and despite a healthy dose of scepticism), the vast wealth of scientific climate research which has emerged over the last 20 years paints a convincing picture of the long-term and wide-ranging effects of human influence upon the global climate. However, whilst thorough, objective, peer reviewed and historically the most legitimate information source, it is not easily accessible to the lay public. Its language requires a prior knowledge of scientific processes and terms and a feel for probability, uncertainty and postulation. In addition, the lay public will seldom read an entire academic manuscript, the majority of which bears no real relevance to them. Thus, both sides allow the aspects more salient to daily life to be translated via a variety of media; a third party whose own legitimacy is often overlooked due to the service they provide. However, the trade-off for this information franchise has been a trend towards dramatic and attention grabbing headlines², often ‘cherry picking’ scientific information without considering the process or uncertainty involved, or, as in some cases (see above), being fed the more enticing titbits of an otherwise mundane scientific exercise.

There is growing concern that the social construction of the issue of climate change and its amplification by normative communication channels may be acting to distance or even remove much of the lay public from a point at which they feel they can take action. The sparse empirical evidence appears to support this, suggesting that whilst ‘shock’ may make compulsive news it may distance individuals from the reality of the risk, thus reducing the likelihood that they will act to mitigate the risk (Leiserowitz, 2006; Lowe *et al.*, 2006; Lorenzoni *et al.*, 2005; Nicholson-Cole, 2004; Bord *et al.*, 1998). This phenomenon is not confined to climate change; Wroe and Doney (2005) suggest that negative reporting of Third World conflict and famine on a biblical scale has produced an attitude in wealthier countries that there is little point responding to the need because it is too great. Subconsciously it is assumed that change is impossible, rendering them and us as powerless. Thus, paradoxically,

² A report from the Third World and Environment Broadcasting Project found that two thirds of international news coverage concentrates on conflicts and disasters.

whilst climate change (frequently referred to under the auspices of ‘environmental problems’) ranks fairly high among individual concerns (although frequently prioritised at a lower level than other social or personal issues (Dunlap, 1998; Thompson and Rayner, 1998)), public response to the problem remains weak.

1.2 The role of science-fiction in cultural understandings of risk

It appears the current paradigm in climate change risk communication is based upon the assumption that the threat to global survival is a likely driver of the behavioural change required to mitigate such a situation. Apocalyptic imaginings of future scenarios have been greatly aided in their artistic license by the many uncertainties within climate science, often informed by historical accounts of ‘run-away’ climate change leading to mass extinction and global ice age. The release of the film ‘*The Day After Tomorrow*’ in May 2004, sparked a brief but fierce debate over the potential for its effects upon public concern and behaviour relating to climate change. Scientists, politicians, environmental groups and critics speculated about how this ‘environmental disaster film’ might impact on public perceptions and action on climate change. Some believed the film’s international release would increase global awareness about climate change and even galvanise the public to take individual actions and put pressure on governments to act on climate change. Others thought it would reinforce climate scepticism or have no impact at all (Lowe *et al.*, 2006). In both arguments there appeared to be an acceptance of the power of science fiction in the formation of public opinion.

Environmental Science fiction, as a relatively new addition to the human story-telling genre, has deeply rooted mythical, religious or astrological story-telling origins as an imaginative method of predicting, understanding and communicating our knowledge of the social and physical world. Science fiction has become a popular method of perceiving the unknown or the future scenario and has a particularly important place within the socio-cultural psyche.

Similarly to historic religious forewarnings (e.g., Christianity's four horses of the apocalypse, plague and tempest), this style of writing, performance or portrayal perhaps exemplifies a social approach for dealing with future possibilities; ensuring that societies can at least recognise or mitigate their actions in advance of such occurrences. In a world of increasing scientific complexity and public ownership, many science fiction works have also attempted to bridge the gap between public understanding and scientific perception, especially in the field of environmental problems. Griffiths and Brake (2003) describe the use of science fiction as "*a way of imagining the relationship between technology, science and society, both as an inspirational source guiding the direction of scientific development, and a way of popularizing and disseminating scientific ideas*" (p.7). In addition, Nisbett (2004) quotes from Michael Crichton's address to the annual meetings of the American Association for the Advancement of Science (AAAS) that science fiction serves an important functional role in society; "*Science and technology in the news media is usually greeted in boosterish terms, whereas films and novels are important outlets for the expression of society's anxieties about rapid scientific and technological advance*".

To what extent (as suggested by Griffiths and Brake, 2003) does environmental science fiction provide a function for a new generation who are now removed from mainstream religions? Can this combination of science and media spin act as a form of social comment; a moral marker, with man's own potential to create change now an even greater threat to society than the Gods or Mother Nature? Or is this apocalyptic construction akin to 'climate porn'; purely a way to entice the audience, to sell books, papers and films with no real intention of persuading the masses to reform their behaviour and mitigate their effects upon the global climate? Kirby (2003), in a paper on the communication of science in media formats such as television and cinema, reports a detrimental effect of these media upon the individuals' understanding of science and a "*corrosion of the public's critical thinking skills which hinders scientific literacy*" (Kirby, 2003: p.262). Representations of science in

entertainment media and mediation among scientists, the entertainment industry and audiences, were said to contain tensions “*not only between the narrative forms of media and those of science, but also between the needs of the entertainment industry and those of the scientific community*” (Kirby, 2003: p.267). Further evidence suggests that translating public concern for global warming into effective action requires real knowledge of climate change (Bord *et al.*, 2000), a fact which makes current representations seem insufficient.

Thus, the questions which this paper aims to address relate to the best ways to communicate complex issues to an equally complex public. Whether the abandonment of scientific rigour in favour of creative expressionism is an adequate pathway to social learning or whether creative imaginings of possible futures should be replaced with carefully presented information from which the receiver may draw knowledge and a responsible attitude towards behavioural actions. The following results and discussion centre upon the hypothesis that the filmic experience, a medium which is specifically designed to manipulate the feelings and emotions of the viewer (and portraying the impacts and implications of climate change in a context or frame which differs significantly from scientific reporting), may promote a greater individual reaction to the potential dangers from climate change than simply reading a compendium of scientific information detailing the causes and potential effects of human induced climate change.

1.3 Affective images of climate change

The experiment described here aimed to investigate how information sources are able to impact upon people’s perceptions and ultimately their behaviour by assessing the “affect heuristic”. This is used as an orienting mechanism allowing people to navigate quickly and efficiently through complex and uncertain issues by drawing on either positive or negative feelings associated with particular risks (Finucane *et al.* 2000; Alhakami and Slovic 1994) –

often informed through experiential or vicariously experienced processes. The study of risk and decision-making focuses attention on how risk perception and behaviour are guided by affect, cognitive imagery, and narrative (Leiserowitz, 2006; Slovic et al., 2004; Lowenstein 2001; Peters and Slovic 1996). This influence is summarised by Epstein (1994 in Leiserowitz, 2006) who notes that knowledge derived through experience is likely to have a greater influence upon individual's risk perception than the provision of 'abstract' information alone. In addition, Leiserowitz (2006) cites Nisbett and Ross (1980) who argue that "*vivid, concrete information has a greater influence on perceptions and inferences than "pallid" (e.g., abstract or technical) information*" (p.48). Hendrickx, Vleck and Oppewal (1989) also found that warnings were more effective when, rather than being presented in terms of relative frequencies of harm, they were presented in the form of more vivid, affect laden scenarios and anecdotes. Sanfey and Hastie (1998) noted that compared to those given information in bar charts or data tables, respondents given narrative information were able to provide more accurate estimations.

Thus, as Leiserowitz (2003) states, the emotionally engaging images and narratives associated with popular depictions of climate change have significant effects on the experiential processing system. This is because they can create a situation which is similar to real life, in which locations, characters and relationships can be manipulated in order to instigate powerful emotional responses. Environmental science fiction, which uses dramatic and realistic special effects and strong emotional cues can be seen to have a direct influence upon the experiential processing system. Film viewers can become so engrossed in a film that they are able to "suspend disbelief, identify with the characters and vicariously experience the events of the film" (Leiserowitz, 2003).

Whilst it is acknowledged that not all media reporting is of an alarmist or apocalyptic nature, the paper's focus will be upon this cohort of narratives as they are considered most familiar

and accessible to the wider public. The paper will discuss the extent to which such representations are imbued by the public psyche and, importantly, the extent to which such messages are likely to effect behavioural change. Evidence is presented suggesting that although the public harbours deep concerns about the effect climate change is having or may have, there is a disconnect between this and the actual sacrifices we are willing to make. Popular reporting of climate change in the style of environmental ‘science fiction’ appears not to be a catalyst for change; rather it creates a nagging concern, the solution to which is felt to be beyond the reach of the ordinary person.

2.0 Methods

The experiment was designed to test the hypothesis that popular film/film representations of risk and the vicarious experiences they create can have a powerful – and in some cases more powerful – influence on public risk perceptions than official risk communications from scientists, government officials, industry or special interest groups. The experiment involved a between-subject analysis of undergraduate students at the University of East Anglia, Norwich, UK in March 2005. Respondents were split into three groups: watchers of the film ‘*The Day After Tomorrow*’ (n=100); readers of a technical/scientific report (n=100) and; a control group (no intervention)(n=100) in order to investigate whether the film or the report had a larger influence on subject risk perceptions, affective imagery, knowledge, conceptual models, behavioural intentions, or policy preferences.

The first intervention, the film “*The Day After Tomorrow*”, is a 2.5 hour Hollywood film classified under the genres of “action”, “Adventure”, “Drama”, “Sci-fi” and more recently “environmental disaster film” (Reusswig and Leiserowitz, 2005). The film’s story, screenplay and direction were carried out by Roland Emmerich whose other work includes “*Stargate*” (1994), “*Independence Day*” (1996), and “*Godzilla*” (1998). The film is loosely based on scientific predictions of disastrous climate changes due to global warming, in which the Gulf

Stream is 'shut off', triggering a series of freak weather conditions (giant hailstones in Japan, tornadoes in Los Angeles, tidal waves in New York, etc.) which culminate in a new Ice Age. The film's makers describe it thus: "*When Global Warming triggers the onset of a new ice age, tornadoes flatten Los Angeles, a tidal wave engulfs New York City and the entire Northern hemisphere begins to freeze solid*" (20th Century Fox).

The reading material was intended to impart the same kind of information as shown in the film but from a more scientific and pragmatic standpoint. The information was sourced from respected scientific research institutes such as the Hadley Centre in the UK and the United States' National Academy of Sciences. Information was also presented from IPCC reports. Every attempt was made to represent the wider discourse in the choice of texts; longer paragraphs were taken in order to include the necessary detail and the subject area was kept fairly narrow so as to avoid summaries which may only involve key points without describing context. The reading material took approximately 25 minutes to read through.

All subjects first carried out a short pre-test questionnaire which did not mention climate change specifically but which attempted to gauge concern for climate change within the context of other risk issues such as poverty, AIDS, Terrorism, Radioactive Waste etc. The remaining information gathered in the pre-test related to demographic information and religious and political preferences. This was used to identify any significant differences existing between the groups and, if so, whether weighting of results was necessary. The second part of the questionnaire was administered following either the reading or the film treatments or, in the case of the Control experiment it followed straight after the pre-test questionnaire. The second questionnaire began by gathering affective images from respondents through continued word association, asking the question "What is the first (second, third) thought or image that comes to your mind when you think about climate change / global warming?" This method of assessing subjective meanings was developed by

Szalay and Deese, (1978); Peters and Slovic, (1996) and more recently utilised by Leiserowitz, (2003) and Lorenzoni *et al.* (2006). Responses were then placed into 14 thematic categories developed inductively by the author (see appendix 1). Further questions investigated cultural and environmental values, perceptions of risks and benefits, acceptability and trust (see Poortinga and Pidgeon, (2003) for further detail of this methodology).

3.0 Results

The range of affective images described by the respondents is similar to the findings of Lorenzoni *et al.* (2006). However, importantly, no significant difference was identified between the image associations of the treatment groups. All respondents described general ‘cooling’ or ‘warming’ trends and changes in weather patterns. The negative effects of anthropogenic pollution and damage on natural systems were described, including ‘flooding’, ‘ozone depletion’ and ‘shutdown of the thermohaline circulation’. ‘Global warming’ and ‘melting of ice caps’ were by far the most common response, however, the responses in all groups depicted negative, damaging and even catastrophic impacts with particular emphasis upon human suffering, death and destruction. Only a very few respondents mentioned positive effects occurring as a result of climate change, e.g. ‘better weather’ and a small minority expressed scepticism or a feeling of ‘over reaction’ to climate change. It is surprising that an even smaller minority associated climate change / global warming with images seen in the school classroom given that the majority of respondents would have only left school one to three years previously. Overall, the manifold negative effects and despondency over negative human impacts upon the earth that were described suggest a very real concern among the respondents about climate change.

In order to examine spatial perceptions of climate change images following the treatments, i.e. when, where and to what extent climate change was to be expected, respondent’s descriptive words and images were again categorised depending on whether they referred to local or

global impacts (see coding table in appendix 2). ‘Globally catastrophic’ mental images were, again, shared between all respondents, regardless of their treatment. It appears, however, that there was a significant difference between the film and control responses in terms of the time scale of climate change effects. In answer to the question “*When do you think climate change / global warming will start to have dangerous impacts on people around the world?*”, film respondents envisaged climate change to be a slightly more distant threat ($f(2, 302) = 3.78, p < .05$)(see figure 1). Thus, fewer film respondents said climate change is dangerous now, but more said that it will start to have dangerous impacts in 100 years compared to the reading and control groups.

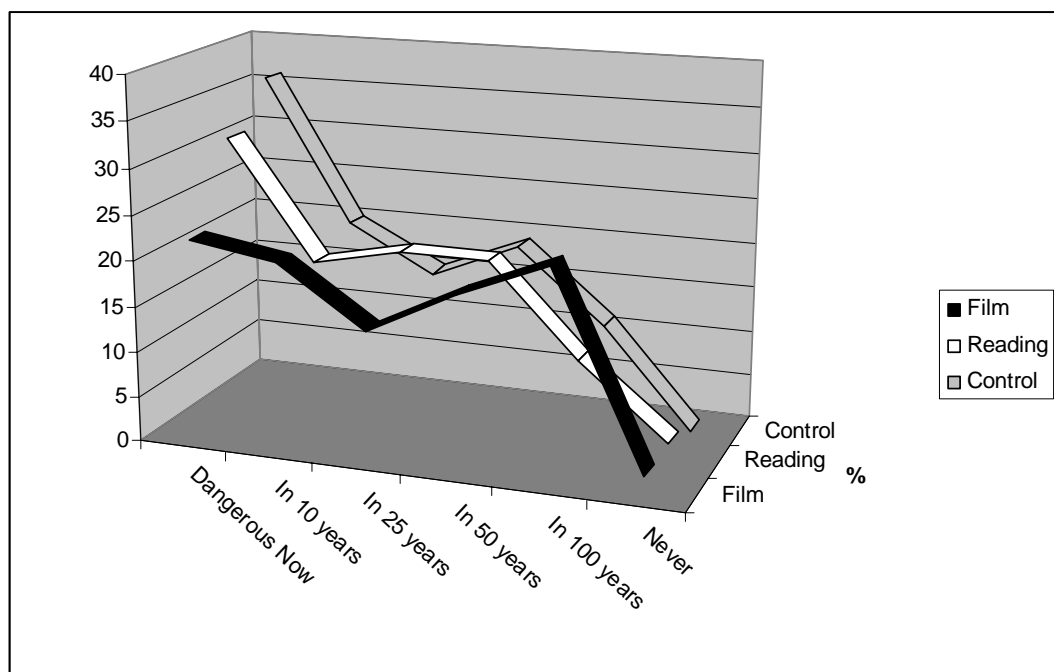


Figure 1: When do you think climate change / global warming will start to have dangerous impacts on people around the world?

Respondents were clear in their opinions about the scientific accuracy of the treatments they received when asked “*In your opinion, how likely is an occurrence of the sudden climate change/ global warming portrayed in the film / reading material?*” (Figure 2). This response is interesting given the levels of uncertainty acknowledged within the scientific material. Clearly, the sample found that the ‘unreality’ of the film created a more distant and unlikely scenario of climate change whilst the scientific presentation was seen as more legitimate; a fact that is supported by respondent’s trust for information provided by University scientists

(‘Strongly trust’ = 42 percent, n300) versus that provided by the media (‘Strongly trust’ = 2 percent, n300).

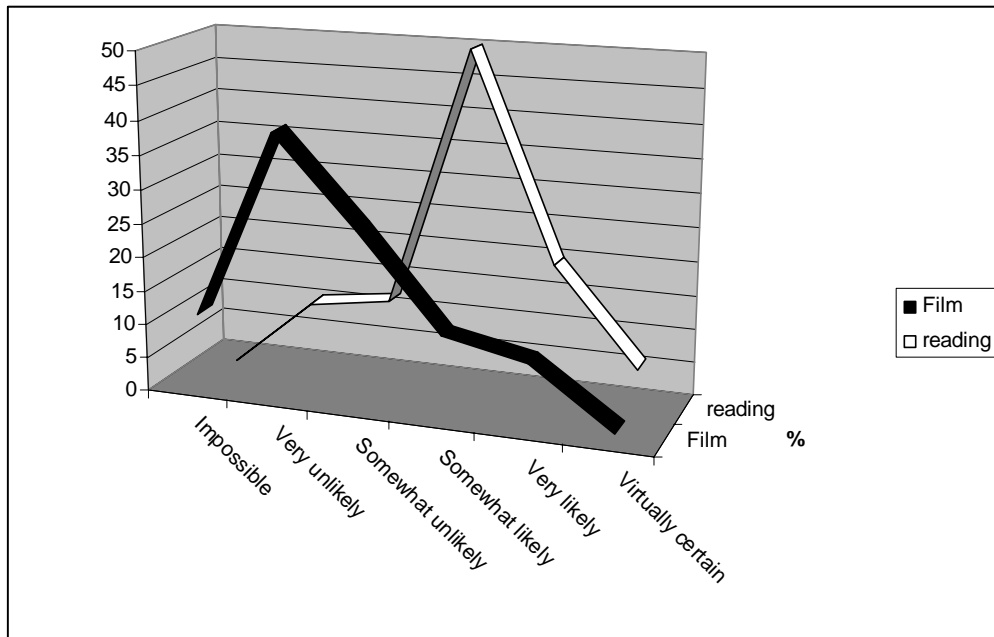


Figure 2: “How likely is an occurrence of the sudden climate change/ global warming portrayed in the film / reading material?”

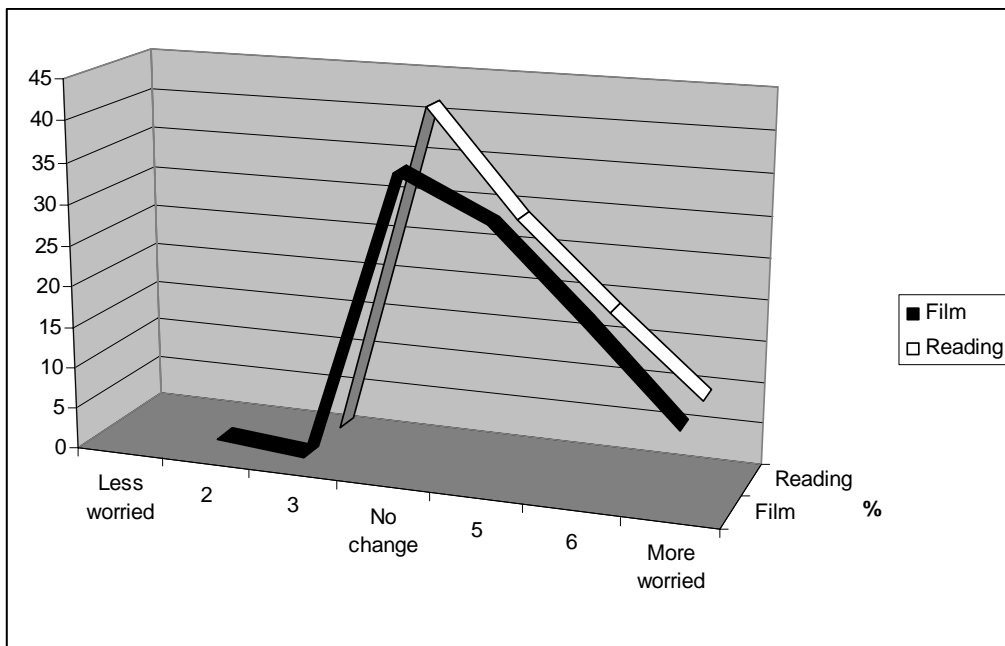


Figure 3: “Did the film / reading material make you more or less worried about climate change / global warming?”

Despite the disparity of belief in the accuracy of the two treatment sources, both sets of respondents report a positive shift in their concern about climate change following the experiment treatment (Figure 3). Such claims, however, do not appear to lead to an increase in

willingness to change behaviour or accept changes which could mitigate climate change. A key observation was that whilst respondents were willing to support broad measures to combat climate change, they were not keen on measures that would have a more personal impact. A comparison between figure 4, which shows a fairly tentative and mixed response to tax increases, and figure 5, which shows more definite support for campaigns which have an indirect or collective impact, exemplifies this point. The most indirect method of mitigation is therefore most welcomed.

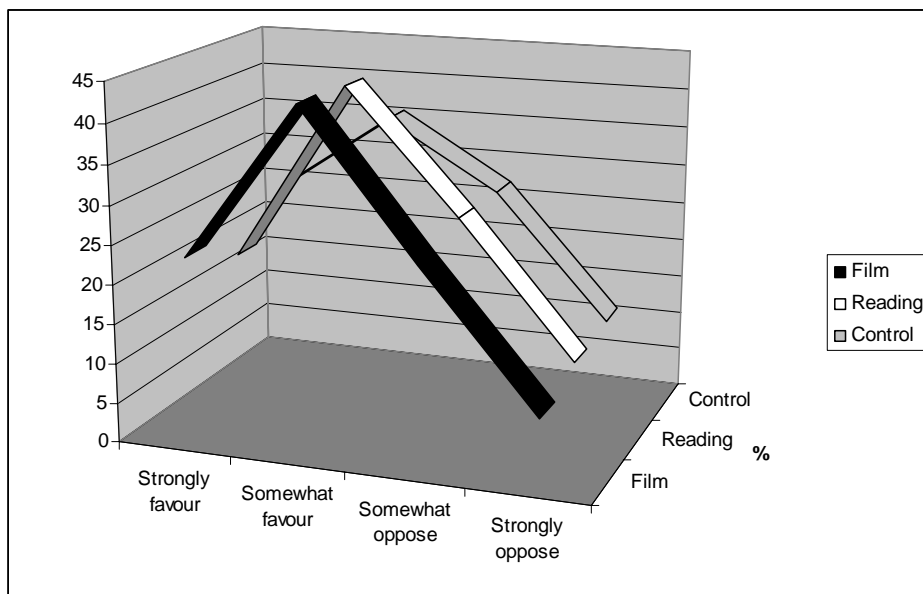


Figure 4. “To address climate change / global warming, the government should: Raise taxes on fuels each year for the next ten years to get people to use less energy.”

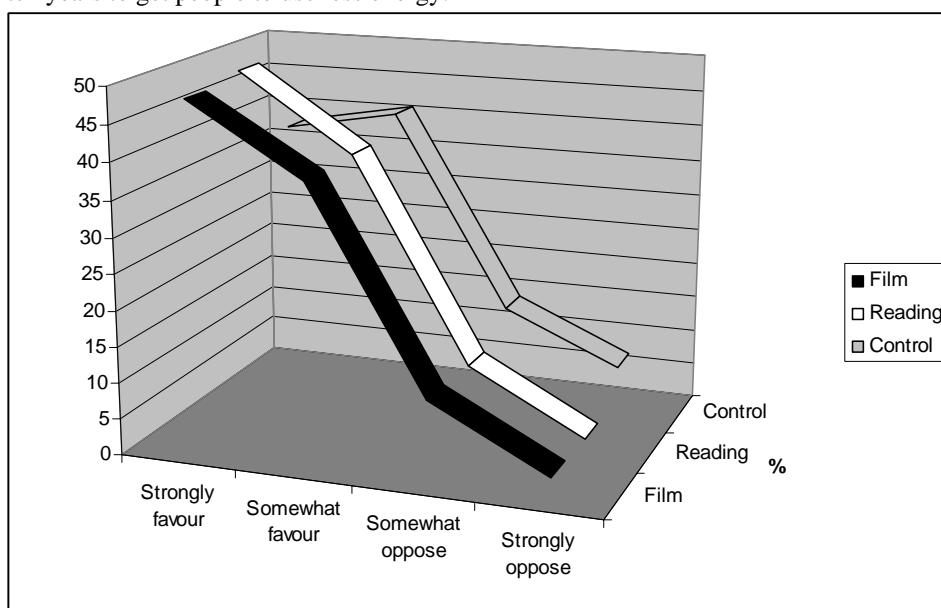


Figure 5. “To address climate change / global warming, the government should: Spend money on campaigns to persuade people to cut back on driving.”

This effect can also be seen from the group's response to choice between tax increases as a means to combat climate change and a direct increase in the price of consumer goods (figure 6). Despite a stated concern for climate change and a feeling that its effects could impact significantly upon the world and humanity itself, individuals from all groups are not prepared to take on the more personalised effect of increased prices (although capacity or willingness to pay tax may be skewed in this response due to the student sample). The film and reading treatment responses bear no significant difference to that of the control group, despite having stated an overall increase in concern having carried out the treatment. However, figure 7 depicts a slightly higher willingness to accept a shift from the status quo from the film treatment group and to a lesser degree the reading treatment, when compared to the sacrifices the control group are willing to make. This is interesting given the lesser belief of film respondents in the legitimacy of the film and the distancing effect that was observed.

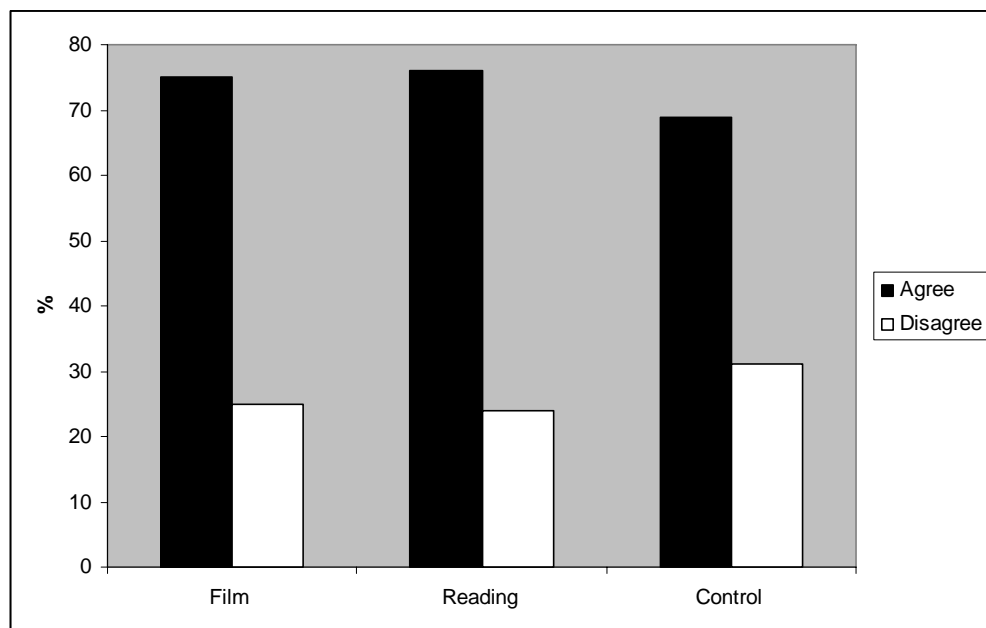


Figure 6. "I would agree to an increase in taxes if the money were used to combat climate change / global warming"

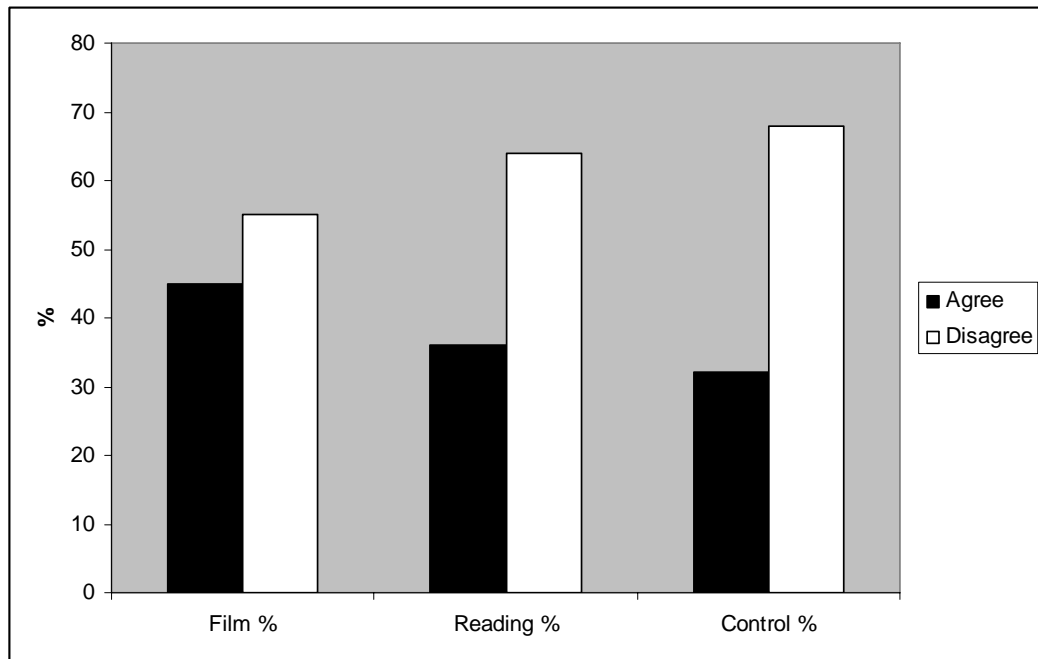


Figure 7. “I would buy things at 20 % higher than usual prices if it would help combat climate change/ global warming”

4.0 Discussion

The results of this experiment highlight three factors important in formulating a response to this question: 1) Affective images of catastrophic climate change appear to pre-exist within the cultural psyche; 2) Knowledge and affective images of climate change as a serious threat appear disconnected from a willingness to incur direct costs to mitigate climate change, and; 3) We must question the role of the ‘affective association’ as predictors or drivers of behavioural intention, particularly in the case of climate change. These factors will be discussed below.

4.1 Alarmist representations at the core of public understanding

The nature of perceptions and judgements concerning climate change impacts may stem from associations with extreme weather, as there is a tendency for people’s views to be easily influenced by inter-annual climate-variation (Henry, 2000). This perception is often fed and strengthened by the nature of media reporting. To this end, it is clear that climate change has grabbed the attention and imagination of our sample. Affective images of climate change

relating to global impacts, frequently of a catastrophic nature, were shared by all respondents regardless of their treatment. The very negative and destructive perceptions perhaps reflect the manner in which climate change has been framed by the media, politicians and environmental groups, as Stein (1972 in Dispensa, (2003)) states, “*the media furnishes our consciousness with the people, places and events that we call reality*” (p.75). Other studies have also identified a strong link between media representations and public understandings of climate change. Stamm *et al.* (2000), in a survey conducted among residents of Washington State, found that both mass media and interpersonal communication make a positive contribution to understanding, as well as to perpetuating some popular misconceptions. Lorenzoni *et al.* (2006) noted that in the United Kingdom and the United States individuals appear to draw upon commonly available information, the fine details of which may be skewed towards culturally defined manifestations of climate change, e.g. “rain” in the UK. Thus, whilst affective images predominantly focus upon climate impacts, individuals tend not to relate to these personally with little knowledge or interest in activities to mitigate change.

4.2 Emotional fear removed from rational action

This research has also shown that despite possessing such disturbing images of future environmental scenarios, the individuals in our sample were unlikely to take equally drastic action to mitigate such change. This raises the question of what will actually motivate people to alter their behaviour (student sample bias will be discussed in section 5.0). In attempting to identify whether strong affective images had a greater impact on our respondents than scientific information, the experiment found only one significant difference; that of the time-frame of expected climate change impacts. The fact that film viewers saw climate change impacts as a threat more distant in time suggests that the unreality of the images they were exposed to departed from personal experience to such an extent that it could only be possible in the distant future. Thus, whilst science fiction may be a useful way of imagining a possible

future or scenario, the stretch of imagination required to support such a reality is perhaps too far removed to warrant immediate concern.

That having been said, von Storch and Kraus (2005) suggest that the construct of 'Klimakatastrophe' ('climate catastrophe') in Germany has become a valuable asset in the public shift towards a more environmentally conscious political attitude. The use of traditional moral narratives, actions, symbols and stereotypes to amplify the potentially catastrophic impacts of climate change have led to "*the rise of the Green Party, the fall of the nuclear industry, the societal task of household waste separation and recycling and the moralizing call to bike instead of drive*" (p.101). They argue that meanwhile, the perception of 'global warming' in the US is one of gradual increase in temperature, one that is manageable, distant and unlikely to impact directly upon their daily lives.

The willingness to act of reading treatment respondents showed no significant difference to that of the control group. Thus, assuming the reading treatment was effective in imparting knowledge of climate change, this finding is contrary to those of Bord *et al.* (2000) who suggested knowledge of the causes of climate change to be the strongest determinant of intentions to act. Similarly, O'Connor *et al.* (2002) found that cognitive explanations of support for reducing GHG emissions are more powerful than economic or partisan heuristic ones. However, Stoll-Kleemann *et al.* (2001) discovered that despite accurate knowledge of climate change and its causes, participants in Swiss focus groups were not found to have acted on climate change. Thus, even individuals with an accurate knowledge of the causes of climate change do not necessarily adapt their behaviour to mitigate the problem. This finding may highlight an ability for individuals to separate moral conscience from economic or behavioural action. As Kasemir *et al.* (2000) discovered, climate change is a profound social and environmental problem, but it is viewed from an ethical rather than an economic perspective. Whilst it may be of great concern, individuals frame mitigation measures in

economic terms, accepting, for example, only small increases in energy prices. Equally, Kirby (2004) discovered that whilst 85% of respondents claimed a willingness to act to reduce their impacts on the climate, the options favoured by over 90%, e.g. recycling and reduced energy use, were those that could be achieved most easily and at least cost.

4.3 Affective images as a predictor of behavioural change

It appears that a short piece of communication (no matter how extreme in its prognosis and imagery or balanced in its view) is unlikely to change deeply held attitudes or preconceptions. This suggests that there may be a need to work with existing mental models rather than attempting to change or update existing ones. To this end we must perhaps also question the utility of affective associations as predictors of action, particularly in the case of climate change. The use of catastrophic affective images may be of use in instigating immediate responses to stimuli, however, this research shows that affect responses and consequent behaviour are not entirely related and are able to operate independently of each other. For example, graphic and disturbing pictures are now favoured on cigarette packaging as opposed to written warnings; the intention is that the negative affective associations at the point of sale make the buyer think twice before purchase. Similarly automobile advertisements frequently depict free flowing traffic and exuberant owner satisfaction; an image designed to portray car ownership as a liberating, carefree and even healthy experience.

In contrast, this study suggests that the extreme and uncontrollable nature of the threat perceived by our sample may preclude a sense of 'self-efficacy'. Reasons for this effect are two-fold; first, a prevailing assumption among the environmental risk perception literature is that *"people that perceive a relatively high likelihood of an adverse event are more likely to take personal ameliorative steps and support government initiatives to do likewise, even in the face of a required sacrifice"* (O'Connor *et al.* 1999: p. 461). The findings of this experiment

suggest that popular media representations of climate change *reduce* people's perceptions of the likelihood of adverse events, thereby reducing the likelihood that they will be inspired to take action. Second, key studies into the ways in which laypeople perceive climate change have found that, in general, people exhibit misconceptions about the causes and consequences of climate change (Kempton, 1991; Bostrom *et al.*, 1994; Kempton *et al.*, 1995; Bord *et al.*, 1998; Bickerstaff, 2002; Portinga and Pidgeon, 2003). These misunderstandings have the propensity to cause fear about the consequences of climate change (Read *et al.*, 1994). Protection motivation theory (Rogers, 1983)(not tested in this survey) suggests that appeals which are threatening, but which offer an effective means of coping with the threat, instigate danger control processes, which include accepting the recommended coping strategy and changing the maladaptive behaviour. However, when the threat is greater than the ability to cope, fear reactions can instigate message rejection through defensive responses. It can be concluded that the determinants and processes of behavioural change may not solely be a function of motivation or increased awareness and perception of risks. Instead they may be tempered by feelings of personal involvement, personal efficacy, acceptability and other, more pressing personal considerations – a far cry from personal impacts on global environmental change.

Thus, the evidence suggests that individual's (mis)conceptual models of climate change are pre-formed or 'anchored' by their formative experience of climate change representations (Tversky and Kahneman, 1974); consequent use of dramatic images is unlikely to instigate a stronger or longer-term response. The reasons appear to filter down to what is seen as achievable by the individual and what is practical amid the more pressing choices, costs and benefits of daily life. As figure 8 below demonstrates, short-term responses to stimuli such as news events, films, and other vicarious experiences may be extreme and intense. However, whilst these easily tapped emotions may be sufficient to secure a rapidly realised goal (such as

the sale of a product or an evening's entertainment at the cinema) this relatively insignificant experience has little impact upon deeper drivers of human cognition and behaviour.

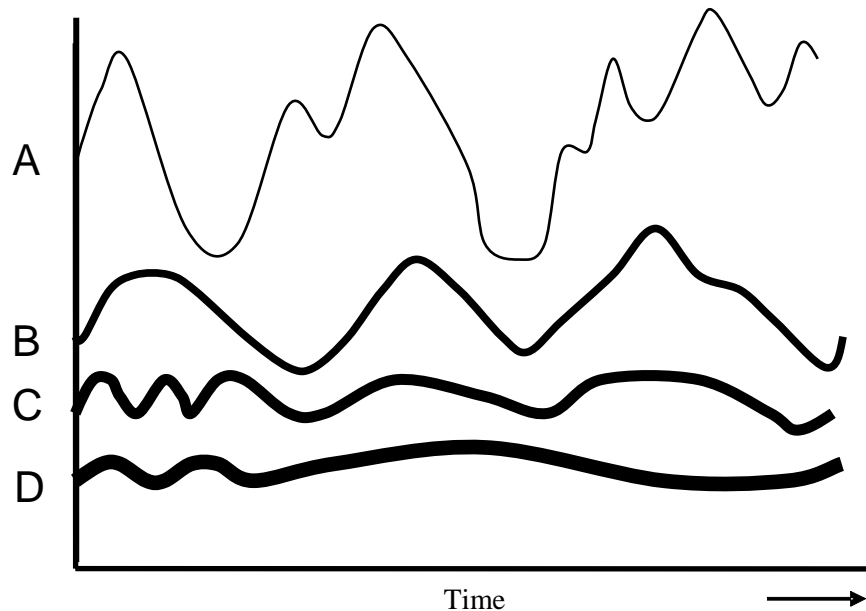


Figure 8. The influence of affective images upon climate change related behaviour

A – External influence, e.g. experienced, reported.

B – Short-term decisions or perceptions: These often relate to large scale climate change impacts i.e. melting ice caps, droughts in Africa (distant global impacts) and subsequent decisions based upon these. Behavioural change in reaction to impacts on this scale may be slow, ineffectual or non-existent. Information may be updated through these experiences (e.g. Lowe, *et al.* 2006; viewers were more accepting of cooling scenarios rather than warming after watching the film). However, although the most readily disrupted by events and stimuli, these perceptions act as a ‘buffer’ and will rarely affect existing mental models.

C – Medium-term decisions or perceptions: Usually associated with the more mundane yet individually important aspects of life e.g. health, welfare, family and security. Reactions to

these stimuli are more likely to steer behaviour with decisions based upon what is perceived as acceptable or tolerable.

D – Long-term decisions or perceptions: These are the inner mental models which individuals construct through formative experience and early social interaction (amongst others, e.g. ‘availability bias’ and ‘anchoring and adjustment’ (Tversky and Kahneman, 1973; 1974)). Strongly related to individuals’ world views and beliefs these core mental models will often be representative of the cultural mindset which in turn is dictated by the geographical (i.e. placid/extreme) and political (i.e. developed/developing) environment.

5.0 Conclusions

This paper addressed the roles played by quasi-fictional narratives and the provision of scientific information in stimulating personal responses to climate change. It was hypothesised that the film ‘*The Day After Tomorrow*’s’ portrayal of climate change may, by vividly displaying a significant threat to individual’s personal lives, alter perceptions to the point that they are more likely to accept greater personal sacrifice or responsibility; more so than purely as a result of reading scientific literature of a similar nature.

The experiment exposed respondents to one of two treatments, the film *The Day After Tomorrow* or a compendium of scientific literature detailing the causes and potential impacts of abrupt climate change. A third group was used as a control. Very few differences were found between the responses of the three groups following the treatments. However, the film group was found to perceive climate change as a more distant threat both in location and time, thus reinforcing a growing body of climate change communication theory which suggests that commonly held negative and in many cases catastrophic depictions of climate change impacts depersonalise the problem for the public.

The research identified that the kinds of alarming representations of climate change so often used by the media to grab attention and by interest groups and politicians to raise awareness are already imbued into the public psyche. For many people, climate change conjures images of quasi-fiction and global disaster, the details of which are informed by extreme weather events, grim scientific prognoses, informal information networks and the possibility of run-away effects which are beyond the realms of conceptualisation.

The great paradox is that despite having almost uniform negative connotations, climate change appears to be a problem that few people are willing to pay or change their behaviour to mitigate. This is evidenced by a general unwillingness for the public to move away from the status quo; personal issues of survival inevitably take precedence over a threat which looms so large that it is beyond our focus. Thus, whilst films and novels may provide an expression of society's anxieties, they ultimately refer to a hypothetical future, one which may be too far ahead to warrant immediate concern.

Communicating global risk to a global community is a challenge with limited historical precedent and one which shows no immediate signs of success on a scale great enough to have a significant effect. What is clear, however, is that the problem must be made tangible and manageable if the warnings are to have a real impact. Given current representations, the solutions to such a vast and complex problem make the public's response seem insignificant, futile and in some cases too late to make a difference; as Al Gore (*The Guardian*, 2006) accurately identifies, we have moved from a position of "denial" (believing that there is no danger), to one of "despair" (believing that there is nothing that can be done about it). In this case, the implications of continuing along the current trajectory need to be explained and understood in ways that have real relevance and meaning for those that are likely to be affected. Climate change is not an issue of the future in a far away land; it has pervasive

social, economic, political and cultural implications for which society should - and ultimately will - have to take into account.

Improvements should be made in discussions of probability, using well-defined descriptive language in a way which is less difficult for the public to interpret. Such information should be presented, received and communicated in a more controlled manner by scientists and the media, requiring greater understanding of the needs and aims displayed by both sides. This also counts for decision makers, many of whom are now apparently convinced that climate change poses a real threat, and who are demanding more practical and realistic predictions, coupled with mitigation and / or adaptation measures which can be practically retrofitted into existing systems, rather than the revolutionary changes which had previously been called for.

Finally, the effects of the latest wave of environmental films, the most famous of which features Al Gore in '*An Inconvenient Truth*' (Paramount), but which also include Sir David Attenborough's '*Are We Changing Planet Earth?*' (BBC) and Michael Stenberg's '*The Planet*' (Charon Film AB) will be of considerable interest. The images in these approaches remain stark; however, they are now tied to an existing evidence base and delivered by familiar, popular and trusted messengers. The influence that this more personal and localised communication and discourse has upon public attitudes and behaviour remains to be seen.

6.0 Methodological considerations:

In considering the strength of the findings discussed in this paper, two main factors are important. First, Lowenstein and Lerner (2003) point out that immediate emotion can alter the decision maker's perceptions of probabilities, outcomes or behaviour by altering the quality and quantity of processing of decision-relevant cues. As the intensity of immediate emotions intensifies, they progressively take control of decision-making and override rational decision-making. As the experiment tested the immediate reactions of respondents following their

treatment, the findings may not be representative of the overall effect over a longer time period. Lowe *et al.* (2006) tested the effect of time upon perceptions by carrying out focus groups with a small number of people one month after viewing the film. They found that levels of concern which had been heightened immediately following the film were soon overtaken by more mundane, day to day issues, until climate change returned to its previous background level. In addition, Leiserowitz (pers comm.) attributed differences between the reactions of audiences of *'The Day After Tomorrow'* in the USA and Germany (Reusswig and Leiserowitz, 2005) to differences in the timing of questionnaire surveys; American respondents had more time to reflect or filter messages from the film than German respondents who were interviewed as they left cinemas.

The second factor relates to the use of a student sample. It was decided, for ease of recruitment and the greatest possibility for continuity across culturally different samples³, that undergraduate students should be used for the study. However, it should be considered that students (on average) have fewer financial, social and domestic responsibilities than the wider population, thus making questions regarding willingness to pay tax, or invest in energy efficient household appliances, for example, problematic. Anecdotal evidence suggests that undergraduates are far more likely to leave bedroom lights on than graduates in full-time employment. This sample choice is not purported to represent the wider public and it is acknowledged that the unique and transitional position of undergraduate students in society makes the extrapolation of these findings to the wider public more difficult. The effects that have been identified and cited in this paper may be confined to this student sample.

³ This study forms part of a wider cross-cultural comparison involving results from a number of identical experiments being carried out at universities around the world; University of Buenos Aires (Argentina), Federal University of Ceara (Brazil), Research Centre for the Study of Sociology and Anthropology (CIESAS) (Mexico), Columbia University (USA), University of Oregon (USA): including this study, a total number of 1,813 subjects. Published results are in preparation.

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Appendices

Appendix 1: Affect categories; compiled in response to survey observations

Affect category	Specific words, thoughts, images
1. Cooling	Freezing, a new ice age
2. Warming	Drought, deserts, melting ice (caps, glaciers), sea level rise
3. Flooding	East Anglia under water, mass flooding
4. Change in weather patterns	Unpredictable seasons, gradual changes
5. Negative effect upon Human and natural systems	Extinctions, biodiversity loss, crop failures, famine disease, chaos, displacement, conflict, death, despair, pain, poverty
6. Catastrophic impacts due to natural phenomena	Tidal waves / tsunami ⁴ , extreme weather e.g. storms & tornados, destruction, 'the end of the world'
7. The treatment i.e. film, reading + other e.g. the film 'Waterworld'	The film 'The Day After Tomorrow', 'tidal waves and snow storms', 'animals everywhere'
8. Human-made pollution and anthropogenic damage	Loss of rainforests, the greenhouse effect, the atmosphere, the need for change (e.g. human, political, behavioural)
9. Ozone depletion	The hole in the ozone layer, CFCs, ozone damage
10. Over reaction to climate change	Climate change is a natural cycle, climate change being used as a political tool
11. Shutdown of the Thermohaline circulation	THC shutdown, Change in ocean currents
12. Positive impacts	Sun tans, better weather in England, growing bananas in England, sitting in beer garden at night wearing summer clothes
14. Educational images	A global warming diagram

⁴Among the catastrophic impacts mentioned by respondents, a handful mentioned tidal waves, tsunami and even earthquakes and volcanic activity. It is possible that these relate to the images shown in the film and its advertising. However, the Boxing Day tsunami (2005) may well have had a significant impact, indeed, one respondent describes "a huge wave moving towards a populated beach"; a vision which has become synonymous with images of the Boxing Day tsunami.

Appendix 2: Proximity Coding

Climate impact proximity	
1. Local	Within this country / region. Effects upon the weather (if specifically stated as local). Effects upon seasons, i.e. hotter summer & colder winters. Personally experienced effects e.g. ‘suntan’, ‘bad skiing back home’
2. Global	Occurring elsewhere in the world, i.e. famine, melting ice caps, or affecting the entire world, i.e. sea level rise, pollution
3. Non-specific	Word or image does not refer specifically to scale

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