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On 24 March 2009, Dr Lawrence gave a talk at the ASC Hot Air Symposium in Perth. She shares this paper - which she calls a work in progress - that formed the basis of her talk.

Australian Science Communicators Hot Air Symposium

Communicating the science of climate change in a sceptical world

Opportunities for shaping individual behaviours through communicating the science of climate change

Dr Carmen Lawrence

We have the dubious privilege of living through two big meltdowns: one liquidating the financial markets, the other the Arctic sea ice. And they are not unrelated.

With exception of a few recalcitrant deniers, most people now agree that climate change is one of the greatest challenges facing the human race, although they may not care about it as much as we might expect, given all the attention it has had. Despite the fact that numerous reports indicate that failure to act will actually cost substantially more than prevention, many politicians, and the voters who elect them, continue to prevaricate or make largely token gestures to solve the problem. In fact, there is increasing evidence that, if anything, there is a “tendency for the public to distance themselves from the causes, impacts and responsibility for tackling the problem.”¹ And most of the solutions contemplated are focused on ways to allocate a given level of carbon emissions rather than on sharply reducing the extraction and consumption of fossil fuels. We continue to act and think as if resources are unlimited and the planet is infinitely capable of absorbing our wastes.

¹ Whitmarsh, L. (2009) What’s in a name? Commonalities and differences in public understanding of “climate change” and “global warming” *Public Understanding of Science OnlineFirst* published on September 16, 2008 as doi: 10.1177/0963662506073088.,

Reviewing the current state of knowledge about climate change mitigation in *Science* in 2004, Pacala and Socolow² concluded that “humanity already possesses the fundamental scientific, technical and industrial know-how to solve the carbon and climate problem for the next half century.” Yet, as Bazerman suggests, the current situation has all the characteristics of a “predictable surprise” - “an event or set of events that catch an organisation off guard, despite leaders’ prior awareness of all the information necessary to anticipate the events and their consequences.”(p 180)³ Of the barriers which prevent leaders pursuing the necessary strategies to prevent this “predictable surprise”, amongst the most important are our common patterns of thinking and acting.

There is no doubt that any lasting reduction of greenhouse gas emissions will require action on numerous fronts - legislation and regulation to control emissions, investment in alternative, low carbon technologies, economic instruments to alter the prices of products and services and the provision of information necessary to inform and persuade the community about the desirability of change. More radical proposals for economic reform - including many outlined in a recent *New Scientist* - point to the need to resolve the contradiction between “hanging on to a habitable planet and the expansionary demands of the global market.”⁴ They call for a major rethink of the way we think about the economy and the way we do business.

Fundamental to the success of any of these strategies is social change, including people’s willingness to accept the seriousness of the situation, to support the necessary government intervention and to change their own behaviour.

While scientists and policy makers have advanced various proposals to deal with climate change, it is only very recently that they have begun to consider the most effective ways of producing the necessary and substantial changes in our individual and collective behaviour to support this change. Whether it is modifying our transport use, rates of reproduction, energy use, patterns of settlement, food consumption and the design of our homes or accepting higher prices for some products and services, there is no doubt that just as human behaviour lies as the root of the problem, so it must be a major part of the solution. Fundamentally, it is human behaviour which must be modified to ameliorate global warming. And on a scale that has never before been contemplated.

² Pacala, S. & Socolow, R. (2004) Stabilization wedges: Solving the climate problem for the next 50 years with current technologies. *Science*, 305, 13 August, 968-972.

³ Bazerman, M. (2006) Climate change as predictable surprise, *Climate Change*, 77, 179-193

⁴ Soper, K (2008) Special report: Nothing to fear from curbing growth. *New Scientist*, 16 October, online edition.

Pointing to the fact that individual behaviour contributes 40% to greenhouse gas emissions, the U.K. National Endowment for Science, Technology and the Arts' 2008 report observed, "policy has not yet fully recognised the importance of mass behaviour change in meeting the climate challenge" (p 4). A more inclusive approach to estimating the contribution of individual decisions on energy use and CO₂ emissions (The Consumer Lifestyle Approach) reveals that more than 80% of energy used and CO₂ emitted in the U.S. is a result of consumer demands and the economic activities which support those demands.⁵

While much money, time and energy have been devoted to understanding the consequences of human action on the climate, there has not been a corresponding effort to understand how we can stimulate the changes in human behaviour needed to forestall (or even adapt to) the predicted outcomes of global warming. Many analysts recognise that significant behaviour change is implicit in their policy recommendations, but there is little evidence of them actually tapping the substantial research literature in the social sciences which might help facilitate this objective. In fact many policy makers assume they know, because they are human and live in society, all that they need to know about human behaviour. Or they assume that economic theory will provide all the critical insights necessary to underpin effective policy and that simply changing the price of products and services, whether by a carbon tax or a cap-and-trade program will move behaviour in the desired direction.

However, the evidence clearly shows that, in reality, limited information, high transaction costs and a variety of cognitive and behavioural tendencies limit the extent to which price alone affects behaviour.⁶⁷ A moment's thought should make it clear that success in addressing complex problems like climate change - sometimes called "wicked" problems - requires, at least, a rudimentary understanding of human behaviour and cognition, not to mention the biological and social forces which shape us. As Dan Gilbert has pointed out⁸, the human brain evolved to respond to threats that have critical features that terrorism has and that global warming lacks. He argues that "Global warming is a deadly threat precisely because it fails to trip the brain's alarm, leaving us soundly asleep in a burning bed."

⁵ Bin, S & Dowlatabadi, H (2005) Consumer lifestyle approach to US energy use and the related CO₂ emissions, *Energy Policy*, Volume 33, Issue 2, 197-208 .

⁶ Stern, P (1999) Information, Incentives, and Proenvironmental Consumer Behavior, 22, *Consumer Policy*, 461, 469.

⁷ Hughes, J et al., Evidence of a Shift in the Short-Run Price Elasticity of Gasoline Demand, *National Bureau of Economic Research*, Working Paper No. UCD-ITS-RR-06-16, (2006).

⁸ Gilbert, D (2006) if only gay sex caused global warming. Why we're more scared of gay marriage and terrorism than a much deadlier threat. *Los Angeles Times*, July 2.

While nearly all public policy rests on assumptions about human behaviour, these are rarely made explicit or tested against the available evidence. And sometimes they are simply wrong. Past attempts to influence public behaviour have often failed because as Jackson indicates:

“Existing institutional responses have tended to rely on rather meagre, one-dimensional conceptions of human behaviour, which turn on either the ‘economic rationality’ of the individual consumer or the supposed ‘commodity fetishism’ of consumer society.”⁹

We need a concerted analysis of what we already know about human psychology that is relevant to encouraging behaviour which supports and directly influences greenhouse gas reducing actions, including backing the political figures who are attempting to design appropriate policies. At the very least, this should include an examination of:

- what values people bring to their assessment of the environment and to the consumption of resources;
- how people judge the seriousness of the risks they confront and how they respond to such threats;
- how attitudes toward environmental issues are formed and changed;
- what methods of persuasive communication, including the use of fear, are most likely to facilitate changes to attitudes and behaviour and which could backfire;
- what are the most effective techniques for producing rapid and widespread behaviour change; and
- what barriers and habitual modes of thinking prevent the adoption of climate friendly patterns of behaviour and what incentives and social forces facilitate such behaviours.

Perhaps one of the reasons there has been so little engagement on these questions is that behavioural change is notoriously difficult. This is, in part, because there is such a vast range of factors that can influence behaviour. And the messages to policy makers can sometimes seem, as one group of researchers observed, like a “veritable Tower of Babel. People act rationally. But not always. Framing information matters. But which frame matters most may be very context- and person-specific. The focus of policies should be on the individual, the group, or some combination of smaller and larger groups. Social marketing works. Except when it does not.”

At the same time, behavioural and lifestyle issues, especially surrounding consumption, are heavily ‘value laden’ and often contentious. Ours is a materialistic society and material goods are important to many people not just because of their utility but also because they play a symbolic role in our lives,

⁹ Jackson, T. Models of Mammon: A cross disciplinary survey in pursuit of the ‘sustainable consumer’. *Economic & Social Research Council Working Paper Series*, number2004/1.

marking status, identity and the pursuit of personal and cultural meaning and belonging.

Nowhere is this more obvious than in our love affair with the car. Demanding that someone in love with a souped up Monaro switch to a fuel-efficient urban runabout may not be well received. Changing consumption patterns is about more than simply choosing different products and services.

It is also obvious that change is difficult because people are often “locked into” unsustainable patterns of consumption because of economic constraints and institutional barriers over which they have little control (like the absence of public transport) as well as by habits, routines and social norms and expectations, of which they are largely unaware. This means that both individual behaviour and social institutions should be the focus of any attempts to change behaviour.

What is needed is a comprehensive analysis of which changes in human behaviour are most likely to reduce global warming and how such changes can be facilitated. This in turn requires a better understanding of how people perceive and experience climate change and which modifications to human systems people are more likely to accept and adapt to. For example, climate friendly behaviour may be induced by marketing and information strategies which alter demand for various products and services or by changing the products and services that are available through technology, pricing and regulation. In either case the public’s acceptance of such policies, including their judgements about fairness and efficacy, are critical to their success. One dimensional analyses of *homo economus* are not sufficient.

It may be stating the obvious, but if we are to arrest the slide toward destructive climate change, we need to mobilize the widest possible support for the various policy options required to arrest the change, engender support for the political and business leaders who implement such policies and we need people to change their own behaviour as well. Some of these changes - whether political, social or personal - will involve difficult choices.

Failure to take account of public opinion and knowledge when designing and implementing policies will invariably lead to poorer results, not least because differences in the frames of reference or levels of understanding between policy makers and the public at large will make communication and acceptance problematic. At worst, poorly designed programs may produce resistance and make matters worse.

Information and perception

Basic to both informed debate and the enlistment of public support for and participation in mitigation efforts is the dissemination of information about the

causes and likely impacts of climate change. Such information campaigns necessarily begin with research into existing public knowledge and understanding.

There has been a steady flow of studies on how people perceive and experience climate change, how their perceptions have changed, whether they understand the causes of and solutions to climate change, and how they judge the importance of climate change against other areas of public interest. Because of its complexity, we know that climate change is difficult for people to conceptualise. In addition, many of those asked for their opinions may not have thought about the issue in any depth and may not give meaningful responses. In addition, when checklists are employed to garner information, acquiescence bias, the tendency to agree with whatever options or statements are presented, may produce inflated estimates of people's concern about and understanding of the issue.

For almost 15 years, studies from the developed world have shown that people view climate change as a serious problem. In Australia, 75% of voters believe that climate change is a major problem and support government action to introduce energy efficiency, clean electricity generation and motor vehicle emissions reductions. Generally speaking, however, in most of the world climate change is rated as a lesser priority than other, more personally relevant issues. The Lowy Institute poll of 2007 found that Australians rated tackling climate change after improving education and health as the most important goals for Australia. In some parts of the world, climate change still ranks below other, more tangible, environmental risks, such as nuclear power and radioactive waste, industrial pollution and ozone depletion.¹⁰

Investigations have also shown that most people still have a fairly limited understanding of the causes of climate change and they typically do not have an accurate picture of what and how human behaviour is responsible. Their understanding of key concepts is far from complete and the terminology used may produce further confusion. For example, in one U.K investigation¹¹ almost everybody reported that they had heard of "global warming", but a more than 6% said they had not heard of "climate change" and there was some evidence that respondents understood climate change and global warming as different phenomena, apparently judging global warming as more serious than climate change. However, nearly 17% of those interviewed expressed doubt about the reality or human causes of climate change/ global warming and a similar percentage claimed to know little or nothing about it. As Monbiot so caustically put it in a recent article, "using climate change to describe events like this,

¹⁰ Lorenzoni, I & Pidgeon, N (2006) Public views on climate change: European and USA perspectives. *Climatic Change*, 77:77-95.

¹¹ Whitmarsh, L. (2009) What's in a name? Commonalities and differences in public understanding of "climate change" and "global warming" *Public Understanding of Science OnlineFirst*, published on September 16, 2008 as doi: 10.1177/0963662506073088.,

with their devastating implications for global food security, water supplies and human settlement, is like describing a foreign invasion as an unexpected visit, or bombs as unwanted deliveries.” He suggests we should call it “climate breakdown”.

Misunderstandings are evident even in countries with relatively strong environmental values. While there has been some recent improvement in the knowledge base, many respondents, including in Australia, continue to confuse the greenhouse effect with ozone depletion and a majority probably still do not appreciate that burning fossil fuels is the main anthropogenic contributor to global warming or that global warming is the result of increasing CO₂ emissions. When respondents to such surveys are not provided with a list of possible causes, their understanding is even poorer. In one U.K study¹² only 30% named CO₂ as the main contributor to global warming and in the U.S only 18%, unprompted, named burning fossil fuels as a cause. Across the Atlantic, U.S research has shown large segments of the community fail to grasp the fundamental physical mechanisms underlying global climate change.

A comprehensive review of the evidence on public attitudes in the U.K found that the majority of people identified the destruction of forests and the burning of fossil fuels as contributors to global warming, but only just over half the population recognised emissions from power stations and only a quarter identified the use of gas and electricity in homes as contributors. The authors concluded that there seemed to be a disconnection between the recognition of primary contributors (e.g. fossil fuels) and the use of these fuels (e.g. in power stations or in the home).

Many of the behaviours that people were less likely to link to climate change are those that they are also least prepared to address in their own lifestyles. The report also found that the majority of the public don't regard climate change as an immediate threat to themselves, but as a threat to future generations and far away places. Most placed responsibility for solving the problem elsewhere - national and global institutions. A recent study found that although 61% of those surveyed said they felt a moral obligation to do something about climate change, most had little faith that other people would act to tackle climate change and believed that “action should be equitably enforced, rather than left up to individuals.”¹³

There is some suggestion that framing the threat in terms of human impacts, for example on health and social conflict, may increase the likelihood that people will take action.¹⁴ While the fate of the polar bears may not engage

¹² Norton, A. & Leaman, J. (2004) *The Day After Tomorrow: Public Opinion on Climate Change*. London: MORI Social Research Institute.

¹³ Whitmarsh (2009), op cit, p 11.

¹⁴ Gilbert, D (2006) op cit

everyone, the fact that hotter days, months and seasons produce higher than normal crime rates might motivate more of us to act. It is of some interest for our current discussion, that the people in this survey regarded global warming as more serious than climate change, more likely to have been the result of human action and more of them believed that individuals, “the public”, could take remedial action to mitigate “global warming” than “climate change”.

One recent review of the literature concluded, pessimistically, that “People have virtually no idea of the potential global climate change policies actually being debated.”

This gloomy analysis was given weight by a recent Australian survey which showed very little awareness among the public of what emissions trading is all about - more than half said they had have “no idea” what an emissions trading scheme is and 17% had never heard of the concept. A whopping 93% indicated that they know either little or nothing about the proposed changes. This may have improved since the introduction of the CPRS, although I doubt it, given the level of abstraction at which the debate is conducted and the absence of any systematic public education.

It has been suggested that the lack of information and the existence of basic misperceptions are likely to “inhibit the public’s ability to participate meaningfully in democratic discussions of the issue, to understand how their own actions affect the climate and to fully and accurately appreciate how climate change will affect our future” (p 261). Recommendations for behaviour and policy change which do not account of these limitations are likely to founder. Policy makers need to reinforce accurate beliefs and correct inaccurate ones while linking effective solutions to the explicitly stated causes. A major public information campaign is clearly necessary.

But it should also be understood that even if people generally come to view climate change as a problem and recognise that human actions are the cause, they will not necessarily change their behaviour to any extent. The assumption that educating and informing people will change their attitudes and beliefs - and hence their behaviour - is simply wrong, although it is a surprisingly common prescription for solving social problems. While information is essential to such change, it is rarely sufficient, especially when there are barriers - personal, social and economic - which prevent pro-environmental attitudes being expressed in action; the so-called “attitude-behaviour gap”.

The influences on climate relevant behaviour go beyond information or even “concern”, and include how people respond emotionally (e.g. by anger or fear) to climate change, their values, the benefits and costs they expect from

various actions, their perception of their ability to undertake such actions, their beliefs about how others will act and their habitual patterns of thinking and acting.

Risk perception

These influences are, in turn, dependent on how people appraise the problem. In addition to understanding people's knowledge about climate change, we also need to take account of the substantial literature on the psychology of risk perception. Understanding these processes will result in more sophisticated policy settings which, at the very least "nudge" people in the direction of preferred behaviour. Perceptions of risk are influenced by emotion as well as by more analytic processes and depend, at least, in part on learned associations. We are certainly not the unfailingly rational, fully informed, machine envisioned in neo-classical economics - which is why reliance on price signals alone is not likely to succeed in shifting behaviour very far.

The analytic processes of risk assessment, while governed by more logical processes of judgment and decision making, are also susceptible to errors or reasoning which result from systematic biases and the employment of various rules of thumb (heuristics). For example, the "status quo bias" - inertia - means that people have a very strong tendency to go along with the status quo or "default option" even when it conflicts with other values or produces higher costs than would otherwise be the case. In certain circumstances this tendency can be harnessed to increase climate friendly behaviour. A recent study of people's choices of electricity sources showed that markedly more chose the green utility when it was the default, even though it was slightly more expensive than when they had to make an active choice to opt in to "green" energy¹⁵.

In seeking to explain why people exaggerate or underestimate risks researchers have examined how we employ these "rules of thumb" to enable us to more simply understand our environment and which will influence the way we judge and respond to what is going on around us. For example, we often make judgments based on processes called "anchoring and adjustment", which means a decision such as how much to donate, can be influenced by the range of options offered - the larger the categories offered, the bigger the donation made; the same might be true of energy conservation decisions.

Similarly, if we can easily remember or have vivid images of certain events (availability), we will judge them as more of a risk than others for which we lack such images. One study showed that when people were asked about an illness which was "becoming increasingly prevalent" they were more likely to

¹⁵ Pichert, D & Katsikopoulos, K. (2008) Green defaults: Information presentation and pro-environmental behaviour. *Journal of Environmental Psychology*, 63-73.

believe that they would get the disease when the symptoms described were concrete and easy to imagine.¹⁶

Events that affect us, which we can readily imagine and which occur in the near future are judged more risky. By implication, the lack of vividness is an obstacle to acting to prevent climate change - and, conversely, communication which ties climate change risks to our own experiences and which emphasises the risk of damage to our society is most likely to produce action.

Research in a variety of settings also confirms the human tendency to discount the future: we generally prefer to take actions which confer lesser benefits now than those which give us greater benefits in the future. This attribute is obviously pertinent when trying to persuade people to take preventive action whose benefits will not be immediate. Of particular relevance is the fact that such discounting is greatest when the future is distant and uncertain and when intergenerational distribution is involved, as it is with climate change. When “egocentricism” - the tendency to make self serving judgments regarding allocations of blame and credit - is added to this mix, it is perhaps not surprising that getting agreement about the needed actions to combat climate change has been so difficult.

Similarly, when strong emotions are involved, people are inclined to ignore the fact that an event is highly unlikely. Again empirical research illustrates this phenomenon. In one study, people were asked how much they would pay to eliminate cancer risks ranging from one in a million to one in 100,000. Some of the participants were given descriptions of the cancer as gruesome and intensely painful. The statistical risk mattered less than the vividness of the description in influencing the payment they were willing to make.¹⁷ Global warming seems to be a case where the absence of direct experience or vivid images may result in lower risk assessment than is really justified.

Policy designers also need to take account of “loss aversion”, the fact that a variety of studies has shown that, roughly speaking, losing something make people twice as miserable as gaining the same thing makes them happy. Such loss aversion helps produce inertia, leading people to avoid change, even when it is clearly in their own interests. This is an obvious hurdle for policy makers.

On the other had, appropriate framing of an issue can “nudge” people in the direction of desirable behaviour. In numerous studies of people’s reactions to

¹⁶ Sherman, Stevens J et al (2002) Imagining can heighten or lower the perceived likelihood of contracting a disease: The mediating effect of ease of imagery. *Heuristics and Biases: The Psychology of Intuitive Judgment*. Eds Thomas Gilovich, Dale Griffin, and Daniel Kahneman. New York: Cambridge University Press.

¹⁷ Sunstein, Cass R. (2002) Probability neglect: Emotions, worst cases and law. *Yale Law Journal*, 112:1.

the risks from various medical procedures, people react very differently to the information that “ninety to one hundred are alive” than to the statement that “ten in one hundred are dead”.

Similarly, energy conservation campaigns which frame results in terms of losses - you will lose money if you do not adopt the recommended energy conservation method - are far more effective than those which emphasise the savings, even when the amount is the same. In addition, the commonly observed phenomenon of unrealistic optimism even when the stakes are high and people’s tendency to overestimate their own capacities add further barriers to achieving necessary behaviour change. Most people see themselves and their world in a more positive light than objective data would dictate.

Asked to envision their future, people typically say they are far less likely than average to have a heart attack, be fired from their jobs, get divorced, have a car accident or suffer major diseases. Part of this optimism is reflected in people’s beliefs that they can control uncontrollable events, a disposition which reflected in the often expressed expectation that- as yet unproven - technological solutions will emerge which will dramatically reduce CO2 emissions. As Monbiot observes, “a faith in miracles grades seamlessly into excuses for inaction.”(p205).

In the same way, while most people judge that the risks associated with climate change outweigh the benefits, they distinguish between the effects of climate change on their personal lives and on wider society, rating the risks to society as higher. Data also show that people generally view developing countries as more at risk and less able to adapt to the consequences of climate change and tend to underestimate the risks to them personally. In a 2004 study, 52% of British respondents said that climate change would have little or no effect on them.

It appears that phenomena like climate change have a relatively “low cognitive presence” partly because they are not directly experienced. Even in areas likely to be adversely affected e.g. by flooding, coastal erosion, the risks from climate change tend to be underestimated. What is more, it is still the case that for many, the benefits associated with their current lifestyles and patterns of consumption are judged to outweigh the possible risks at a personal level of climate change.

When individuals downplay the risks to themselves while recognising the possible broader social costs, this may represent denial or a resistance to any personal involvement in the solutions. It may also reflect the majority assessment that they are not able to influence the risk of global warming to any extent, although in one study, 85% maintained they would be willing to change their lifestyles to do so.

Generally speaking, the research to date indicates that while more and more people are concerned about climate change, they are less inclined to take personal actions or to support policies which can counter such change. This widespread concern is often of secondary importance in competition with other issues in people's lives. Research has suggested that while people are willing to accept programs and policies which have marginal and relatively cost - free effect on their lives, they're very reluctant to contemplate high cost solutions e.g. fuel taxes, higher electricity costs or driving less. There is a particularly strong view that personal action is pointless if taken in isolation and an accompanying reliance on government to provide the solutions.

Conversely, in this as in other areas of behaviour, actions are influenced by others through perceived social norms. For example, people are much more likely to give money to a street musician when they see others doing so. Similarly, the adoption of energy conservation and renewable energy technologies is influenced by personal contact with others who have already adopted the technologies, although in such cases people are often unaware of - and even deny - the impact of others' actions on their behaviour.¹⁸ This phenomenon of "social learning" may be one of the most potent ways of spreading ideas and practices at great speed with a minimum of persuasive communication.

But it can cut both ways. As Cialdini and his colleagues have demonstrated, warning people about the increasing occurrence of a problem like littering or theft, for example, can actually make the problems worse by describing - and normalising - actions which people might otherwise not carry out.

Social norms are particularly powerful in conditions of uncertainty when people are more likely to attend and respond to information about what others are doing. We are also most susceptible to the behaviour of those who are most like us. Some attitudes and sympathies are activated when a practice becomes more visible and public - and may spread like a virus. We are social creatures influenced by other people's choices and opinions and tend to conform to the values held by people around us. It makes sense to let people know that people like them are reducing their carbon emissions.

Changing environmentally destructive behaviours

Little is actually known about what techniques are best suited to stimulating climate friendly behaviours. What research there is relates to attempts to increase energy conservation. It is clear that information alone is rarely effective but that greater success is achieved when people are provided with

¹⁸ Griskevicius, V., Cialdini, R. & Goldstein, N.J (2008) Social Norms: An underestimated and underemployed lever for managing climate change, www.ijsc-online.org IJSC: 5-13

regular feedback about their energy use and when they are exposed to models who demonstrate effective conservation behaviours.¹⁹

Expressing public commitment, particularly to friends and neighbours also increases energy saving actions. Similarly, altering the rewards and costs of various behaviours through taxes, subsidies and rebates is important, although it is clear that incentives with the same financial value have widely differing effects, depending on how they are presented (e.g. low interest loans tend to be less effective than grants) and the stronger the financial incentive, the greater the role of psychological factors. And I would argue that it is not simply a matter of applying taxes and charges to increase the cost of carbon-intensive products and services while reducing the cost of low carbon intensive ones. While the use of economic instruments is argued to be more cost-efficient and less intrusive than regulation, behaviour change is by no means guaranteed in either case.

Apart from the question of how sensitive individuals and firms are to the increased prices (price elasticity of demand), people may simply absorb the additional cost and continue their present behaviour; or businesses may elect to pass on costs without reducing their own carbon emissions. A recent study of small businesses in the hospitality and construction industries in the U.K found that taxes to induce more environmentally friendly practices actually led to increases in the costs to clients rather than changes in behaviour. Furthermore, taxes and charges are extremely politically sensitive and may produce resistance and backlash in the short-run. Charges that are politically acceptable may not be large enough to produce the necessary behaviour change.

On the other hand, in response to California's high profile energy crisis, and despite frozen retail electricity prices, households voluntarily cut electricity use by an average of 10.4%. Over 75% reported taking at least one conservation action. Some followed the suggestions of a marketing campaign, "Flex Your Power", and were no doubt influenced by an expanded rebate program to encourage energy efficiency. But the fact that many people actually went beyond the recommended actions and turned off their air conditioning altogether caught researchers by surprise.²⁰

A more comprehensive and nuanced understanding of human behaviour which incorporates social, moral and altruistic behaviours is required. In particular, the assumption from classical economics that behaviour is fashioned by self-interested individual choice is suspect; social factors shape and constrain

¹⁹ Stern, P.C. (1992) Psychological dimensions of global environmental change, *Annual Review of Psychology*, 43: 269-302.

²⁰ Bender, S., Kandel, A., & Goldstone, S. (2004) Behavioral economics: The link between human dimensions and market transformation. Online publication: http://www.eceee.org/conference_proceedings/ACEEE_buildings/2004/Panel_7/p7_2/.

decision making and emotional responses may confound logical deliberation. Framing global warming as a solvable and shared moral challenge, as E.O. Wilson recommends²¹, is likely to be more successful in generating change than constantly banging on about the costs.

While economic theory assumes that individuals' actions are guided principally by external rewards, there is good evidence that for civic tasks such as protecting the environment, intrinsic motivation plays a critical role. And invoking such motivation may be at least as important as price signals. The language of burden and cost is particularly counter-productive. We all make voluntary contributions to public goods as part of everyday life: we recycle our household waste, donate to environmental causes and volunteer in the canteen at the local school. Such actions, from the standpoint of neoclassical economics make little sense.

In the California energy crisis consumers reported that they changed their energy use, not only to lower energy bills, but because of a sense of civic responsibility and altruism - "doing my bit", "protecting the environment" and "using energy resources wisely". One of the unfortunate consequences of the economic model which portrays humans as self-regarding, rational actors is that it ignores social context and our very strong inclination to co-operate with one another and to punish those who do not. It is of interest, that the "Flex your power" campaign framed its messages - "together we can do this", "help us all get through the power emergency" - to connect the actions of people "just like themselves" to the powerful effect of people acting together.

Conversely, monetary incentives can be a deterrent to co-operative behaviour and research has shown that the mere mention of money can have a negative effect on generosity- the "crowding-out" effect. Behavioural economist, Daniel Ariely, depicts us as operating in two worlds: one characterized by social exchanges and the other by market exchanges. Since we apply different norms - or expectations - to these two kinds of relationships, introducing market norms into social exchanges can produce perverse effects. Gneezy and Rustichini's research²² illustrates the long-term effects of a switch from social to market norms; they studied a day care centre in Israel to determine whether imposing a fine on parents who arrived late to pick up their children was a useful deterrent. They concluded that the fine didn't work well, and in fact backfired.

As Ariely²³ explained,

²¹ Wilson, E.O. (2006) *The Creation: An Appeal to Save Life on Earth*. New York: Norton.

²² Gneezy, Uri and Rustichini, Aldo, (2000) A fine is a price. *Journal of Legal Studies*, Vol. 29, No. 1, January 2000. Available at SSRN: <http://ssrn.com/abstract=180117>

²³ Ariely, D (2008) *Predictably Irrational: The Hidden Forces That Shape Our Decisions*. New York: Harper Collins.

before the fine was introduced, the teachers and parents had a social contract, with social norms about being late. Thus, if parents were late – as they occasionally were – they felt guilty about it – and their guilt compelled them to be more prompt in picking up their kids in the future. But once the fine was imposed, the day care center had inadvertently replaced the social norms with market norms.

Now that the parents were paying for their tardiness, they interpreted the situation in terms of market norms. In other words, since they were being fined, they could decide for themselves whether to be late or not, and they frequently chose to be late....But the real story only started here. The most interesting part occurred a few weeks later, when the day care center removed the fine. Now the center was back to the social norm. Would the parents also return to the social norm? Would their guilt return as well? Not at all. Once the fine was removed, the behavior of the parents didn't change. They continued to pick up their kids late. In fact, when the fine was removed, there was a slight increase in the number of tardy pickups (after all, both the social norms and the fine had been removed).

This experiment illustrates the unfortunate reality that when a social norm collides with a market norm, the social norm goes out the window.

Fear appeals

Many of the proposals for modifying our patterns of consumption and energy use to reduce greenhouse gas emissions take the form of exhortations to change accompanied by dire warnings about the catastrophic consequences of failure to act - from drowning to burning. Much of the resistance to accepting the science and refusing to ratify Kyoto was also justified by an appeal to fear - the threat of economic destruction and the slide into grinding poverty. In both cases, fear appears to have been selected as the motivating force most likely to produce - or prevent - the needed change.

Climate change is commonly presented through an alarmist prism as awesome, terrible, immense, indeed as beyond human control. The language conjures up visions of Armageddon, sometimes with a “quasi-religious register of death and doom.”²⁴ Words and phrases like “time bomb”, “havoc”, “catastrophe” “devastation”, “annihilation” appear repeatedly in scientific and media reports, implicitly reinforcing a counsel of despair. Hardin’s classic paper on denial suggested that such an approach was necessary to “unshackle the prisoner of experience.”

²⁴ Institute for Public Policy Research (2006) Warm Words: How are we telling the climate story and can we tell it better. <http://www.ippr.org.uk/search/?title=warm+words&Submit=search>

But fear is an emotion that should be approached with caution. Humans are unique in being aware of their vulnerability to sudden death and the inevitability of their certain mortality, of their annihilation. It appears that, to assuage the potentially paralysing terror engendered by this knowledge, humans construct beliefs about reality which they share with others and which provide a sense of meaning. Such “cultural worldviews”²⁵ can provide people with a sense of self worth as well as orderly and comforting explanations of the meaning of life and their place in the universe. Such worldviews are also likely to incorporate standards for desirable behaviour, including striving to increase one’s wealth and possessions, and may include the promise of symbolic - and even literal immortality - to those who endorse the beliefs and who adhere to the prescriptions of the group.

Numerous studies, conducted under the banner of “Terror Management Theory”²⁶, show that when people are reminded of their mortality, they are more likely to exhibit increased prejudice and aggression toward those who question their beliefs, those with different worldviews and those who are, or appear to be, different from them. Such reminders of mortality also lead to increased nationalism, strengthened endorsement of stereotypes and closer identification with those who share their religious and political beliefs. People constantly reminded of their own mortality may actually become more materialistic and resistant to messages of restraint, if materialistic values are an important part of their worldview. Indeed some studies have found that generating high levels of fear results in some people engaging in higher levels of the risky behaviour being targeted. This appears to be particularly the case when death is threatened as one of the consequences, for example, of drinking and driving.

In using fear to try to engender a sense of urgency about climate change in the community, many scientists and commentators may, in fact, be producing the opposite effect to the one they desire, particularly if their messages are not accompanied by recommendations for action which people believe are likely to make a difference. One of the possible consequences of engendering high levels of fear is that it may cause paralysis in those who are threatened; a sense of powerlessness and inertia, rather than effective action, may be the result. Appeals to fear may inadvertently position climate change as just another media beat-up which will disappear when the next big bogey-man has been fashioned.

On the other hand, emotions like fear and worry can motivate people to remove themselves from threatening situations or to change the environment in ways that reduce feelings of being at risk. They may serve as an early warning of the need to take some risk management action and provide the

²⁵ Pyszczynski, T (2004) What are we so afraid of? A terror management theory perspective on the politics of fear. *Social Research*, Vol 71: No 4.

²⁶ Ibid.

necessary motivation for action. There is some evidence that worry may directly result in an increased disposition to act as well as elevating judgments about climate change risk.²⁷ Dutch research makes clear, however, that such change can be expected only when strong supportive arguments are also provided. Based on the results of a Swiss study one researcher concluded that "...fear is a key variable when it comes to seeking environmental information and knowledge, especially about global environmental issues and problems" (p. 156). "The more one is afraid of environmental issues and problems, especially global environmental ones, the more one is motivated to learn" (p. 158).

There is a substantial public health literature which has examined the circumstances in which fear appeals directed toward encouraging health behaviour such as stopping people smoking or moderating their drinking, produce the desired attitude and behaviour change and, conversely, when such appeals backfire, causing people to use psychological defence tactics to resist the message, minimizing and denying the risk. Much of relevance to climate change behaviour could be learned from this research.

Conclusion

Ultimately our success in dealing with climate change will depend on understanding how we can change human behaviour, with and without the use of fear. Social scientists expert in understanding persuasive communication and behaviour change should be in the forefront of efforts to mitigate global warming. At the moment, they are nowhere to be seen. Perhaps it was because the effects of climate change were first brought to the world's attention by natural scientists that policy makers have tended to overlook the need to also understand human psychology in crafting workable solutions.

Now is the time to remedy that deficiency since, as Nicholas Stern stressed in his influential report, overcoming the "greatest market failure the world has ever seen" needs "action to remove barriers to energy efficiency and to inform, educate and persuade individuals about what they can do to respond to climate change."

John Gowdy puts it clearly:

*Understanding how humans make decisions and respond to incentives is much more than an interesting academic question. It may prove to be the key to the quality of human existence in the decades and centuries to come. It is likely that responding to rapid climate change will be the major challenge our civilization faces in the coming decades.*²⁸

²⁷ Sunblad, E, Biel, A & Garling, T (2007) Cognitive and affective risk judgments related to climate change, *Journal of Environmental Psychology*, 27, 97-106.

²⁸ Gowdy, John (2008) Behavioural economics and climate change policy. *Journal of Economic Behaviour & Organization*, doi:10.1016/j.jebo.2008.06.011, p 6.

That means we have to engage social scientists in the task as well.