

# The Climate Change Challenge and Barriers to the Exercise of Foresight Intelligence

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*Despite solid evidence from the scientific community about climate disruption, much of the US public remains unconvinced about the reality of anthropogenic change, and national governments have been slow to undertake major steps to deal with the climate crisis. In order to understand this lack of foresight intelligence regarding climate disruption, we identify some features of climate disruption and human psychology that combine to create barriers to effective action. We also review encouraging, albeit modest, successes in persuading Americans to conserve energy through “psych-wise” initiatives. Although the reductions in energy consumption accomplished by these initiatives and strategies fall far short of what is required to address impending global climate change, we believe that the principles underlying these initiatives suggest ways to achieve more substantial reductions. We conclude by offering some specific steps that could be taken to achieve such reductions and more generally meet the building global challenge.*

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**H**umanity is facing an unprecedented combination of serious environmental threats. However, climate disruption and the role of humans in creating it have attracted the most attention, undergone the broadest scientific assessment, and produced the most heated debate (Jacquet et al. 2014, Jamieson 2014). Although estimates of the amount of warming to be anticipated in the absence (or the presence) of major changes in policies are uncertain, no serious analysis offers any grounds for complacency or delay (Molina et al. 2014). However, the consensus within the scientific community and repeated warnings from that community—along with evidence of changes that have become increasingly apparent over the last few decades—have failed to end public uncertainty (Weber and Stern 2011, Stanford University et al. 2013). Nor have they moved national governments to undertake major steps to deal with the climate crisis, although the recent Paris accords show promise in this regard.

Why has it been so difficult to elicit substantive actions to alleviate this climate disruption? In part, the answer relates to the capacity of those who benefit most from the economic status quo to reward or punish legislators, media pundits, and even academic researchers. Shareholders often care more about short-term financial returns than

the longer-term sustainability of their companies and the damage they do to the environment. Both excessive focus on short-term consequences and political calculation lead most state and local governments that tax wages and profits to delay measures to deal with the threat, and the businesses that benefit from such delay and the people whose jobs depend on the unrestrained production and use of energy are all too willing to close a blind eye to the threat (McCright and Dunlap 2011, Elsasser and Dunlap 2013). In spite of these pressures, there are an increasing number of local governments that have taken on initiatives, although it is unclear to what extent they can accumulate support for major shifts in global trends without strong action at the national and international levels.

But economic and political considerations are only a part of the problem. Some specific features of the climate change threat combine with certain aspects of human psychology to make the challenge of collective national and international action an especially daunting one (Swim et al. 2010, Jamieson 2014, Gilovich and Ross 2015). When it comes to confronting environmental perils that lie in the future and unfold gradually, our species generally has failed to exercise *foresight intelligence*—that is, to recognize, diagnose, plan, and act to address those perils before it is too late to do so.

We use this term in extension of Gardener's (1983) concept of multiple kinds of intelligence with the conviction that individuals and societies can be educated to show wisdom and foresight about threats to individual and collective well-being, including threats which loom for future generations. In contrast to *data intelligence* (e.g., military intelligence), *foresight intelligence* refers to behaviors or actions that are in the best interest of a sustainable and equitable future for all humanity—behaviors that are “future smart.” Historically, the United States has exercised foresight intelligence in a wise manner on a few notable issues. The devotion of considerable current resources to the needs of the future through creation of the national park system, land-grant universities, the National Science Foundation, the adoption of safety requirements in the workplace and for automobiles, and social security are outstanding examples. Undertaking these programs in the face of organized opposition at the time provided benefits that Americans appropriately acknowledge and continue to enjoy many decades later. At a more global level, both the Marshall plan that helped restore postwar economies in Europe and the cooperation in many World Health Organization efforts to eradicate particular diseases and ameliorate the environmental factors that pose grave health hazards have also provided encouraging examples.

Past literature has laid out some of the possible policy instruments that could be effective for changing norms related to climate change. In this article, we focus on changes needed in personal and collective behavior, which were not features in the national programs mentioned above but will be needed to address climate change. We begin by identifying factors—some covered extensively in previous reviews (Weber et al. 2004, Swim et al. 2010, Kinzig et al. 2013, Jamieson 2014) and some less obvious—that make the problem of confronting global climate change a particularly difficult one (Gilovich and Ross 2015). We then review some modest successes in persuading Americans to conserve energy through “psych-wise” initiatives and briefly describe the psychological process and principles that lie behind those success stories, as well as strategies that could be useful in accomplishing more substantial behavior changes. We conclude with a further discussion of what could and must be done to meet the building global challenge of climate change.

### **Psychological barriers to the exercise of foresight intelligence in addressing the climate change challenge**

Below we explore psychological barriers identified in previous literature that may be applicable to this challenge.

**The noisy-signal problem.** Climate change—even change that is already producing floods, famines, rising tides, loss of shoreline, crises in food production, and loss of animal habitat—does not reveal itself with a clear signal. The biting winds and freezing temperatures of winter, the amount of day-to-day and week-to-week variability in the weather, and

the unevenness of changes in different parts of the globe tend to obscure the gradual 1- or 2-degree Celsius change in average temperature that we have experienced or will experience over several decades (Saad 2012).

**Time-frame, beneficiary, and end-point problems.** Meeting the challenge of climate change demands that people make personal changes in behavior now to minimize harm in the future, even if involving costs in the present. However, our species evolved as a small-group animal with a focus on our own survival and short-term needs, along with those of our offspring and near kin. Whereas some societies, such as various Native American tribes, have a tradition of thinking ahead multiple generations, we are not programmed to worry much about the welfare of our great-grandchildren, much less the welfare of descendants of people living far away (Schelling 1995). Furthermore, what is called for are permanent changes, not temporary alterations in how we live our lives and cooperate during times of war or economic crisis.

**The absence of payoffs for “communities of cooperators.”** Even people who might be willing to pay their share of the costs of combating global warming are unwilling to be “suckers” or “saints” who bear financial cost while others—free riders—share the benefits without footing their share of the bill. This is a problem in any situation in which people can benefit from the work of others without contributing themselves. But there is an additional problem when it comes to climate change. In many human interactions, although selfish individuals may gain a temporary advantage over cooperative individuals, communities of cooperators fare better than communities of noncooperators (Axelrod 1984). So-called co-benefit actions to mitigate or adapt to climate change, in contrast, do offer a partial bridge that may help encourage taking on local costs that lead to lower climate risks globally when also leading local benefits that are nearer in time and space. These have sometimes been called “no-regrets” or “win-win” strategies to emphasize the encouragement they may provide. Examples of such co-benefits for health and climate are actions to expand access to reproductive health services; to reduce many categories of air pollution; to create smarter, more energy-efficient urban infrastructure; and to encourage lower meat consumption in rich countries (Smith et al. 2014).

**The “drop-in-the-bucket” problem.** People are all too aware that their own efforts, and those of their communities, will not really make a difference. Even the efforts of our entire nation will not be enough unless governments and industries across the globe act decisively and in coordination. To the extent that people feel such collective efforts will not be undertaken, they are understandably unwilling to exert effort (Gilovich and Ross 2015).

**The temptations of denial and rationalization.** Perhaps the most difficult problem to overcome in mobilizing efforts to

combat climate change is the most obvious one: the all-too-human inclination to engage in denial, rationalization, and dissonance reduction (Festinger 1957, Taber and Lodge 2006, Hart and Nisbet 2012). This inclination is particularly strong in the case of the climate change challenge because it seems so daunting, because the steps to be taken threaten to be so costly and uncertain in their effectiveness, and because the looming consequences threaten to be so dire (Ditto and Lopez 1992). In the case of climate change, denial and rationalization are especially potent because they are engaged in collectively (Gilovich and Ross 2015). People do not arrive independently at the bases for doubting scientists who sound the climate change alarm or at justifications for inaction. They are encouraged to adopt their comforting rationalizations by interest groups with powerful motivations and virtually limitless resources, groups that are telling them what they prefer to believe, just as in the case of tobacco companies denying the conclusiveness of evidence linking smoking to cancer and heart disease. In the United States, to a greater extent than anywhere else, various interest groups have combined to make climate change denial an expression of a conservative political identity (Conway and Oreskes 2010, McCright and Dunlap 2011).

### Successful, small, psych-wise interventions in the United States

Although the challenge of achieving large-scale societal changes in energy consumption and greenhouse gas emissions has not been addressed on a national scale in the United States, there are a few small but nontrivial success stories that are worth considering.

**The power of norms.** Social psychologists have shown that the potent and often-underestimated influence of what we perceive to be group norms can be employed to good effect in curbing energy consumption. In one study, a team went door to door in one San Diego suburb, attaching signs about energy conservation to doorknobs. Some of the signs offered good reasons to conserve energy: for “the sake of the environment,” “for the sake of future generations,” or to help homeowners “save money.” But none of these signs proved as effective as the one that gave no reason but stated, “the majority of your neighbors are undertaking energy-saving actions every day” (Schultz et al. 2007, Nolan et al. 2008).

Refining this technique with a more precise message, the team sent residents a monthly letter with two pieces of information: the average energy use of their neighbors and the extent to which their home’s use was worse or better than that average (Schultz et al. 2007). Homeowners who discovered they had been consuming more energy than their neighbors quickly began to consume less. However, those who discovered that they had been consuming less energy than their neighbors began to consume more. To address this problem, the researchers added a smiley face next to the energy-use figures for those below-average users,

thereby signaling a prescriptive norm rather than merely a descriptive one. The problem was solved: The low users no longer tended to increase their use (see the Annual Behavior, Economics, and Climate Change Conferences, <http://beccconference.org>).

The overall energy savings from such efforts were modest. But they demonstrated that influence strategies employing insights from the social sciences can be done at very low cost—perhaps even the cost of a postage stamp.

Long-established theory and research in social psychology suggest an important bonus from such small, “psych-wise” interventions and their small accomplishments (Gilovich and Ross 2015). The same cognitive and motivational processes that prompt individuals to rationalize inaction in the face of threat can also lead them to internalize values that rationalize the initially small actions that they *do* take. Therefore, individuals “nudged” (Thaler and Sunstein 2008), without coercion or huge incentives, to act in accord with environmentally friendly values come to hold, endorse, and even spread those values. And once those values are widely held, citizens are likely to call for, or at least not resist, policies and practices that take more consequential steps that reflect those values. In other words, a kind of virtuous cycle can be created whereby values, beliefs, and actions reinforce each other (Gilovich and Ross 2015). Such cycles have developed in health and safety practices, in local cleanups and recycling programs, and especially in bearing the costs and sacrifices of war.

**Default options and other nudges.** Messages about norms are not the only way to create the virtuous cycle. Consider the results of the following “natural” experiment: Different European countries present motorists with different “default” options regarding the use of their body organs in the aftermath of a fatal traffic accident. Many countries follow the same opt-in policy as that in the United States—that is, to be a potential donor, motorists must take some action, such as signing the back of their drivers’ licenses. In other European countries, the default is reversed: Individuals are assumed to be willing donors but are given the freedom to opt out of the donation program by signing the back of their licenses on a designated line signifying their unwillingness.

As reported in a well-known study, the results of this difference in default policies are dramatic (Johnson and Goldstein 2003): Although public-opinion polls reveal comparable enthusiasm for organ donation across these different countries, the participation rates average only about 15% in the opt-in countries but are close to 100% in nearly all the opt-out countries. For example, whereas only 12% of license holders make their organs available for harvesting in opt-in Germany, 99% of license holders do so in opt-out Austria.

At first glance, this remarkable finding may seem to suggest only that people are lazy and given to inertia—that they don’t bother to read what is on the back of their drivers’ licenses or take a moment to sign, even when doing so would be consistent with their views about organ donation.

But further research suggests that more than laziness and inertia may be involved. Default opinions convey a message about social norms and the meaning of one's choices. In the case of the opt-in provision, the expectation conveyed is that whereas the more generous and outward-looking individuals participate in the program, typical community members are unlikely to do so. The opt-out provision, by contrast, conveys the message that participation is the normal course of action and that failure to participate reflects selfishness and unwillingness to do one's part in fulfilling a normal responsibility of good citizenship (Davidai et al. 2012).

It is but a small extrapolation from these research findings to suggest that default options with regard to energy conservation and carbon dioxide (CO<sub>2</sub>) emissions could produce similar results. Consider a requirement that devices have default options in settings for furnaces and air conditioners that avoid excessive energy consumption—even if, and perhaps especially if, that setting could be overridden by the homeowner for fixed periods of time. Beyond requiring some effort to change such settings, the implicit message conveyed is that most fellow citizens do not take that step and that taking it requires special justification; otherwise, one would be failing to meet the normal expectations of one's community.

If the message of research on cognitive dissonance and self-perception processes holds true (Festinger 1957, Bem 1972), individuals nudged to adhere to an energy-conservation norm would become more likely to support building regulations for new homes, businesses, schools, and sports arenas that require energy efficiency. They might even become more willing to advocate, or at least accept, expenditures of government funds to subsidize non-carbon-based sources of power and the imposition of carbon-emission quotas and taxes. Steps to promote energy conservation that are highly visible to neighbors and passersby (e.g., solar panels) are especially valuable in conveying the message that energy conservation is normative rather than only for those with particular political views and values.

**A role for the media.** People have long been spurred to social action by books, pamphlets, and films that make particular evils or threats more vivid and concrete. Harriett Beecher Stowe's *Uncle Tom's Cabin* (1852) and various slave narratives helped to win support for the abolitionist movement. Upton Sinclair's *The Jungle* (1906) spurred the introduction of various pure-food regulations, and Rachel's Carson's *Silent Spring* (1962) played a role in the elimination of DDT spraying.

More recently, transformations in social norms and practices have been accomplished through serialized radio and television dramas, many of which were inspired by Miguel Sabido, the former vice president of a large television network in Mexico. This type of work was expanded by the Population Media Center, among others, in Africa, Asia, and Latin America. These dramas use fictional characters to essentially function as role models. In the plot twists and turns of these dramas, the characters confront and deal

effectively with social issues, including family planning and the treatment of women.

Some of the data obtained in studies of the impact of these dramas have been striking. When characters in the Mexican serial *Televisa* dealt explicitly with family-planning decisions, the national population council (CONAPO) reported dramatic subsequent increases in the number of people seeking family-planning information and of women volunteering to work in the national program of family planning, a 23% increase in contraceptive use in the following year (compared with a 7% increase the preceding year), and a 33% increase in family-planning-clinic enrollment (compared with a 1% decrease the previous year). Between 1977 and 1986, when several soap operas with family-planning themes were on the air, Mexico experienced a 34% decline in its population growth rate, and the Mexican people attributed the changed norms to the soap operas (Ryerson 2008). Brazilian soap operas portraying small families have also been found to be associated with individuals having fewer children, especially among lower-socioeconomic-status women (La Ferrara et al. 2012).

Al Gore's book and television documentary, *An Inconvenient Truth*, which reified and dramatized the environment threat, produced a spike, albeit a temporary one, in public awareness and activism. New technologies now exist that could place people into "virtual worlds" that make the current and future consequences of climate change even more salient. But the challenge of converting awareness, concern, and resolve to "do something" into effective collective action—in the face of the obstacles outlined earlier—has yet to be met.

An individual family can decide to have few or no children, and by taking steps reflecting that decision, they can ease their own burdens and in so doing reduce the burdens of unchecked population growth for their society. By contrast, an individual family, community, or even country cannot spare itself the results of global climate change solely by reducing its own energy use. To accomplish that goal, concerted collective action, courageous national and international leadership, and both national and international institutions capable of translating good intentions and shared norms into sustained, effective actions are required.

### Strategies for producing cooperative global action

Although changes in individual behavior and greener community norms are necessary, they are at best a first step. Coordinated efforts within communities and even nations are required. Social movements that transcend national boundaries can also play a role (Tajfel and Turner 1986). But ultimately, civilization as a whole, with its diversity of views, cultures, and short-term interests, must solve this problem. A multilevel "polycentric" approach is needed to overcome barriers to foresight intelligence (Ostrum 2009).

Social movements that take a bottom-up approach can play an important role, particularly if they are supported by inspired leadership from above. However, the greatest

prospect for rapid progress in the near future may lie with midlevel organizations and institutions, including city and state agencies, business communities, clubs and organizations, religious communities, social-media blogs and websites, and, of course, schools. Some of these are already trying to change norms and practices in ways that promote human betterment. What is needed most is more coordination of their efforts.

Although it is important to alert our society and others around the world to the magnitude of the threat and to the concerted and sustained effort required to address that threat, it is also important to avoid producing resignation or denial. There is an outside chance that new technologies will somehow be developed that greatly facilitate efforts to cleanse the atmosphere of CO<sub>2</sub>, methane, and other greenhouse gases that are responsible for climate change—or at least to slow the rate of deterioration. There is a greater chance that the lure of profits, even in the absence of more altruistic motives, will prompt private enterprise to develop better batteries for electrically powered cars or to transition to cleaner and less expensive energy sources. In this regard, marketing research on the means to encourage the widespread adoption of the new technologies that have been developed—and also more basic research that could lead to new products and services not yet even imagined—would serve us well.

Knowledgeable observers often underestimate how rapidly progress can be made once people start to work in earnest. Moreover, solutions to particular problems can provide bonuses of obvious value to society and thus win support for the larger undertaking. The public might not be inspired by the prospect of slowing global warming over the next decade or so from 0.2 degrees Celsius to 0.1 degrees Celsius through an increase in the number of electrically powered cars and more use of wind and solar power. But it might welcome fewer days of smoggy haze, lower health costs, a more productive workforce, and also the prospect of new well-paying jobs for a generation of new workers. These motives have spurred action in China and could do the same in the United States—especially the opportunities for jobs (and profits).

The ultimate questions to be tackled are clear enough: How can we produce the required dramatic shift in norms and values relevant to the preservation of our climate and, for that matter, the protection of many other features of our planet that contribute to our collective well-being? And how can we translate that shift in norms to a shift in decisions and actions by individuals, industries, and nations (see the Collective Impact Framework, [www.collaborationforimpact.com/collective-impact/](http://www.collaborationforimpact.com/collective-impact/))?

It is instructive to consider the success of efforts to curb smoking. Like climate change, the impacts of smoking came slowly to be well established in the scientific literature but did not alone substantially change behavior. Public-health media campaigns aided by the recruitment of physicians to reinforce those messages to their patients helped, as did warning labels on cigarette packages, banning TV cigarette

commercials, and discouraging scenes in television and film dramas that associate smoking with sophistication and sexual allure. Making it more difficult and expensive to smoke no doubt also played a role, but stigmatizing smoking as ill mannered and antisocial—something to be done furtively, away from other people—may have helped even more. Younger members of society, at least those from middle-class backgrounds, increasingly came to see the young smokers in their midst as “losers” or as kids “going nowhere,” and they pestered their parents to give up smoking as well (Gilovich and Ross 2015).

Could similar measures curb greenhouse gas emissions? The task would be more difficult. What is being sought is not a one-time decision to stop or not to commence a particular practice but rather continuing efforts to reduce a whole range of practices. The list would include obvious steps—avoidance of unnecessary driving, excessive air-conditioning use, and high thermostat settings—and some less obvious ones, such as reducing the consumption of foods that require the heavy use of energy, curtailing the construction of large single-family homes, and holding meetings via virtual conferencing rather than requiring people to fly (Vandenbergh et al. 2011). The most radical change required is perhaps the most difficult and most likely to be fiercely resisted: a reduction in consumerism in its current form, with its message to buy ever more and ever newer stuff to keep the economy growing.

The list above suggests some specific measures worth trying. Beyond the adoption of policies that directly discourage activities that produce greenhouse gases (in particular, driving rather than using alternative means of transportation), there are some less obvious steps that could prove helpful. One is the banning of deceptive advertising and marketing of so-called low-emission products. Conversely, it would be helpful to expand current efforts to offer consumers efficiency ratings on cars and appliances and also to require special warning labels on high-emission vehicles, refrigerators, lawn mowers, leaf blowers, etc. (akin to the warnings on cigarette packages that have become increasingly harsh over the years). Indeed, in a number of cities around North America, warning labels are being considered for placement on gasoline pumps to help shift public perception and behavior related to climate change (see figure 1).

The most difficult but perhaps most important task is that of creating a steady-state economy (Victor and Rosenbluth 2007) that emphasizes services and experiences rather than an unquenchable appetite on the part of consumers for new things, some of which require the use of carbon-based energy in their operation but virtually all of which require such use in their manufacture, packaging, and transportation (Daly 1996). This somewhat utopian goal is bound to face fierce opposition from profit-seeking companies and those who benefit most from them, who today have a stranglehold on our political process.

Some conventional persuasion techniques hold promise, such as celebrating individuals, industries, communities, and nations that take the lead in the struggle against climate



**Figure 1.** (a) A warning label on a gasoline pump. (b) A close-up of the warning label. Photo credits: Our Horizon ([www.ourhorizon.org](http://www.ourhorizon.org)).

change—perhaps a Nobel Prize for those whose contributions are most noteworthy. So would the use of booby prizes and walls of shame to stigmatize politicians, corporations, and nations that are particularly egregious offenders and foot draggers (Gilovich and Ross 2015).

A less obvious strategy is the encouragement not only of efforts to curb climate change but also of collective projects to adapt to the effects of change that almost certainly will be felt in the near future. Such projects—building sea walls, widespread insurance plans offering protection for those

likely to be harmed by rising tides and other manifestations of global warming, investment in research to develop new crops to replace ones threatened by ecological change, and subsidization and celebration of new energy sources—can serve a dual function.

Beyond the benefits of adaptation, these undertakings counteract the temptations of rationalization and denial (Gilovich and Ross 2015). Citizens and public figures who support measures to deal with imminent threat are likely—and indeed motivated—to see themselves and to be seen by others as people who acknowledge the reality of that threat (Festinger 1957, Bem 1972). Indeed, to prepare for and take steps to adapt to climate change and at the same time deny the reality and magnitude of the threat would evoke the type of cognitive dissonance that social psychologists have explored in decades of research.

Educators at all levels could also play a constructive role in helping young people to understand the basics of environmental science well enough to see the links among air and water temperature, glacial melting, sea-level rises, the greater frequency of severe storms, and other aspects of the climate change threat. Denial and rationalization become very difficult in the face of such understanding, and environmental activism among the young is more likely to spread.

Visual signals of changing norms can inspire additional action. Schools and government buildings with solar panels and other non-GHG sources of energy convey a green message, such as those encouraged by Leadership in Energy and Environmental Design (LEED) building standards. There is evidence that both the benefit of signaling and the desire for the benefits of going green contributed to businesses adopting the LEED standards to make their building green (Corbett and Muthulingam 2007). So do buses and vans that take people to and from workplaces, shopping centers, libraries, and other public facilities. Posting specific goals for public transportation use—and acknowledging success in meeting those goals—could also be a useful strategy in this regard.

Mandating such steps would produce resistance and perhaps even reactance that would make people value what is banned or penalized. But it is unlikely that requiring utilities to provide renewable power options would create opposition from ordinary citizens. Opposition from business interests that stand to lose profits would be inevitable, as we have seen with the attacks on President Obama's Clean Power Plan. Wherever possible, initiatives that allow citizen groups and business interests to unite in their opposition are to be avoided. Indeed, freely chosen actions, as dissonance theorists demonstrated long ago, are more likely to produce internalization than actions that one is forced to take (Festinger 1957, Festinger and Carlsmith 1959, Aronson and Carlsmith 1963).

Norms and behaviors that affect climate change could, we believe, be shifted by recruiting media and entertainment idols to talk about their contributions to reducing GHG emissions. Blogs, tweets, and other social media are becoming increasingly useful in this regard, especially in targeting the young. The use of television programs featuring

continuing characters who explicitly talk the talk and walk the walk of confronting climate changes could be effective in the United States in a manner akin to the successful use of such media in Mexico that we noted earlier. The characters might even engage in foresightful discussions of taboo topics such as the environmental impact of livestock—perhaps even the pros and cons of a carbon tax. But again, the greatest challenge lies less in exposing people to the wisdom of collective action to counteract the threat of climate change than in reducing or evading the power of those with incentives and financial resources to bend government decision-makers to the service of their narrow interests.

## Conclusions

Despite the evidence that the damaging consequences of climate change are already being felt and will almost certainly become worse in the absence of collective coordinated action, plans for such action are not fully on the table in the halls of political power. Bringing about the necessary change in the climate-related norms required to influence decisionmakers will be a tough slog especially at first for both the psychological and political reasons that we have noted throughout this article. But as history shows with regard to other shifts in norms, once the ball starts rolling, momentum can build, and remarkable change can take place quickly. We discussed changes in smoking rates, but we could have cited other even more dramatic examples, including not only in goods and services (such as the new safety standards for automobiles and other products) but also in social attitudes and practices, as we see in the dramatic change in the acceptance of gay marriage and gay rights, and the earlier productive—if more gradual and still unfinished—struggle to ensure the civil rights of Americans of all races and ethnicities.

There is obviously no magic bullet that would alleviate the environmental crisis, but some obvious opportunities exist for constructive action. The most important initial task involves increasing public recognition of the importance of the issue. More research on the most effective means of communicating about climate would be helpful in this regard. But we cannot afford for the pace of social change to be slow. Wherever possible, it will be important to initiate the kind of step-by-step process whereby small and uncontroversial initiatives change behavior a bit, which in turn promotes changes in attitudes, beliefs, and norms, which culminates in the acceptance of more stringent measures and global undertakings. The window of opportunity for action is narrow, perhaps only a decade or two. The scale of the task is daunting, and many more individuals and organizations must be recruited in order to undertake the necessary steps. But the task is nowhere near as daunting as the prospects for civilization if it is not accomplished.

## References cited

Axelrod R. 1984. *The Evolution of Cooperation*. Basic Books.  
 Aronson E, Carlsmith JM. 1963. Effect of the severity of threat on the devaluation of forbidden behavior. *Journal of Abnormal and Social Psychology* 66: 584–588.

Bem D. 1972. Self-perception. Pages 1–62 in Berkowitz L, ed. *Advances in Experimental Social Psychology Theory*, vol. 6. Academic Press.  
 Conway EM, Oreskes N. 2010. *Merchants of Doubt*. Bloomsbury.  
 Corbett CJ, Muthulingam S. 2007. Adoption of Voluntary Environmental Standards: The Role of Signaling and Intrinsic Benefits in the Diffusion of the LEED Green Building Standards. UCLA Institute of the Environment and Sustainability, Center for Corporate Environmental Performance. doi:10.2139/ssrn.1009294  
 Daly HE. 1996. *Beyond Growth: The Economics of Sustainable Development*. Beacon Press.  
 Davidai S, Gilovich T, Ross LD. 2012. The meaning of default options for potential organ donors. *Proceedings of the National Academy of Sciences* 109: 15201–15205.  
 Ditto PH, Lopez DF. 1992. Motivated skepticism: Use of differential decision criteria for preferred and nonpreferred conclusions. *Journal of Personality and Social Psychology* 63: 568–584.  
 Elsasser SW, Dunlap RE. 2013. Leading voices in the denier choir: Conservative columnists' dismissal of global warming and denigration of climate science. *American Behavioral Scientist* 57: 754–776.  
 Festinger L. 1957. *A Theory of Cognitive Dissonance*. Stanford University Press.  
 Festinger L, Carlsmith JM. 1959. Cognitive consequences of forced compliance. *Journal of Abnormal and Social Psychology* 58: 203–210.  
 Gardner H. 1983. *Frames of Mind: The Theory of Multiple Intelligences*. Basic Books.  
 Gilovich T, Ross L. 2015. *The Wisest One in the Room*. Free Press.  
 Hart PS, Nisbet EC. 2012. Boomerang effects in science communication: How motivated reasoning and identity cues amplify opinion polarization about climate mitigation policies. *Communication Research* 39: 701–723.  
 Jacquet J, Dietrich M, Jost JT. 2014. The ideological divide and climate change opinion: “Top-down” and “bottom-up” approaches. *Frontiers in Psychology* 5 (art. 1458).  
 Jamieson D. 2014. *Reason in a Dark Time: Why the Struggle against Climate Change Failed—and What It Means for Our Future*. Oxford University Press.  
 Johnson EJ, Goldstein D. 2003. Do defaults save lives? *Science* 302: 1338–1339.  
 Kinzig AP, et al. 2013. Social norms and global environmental challenges: The complex interaction of behaviors, values, and policy. *BioScience* 63: 164–175.  
 La Ferrara E, Chong A, Duryea S. 2012. Soap operas and fertility: Evidence from Brazil. *American Economic Journal: Applied Economics* 4: 1–31.  
 McCright AM, Dunlap RE. 2011. The politicization of climate change and polarization in the American public's views of global warming, 2001–2010. *Sociological Quarterly* 52: 155–194.  
 Molina M, et al. 2014. *What We Know: The Reality, Risks, and Response to Climate Change*. American Association for the Advancement of Science.  
 Nolan JM, Schultz PW, Cialdini RB, Goldstein NJ, Griskevicius V. 2008. Normative social influence is underdetected. *Personality and Social Psychology Bulletin* 34: 913–923.  
 Ostrum E. 2009. A polycentric approach for coping with climate change. World Bank. Policy Research Working Paper no. 5095.  
 Ryerson WN. 2008. *The Effectiveness of Entertainment Mass Media in Changing Behavior*. Population Media Center.  
 Saad L. 2012. In US, Global Warming Views Steady despite Warm Winter. Gallup Poll.  
 Schelling TC. 1995. Intergenerational discounting. *Energy Policy* 23: 395–401.  
 Schultz PW, Nolan JM, Cialdini RB, Goldstein NJ, Griskevicius V. 2007. The constructive, destructive, and reconstructive power of social norms. *Psychological Science* 18: 429–434.  
 Smith KR, Woodward A, Campbell-Lendrum D, Chadee D, Honda Y, Liu Q, Olwoch J, Revich B, Sauerborn R. 2014. Human Health: Impacts, Adaptation, and Co-benefits. Pages 709–754 in Field CB, Barros V, Dokken DJ, eds. *Climate Change 2014: Impacts, Adaptation, and Vulnerability*, vol. 1: Global and Sectoral Aspects. Contribution of Working Group II to

- the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge University Press.
- Stanford University, Resources for the Future, USA Today. 2013. Global Warming and Clean Energy National Poll. Stanford University.
- Swim J, Clayton S, Doherty T, Gifford R, Howard G, Reser J, Stern P, Weber E. 2010. Psychology and Global Climate Change: Addressing a Multi-Faceted Phenomenon and Set of Challenges. American Psychological Association Task Force on the Interface between Psychology and Global Climate Change.
- Taber C, Lodge M. 2006. Motivated skepticism in the evaluation of political beliefs. *American Journal of Political Science* 50: 755–769.
- Tajfel H, Turner JC. 1986. The social identity theory of intergroup behavior. Pages 7–24 in Worchel S, Austin WG, eds. *The Psychology of Intergroup Relations*. Nelson-Hall.
- Thaler R, Sunstein C. 2008. *Nudge: Improving Decisions about Health, Wealth, and Happiness*. Yale University Press.
- Vandenbergh MP, Dietz T, Stern PC. 2011. Time to try carbon labelling. *Nature Climate Change* 1: 4–6.
- Victor PA, Rosenbluth G. 2007. Managing without growth. *Ecological Economics* 61: 492–504.
- Weber EU, Stern PC. 2011. Public understanding of climate change in the United States. *American Psychologist* 66: 3015–328.
- Weber EU, Shafir S, Blais A-R. 2004. Predicting risk-sensitivity in humans and lower animals: Risk as variance or coefficient of variation. *Psychological Review* 111: 430–445.

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