Seeing Is Believing: Understanding & Aiding Human Responses to Global Climate Change

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This essay traces my academic voyage from studying human perceptions of financial risk to the realization that the human response to climate change is a more fundamental and profound challenge. Along the way, I came to realize that different academic disciplines need to be recruited for two purposes: 1) to tell an accurate story about the motivations and processes by which environmental (and other) decisions get made by stakeholders that range from policy-makers in the public and private sector to the general public; and 2) to determine and implement effective and feasible ways of changing the physical, institutional, and social environment to help myopic decision-makers achieve long(er)-term objectives. I see my voyage as an exercise in applied hope, resisting the constraints that disciplines and academia try to place on scholars and helping others to do so as well, by both example and institution-building.

> Be neither an optimist nor a pessimist. Both are different forms of fatalism. Instead, practice what I call *applied hope*: believe our world and the causes you care about can get better, and work to make them so.
>
> —Amory Lovins[1]

This is the intellectual puzzle of our time: what lies at the root of pervasive inaction, wishful thinking, and denial in the face of global climate change, a hazard with potentially catastrophic consequences for the continued habitation of the human species on planet Earth? In this essay, I trace my academic voyage from studying human perceptions of financial risk to the realization that the human response to climate change is a more fundamental and profound challenge. Climate change shares all the characteristics that make wise responding hard in other individual and societal problem settings, from insufficient retirement savings to the opioid epidemic and obesity, but more so. On this personal trajectory, I came to realize that different academic disciplines need to be recruited for two purposes: 1) to tell an accurate story about the motivations and process-

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es by which environmental (and other) decisions get made by stakeholders that range from policy-makers in the public and private sector to the general public; and 2) to determine and implement effective and feasible ways of changing the physical, institutional, and social environment to help myopic decision-makers achieve long(er)-term objectives. Stops along this voyage will revisit the establishment of an interdisciplinary center that created a new area of research and will describe the rewards and challenges of leaving the comfort zone of one's academic discipline and of actively translating and exporting academic insights for use in the proverbial "real world."

Academic writing typically does not happen in the first person singular, but the invitation to bear witness on climate change as an academic and societal challenge suggests a personal as well as a professional account. I take this opportunity to reflect back on the journey that has brought me to this juncture of addressing the intellectual puzzle of our time described above: Why is it that the well-documented threats of global and potentially catastrophic climate change do not move national governments, corporations, or large segments of civil society to more fully consider mitigative or even protective action? Why is it or how is it that so many of us prefer to engage in the wishful thinking and denial of inconvenient facts that may well imperil the comfortable existence of future generations of the human species on planet Earth?

I started on my academic path with Ph.D. research at Harvard's program on behavior and decision analysis within the department of psychology and, by my own initiative, at Harvard Business School, modeling and empirically investigating people's perceptions of risk, mostly in the context of risky financial investment decisions. Serendipity, in my first faculty position in quantitative psychology at the University of Illinois at Urbana-Champaign, led me to a group of agricultural economists who were interested in studying awareness about and actions in the face of potential climate change among farmers in East Central Illinois. I joined the team as someone with expertise in interviews and surveys and, through the research, discovered the first instantiation of what I later came to call *the single-action bias*: namely, the tendency of people (in this case, farmers) who are responding to a threat to rely on a single action when other actions exist, even when the single action provides only incremental risk reduction and may not even be the most effective option.[2] My senior colleague at Carnegie Mellon University, Baruch Fischhoff, one of the few psychologists at the time interested in applying psychological theory to solve real-world problems (and a long-standing role model and mentor), learned about my foray into climate change research and would pass my name on to National Research Council committees and other organizations looking for a psychologist with expertise and interest in the topic, whenever he could not or did not want to take on an invitation. By contributing to reports

like those written by social and environmental scientist Paul Stern and geoscientist Bill Easterling, I learned to appreciate the value that interdisciplinary collaborations between the physical and social sciences as well as across different social and behavioral sciences bring to the challenges of climate change action.[3]

This essay is a welcome opportunity to take stock of the fundamental insights about climate change perceptions and action that I arrived at over these past thirty-five years. Here are my top three: 1) climate change does not elicit sufficient fear or dread; 2) motivating climate action through fear or guilt is a bad idea even though it might sound like an effective approach; and 3) we need to help people recognize their personal experience of the concrete impacts of climate change on their lives, though this is easier said than done and may not work for everyone.

My first insight, that climate change does not elicit sufficient fear or dread to motivate action, not surprisingly builds on the foundational work by Baruch Fischhoff and his colleagues Paul Slovic and Sarah Lichtenstein on psychological risk dimensions. I put this insight forth as a hypothesis fifteen years ago at a meeting at Princeton organized by geoscientist Michael Oppenheimer, expecting others to put it to the test.[4] Eventually, one of my Ph.D. students took the bait and set out to replicate and expand the classic Lichtenstein and colleagues study on psychological risk dimensions, which now also included climate change, global warming, and a list of extreme weather events and natural disasters known to be exacerbated in frequency or intensity by climate change.[5] As predicted, people's perceptions of the composite "dread" variable for climate change (or global warming, the label for the hazard did not matter) were far below the average for all hazards, while the perhaps more concrete extreme weather events or natural disasters scored high.

This suggests that it would not be easy to motivate climate action by fear, since climate change does not elicit visceral responses of dread. But even if climate change were dreaded, would it be a good idea to use this fear or the guilt of not contributing to a solution as a motivator for action? My second theoretical and empirical insight suggests that the answer to this question is no, given that effective climate change action requires sustained attention and action over time. Negative messaging that elicits fear or guilt gets attention, but people want to get out of the negative mood state quickly because it is unpleasant, leading among other things to the single-action bias mentioned earlier, where the fear-motivated flag for action goes down after the first protective or corrective action is taken. Positive messaging and information about a way forward, on the other hand, are far more effective motivators for the long haul. One particularly effective positive emotion is pride. Campaigns that make people anticipate the pride of being part of the solution (rather than the guilt of being part of the problem) have proven to be a far better strategy, both in controlled tests in the lab and in field settings that range from the conservation of birds in the Caribbean and fisheries in the Philip-

pines by the NGO Rare.org to the preservation of coral reefs with the help of cane farmers in Queensland, Australia, by the company Evidn.[6] I have been impressed by both of these organizations with whom I have had the opportunity to interact for the way in which they have been putting behavioral science principles to good use.

My third insight relates to the fact that personal experience is a powerful teacher, far more convincing than pallid statistics, even if the latter carry greater evidentiary value.[7] This insight is alluded to in the title of this essay: "Seeing Is Believing." But as is often true in psychology (not a logically consistent and internally coherent social science discipline like economics), the opposite can also be the case: namely, that "believing is seeing." In other words, people are often committed to their beliefs, especially when those beliefs are visibly and vocally shared by others in their tribe, and will selectively attend to information that confirms those beliefs and fail to see evidence that contradicts them. This, of course, explains the increasing polarization of climate change beliefs.[8]

Building bridges and commuting on those bridges between continents and academic disciplines has been a strong metaphor in my life, from living and working in some form or other in both North America (Canada and the United States) and Europe, to trying to draw on, reconcile, and integrate theoretical frameworks and empirical tools from psychology, economics, and other behavioral disciplines. "Combine and conquer," a phrase I coined in 1984, has been an epistemic theme in my work, a call to arms and part of the title of more than one paper.[9] It reflects my belief that multiple academic disciplines are needed to understand the motivations and processes by which environmental decisions get made by actors that include the general public as well as professional decision-makers. Contrary to the prevalent implicit assumption in policy circles, not all decisions are made solely by rational deliberation, but also involve emotional reactions and, frequently, the implicit or explicit application of rules (such as standard-operating procedures, best practices, and moral or ethical rules of conduct) that follow from people's social or professional identity.[10] People have many and often conflicting goals, and preferences are not the primitive they are assumed to be in economics, but often get constructed in real time and thus are influenced by the subset of goals that are activated by the physical and social environment in which the decision is being made.[11] Cultural environments vary in the chronic activation levels that different goals have through pervasive prompts that range from nursery rhymes to proverbs, advertisements, and spoken and unspoken social norms that communicate long-standing shared values.[12] But across all cultures, boundedly rational humans with limited attention and processing capacity are paying more attention to goals that are close in physical and psychological space and time, suggesting that attention to longer-term objectives needs to be

actively primed and solicited.[13] The fact that our preferences are often constructed also suggests that they can and may change. This is an important fact to know for politicians and other elected officials, who may govern by opinion polls rather than proposing climate (and other policies) that increase public welfare and achieve long(er)-term sustainability and social equity objectives, for fear of their chances for re-election. There is evidence that initially unpopular policies (like the 2009 carbon tax by the Canadian provincial government of British Columbia and the 2002 smoking ban in public places by New York City) can become popular within one or two years of their implementation, suggesting that public opinion can be educated by evidence of the benefits of change and that status quo bias can be a transient phenomenon.[14] The current COVID-19 crisis shows that paternalism need not be a dirty word. Crisis situations call for leadership and tough love on the part of public policy-makers, where actions that are in the long-term public interest may need to and should be mandated for the benefit of all.

Last we looked at the physical trajectory of my career, I was at the University of Illinois at Urbana-Champaign. My three years there were followed by seven years at the University of Chicago and then four very productive and enjoyable years at the Ohio State University. A new marriage then brought me to Columbia University and its Earth Institute in 1999, where I founded the Center for Decision Sciences with my colleague Eric Johnson and then, in 2002, as an offshoot, the Center for Research on Environmental Decisions (CRED) with my colleague David Krantz. CRED came into existence as the result of a National Science Foundation solicitation for interdisciplinary social science collaborations that would address climate change perceptions, beliefs, and actions, funded by the George W. Bush administration as an excuse to delay ratification of the Kyoto agreement ("more research" was first needed on climate change). CRED reversed the usual way in which the physical and climate sciences and the behavioral sciences cooperated: instead of the climate sciences playing the central role and the behavioral sciences being recruited toward the end in (only) a supporting capacity to help craft climate change communications, CRED put psychology, anthropology, and behavioral economics center stage for their theories and methods, assisted by input from the climate sciences as needed. In the process of doing so, CRED helped to create a new interdisciplinary subdiscipline called environmental decision-making, now being pursued in other places around the country and the world. CRED's lessons and takeaways were translated into an accessible and actionable format from the numerous academic publications that its researchers generated to two Climate Change Communication Guides, one published in 2009 and an update and expansion published in conjunction with ecoAmerica in 2014.[15] These publications are being used by a wide range of organizations around the country, such as the Central Park Zoo, which uses them to train its volunteer

docents in climate change communication. CRED has trained many Ph.D. students and postdocs who have since gone on to academic and applied positions around the world, a valuable contribution in light of Patrick Kinney's comment in this issue of *Dædalus* about the importance of early training in multidisciplinary collaboration.

In 2016, I moved to Princeton, where I founded the Behavioral Science for Policy Lab (BSPL), located in the Andlinger Center for Energy and the Environment and bridging to the School for Public and International Affairs, the Department of Ecology and Evolutionary Biology, and the Department of Psychology, with Ph.D. students and postdocs from across the university. The decision to leave Columbia University and my two centers there was motivated by a desire to expand even further the range of disciplines, theories, and tools to be brought to bear on environmental decision-making and climate change (in)action. I felt that the field had gotten a good grasp of the cognitive and motivational barriers to climate action at the individual actor level and so, in collaboration with the Behavioral Science and Policy Association, I organized an expert summit that prepared an integrative summary of the behavioral science tools that can improve and strengthen energy and environmental policy.[16] At the same time, I felt that this knowledge and resulting efforts to design interventions to overcome or circumvent barriers to change ("choice architecture") was not at all integrated into theories, models, and analyses of action at the social, organizational, and collective level. Some months spent in 2012 on sabbatical leave to Princeton, with the interdisciplinary research community Communicating Uncertainty: Science, Institutions, and Ethics in the Politics of Global Climate Change at the Princeton Institute for International and Regional Studies, had taught me that I would find invaluable colleagues on that front at Princeton.

For the past four years, my Ph.D. students and postdocs at the BSPL, in collaboration with colleagues across Princeton and around the world (at the Stockholm Resilience Center, the Potsdam Institute for Climate Impact Research, and the University of St. Gallen, among others), have been investigating environmental and conservation decisions by individuals in their physical and social environments, and the decisions made by households, firms, city councils, and other organizations. We are actively working on bringing in disciplines that better speak to the role of the physical and social contexts in such decisions, including sociology and social network theory, philosophy and social norm theory, and evolution and ecology and complex adaptive systems theory.

While it has been gratifying to build local centers of research on the questions of great theoretical and societal importance and to train and cross-train scores of undergraduate and graduate students and postdocs in the requisite theories and methods, it has always been obvious to me that the demand for such research, training, and insights far outstrips the supply. Many (if not most) psychologists, (behavioral) economists, organization scholars, anthropologists, sociologists,

and political scientists are more comfortable pursuing discipline-based research questions that address relatively narrow theoretical or empirical issues than engaging in the time-consuming and often initially challenging efforts to learn and integrate the vocabulary, frameworks, and methods of neighboring disciplines. The sad truth is that interdisciplinary research or even disciplinary research designed to address important social issues is currently not highly valued within the academy, an observation seconded by several other contributors to this volume, including Rebecca Henderson and Patrick Kinney. What any individual can do to change this situation so as not to disadvantage young interdisciplinary academics when they are being considered for promotion and tenure, for example, is minimal, but I have been trying to do so anyway (among other ways by serving on bodies like Columbia's Tenure Review Advisory Committee that advises the provost on such decisions). This illustrates another long-standing belief of mine: that life is a battle between aspiration and hope over realism and despair; and that action wins the day, as expressed by Amory Lovins at the beginning of this essay. Albert Camus's "Myth of Sisyphus" tells a similar story, and the sentiment that one "must imagine Sisyphus happy" has long resonated with me as very true. Pursuing the goals outlined above for their intrinsic value and rewards, against temporary setbacks but with frequent longer-term victories, has been a rewarding and largely happy endeavor.

So what boulders have I tried to roll uphill in an effort to make interdisciplinary research on responses to climate change more appealing and more rewarding for my students, young colleagues, and future generations? First, I have been trying to lead by example and to show by my own work that fundamental psychological theory can be adjudicated and advanced extremely well or perhaps even better when examined in the context of real-world problems than in stylized lab settings with abstract content. For me that has resulted in advancing theory on a variety of issues including risk-taking (risk as feelings, domain-specific risk-taking, single-action bias), decision modes, and decisions from memory and experience. Second, I have been willing to contribute to organizational attempts to publicize the need for and utility of such efforts: two notable examples have been the creation of a report by the American Psychological Association about the role of psychology in addressing the global climate challenge and, more recently, the creation of an expert panel and resulting report on the role of behavioral science in the process of designing (physically and metaphorically) for sustainability, organized by the journal *Nature Sustainability*.[17] Third, I have helped create attractive high-profile publication outlets for interdisciplinary research on climate action in the form of special issues of top journals, in one case, a special issue on political cognition in *Cognition* and, in another case, a special issue on the business of climate change in *Management Science*.[18] The importance of better understand-

ing the ability, willingness, as well as resistance of the business sector to integrate climate change into its operations, goals, and strategic planning is well described by Rebecca Henderson in her essay in this volume. Addressing corporate climate change efforts and barriers as well as opportunities for change is high on my lab's current agenda.

In my research efforts and center activities described above, I have been keenly aware of the need not only to generate research insights, but also to get them out of the ivory tower and into the hands of potential users. I have been trying to do just that in two ways. One has been an active effort to translate research insights from the academese of professional journals into the English, Spanish, or Chinese spoken by potential audiences of users and published in the form of blog posts or op-ed pieces. Thus, academic insights about cognitive myopia and status-quo bias became op-ed pieces for *The Daily Climate* and a paper for Argentinian farmers in their Ag-Extension magazine;[19] academic insights about how to promote longer time horizons in decision-making became an article in *The Huffington Post* and a post on the Climate Strategies & Climate Policy Blog;[20] and academic insights about the role of habits in energy use and carbon dioxide emissions became an article in the Chinese *Boao Review*.[21] As a complement to such translation in writing, I have also been presenting the policy and action implications of this research (my own and those of students and colleagues) to professional organizations, NGOs, and governmental and intergovernmental agencies, sometimes at workshops or invited talks (such as at the UN and the White House), other times by serving on scientific advisory boards (such as chairing the Green Growth Knowledge Platform of the Organisation for Economic Co-operation and Development, the UN Environment Programme, and the World Bank, or serving on the science advisory boards of the U.S. Environmental Protection Agency and the environmental NGO Rare). I sometimes refer to these activities as missionary work to promote recognition of the crucial role that the behavioral sciences (including but notably beyond economics) can play in the design and effective implementation of policy. With this mission in mind, I have been serving since 2012 as lead author on the Fifth and now the Sixth Assessment Report by the UN Intergovernmental Panel on Climate Change (IPCC), inserting the first mention of nonrational choice processes into a chapter on risk management in 2014 and now working on a chapter on demand-side solutions.[22]

It is important to demonstrate that complex human responses to climate change information (that is, responses that go beyond rational accounting but include emotion and social elements and biases) are not just encountered among members of the general public (consumers or voters), but also among professional decision-makers. In this spirit, I have been conducting studies and experiments in which infrastructure engineers or climate negotiators at the UN Conference of the Parties are the target populations.[23]

Given that our responses to climate change are based on personal experience and emotional and social responses as much or more than on rational deliberation, I have also attempted to connect and work with boundary organizations that communicate climate risk information and climate solutions in more experiential ways and in less polarized cultural settings. This has included serving on the science advisory boards of the Climate Museum in New York City and of UN Live, the UN Museum for Humanity, and contributing to efforts by artists like the sculptor Olafur Eliasson or to plays like *The Great Immensity* by The Civilians.[24]

Leading by example has been another maxim of my life. Doing so in the context of climate action is not always easy. In a project led by a former CRED postdoc, we show that it matters to members of the American public across the political spectrum that climate scientists who deliver suggestions for personal action on climate change in the form of lifestyle changes or policy support "walk the talk."[25] In a world of multiple goals (with professional obligations to present work at international conferences, IPCC meetings in far-away locations, and family obligations in the form of aging parents in Germany), walking the talk in the form of changing one's diet and restricting one's air travel is not always easy, but is an objective that should be given constant attention, an issue also addressed eloquently in Jessica Green's essay in this volume.[26]

Climate change denial is something all of us engage in to different degrees. Denial, like all defense mechanisms, enables us to function and attend to other goals and objectives when the challenges of climate change seem overwhelming and the solution space not very feasible. I see similarities to how we deal with knowledge of our mortality: both are massive problems without obvious easy solutions, where it makes sense to turn away from the problem at times, as otherwise despair and nihilism may set in. Understanding why and how we turn to different forms of denial or wishful thinking in both cases can help us think about alternatives. My personal alternative has already been alluded to in the opening quote: practicing "applied hope" in the shape of working to make things better, in my case by researching and applying (behavioral) science to help design and implement better climate change policies and responses. Looking back on my professional life has made it apparent that I really am an engineer at heart, someone who appreciates and uses science, including social science, to make things better. In this sense, it seems very fitting that I have made the Andlinger Center for Energy and the Environment my current home, as it resides in Princeton's School of Engineering and Applied Science.

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ENDNOTES

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