SYMPOSIUM

A CHANGING MORAL CLIMATE

CLIMATE SCEPTICISM, EPISTEMIC DISSONANCE, AND THE ETHICS OF UNCERTAINTY

BY AXEL GELFERT

© 2013 – *Philosophy and Public Issues (New Series)*, Vol. 3, No. 1 (2013): 167-208
Luiss University Press
E-ISSN 2240-7987 | P-ISSN 1591-0660

[THIS PAGE INTENTIONALLY LEFT BLANK]

Climate Scepticism, Epistemic Dissonance, and the Ethics of Uncertainty

Axel Gelfert

Abstract. When it comes to the public debate about the challenge of global climate change, moral questions are inextricably intertwined with epistemological ones. This manifests itself in at least two distinct ways. First, for a fixed set of epistemic standards, it may be irresponsible to delay policy-making until everyone agrees that such standards have been met. This has been extensively discussed in the literature on the precautionary principle. Second, key actors in the public debate may—for strategic reasons, or out of simple carelessness—engage in the selective variation of epistemic standards in response to evidence that would threaten to undermine their core beliefs, effectively leading to epistemic double standards that make rational agreement impossible. The latter scenario is aptly described as an instance of what Stephen Gardiner calls "epistemic corruption." In the present paper, I aim to give an explanation of the cognitive basis of epistemic corruption and discuss its place within the moral landscape of the debate. In particular, I argue that epistemic corruption often reflects an agent's attempt to reduce dissonance between incoming scientific evidence and the agent's ideological core commitments. By selectively discounting the former, agents may attempt to preserve the coherence of the latter, yet in doing so they threaten to damage the integrity of evidence-based deliberation.

 Philosophy and Public Issues (New Series), Vol. 3, No. 1 (2013): 167-208
Luiss University Press
E-ISSN 2240-7987 | P-ISSN 1591-0660

I

Introduction

For a problem that has been unfolding for many decades and has been receiving continuous media attention since at least the late 1980s, global warming was slow to catch the attention of academic philosophers. With the exception of a few isolated publications in the 1990s,[1] it was not until well into the 2000s that a more systematic philosophical dicussion of the ethical, political and epistemological challenges of global climate change began to take shape. Over the past few years, however, this situation has changed markedly, and climate change has moved from being a topic at the margins of environmental ethics (and, to a lesser extent, the philosophy of science) to being a contested issue of global justice and an important touchstone for any theoretical attempt to square the demands of intergenerational responsibility with established frameworks of democratic theory and political philosophy.[2]

In the present paper, I argue that the moral dimension of climate change is inextricably intertwined with its epistemology, in at least two distinct ways. First, for a fixed set of epistemic standards, it may be irresponsible to delay policy-making until everyone agrees that such standards have been met. Second, key actors in the public debate may—deliberately or carelessly—engage in the selective variation of epistemic standards in

1 E.g., D. Jamieson, "Ethics, Public Policy, and Global Warming," *Science, Technology, and Human Values* 17 (1992), 139-153, and H. Coward and T. Hurka (eds.), *Ethics and Climate Change: The Greenhouse Effect* (Waterloo: Wilfrid Laurier University Press, 1993).

2 See S. Gardiner, S. Caney, D. Jamieson and H. Shue (eds.), *Climate Ethics: Essential Readings* (New York: Oxford University Press, 2010), and D. Arnold (ed.), *The Ethics of Global Climate Change* (Cambridge: Cambridge University Press, 2011).

response to evidence that would threaten to undermine their core beliefs, effectively leading to epistemic double standards that make rational agreement impossible, or at least difficult, to achieve. Whereas the first point is essentially a version of the precautionary principle, which has received considerable philosophical attention, the second point is best described as an instance of what Stephen Gardiner calls 'epistemic corruption.' In the present paper, I aim to give a fuller account of the place of epistemic corruption within the debate about climate change as well as of its cognitive basis.

The rest of this paper is organized as follows. In Section 2, I give a brief survey of some of the moral issues in connection with climate change. In Section 3, I comment on the historical development and achievements of contemporary climate science as well as on the misconception that anthropogenic climate change has only recently become a topic of scientific discussion. Section 4 explores the recent notion of the 'Anthropocene' and how it relates to powerful self-images of the place of humans in nature. These play an important role in the cognitive mechanisms that drive epistemic corruption. As I argue in Section 5, agents may attempt to reduce any dissonance that may arise when scientific evidence challenges their ideological core commitments by selectively discounting such evidence so as to preserve their core commitments and sense of self. I develop this suggestion by drawing on the social-psychological literature on cognitive dissonance and, in Section 6, illustrate its application to the debate about climate change with a concrete historical example. Section 7 concludes with a discussion of the cognitive basis of epistemic corruption. By understanding epistemic corruption better, it may just be possible to lay the foundations for breaking the stalemate that characterizes current climate inaction.

II

Climate Change as a Moral Challenge

Humanity faces a plethora of challenges—poverty, inequality, armed conflicts, etc.—and one might think that global climate change should be considered simply one among a multiplicity of morally significant issues. Indeed, this has been a common theme among those critics who argue that international efforts at global cooperation should centre on specific achievable tasks—such as the alleviation of poverty, the eradication of diseases, international debt reduction etc.—rather than on the elusive goal of limiting carbon emissions on a global scale.[3] Yet there are good reasons why the topic of climate change should occupy a special place in today's political, moral, and philosophical landscape. For one, in spite of all the uncertainties that attach to specific predictions concerning the impact of climate change on individual communities and social-ecological systems, we know enough about its long-term effects to know that many of the more immediate problems—rising sea levels, disappearing glaciers and other freshwater reserves, disruptions of agriculture—will themselves be influenced, and typically exacerbated, by climate change. In addition, the problem of climate change also exhibits genuinely novel structural features that imbue it with a moral significance that cannot easily be reduced to the sum total of its adverse first-order effects that might result from a changing climate.

The structural novelty of climate change as a moral problem is two-fold. Whereas part of the novelty consists in the degree, or extent, to which climate change instantiates familiar ethical dilemmas, some of the new structural features relate directly to

[3] For a typical example see B. Lomborg, *Cool It: The Skeptical Environmentalist's Guide to Global Warming* (New York: Knopf, 2008).

the nature of the dynamic, causal and temporal processes involved. Regarding the former, consider the role of intention and agency in the evaluation of actions, such as the burning of fossil fuels, that contribute to climate change. Few people would claim that the current problem of global climate change is the result of anyone intentionally setting out to change the world's climate system. To be sure, there have been (and continue to be) attempts to control the weather and climate[4], mostly at the local and regional level, and in recent years there has been a growing debate about the prospects of 'geo-engineering' as a *response* to climate change, but for the most part our current levels of climate change are the unintended consequence of actions performed for other reasons—which is not to say that agents are not often culpably negligent since lack of intention does not render entirely foreseeable consequences morally insignificant. By and large, the anthropogenic contribution to climate change is a side effect of rapid industrialization, population growth, and increasing levels of consumption and mobility. As a corollary, it is important to note that climate change "is caused not by a single agent, but by a vast number of individuals and institutions not unified by a comprehensive structure of agency."[5] At the level of individual emissions, the contribution to climate change of any one individual is virtually negligible—even when that individual engages in the most lavish 'high-carbon lifestyle' and consumption patterns.[6] (The picture is somewhat different if one looks at institutions, which is why a number of climate activists

[4] See J.R. Fleming, *Fixing the Sky: The Checkered History of Weather and Climate Control* (New York: Columbia University Press, 2010).

[5] S.M. Gardiner, "A Perfect Moral Storm: Climate Change, Intergenerational Ethics and the Problem of Moral Corruption," *Environmental Values* 15 (2006), 397-413, 399.

[6] For the notion of "high carbon lives," see J. Urry, *Climate Change and Society* (Cambridge: Polity, 2011), ch. 4.

have begun to single out, say, individual coal plants and their corporate owners.[7]) Yet, it is the (past and present) emissions of billions of individuals, predominantly from industrialized (or rapidly industrializing) countries, which collectively have set in motion the ongoing warming of the planet.

How the causally distributed nature of climate change obscures its moral significance can be seen by way of contrast with other widely discussed global challenges. Consider the example of global poverty. While no single individual's donation will be sufficient to bring world poverty to an end, even a small donation will make a measurable difference to the lives of specific others. Unfortunately, in the case of climate change, a similarly salient link between individual action and measurable beneficial effects is lacking. Even if I were to reduce my inflated first-world carbon footprint to levels at, or below, what is considered sustainable (ca. 2 metric tonnes per year), I could not reasonably expect this action alone to have any measurable mitigating effect with respect to the consequences of climate change, not least since the causal effects of any particular emission are impossible to trace. This means that, in turn, moral responsibility for the adverse effects of climate change is highly distributed. The novelty of climate change, considered as a *moral* problem, is thus partly due to the unprecedented degree of causal and geographical dispersion of what is essentially an unwelcome side effect of 'our' (first-world) lifestyles.

A second set of considerations arises from the fact that the dynamic, causal and temporal processes of climate change are not only causally and geographically dispersed, but also temporally extended. Many of the processes that are affected by increased greenhouse gas levels and that are, in turn, responsible for the

[7] See C. Saunders and S. Price, "One Person's Eu-topia, Another's Hell: Climate Camp as a Heterotopia," *Environmental Politics* 18 (2009), 117-122.

potentially adverse consequences associated with climate change, operate on a time scale of decades or centuries—much longer than the time scales that are usually considered in moral evaluations of different actions. Thus, the average lifetime of carbon dioxide in the atmosphere has been estimated to be on the scale of decades (35-90 years),[8] with a significant proportion of surplus carbon dioxide remaining in the atmosphere for millennia.[9] Furthermore, it takes considerable time for the atmosphere to reach thermal equilibrium, once greenhouse gas concentrations have increased. Even if we were to cease emitting CO_2 entirely, thus stabilizing greenhouse gas levels at current levels, we could still expect future warming and the gradual unfolding of long-term processes (e.g. the melting of glaciers).

The above analysis has led some commentators to describe climate change as "a *substantially deferred* phenomenon."[10] This temporal deferral has a number of unwelcome consequences. For one, it leads to a further dissociation—in addition to the geographical and causal dispersion—between individual human actions and their adverse consequences on the climate, as well as between, on the one hand, our acknowledgment of climate change as a global problem and, on the other hand, our attributions of moral and political responsibility. Furthermore, because of the significant time delay between emissions and their long-term consequences, there remains the serious danger of our

[8] See M.Z. Jacobson, "Correction to 'Control of fossil-fuel particulate black carbon and organic matter, possibly the most effective method of slowing global warming'," *Journal of Geophysical Research* 110 (2005), D14105, doi:10.1029/2005JD005888.

[9] It is important to distinguish between the atmospheric lifetime of a *given* CO_2 molecule and the lifetime of surplus CO_2 concentrations, due to the existence of continuous exchange of molecules between the atmosphere, the oceans, and the biosphere.

[10] S. Gardiner, *A Perfect Moral Storm*, 403.

inadvertently crossing systemic thresholds ('tipping points'), which could not easily be undone. In this case, inaction would breed irreversibility. The distributed nature of climate change and the very real possibility of radically altered long-term futures, details of which remain uncertain, are bound to create a state of anxiety, not least for anyone attached to the idea that our current lifestyles, civilizational structures, and population density should ideally be maintained in perpetuity.

The moral and political problem of climate change is as much an intergenerational problem as it is a problem for existing institutional frameworks of governance and global decision-making—partly because it brings into sharp focus the relative inadequacy of the latter in dealing with substantially deferred phenomena. Our moral practices and political mechanisms, which have been honed to deal with situations of (largely synchronic) conflict, governed by identifiable patterns of agency, cause and effect, seem to be woefully inadequate when it comes to the (diachronic) consequences of highly distributed human actions and their impact on processes that unfold at the time scale of biogeochemical cycles. It has even been argued that the structure of the moral and political problems posed by climate change, and of the various relations and trade-offs that exist between them, may be such that they effectively preclude collaborative good faith efforts to tackle climate change and its consequences. Stephen Gardiner has coined the phrase "perfect moral storm" to refer to just this aspect of what he calls "the ethical tragedy of climate change." As Gardiner sees it, the confluence of the various aspects described so far—the truly global nature of the problem, the causal, geographical, and temporal dissociation between individual emissions and their long-term consequences, and the theoretical poverty of our moral and political frameworks—may conspire to create a motivational gap between the recognition of the problem and the (individual and

institutional) willingness to do something about it. One deep worry concerns the possibility that the very complexity of the problem "may turn out to be *perfectly convenient* for us, the current generation, and indeed for each successor generation as it comes to occupy our position"[11]—insofar as it allows each generation to postpone meaningful (and ever costlier) climate action until the next generation. Such 'intergenerational buck-passing' is especially dangerous in cases, such as greenhouse gas emissions, where the effects of past missed opportunities accumulate. Effective action to prevent a global climate crisis, then, seems to require nothing short of a collective exercise of the moral imagination, on the part of the present generation as well as for generations to come. As Malcolm Bull puts it in a review of Gardiner's book, climate ethics may not be "morality applied but morality discovered, a new chapter in the moral education of mankind."[12]

III

Scientific Evidence and the Demands of Timeliness

In February 1965, U.S. President Lyndon B. Johnson, in a Special Message to Congress, urged lawmakers to keep in mind that "large-scale pollution of air and waterways is no respecter of political boundaries, and its effects extend far beyond those who cause it." In particular, he noted:

[11] Ibid., 408.

[12] M. Bull, "What is the Rational Response?," *London Review of Books* 34 (2012), 3-6, 6.

> This generation has altered the composition of the atmosphere on a global scale through [...] a steady increase in carbon dioxide from the burning of fossil fuels.[13]

Johnson was reacting to the nascent scientific consensus, from the early 1960s onwards, that human industrial activity was leading to a gradual accumulation of carbon dioxide in the atmosphere. Since carbon dioxide had been known to be a greenhouse gas since at least the late nineteenth century, thanks to work of the Swedish chemical physicist Svante Arrhenius, increased levels of CO_2 in the atmosphere should be expected to bring about, in due course, a rise in average global temperatures. During the first half of the twentieth century, much of the interest in the connection between atmospheric CO_2 levels and the world's climate system was directed towards past climate change, in particular to understanding why there had been several ice ages throughout the Earth's history. Although Arrhenius had already estimated that a doubling of atmospheric CO_2 levels would lead to a 5-6°C rise in average global temperatures[14], many scientists thought it unlikely that human emissions would reach such levels—not least because it was thought that the oceans, which contain about sixty times more carbon than the (pre-anthropogenic) atmosphere, would act as a near-perfect 'carbon sink,' dissolving—and thereby removing—surplus atmospheric carbon dioxide and 'trapping' it for centuries.[15] It was not until a better understanding of surface ocean chemistry showed that

[13] L.B. Johnson, "Special Message to the Congress on Conservation and Restoration of Natural Beauty," *Public Papers of the Presidents of the United States: Lyndon B. Johnson*, Vol. 1 (1965), (Washington, D. C.: Government Printing Office, 1966), 161.

[14] See J. Uppenbrink, "Arrhenius and Global Warming," *Science*, 272 (1996), 1122.

[15] See M. Maslin, *Global Warming: A Very Short Introduction* (Oxford: Oxford University Press, 2008). 25.

much of the absorbed carbon dioxide was immediately released again into the atmosphere[16], and until more accurate direct measurements of atmospheric CO_2 levels were conducted from the late 1950s onwards—resulting in the famous 'Keeling curve' of measurements conducted on Mauna Loa in Hawaii, showing a steady year-on-year growth of atmospheric CO_2 levels, modulated by minor seasonal variations—that scientists realized that the permanent accumulation of anthropogenic CO_2 in the atmosphere was already well under way. It is such findings that President Johnson was referring to in his address to Congress. But not only policymakers, the educated public, too, were gradually being exposed to the emerging science of climate change. Thus, in 1956 Gilbert Plass published an article on "Carbon Dioxide and the Climate"[17] in the general-audience journal *American Scientist*, in which he "explained in detail the sources and sinks for carbon dioxide in the atmosphere, and offered estimates of its influence on global average temperature and even ocean acidity."[18] Plass's findings had previously been reported in the widely read magazine *Popular Mechanics* (1953) and were featured in a popular nation-wide radio programme *Excursions in Science* (1956), which was sponsored by General Electric and gave rise to spin-offs such as books and LP records.[19]

16 The classic paper is R. Revelle and H. Suess, "Carbon Dioxide Exchange Between Atmosphere and Ocean and the Question of an Increase of Atmospheric CO_2 during the Past Decades," *Tellus* 9 (1957), 19-27.

17 G. Plass, "Carbon Dioxide and the Climate, *American Scientist* 44 (1956), 302-316.

18 Quoted from the online introduction to a reprint of the article on the *American Scientist* website, http://www.americanscientist.org/issues/page2/carbon-dioxide-and-the-climate (accessed 31 January 2013).

19 Listeners to the programme were asked to write in to GE to request a transcript; G. N. Plass, "Scientific Paper No. 646," *General Electric, Excursions in*

Over time, a more complete scientific picture emerged, both regarding the relative strength of different climate forcing factors—ruling out possible natural causes such as solar cycles and volcanoes as anything more than mere 'modulations' of underlying anthropogenic factors—and concerning the time scale at which different climate scenarios unfold. Thus, scientists realized that "glacial periods, or ice ages, take tens of thousand years to occur, primarily because ice sheets are very slow to build up and are naturally unstable," whereas "the transition to a warmer period or interglacial, such as the present, is geologically very quick."[20] By the time the Intergovernmental Panel on Climate Change (IPCC), formed in 1988 with the task of undertaking a comprehensive review of the scientific evidence in connection with climate change, presented its First Assessment Report in 1990, a scientific consensus had been reached that continued emissions of greenhouse gases due to the industrial and agricultural sector, combined with such factors as deforestation, would eventually give rise to irreversible effects, including significant sea level rises, changing patterns of precipitation, and changes in the distribution of extreme weather events. Scientific research in the 25 years since the founding of the IPCC has filled in more and more details, leading to a more subtle understanding of the world's climate system and—thanks to improved computational models—resulting in more and more specific (and hence empirically testable) predictions, lending ever more support to the thesis that human activities are the dominant force driving current climate change.

Science Series. See also M. C. Lafollette, "A Survey of Science Content in U.S. Radio Broadcasting, 1920s through 1940s: Scientists Speak in Their Own Voices," *Science Communication* 24 (2002), 4-33.

[20] M. Maslin, *Global Warming*, 29-30.

As this brief discussion shows, public pronouncements that anthropogenic climate change is a 'new' scientific phenomenon—'invented,' as it is sometimes claimed, by Al Gore in his 2006 movie *An Inconvenient Truth*—are deeply distorted. Scientific analyses of the potential warming effect of CO_2 accumulation in the atmosphere date back more than a century, and climate science as a systematic global effort can look back on decades of experience that have resulted in convergence upon a shared body of scientific evidence, methodologies and principles—and increasingly robust and reliable predictions of future states of the world's climate system. Recognizing this scientific achievement is not to downplay the difficulties involved in studying a massively complex system like the world's climate, especially when various 'inputs' to the system—such as anthropogenic greenhouse gas emissions—are themselves a 'moving target' that depends on complex social, economic and political choices. Thus, it has been argued that the traditional scientific goal of aiming for completeness in our models and computational representations of the global climate system may be misguided, insofar as what is called for—given the very real challenges posed by current climate change—is not complete empirical fidelity but a more pragmatic sense of 'adequacy-for-purpose.'[21] As is well-known from the literature on the epistemology of scientific models, for models of complex evolved systems, trade-offs between theoretical desiderata (e.g., accuracy, precision, generality and simplicity) may be inevitable.[22] In such a situation, the goal of improving a model by adding more detail may be self-defeating. Furthermore, as Sandra Mitchell notes,

[21] W. Parker, "Confirmation and Adequacy-for-Purpose in Climate Modelling," *Proceedings of the Aristotelian Society (Suppl.)* 83 (2009), 233–249.

[22] See A. Gelfert, "Strategies of Model-Building in Condensed Matter Physics: Trade-offs as a Demarcation Criterion Between Physics and Biology?," *Synthese* 190 (2013), 253-272, and references therein.

> in cases of complex systems, it may very well be that waiting until there is agreement or confidence in the quantitative probability assigned to possible outcomes is unreasonable. For example, we may be waiting until it is too late to avoid seriously undesirable consequences. […] Alternative representations of what is known and what is not known, and alternative policy strategies that acknowledge ineliminable uncertainty, promise to provide a better guide to decision making.[23]

An undue focus on the residual uncertainty of climate models and the inevitability, in general, of trade-offs in modelling, would, however, not only violate the demands of timeliness that come with researching policy-relevant phenomena, but would also risk downplaying the actual explanatory and predictive successes that climate science has amassed over the past decades.[24] Climate science today works with models that "simulate an ever-increasing range of processes and feedbacks and are tested in a wide range of applications and for different climate states."[25] As Elizabeth Lloyd notes, "today's climate models are supported empirically in several ways that receive little explicit attention"[26]—including the fact that they are based on proven causal mechanisms, display significant convergence and robustness, and receive empirical confirmation from multiple independent sources of evidence. Perhaps most significantly, "no credible model has been produced that questions the strong

[23] S. Mitchell, *Unsimple Truths: Science, Complexity, and Policy* (Chicago: University of Chicago Press, 2009), 89.

[24] A good example is the prediction of Arctic methane release due to warming temperatures, which was predicted in the early 1990s and was subsequently reported in 2008. N. Shakhova, I. Semiletov, A. Salyuk, D. Kosmach and N. Bel'cheva, "Methane Release on the Arctic East Siberian Shelf," *Geophysical Research Abstracts* 9 (2007), 01071.

[25] R. Knutti, "Should We Believe Model Predictions of Future Climate Change?," *Philosophical Transactions of the Royal Society A* 366 (2008), 4657.

[26] E. Lloyd, "Varieties of Support and Confirmation of Climate Models," *Proceedings of the Aristotelian Society (Suppl.)* 83 (2009), 228.

anthropogenic influence on climate in the past and future."[27] All models, as a matter of practical necessity, involve simplification, abstraction, and idealization, since their function is to enable inquiry into systems that are too complex to describe in every detail. For this reason, one must take special care not to apply epistemic double standards, as might happen if one demands the highest standards of proof for climate models, while accepting far lower standards of evidence for, say, economic models of the cost of combating climate change. (For an instance of such epistemic double standards, see the case study in Section 6.) If anything, the observation that today's climate models are known to have room for improvement is an indicator of the fact that they are based on known causal mechanisms—which is more than can be said of many models in, say, the social sciences (including economics).

IV

Human Self-Images in the Anthropocene

In the year 2000, Nobel laureate Paul Crutzen and his co-author Eugene Stoermer introduced the term 'Anthropocene' to emphasize the fact that humans had driven Earth into a new geological epoch, one in which virtually every aspect of the planet's biogeochemistry showed signs of human activity or, as in the case of the global climate system, was subject to substantial anthropogenic forcings.[28] Many of the facts that have been cited as motivating the term 'Anthropocene' are indeed stark. Carbon dioxide concentrations "are already 30–40% higher than ever

[27] Ibid.

[28] P. Crutzen and E. Stoermer, "The 'Anthropocene'," *IGBP Newsletter* 429 (2000), 623–628.

experienced during the past 650,000 years."[29] Humans are thought to have become the "premier geomorphic agent sculpting the landscape."[30] More nitrogen in the form of artificial fertilizer "is applied in agriculture than is fixed naturally in all terrestrial ecosystems."[31] Add to this the rapid extinction of non-human species through hunting, habitat loss, and agriculture, along with other anthropogenic markers, and the planetary scale of human influence on the Earth's biogeochemical systems becomes evident. When viewed from this angle, the meaning of 'Anthropocene' is as much a matter of the biogeochemistry of the planet as it is a recognition of the special historical moment that we, as a species, find ourselves in. The question of whether or not we live in the 'Anthropocene' thus becomes, at least in part, a matter of reassessing the place of humans in nature. This latter project has a recognizably normative-philosophical dimension—for the question of 'Man's place in nature' has always been closely associated with the question of how we ought to conduct ourselves in relation to our environment. What is at stake, then, is not only the future state of the planet, but our self-image as human beings living on this planet. Once it is realized that living in the Anthropocene is not merely a matter of 'managing' the ongoing physical, biogeochemical, and ecological changes around us, but that it also requires a decision on what we see as our proper place in this complex process of adaptation and management, it becomes clear that there is ample potential for conflicting moral visions.

[29] P. Crutzen, "Albedo Enhancement by Stratospheric Sulfur Injections: A Contribution to Resolve a Policy Dilemma?," *Climatic Change* 77 (2006), 221-220, 215.
[30] R. Hooke, "On the History of Humans as Geomorphic Agents," *Geology* 28 (2000), 843-846.
[31] P. Crutzen, *Geology of Mankind* (2002), 23.

Earlier (see Section 2), it was noted that the problem of climate change required nothing short of a collective exercise of the moral imagination. The precise form such an exercise in moral imagination will take, however, is not uniquely determined by the scientific facts alone; rather, it depends on value judgments and prior commitments to views concerning the place of humans in nature. In the remainder of this section, I shall focus on two such (classes of) human self-images in the Anthropocene, and will attempt to lay out how commitments to competing moral visions can influence the perception, interpretation and evaluation of the overall situation, as portrayed by science. In particular, as we shall see shortly, deep commitments to such visions can significantly shape epistemological stances towards standards of evidence and balancing conflicting beliefs. There is, of course, a continuum of possible outlooks, ranging from the Christian notion that humans should be 'stewards' of the Earth to its Baconian reinterpretation as giving humans licence to dominate and exploit nature. In what follows, I shall focus on two sharply contrasting outlooks which, although not widely advocated in their 'purest' form, nonetheless have enjoyed some currency in the public debate. For lack of a better terminology, I shall refer to the two views as the 'cornucopian' and the 'limits-to-growth' views, respectively.

Cornucopians hold that, for all practical intents and purposes, the resources of the Earth can be considered limitless. As the economist Julian Simon puts it:

> There is no reason to believe that at any given moment in the future the available quantity of any natural resource or service at present prices will be much smaller than it is now, or non-existent.[32]

[32] J. Simon, *The Ultimate Resource* (Princeton: Princeton University Press, 1981), 48.

Emboldened by the failure of Malthusian predictions, according to which rapid population growth would quickly deplete scarce resources, cornucopians argue that, on the contrary, population growth offers a solution to resource scarcities and environmental problems, as this would unleash human ingenuity and the innovative power of markets. Even if certain resources are indeed physically scarce, such scarcities can be overcome through market-based innovation, as resource use becomes more efficient and substitutes are being developed. "The main fuel to speed the world's progress is the stock of human knowledge,"[33] allowing humanity "to go increasing forever."[34] As Sarah Krakoff has noted, this take on the place of humans in nature is premised on a somewhat idiosyncratic "ontology of the planet," which views the Earth as "an endlessly malleable resource, which when we apply our dazzling ingenuity to it, can yield ever increasing wealth for humans."[35] It is also based on a distinctive view of human beings, who are characterized as "the ultimate resource"—"skilled, spirited, hopeful people, exerting their wills and imaginations to provide for themselves and their families, thereby inevitably contributing to the benefit of everyone."[36] Whereas the 'cornucopian' label might initially suggest that human beings are seen as passive consumers of whatever the Earth's 'horn of plenty' has to offer, it is really human beings who, on this view, are being credited with near-magical productive powers.

[33] N. Myers and J. Simon, *Scarcity or Abundance? A Debate on the Environment* (New York: Norton, 1994), 33.
[34] Ibid., 65.
[35] Sarah Krakoff, *Parenting the Planet*, in D.G. Arnold (ed.), *The Ethics of Global Climate Change* (Cambridge: Cambridge University Press, 2011), 165.
[36] Myers and Simon, *Scarcity or Abundance?*, 33.

At the other end of the spectrum from cornucopianism is what I shall call the 'limits-to-growth' view.[37] On this view, while humanity has made great strides, not least through science and technology, in creating systems of production and supply that so far have been able not only to support an ever-increasing population, but to also lift a larger and larger percentage of people out of poverty, the fact remains that resources are finite and that no amount of human ingenuity can transcend the very real physical and ecological limits of what the planet can support. If past predictions—ranging from Malthusian food shortages to worries about 'peak oil'—have turned out to be wrong, then this is because the upper limits of productive capacity have been underestimated, not because no such limits exist. Thinking of the 'limits to growth' purely in terms of impending shortages in the supply of raw materials may also be too simplistic. Indeed, in the case of climate change, it is the overabundance of fossil fuels which poses a major challenge to any attempts to rein in anthropogenic greenhouse gas emissions. After all, it is estimated that the amount of carbon contained in proven oil, gas and coal reserves of the main fossil fuel producers exceeds the amount that can be 'safely' tolerated by the atmosphere—that is, without leading to run-away climate change beyond the 2°C limit—by around a factor of five.[38] A narrow focus on the alleged substitutability of scarce resources thus misses the important point that some of the limits of growth are *systemic* in nature. As one 'limits-to-growth' critic of the cornucopian view puts it:

[37] I prefer this to the usual label 'neo-Malthusian' which has rather specific historical connotations.

[38] For a popular discussion of this point see Bill McKibben, *Global Warming's Terrifying New Math,* "The Rolling Stone" (19 July 2012), online at http://www.rollingstone.com/politics/news/global-warmings-terrifying-new-math-20120719(accessed 31 January 2013).

> There are many, including myself, who believe that given a reasonably free market, technology can generally be depended upon to find a substitute for almost any scarce material resource input (except energy itself). However, there are no plausible technological substitutes for climatic stability, stratospheric ozone, air, water, topsoil, vegetation—especially forest—or species diversity.[39]

Consonant with this view of the Earth as "a bounded system with resources that are by definition limited,"[40] is a view of human beings that emphasizes the contingency and fragility of our own existence, as well as that of the Earth system at large, along with the need to care for the latter. If the proper exercise of care requires that we forego, say, short-term economic benefit in exchange for a better chance at long-term sustainability, then, on this world view, it will not be irrational to do so. Indeed, it may be the very course of action that is called for, given the circumstances.

What is of central importance to the present argument is the realization that views concerning the ontology of the Earth system and the place of humans in nature are not ideologically neutral, but are often aligned with—or, indeed, are expressions of—certain moral and political values. Thus, if one subscribes to the 'limits-to-growth' view, according to which natural resources—and, consequently, the amount of wealth that can be generated from them—are necessarily finite, it may seem natural to also worry about the unequal distribution of such wealth. Similarly, if human ingenuity and individual enterprise are seen as a panacea for all of mankind's problems, then any restrictions on the free exercise of these faculties—for example, in the form of

[39] R.U. Ayres, "Cowboys, Cornucopians and Long-Run Sustainability," *Ecological Economics* 8 (1993), 189-207, 195.
[40] S. Krakoff, *Parenting the Planet*, 165.

government-imposed restrictions on the flow or accumulation of capital—would likely be considered loathsome.[41]

Finally, it has been suggested—usually by adherents of the opposing view—that both 'cornucopianism' and the 'limits-to-growth' view are more indicative of a general psychological disposition than they are labels of coherent ideological positions. Hence, adherents of the 'limits-of-growth' view are sometimes labelled 'technological pessimists' or 'doomsters,' whereas advocates of cornucopianism have been said to be prone to 'foolish optimism'[42] and an immature, anthropocentric 'techno-narcissism.' While it may be tempting to regard the exchange of such epithets as a merely polemical device, it is important to realize that such labels do pick up on very real psychosocial differences between the opposing camps—differences which, as I shall argue in the rest of this paper, give rise to curious epistemic strategies when it comes to assessing the actual situation we find ourselves in and the demands it places on us.

[41] There is, of course, no *necessary* connection between endorsing a certain vision of humans' place in nature and supporting specific political proposals or policies. As the 20th-century example of the Soviet Union shows, belief in the limitless powers of technology is as compatible with political authoritarianism as laissez-faire Social Darwinism is with belief in the need to compete for limited resources. Even within the ranks of American technological optimists, some authors have distinguished between those who 'see government as an active, interventionist ally (e.g., the "cavalry") in taming and exploiting the wilderness' (the 'cowboys') and those who 'see the role of central government as limited to macro-economic policy and defense' (the 'cornucopians' in a narrow sense). See R.U. Ayres, *Cowboys*, 194.

[42] Jonathan Power, "The Cornucopians' Foolish Optimism," *The Baltimore Sun* (17 April 1992), 9.

V

Cognitive Dissonance and Epistemic Standards

In the previous section I argued that differences in ideological outlook—which manifest themselves in divergent views regarding the place of humans in nature—colour the perception of global problems such as climate change, either by reconceptualizing them as technical problems that need to be overcome by human ingenuity and technological innovation (as in the case of cornucopianism) or by treating them as signs of an imminent violation of objective system constraints (as in the case of the 'limits-to-growth' view) requiring a significant reduction of our 'footprint' on the system, so as to maintain its balance. In this section, I shall illustrate how such 'colouring' of perception may arise in practice, suggest a psychological mechanism for it, and argue that it may have unwelcome epistemic consequences—which in turn give rise to moral worries about the corruption of scientific due process and the harmful consequences that may result.

First, however, it is important to address a worry that might be raised for any attempt at generalizing about patterns of belief formation in controversial matters. Given that, as outlined in Section 2, the moral and political choices are stark, and the underlying processes complicated, is it not entirely to be expected that there should be considerable variation in the responses to a complex challenge of global proportion? And won't there always be considerable diversity in the response of individuals, due to differences in outlook, background knowledge, and other idiosyncratic factors? The answer to both questions is, of course, yes. But the primary goal is not to evaluate *individual* beliefs, considered in isolation, but to analyze how such belief formation may be systematically influenced by ideological attitudes and commitments. Furthermore, it is worth keeping in mind that,

certainly with respect to its factual basis, global climate change is not simply a matter of individual opinion. While there is much scientific disagreement about details and considerable uncertainty attaching to specific predictions, the reasons for the persistence of, say, mismatches between different climate models are themselves the subject of scientific investigation. Such investigation takes place against the backdrop of an overwhelming scientific consensus about the basic mechanisms driving current climate change.[43] Given the high profile of climate change as a global issue and the media attention it has enjoyed over the past 25 years, virtually every commentator on the topic—even those who proclaim themselves to be 'sceptics'—will likely be familiar with the scientific consensus, at least in its most basic outline. Indeed, as I shall argue, familiarity with the consensus view—where that view is in tension with an individual's basic ideological outlook—may itself explain some of the more peculiar epistemic and argumentative strategies in the public debate. When the authority of the scientific consensus—directly or indirectly—challenges beliefs (or meta-beliefs, e.g. about what constitutes compelling reasons for action) that are central to an agent's self-image, an agent may resort to selectively discounting such evidence so as to preserve the coherence of his core beliefs and avoid dissonance.

Social psychology has investigated the basis of such phenomena under the label of 'cognitive dissonance theory' since the mid-1950s. According to its original formulation due to Leon Festinger (1957), an unpleasant state of 'dissonance' arises whenever an agent holds two cognitions that are relevant to each

[43] N. Oreskes, "The Scientific Consensus on Climate Change," *Science* 306 (2004), 1686.

other but contradict one another.[44] Like basic drive states such as hunger or thirst, the unpleasant state of dissonance, too, can motivate agents, typically in such a way that agents

> may engage in 'psychological work' to reduce the inconsistency. This work will typically be oriented around supporting the cognition most resistant to change. To reduce the dissonance, individuals could add consonant cognitions, subtract dissonant cognitions, increase the importance of consonant cognitions, or decrease the importance of dissonant cognitions.[45]

One important measure of dissonance reduction is change in attitudes. Such change, according to dissonance theory, "is expected to be in the direction of the cognition that is most resistant to change."[46] Although cognitive in its orientation, many of the most prominent applications of dissonance theory relate directly to behaviour, including social behaviour. This has led to a number of theoretical refinements, such as the differentiation of the (unitary) notion of dissonance into the concepts of dissonance arousal and dissonance motivation[47], and to 'action-based' models, according to which dissonance reduction not only serves the proximal goal of reducing the unpleasant state of dissonance arousal, but also the distal function of "facilitating the execution of effective and unconflicted action."[48]

Among the plethora of theoretical extensions and experimental findings, a number of results are especially

44 L. Festinger, *A Theory of Cognitive Dissonance* (Evanston: Row and Peterson, 1957).
45 E. Harmon-Jones, "Cognitive Dissonance Theory," in V.S. Ramachandran (ed.), *The Encyclopedia of Human Behavior*, Vol. 1 (New York: Academic Press, 2012), 544.
46 Ibid.
47 J. Cooper and R. Fazio, "A New Look at Dissonance Theory," *Advances in Experimental Social Psychology* 17 (1984), 229-266.
48 E. Harmon-Jones, *Cognitive Dissonance Theory*, 546.

insightful. Thus, in a number of experiments it was shown that when participants had to make a difficult choice—between two mutually exclusive, but similarly attractive—alternatives, their attitude towards the rejected alternative was more negative after they had made their choice than immediately before. That is, after having made an irreversible decision, participants would discard all those (dissonant) cognitions that, prior to the choice, would have favoured the rejected alternative. Similarly, in the case of 'adaptive preference formation'[49], if an agent desires something, but finds it unattainable, the dissonance that results from the mismatch between what is desirable and what is feasible is reduced by discounting the initial attractiveness. Finally, in a famous experiment studying conditions of induced compliance, participants were recruited to perform a boring task in the laboratory.[50] The same participants subsequently were paid either a trivial amount ($1) or a significant amount ($20) to 'lie to' another participant by telling them that the task they would be performing was, in fact, interesting. Whereas the $20 payment was expected to provide sufficient justification for the counter-attitudinal behaviour, the $1 payment, by contrast, was thought to be insufficient to offset the dissonance created by lying to another participant. And indeed, in response to the $1 condition, participants reduced their dissonance by revising upwards their initial judgments concerning the interestingness of the task.

Given the wide range of contexts across which dissonance-related phenomena have been observed, one should expect attempts at dissonance reduction to also play a role in activities pertaining to public debate—such as questioning, disputing,

[49] See J. Elster, *Sour Grapes: Studies in the Subversion of Rationality*, (Cambridge: Cambridge University Press, 1983).

[50] L. Festinger and J.M. Carlsmith, "Cognitive Consequences of Forced Compliance," *Journal of Abnormal and Social Psychology* 58 (1959), 203-210.

rebutting, denying etc. All of these are as much actions as they are expressions of attitudes and beliefs and, especially when performed in a public setting, may be both the source of dissonance and ways of managing perceived dissonance. However, unlike in situations with determinate outcomes—which, plausibly, are the norm in standard experimental setups—participation in real-life public debate is typically open-ended, especially when the debate is about complex long-term challenges. Rather than moderate their attitudes in an adaptive way—either by 'rationalizing' their past choices or by reassessing the perceived consequences of such choices—participants may engage in more elaborate forms of 'reputation management,' or may even bolster their initial attitudes in the face of evidence that challenges their central commitments. Experimental research provides evidence for such attitude bolstering. In a study by Sherman and Gorkin[51], subjects who scored high on a feminism scale and failed to solve a difficult logic problem concerning gender roles—thereby 'demonstrating' their own sexist thinking—subsequently displayed attitude bolstering in the form of positive affirmative action decisions: When an opportunity arose to reaffirm their central attitudes, e.g. by subsequently participating in affirmative action deliberations involving a female candidate, the subjects with the highest scores of feminism among those who had failed the sex-role test 'overcompensated' their earlier failure by being more favourable towards the female candidate than (equally feminist) control subjects. Attitude moderation may also be precluded by a tendency to misattribute dissonance arousal to extraneous factors that are not, in fact, responsible for the cognitive discomfort experienced. In cases where the dissonance is self-generated, or is due to a mismatch

[51] S.J. Sherman and L. Gorkin, "Attitude Bolstering when Behavior is Inconsistent with Central Attitudes," *Journal of Experimental Social Psychology* 16 (1980), 388-403.

between an agent's central attitudes and the world, this may open up avenues for an agent to protect his sense of self by blaming dissonance on objectively irrelevant factors. That is, agents 'may reassess the events that led them to experience dissonance motivation in a distorted fashion, or they may acknowledge their transgression and strive to make amends'[52], for example by seeking out opportunities to reinforce their fundamental outlook.

What are conceivable sources of cognitive dissonance in the debate about global warming? A number of factors immediately spring to mind. First, incoming scientific evidence might put pressure on deeply held ideological commitments, such as the cornucopian conviction that the Earth's resources are essentially limitless and are able to support perpetual economic (and population) growth. The point, here, is not that science directly adjudicates between different goals that trade off against each other—say, economic growth and preserving natural resources—but rather that it spells out the constraints under which such trade-offs necessarily have to take place. Science does not tell us that continued burning of fossil fuels, or the exploitation of hitherto untapped energy sources such as tar sands or shale gas, are *wrong*, but that these activities come at the price of irreversible climate change, with all its attendant consequences: rising sea levels that will permanently flood coastal communities, shifts in the distribution of extreme weather events, changed patterns of precipitation etc. Hence, if an individual's cornucopian belief in perpetual innovation and continued economic growth is based on the hope that the future, although wealthier and technologically more advanced, will nonetheless be largely continuous with the world as we know it—that is, there will be no major disruptions or catastrophic changes—then the dire predictions of climate science for such business-as-usual scenarios will inject a

[52] J. Cooper and R. Fazio, "A New Look at Dissonance Theory," 259.

significant amount of cognitive dissonance into the individual's belief system. If one's commitment to the cornucopian dogma, with its promise of a bright, limitless future, is so central to one's sense of self that one could not very well give it up, one would plausibly look for ways of discounting the dissonant scientific information as 'uncertain,' 'implausible,' or perhaps even 'alarmist.'

One common strategy of avoiding dissonance while maintaining the coherence of one's central attitudes, I submit, is the selective variation of epistemic standards. Especially in the context of the public debate of complex questions, where appropriate levels of uncertainty and reliability are not obvious and typically cannot be assessed by a single individual, agents may be tempted to vary their judgments of the reliability (and of its sufficiency for knowledge) of a given piece of information in accordance with the 'overall fit' of the information with the agent's central attitudes and commitments. On this model, one would expect incoming information that fits with an agent's ideological outlook to be perceived as more reliable than information that does not fit, or even contradicts, that outlook. Historical evidence of the controversy about climate change suggests that this mechanism is precisely what has been driving some of the more prominent cases of 'climate scepticism.' In the remainder of this section, I shall draw on recent historical work that analyzes the origins and strategies behind efforts to discredit the scientific consensus that has been consolidating for at least the past two decades. At the same time, I shall look at exemplary cases of how, on my interpretation, dissonance may drive the selective revision of epistemic standards, understood both in terms of the perceived reliability of information and in terms of its perceived sufficiency for knowledge and action. I should emphasize that my analysis is not intended as a substitute for empirical research into the social psychology of public

controversies, but instead aims at highlighting the relevance of such research to philosophical questions at the intersection of epistemology and ethics.

Naomi Oreskes and Eric Conway, in their book *Merchants of Doubt* (2010), have shown, as the subtitle of their study puts it, 'How a Handful of Scientists Obscured the Truth on Issues from Tobacco Smoke to Global Warming.' And it is indeed striking that a number of scientists who came to prominence as self-professed 'climate sceptics' from the 1990s onwards, and who continue to be cited as authority figures by journalists and lobby groups associated with the climate-sceptic movement, had previously been involved in efforts by the tobacco industry to perpetuate scientific doubts about the link between smoking and lung cancer, as well as in other controversies in which scientific evidence—such as findings that acid rain was caused by industrial emissions, and that CFCs were responsible for ozone depletion in the stratosphere—had given rise to a nascent political consensus that some degree of regulation was called for.[53] It is easy to see how the threat of government intervention might prompt those with a strong ideological attachment to free market principles to find fault with whatever facts are presented as justifying government involvement. What is perhaps less obvious is the fact, also documented by Oreskes and Conway, that a number of the most prominent 'first-generation' climate sceptics—including Frederick Seitz, Robert Jastrow, William Nierenberg and others—shared fierce anti-Communist views which, at various points, had led to their falling out with the majority of their colleagues, for example over the technical feasibility and political desirability of President Reagan's Strategic Defense Initiative (SDI), which

[53] See N. Oreskes and E. Conway, *Merchants of Doubt* (New York: Bloomsbury 2010), esp. ch. 2.

proposed installing a system of high power lasers in space that could destroy incoming Soviet missiles.[54]

The existence of strong ideological commitments in the form of a fierce anti-Communism, combined with a shared self-image as hard-nosed 'realists' (about the Soviet threat), and a sense of 'being the underdog' in relation to the—politically more liberal—scientific establishment, made for a potent combination of psychosocial factors, which would exert pressure on members of the group to resolve any dissonance between incoming scientific information and ideological commitments in favour of the latter. If the reaction to incoming information is partly determined by deeply held prior commitments of a personal or ideological sort, then it is to be expected that, in any real-life setting, close attention must be paid to the specific combination of outlooks and opinions of a given agent. Whereas in experimental studies of the basic mechanism of cognitive dissonance, it may be possible to prepare experimental subjects in such a way as to achieve sufficient homogeneity to allow for generalizations, in the more complex case of real-life public controversies, it may be more fruitful to look at existing social groups (such as the climate-sceptic movement) or individual case studies.

The selective shifting of epistemic standards as a way of reducing dissonance should be expected to occur whenever strong commitments are challenged by evidence that allows for some degree of 'deniability,' as it were. Personal experiences and

[54] Myanna Lahsen notes the shared 'normative frameworks' between Seitz, Jastrow, and Nierenberg, but adds another layer of interpretation by explaining their behaviour as 'a reaction to a loss in privilege and a general decline of physics,' given that all three obtained their doctorates in physics at East Coast universities in the 1930s and 1940s. See M. Lahsen, "Experiences of Modernity in the Greenhouse: A Cultural Analysis of a Physicist 'Trio' Supporting the Backlash Against Global Warming," *Global Environmental Change* 18 (2007), 204-219, esp. 209.

emotional investments are often protected against the challenges emerging from—objectively more justified, but subjectively less salient—scientific evidence. This phenomenon is not limited to ideological commitments of a particular political persuasion. A politically 'neutral' example would be the case of the so-called 'MMR vaccine controversy' in the UK in the late 1990s, when fraudulent research by a single medical doctor challenged the consensus view that MMR vaccinations are safe, prompting many parents not to vaccinate their children—thereby placing them at risk of contracting crippling diseases and, furthermore, endangering herd immunity. A plausible case may be made that many of those parents did not strongly believe in the fraudulent claim that MMR vaccinations cause autism, but nonetheless shifted their epistemic standards in such a way as to rationalize their decision to opt out—effectively aiming to free-ride on the public vaccination system, by letting their children enjoy the benefits of (everyone else's) herd immunity, without incurring the (hypothetical, but not logically impossible) risk of side effects that every vaccination incurs. Parents, thus, may have believed both 'that the evidence in favour of the claim that the triple vaccine is safe meets the epistemic standards appropriate in science' and, at the same time, that 'those standards, although very high, are lower than the standards [*they*] should adopt for accepting that the vaccine is safe.'[55] While for some parents the decision not to vaccinate their children may have been a rational (though irresponsibly selfish) choice to 'free-ride' on the system, this would not explain why concerns about MMR vaccines have outlived the—widely publicized—debunking of the MMR-autism link as fraudulent. A more plausible interpretation is that, when faced with the taks of balancing their deep emotional commitment to the total safety of their child against the scientific

[55] S. John, "Expert Testimony and Epistemological Free-riding: The MMR Controversy," *The Philosophical Quarterly* 61 (2011), 496-517; here 507-508.

evidence that vaccinations carry only a negligible risk, some parents adjust their standards so as to dismiss even the best scientific evidence, if it allows them to leave their emotional commitments untouched.

VI

From Cold War Alarmism to Climate Change Scepticism: The Case of Edward Teller

An interesting case for the purpose of this paper is that of Edward Teller. Although not as ardent a climate 'sceptic' as the historical figures discussed by Oreskes and Conway, Teller was part of the same league of fervent anti-Communists who worked together to steer American foreign and defence policy towards a more hawkish stance on confronting the Soviet Union. As such, they opposed efforts to effect a détente between the two superpowers, which had been gaining some support under President Ford. In particular, they accused the official intelligence agencies' reports, which collated the various sources of evidence that had been gathered by intelligence experts in the field, of dramatically underestimating the threat posed by the Soviet Union. Intense lobbying to have the expert data re-analyzed 'independently'—that is, by hawkish 'outsiders'—led to the formation of what came to be known as 'Team B.' One bone of contention was the Soviets' ability, or lack thereof, to locate American submarines using non-acoustic means. The CIA's 1975 National Intelligence Estimate stated that the Soviets 'currently do not have an effective defense against the U.S. submarine

force'[56], yet Team B, with input from its appointed reviewers, including Teller, concluded that the absence of such defences posed a puzzle. 'The absence of a deployed system by this time,' the panel found, 'is difficult to understand' and might mean 'that the Soviets have, in fact, deployed some operational non-acoustic systems and will deploy more in the next few years.'[57] The absence of evidence for the existence of non-acoustic systems for locating U.S. submarines was thus not only taken to be compatible with the claim that such system might exist regardless, but was reinterpreted as evidence that such systems were so technologically advanced that, in spite of their already being operational, they had successfully eluded detection. Decades earlier, Teller's strategy of promoting 'a bald statement of the worst-case scenario'[58] for which the United States had to prepare, had already surfaced, in 1949, when Teller, as his Los Alamos colleague George Cowan recounts,

> started putting out memos to the effect that the Russian bomb was probably made using plutonium made in a heavy water reactor. [...] And so he took a worst case scenario immediately which was that the Russians very possibly, and even very likely, would have the capability [...] to beat us to a thermonuclear weapon. So he created an enormous sense of urgency.[59]

When it came to a perceived Communist threat, the smallest shred of evidence—and sometimes even the lack of evidence altogether—apparently sufficed to warrant substantive political action. Mere possibility, through a selective adjustment of

[56] National Intelligence Estimate 1975, quoted after N. Oreskes and E. Conway, *Merchants of Doubt*, 39.
[57] Report of 'Team B,' quoted after N. Oreskes and E. Conway, *Merchants of Doubt*, 41.
[58] Ibid., 39.
[59] Quoted in P. Goodchild, *Edward Teller: The Real Dr. Strangelove* (Cambridge (MA): Harvard University Press, 2004), 145.

epistemic standards, was magically transformed into near certainty, which in turn resonated with deeply held beliefs about the nefarious intentions of the Soviet enemy.

This episode might seem to be little more than an illustration of Cold War paranoia, if it did not make for a sharp contrast with Teller's attitude towards climate change, where he applied very different epistemic standards. As mentioned earlier, Teller—unlike a number of hawkish Cold War scientists—never became centrally involved in efforts to portray 'global warming alarmism' as a new threat to freedom. He did, however, comment publicly on the topic, playing down the threat posed by global warming and arguing for technical solutions instead of, say, emissions cuts that would entail having to restructure the world's energy economy. Whereas in the Cold War context of a potential Soviet threat, Teller argued for an extreme version of the precautionary principle—that action should be guided by 'worst-case scenarios,' even in the absence of hard evidence—in the case of climate change, as we shall see, he forcefully promoted a 'wait-and-see' approach, even at a time when a scientific consensus had already begun to form. Given that four or more decades lie between the two episodes, one might think that Teller simply changed his mind on how much evidence was required to warrant costly policy decisions. Applying different epistemic standards in each case, on this interpretation, might simply be the result of having learnt from past experience, rather than of dissonance-induced 'double standards.' However, this charitable interpretation falls flat, insofar as Teller steadfastly defended his Cold War assessments until his death in 2003[60]; furthermore, it overlooks that selective adjustment of epistemic standards, so as to cohere

[60] See, for example, G. Stix, "Infamy and Honor at the Atomic Café," *Scientific American* 281 (1999), 42-43.

with deep ideological commitments, can also be found *within* his later pronouncements on climate change.

In a 1997 op-ed piece for the *Wall Street Journal*, Teller argued for research and investment into geoengineering—that is, deliberate interventions in the Earth's energy balance, by increasing the planet's albedo, keeping sunlight from reaching the Earth (e.g. via a massive fleet of space-based solar shields), or 'fertilizing' the oceans so as to increase algae growth, thereby removing CO_2 from the atmosphere—while at the same time downplaying the scientific evidence for anthropogenic climate change in the first place. Thus, Teller writes: 'Society's emissions of carbon dioxide may or may not turn out to have something significant to do with global warming—the jury is still out.'[61] Adopting the dual rhetorical devices of neutrality and personal gravitas, Teller immediately reaffirms his claim: 'As a scientist, I must stand silent on this issue until it's resolved scientifically'—a stance that already in 1997, two years after the IPCC's Second Assessment Report documenting the existing scientific consensus, was disingenuous at best.[62] Whereas Teller is keen to exaggerate the level of uncertainty of climate science and to cast doubt even on the very existence of anthropogenic climate change—at one point lamenting that policymakers were considering 'spending $100 billion or so each year to address a

[61] All quotations in the remainder of this section are from E. Teller, "The Planet Needs a Sunscreen," *The Wall Street Journal* (22 October 1997), 10.

[62] Ben Almassi, drawing on Annette Baier's idea of a "test of moral decency" regarding those who present themselves as trustworthy authorities, argues that "those testifying publicly either for or against the claim that 'the science is settled' concerning climate change […] fail this moral test […] if they testify ambiguously, unconscientiously, in a way that preys on public ignorance of how 'consensus' and 'settlement' (or lack thereof) are being operationally defined' ("*Climate Change, Epistemic Trust, and Expert Trustworthiness*," *Ethics and the Environment* 17 (2012), 46); Teller's op-ed piece clearly fails this test.

problem that may not exist'—he is equally keen to play down the uncertainties attaching to his own preferred solution to any climate problems that might arise further down the line, i.e. geoengineering. Thus, Teller claims (without evidence beyond mere ballpark figures of the estimated costs of 'price-ration[ing] fossil fuel usage' versus the 'deliberate, large-scale introduction of [...] fine particles into the upper atmosphere to offset global warming') that geoengineering is in fact already feasible using current technologies, claiming that 'contemporary technology offers considerably more realistic options for addressing any global warming effect than politicians and environmental activists are considering.' The use of epistemic double standards is especially evident in the final part of Teller's piece, which again overstates the uncertainty of the scientific evidence and pits it against the subjective certainty of the belief that human ingenuity can be relied upon to find a technological solution:

> … while we still don't know whether anything really needs to be done—let alone what exactly—let's use innovation and technology to offset any global warming by the least costly means possible. While scientists continue research into any [*sic*] global climatic effects of greenhouse gases, we ought to study ways to offset any possible ill effects.

From a purely epistemic (truth-oriented) viewpoint, it is irrational to reject an evidence-based consensus view as too uncertain while at the same time granting certainty to speculative technofixes that lack evidence—beyond mere wishful thinking—as to their deployability and effectiveness. Yet from the perspective of dissonance-reduction, it is easy to see why a technological solution that celebrates human ingenuity and agency by insisting that humans should engage in *more* interventions in the climate system, has greater appeal to an agent with strong commitments to individual freedom of enterprise than a solution that aims at *reducing* the human 'footprint' on the

environment by, as Teller sees it, waging a 'fashionable [...] all-out war on fossil fuels and the people who use them.'[63]

Similar epistemic double standards, pitting doubt about scientific evidence—where such evidence would suggest restrictions on individual behaviour—against subjective certainty about speculative technofixes, can be found in a number of climate sceptics. For example, Myanna Lahsen reports William Nierenberg—a member of the 'physicist "trio" supporting the backlash against global warming'—as on the one hand dismissing the scientific link between excessive UV-B irradiation and skin cancer ('Do you know that there is no real evidence of melanoma being caused by ultra-violet B?'), while, on the other hand, affirming staunch belief in the easy resolvability of, among others, the problems of nuclear waste disposal and reactor design ('in 40 years, 20 years, we can solve them cold').[64] Even in more balanced discussions with a policy-relevant angle, this pattern is often echoed, attesting to the influence subtle shifts of epistemic standards can have on the public debate. Thus, in an influential piece on geoengineering, published in *Foreign Affairs*, the authors—although cognizant of the fact that the anthropogenic greenhouse effect constitutes 'a dangerous geophysical experiment'—selectively lower their epistemic standards when it comes to assessing the prospects of geoengineering as a solution to the problem, presenting the sci-fi scenario of 'self-levitating

[63] Jay Michaelson notes that geoengineering 'is consonant with a wider and deeper conservative view that, essentially, the market and human innovation will eventually solve whatever problems they have created, with no need for complex and freedom-abridging government intervention'; J. Michaelson, *Geoengineering and Climate Management: From Marginality to Inevitability*, in W. C. G. Burns and A. L. Strauss (eds.), *Climate Change Geoengineering: Philosophical Perspectives, Legal Issues, and Governance Frameworks* (Cambridge: Cambridge University Press, 2013), 81-114, here 98.

[64] Quoted after Lahsen, "Experiences of Modernity in the Greenhouse," 211.

and selforienting designer particles engineered to migrate to the Polar Regions' (where they would cool the planet) as a realistic prospect and asserting a—likewise fictitious—'general agreement that [geoengineering] strategies are cheap.'[65] Blurring the line between technological fantasy and evidence-based science, although more subtle than Teller's contrarian distortion of the state of climate science, may itself be thought of as a form of 'double standards,' in that it actively conflates different argumentative registers. How such a move may be turned into a sceptical strategy will be briefly discussed in the next section.

VII

The Cognitive Basis of Epistemic Corruption

In his book *A Perfect Moral Storm: The Ethical Tragedy of Climate Change*, Stephen Gardiner identifies as one of the factors contributing to the 'perfect moral storm' the danger of moral corruption.[66] Moral corruption, on Gardiner's account, threatens whenever agents fail 'to protect themselves against rationalization, self-deception, and moral manipulation' and give in to the temptation of 'pass[ing] the buck onto the poor, the future, and nature' (p. 301)—for example, by playing off individual self-interest against collective responsibility, or by failing to evaluate

[65] D. G. Victor, M. Granger Morgan, J. Apt, J. Steinbruner and K. Ricke, "The Geoengineering Option: A Last Resort Against Global Warming?," *Foreign Affairs* 88 (2009), 64-76; here 69. The potential of engineered nanoparticles that might exploit photophoretic levitation is explored, albeit only as an—as yet unrealized—theoretical possibility, in D. W. Keith, "Photophoretic Levitation of Engineered Aerosols for Geoengineering," *Proceedings of the National Academy of Sciences (US)* 107 (2010), 16428-16431.

[66] S. Gardiner, *A Perfect Moral Storm: The Ethical Tragedy of Climate Change* (New York: Oxford University Press, 2011).

proposed solutions to climate change by ethical standards that appropriately account for the intergenerational dimension of the problem—which would require breaking out of the 'tyranny of the contemporary' (p. 143). This danger is especially acute for complex problems like climate change, where the wide range of morally relevant variables allows for subtle, yet highly effective, rationalizations and distortions that may gradually chip away at the recognition of a serious moral commitment, instead bringing the agent's overall judgment in line with his narrow self-interest.

Yet moral corruption is not the only kind that is relevant to today's political debate about the challenge of climate change. In an appendix to his book, Gardiner discusses what he aptly calls 'epistemic corruption,' that is, the tendency to 'invoke […] skepticism selectively against climate science' on the basis that it leaves logical room for doubt when, in fact, 'almost everything else that we claim to know, is vulnerable to the same charge' (p. 462). Gardiner illustrates the phenomenon of 'epistemic corruption' by analyzing Michael Crichton's popular techno-thriller *State of Fear* which has eco-terrorists committing mass murder to spread the message of the dangers of global warming. As Jon Adams has noted, the plot of *State of Fear* 'requires that the dangers posed by climate change have been greatly exaggerated,' since the novel is built around the idea that an environmentalist 'charity machine,' whose legitimate causes had run out of the steam by the 1970s, has been guilty of concocting various environmental dangers ever since. A novelist is, of course, free to invent any storyline he wishes, but Crichton regularly peppers his texts with scientific references and, in the case of *State of Fear*, adds an op-ed style postscript which is overtly non-fictional. By blurring the line between popular fiction and popular science in this way, and eliding the distinction between what is fictional and what is fact, Crichton effectively manipulates the reader—which is perhaps a lesser achievement than it might first appear, given

that fiction is, after all, entirely under the author's control. As a result, as Adams puts it, '[t]he facts about climate change are cast into doubt by their association with fictional villains.'[67]

One might argue that Crichton's book is simply a piece of 'climate-sceptic' agitprop, intended to convert naïve readers to his ideological cause. By contrast, I wish to suggest that it exhibits precisely the hallmarks of epistemic double standards identified earlier, including unreasonable demands of absolute certainty (which, given the timeliness constraint discussed in Section 3, would be self-defeating). For example, Crichton casually issues the following demand: 'Before making expensive policy decisions on the basis of climate models, I think it is reasonable to require that those models predict future temperatures accurately for a period of ten years. Twenty years would be better.'[68] While rhetorically effective, this demand is misplaced since, of course, future temperatures depend also on future economic activity and fossil fuel consumption, which are unpredictable not through any fault of the climate models *per se*, but because of the uncertainty of socio-economic activities. Given that retrodiction (of past climate developments) is structurally identical to prediction (of future events) as a test of a model's validity, Crichton's demand expresses at best a folksy preference for what some people happen to find more psychologically convincing.

Considering that, in 2005, Crichton testified as an expert before a U.S. Senate Committee on environmental issues, his epistemic double standards, although originating in a fictional context, can plausibly be expected to have had a distorting effect on epistemic proceedings in the real world. Just as Andrew

[67] J. Adams, *Real Problems With Fictional Cases*, in P. Howlett and M. S. Morgan (eds.), *How Well Do Facts Travel? The Dissemination of Reliable Knowledge* (Cambridge: Cambridge University Press, 2010), 167-191, here 184.
[68] Quoted after S. Gardiner, *A Perfect Moral Storm*, 459.

Wakefield, the fraudulent doctor in the MMR vaccine controversy, abused the institution of science, so Crichton, by freely mixing fact, fiction, and fable, wantonly engaged in the undermining of standards of evidence and consistency, thereby contributing to the spread of epistemic corruption. But epistemic corruption extends far beyond the realm of those who give distorted portrayals of climate change in lowbrow literature or in the media. If selective adjustment of epistemic standards with the goal of protecting one's current belief system or preference structure is the hallmark of epistemic corruption, then the case of Edward Teller, discussed in Section 6, is as clear an example of epistemic corruption as one can expect to find.

VIII

Conclusion

What I have attempted to show in the present paper is that moral and epistemological considerations are deeply intertwined in the debate about global climate change. For one, under conditions of urgency, it may be morally irresponsible to delay policy-making until such time as conclusive scientific data has been obtained. However, the situation is exacerbated further if standards of conclusiveness are themselves subject to selective adjustment by interested parties. This is precisely what occurs in cases of epistemic corruption. Yet, beyond the merely descriptive point that in certain situations epistemic double standards are being applied, I have also identified dissonance reduction as a cognitive mechanism at the heart of epistemic corruption. While this implies that the causes of epistemic corruption may run as deep as the ideological roots of those who resort to it in public debate, it also suggests new ways of breaking the stalemate—by

framing possible measures to combat climate change in ideologically neutral terms and, perhaps more importantly, by calling to account those who engage in epistemic corruption and confronting irresponsible ideologies head-on. Whether this makes the task of living up to the moral challenge of climate change more promising or more daunting remains to be seen.[69]

National University of Singapore

[69] Parts of this paper were presented at the *Fourth Annual Meeting of the Society for the Study of Nanoscience and Emerging Technologies* (S.NET), held at the University of Twente, the Netherlands, in October 2012, and at a Departmental Seminar of the Graduate School of Science and Technology Policy, Korea Advanced Institute of Science and Technology, Daejeon, also in October 2012. I am grateful to audiences on both occasions for their helpful and incisive comments. I would also like to thank Ingmar Lippert and two anonymous reviewers for their detailed and insightful comments on an earlier draft of this paper.

If you need to cite this article, please use the following format:

Gelfert, Axel, "Climate Scepticism, Epistemic Dissonance, and the Ethics of Uncertainty," *Philosophy and Public Issues (New Series)*, Vol. 3, No. 1 (2013), 167-208, edited by S. Maffettone, G. Pellegrino and M. Bocchiola